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Re: Species Proposals for Consideration at CoP16

On behalf of the Center for Biological Diversity, I am writing to provide information and recommendations on freshwater turtle species that should be considered as candidates for U.S. proposals to amend Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora ("CITES") at the upcoming sixteenth meeting of the Conference of the Parties ("CoP16"). *See* 76 Fed. Reg. 34746 (June 14, 2011) (requesting information and recommendations). The Center for Biological Diversity ("Center") is a non-profit, public interest, conservation organization whose mission is to conserve imperiled native species and their habitat and to fulfill the continuing educational goals of its membership and the general public in the process.

The United States is a key player in the international turtle trade with exports reaching millions of live turtles each year. Given the enormity of this commerce, the United States has a duty to take a leading role in promoting responsible commercial turtle trade. We urge the U.S. Fish and Wildlife Service ("FWS") to propose at CoP16 that the following species be included in Appendix II:

- Alligator snapping turtle (Change Listing from Appendix III to Appendix II)
- Map turtles (Change Listing From Appendix III to Appendix II)
- Soft-shell turtles
- Spotted turtle
- Blanding's turtle
- Diamondback terrapin

In addition, we request that FWS list the common snapping turtle on Appendix III, although inclusion of a species in Appendix III is a unilateral decision that does not require a proposal to be brought forward to the Conference of Parties.

These species are eligible for inclusion in the respective Appendices, and regulation of trade in these species is important for their survival. Supporting information for each of these species is discussed, in turn, below. Although our comments are specific to the aforementioned

species, this should not be construed as a position on other proposed species that may also warrant inclusion in a CITES appendix.

BACKGROUND

Turtle Biodiversity in the United States

With 89 species and subspecies of turtles, the United States has the highest richness of turtles in the world (Rhondin & van Dijk 2010). The states of Alabama, Florida, Georgia, Louisiana, Mississippi, and Texas, if counted as individual nations, would warrant ranks near the fifth spot on the global list, reflecting the remarkable richness of turtles in the southeastern United States (Rhondin & van Dijk 2010; Buhlmann et al. 2009).

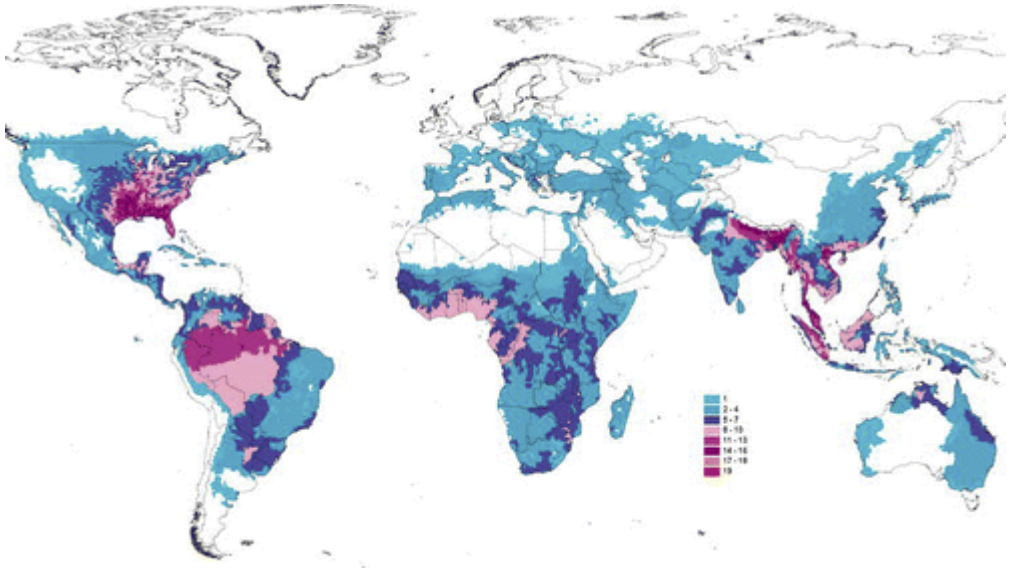


Figure 1. Global patterns of species richness based on projected ranges in hydrologic unit compartments of all 305 species of tortoises (45) and freshwater turtles (260) included in this analysis. Scale of color codes indicates number of species for each area (Buhlmann et al. 2009).

In addition, turtles are among the most threatened of any major group of vertebrates. Forty percent of all turtles are threatened according to the International Union for Conservation of Nature ("IUCN") (Rhondin & van Dijk 2010). Overharvest is a primary threat to turtles. Overharvest has caused population declines in almost all turtle species that are now extinct, critically endangered, or rare (Klemens and Thorbjarnarson 1995). Commercial collecting of wild turtles intensifies the effects of water pollution, road mortality, incidental take from fishery devices, and habitat loss, which are already contributing to turtle declines.

Life History Characteristics of Turtles

Natural populations of turtles are characterized by a suite of life history characteristics that may predispose these populations to rapid declines in the face of anthropogenic harvest.

Among these characters are delayed maturity, high annual survivorship of adults, and high natural levels of nest mortality (Reed and Gibbons 2003). Removing even a few adults from a population can have effects lasting for decades because each adult turtle removed eliminates the reproductive potential over a breeding life that may exceed 50 years. Stable turtle populations are dependent on sufficient long-lived breeding adults to offset the effects of high egg and nestling mortality and delayed sexual maturity (Congdon et al. 1993; Wilbur and Morin 1988). As such, scientists warn that freshwater turtles cannot sustain any significant level of harvest from the wild without leading to population crashes (Congdon *et al.* 1993, 1994; Heppell 1998, Reed *et al.* 2002).

Life history traits not only constrain turtles in their response to harvest but also mask early detection by observers. In contrast to "traditional" managed wildlife and fisheries species, where the effects of management measures become measurable within years, the time scale of turtle life history results in exploitation effects becoming apparent and continuing to have effects for decades after harvest (van Dijk 2010).

Numerous Turtle Species Are Impacted By Trade

The United States has developed into a significant exporter of wild-collected adult turtles. Most turtles harvested in the United States are exported to supply food and medicinal markets in Asia, where turtle consumption rates have soared and where native populations of turtles were rapidly depleted. To be sure, most turtle species in Vietnam and southern China are endangered and it appears that few turtles can be found in the wild in Vietnam (Kiester and Juvik 1997). Importers are now turning to the United States to meet demand for turtle meat and parts.

The international pet trade also threatens wild populations of turtles in the United States. Online dealers fetch hefty prices for several turtle species. As species become rarer, the prices climb and provide further incentive to remove individuals from already overexploited populations.

The available data on turtle exports from the United States indicate that export-driven exploitation has targeted the common snapping turtle (*Chelydra serpentina*), Florida softshell (*Apalone ferox*), and spiny softshell (*A. spinifera*), in particular. Some of the smaller hard-shelled turtle species are also targeted, including diamondback terrapins and map turtles. While export levels of freshwater turtles from the United States appear variable, the long-term trend shows an increase in trade for most species (Weissgold 2010).

More than 12 million wild-caught freshwater turtles have been exported from the United States since 2006 according to a Freedom of Information Act (FOIA) response to a request submitted by the Center to FWS on February 7, 2011. Export numbers demonstrate that trade in map turtles and alligator snapping turtles has not curtailed since they were placed on Appendix III in June 2006.

The commercial turtle trade not only depletes wild turtle populations, but also carries the risk of introducing diseases, upsetting ecological balances, causing genetic pollution of resident native turtle populations (van Dijk 2010).

State Regulation Of Commercial Turtle Trade

Iowa, Kentucky, Missouri, Ohio, South Carolina, and Tennessee continue to allow unlimited commercial take of all sizes and ages of most species of native turtles in public and private waters (Nanjappa 2010). Although some of these states protect rarer turtle species, many state and freshwater turtles are incidentally harvested since turtle traps do not distinguish the species captured, and collectors often misidentify protected species that appear similar to non-protected turtles. Hoopnets and box traps can harm or drown protected turtle species, as well as numerous other nontarget species.

Since 2007, the Center submitted administrative rulemaking petitions to twelve states (Arkansas, Florida, Georgia, Iowa, Kentucky, Louisiana, Missouri, Ohio, Oklahoma, South Carolina, Tennessee, and Texas) requesting each to prohibit commercial harvest of all freshwater turtles. The petitions and background information on the commercial harvest of freshwater turtles can be found on the Center's website at: http://www.biologicaldiversity.org/campaigns/southern_and_midwestern_freshwater_turtles/index.html

In response to the Center's administrative rulemaking requests, Oklahoma and Texas closed commercial turtle harvest in public waters but continue to allow unlimited commercial harvest in private waters. Florida responded by closing commercial turtle harvest in both public and private waters. In South Carolina, it is unlawful to remove more than 10 turtles from the wild at one time and more than 20 turtles in one year, for nine native species. But any legal commercial harvest creates an avenue for illegal export of turtles because of enforcement difficulties.

Most states do not require commercial collectors to report the quantity and species of turtles harvested from the wild, and states that allow commercial harvest and require mandatory harvest reports by collectors have noted underreporting.

Benefits of Regulation Under CITES

The mission of CITES is to regulate international trade in animals and plants (as well as their parts and products) listed in the Treaty's Appendices so that trade does not threaten the survival of wild populations. Currently, 175 countries, including the United States, are Parties to CITES. The FWS serves as the lead U.S. government agency for the Treaty's implementation and enforcement. CITES does not regulate domestic trade or use of wildlife and plants.

International trade in CITES-listed species is regulated with permits and certificates that are presented at the time of export or import. CITES Appendix I includes species that are threatened with extinction; these species are generally not permitted in commercial trade. CITES Appendix II includes species that are not necessarily at risk of extinction now but in which trade must be controlled to avoid utilization incompatible with their survival. Appendix II also lists species that CITES must regulate so that trade in other listed species may be brought under effect control (e.g. because of similarity of appearance). The majority of CITES-listed species in

international trade are listed in Appendix II. Export permits for species listed on Appendices I and II will only be issued if the trade will not be detrimental to the survival of the species.

The Conference of the Parties, which is the decisionmaking body of the Convention and comprises all its member states, has agreed on a set of biological and trade criteria to help determine whether a species should be included in Appendices I or II. Resolution Conf. 9.24 (Rev. CoP14). *See* 50 C.F.R. § 23.89. At each regular meeting of the Conference of the Parties, Parties submit proposals based on those criteria to amend these two Appendices. Amendments pass with a two-thirds majority vote.

Appendix III is the least restrictive of the three Appendices in terms of the requirements for trade, and such a listing is intended for regulated species in which the listing Party is requesting the assistance of other Parties in monitoring the legality of international trade. Unlike species listed in Appendices I or II, export permits for species listed on Appendix III do not require a finding that the trade will not be detrimental to the survival of the species.

Inclusion of a species in Appendix III is a unilateral decision and does not require a proposal to be brought forward to the CoP. According to CITES Resolution Conf. 9.25 (Rev. CoP14), "Inclusion of species in Appendix III," a Party should only include a native species in Appendix III if there are regulations in place to prevent or restrict exploitation and to control trade, and if the cooperation of other Parties is needed to control illegal trade. *See* 50 C.F.R. § 23.90(c).

For freshwater turtles, a limited number of U.S. native species are CITES-listed. The bog turtle (*Glyptemys muhlenbergii*) is listed in Appendix I. Box turtles (*Terrapene* sp.) and the wood turtle (*Glyptemys insculpta*) are listed in Appendix II. In 2006 the United States added all 12 species of map turtles (*Graptemys* spp.) and the alligator snapping turtle (*Macroclemys temminckii*) to Appendix III. Thereafter the FWS designed an export management program for these species. The FWS registers farming operations to receive expedited permits for their hatchlings at a reduced permit cost, and it manages the program on an annual cycle in which each operation must renew its registration.

Inclusion in CITES of a number of turtle species native to the United States that continue to be collected and traded in significant quantities would substantially benefit the conservation prospects of these species and would greatly enhance the understanding and management of the trade (van Dijk and Rhodin 2008).

SPECIES THAT SHOULD BE MOVED FROM APPENDIX III TO APPENDIX II

The Center would like to praise the FWS for its 2006 decision to list the alligator snapping turtle and all 12 species of North American map turtles on CITES Appendix III. We recognize that this is the first time that the United States has listed species on Appendix III, and as explained below, we encourage additional use of this important mechanism. The data collected on these species since their listings on Appendix III has shown that these species meet the criteria for inclusion in Appendix II.

Based on the biological characteristics of alligator snapping turtles and map turtles and the increasing numbers of exports of these species, collecting this species from the wild for international commercial trade could have a detrimental impact on the species by either exceeding, over an extended period, the level that can be continued in perpetuity, or reducing it to a population level at which its survival could be threatened by other influences. This situation meets the criteria of Resolution Conf. 9.24, Annex 2a, for inclusion in Appendix II under the provisions of Article II (a). As such, and as explained more fully below, the Center requests that the FWS propose the alligator snapping turtle and all 12 North American map turtle species for inclusion in Appendix II.

I. The Alligator Snapping Turtle (*Macroclemys temminckii*) Should Be Included In Appendix II

The alligator snapping turtle is found only in the United States. It is North America's largest freshwater turtle and may reach a size of 250 pounds (Ernst and Lovich 2009, p. 138). Adult turtles are harvested for consumption and live young are captured for the pet trade.

In 1997, the United States submitted a proposal to the tenth biennial meeting of the Conference of the Parties ("CoP10") to include the alligator snapping turtle in Appendix II. The proposal was withdrawn after some countries expressed the view that international trade was minimal and conservation problems for the species should be addressed through domestic measures. There was also opposition from Louisiana to the proposal.

Since the 2006 Appendix III listing of the alligator snapping turtle, available data conclusively demonstrates that international trade is extensive and that conservation of the species cannot be addressed through solely domestic measures.

In 2009, the IUCN/SSC Tortoise and Freshwater Turtle Specialist Group recommended that the United States propose to the fifteenth biennial meeting of the Conference of the Parties ("CoP15") the alligator snapping turtle for inclusion in Appendix II. In addition to concerns about direct take for export, the Group was concerned that the harvest of adult breeding stock from the wild to supply commercial farming operations may significantly impact wild populations. The FWS did not make such a proposal to the CoP15.

Thereafter, alligator snapping turtles were also recommended for inclusion in Appendix II by the Conservation, Status & Monitoring Working Group that the FWS convened during the September 2010 conference entitled "Conservation and Trade Management of Freshwater and Terrestrial Turtles in the United States" (USFWS 2010).

IUCN Draft Red List Status: Vulnerable (van Dijk and Rhodin 2010)

Species Description and Taxonomy

The alligator snapping turtle is a very large turtle with a huge head, strongly hooked jaws, an extra row of scutes along each side of the shell (between the costals and marginals), three keels along the carapace, and a long tail (NatureServe 2011). The eyes are placed laterally on

the head so that they cannot be seen from above, and a wormlike process on the tongue is used to lure prey within biting range (Ernst and Lovich 2009, p. 138).

Alligator Snapping Turtle (*Macroclemys temminckii*)

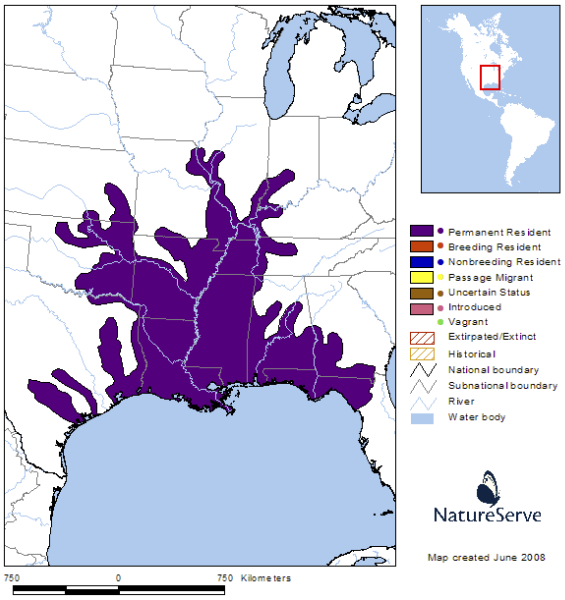
This species represents one of only two living genera (each with one living species) in the family. Until recently, this turtle was included in the genus *Macroclemys*. However, Webb (1995) demonstrated that the generic name *Macrochelys* has priority over *Macroclemys*. Crother et al. (2000) and Crother (2008) agreed with this conclusion and treated this species as a member of *Macrochelys*.

Distribution

The range of the alligator snapping turtle is principally in the southeastern United States in river systems that drain into the Gulf of Mexico (Lovich 1993), including rivers from southern Georgia (Johnson 1989; Jensen & Birkhead 2003) and northwestern Florida (see Pritchard 1992), west to Louisiana (Boundy & Kennedy 2006) and eastern Texas (San Antonio River), and extending north to southeastern Kansas, southeastern Iowa, Illinois, and southern Indiana (Conant & Collins 1991).

Loss and degradation of habitat in many historically occupied sites, and reductions in trapping success in remaining suitable habitat, indicate that a large decline in area of occupancy and abundance has occurred in most parts of the range (Pritchard 1989; Moler 1996; Heck 1998; Reed et al. 2002; Jensen & Birkhead 2003; Riedle et al. 2005; Shipman & Riedle 2008). This species is likely extirpated from Indiana and Iowa, and the Kansas records show no evidence of a viable breeding population (NatureServe 2011).

NatureServe (2011) provides the following distribution map.



Alligator Snapping Turtle (*Macroclemys temminckii*)

Habitat

Adults are usually found in deeper water of large rivers and their major tributaries in floodplain swamp forest (van Dijk and Rhodin 2010) and are also found in lakes, canals, oxbows, swamps, ponds, and bayous associated with river systems (Ernst and Lovich 2009, p. 141), sometimes including swift upland streams (Phelps 2004). This turtle sometimes enters brackish waters near river mouths. Usually it occurs in water with a mud bottom and some aquatic vegetation but may use sand-bottomed creeks. Within streams, alligator snapping turtles may occur under or in logjams, beneath undercut banks, under rock shelters, or in deep holes (Jensen et al. 2008).

Much of the natural habitat of this species in northeast Arkansas and southeast Missouri has been drained and replaced by farm fields in increasing amounts in recent years. A survey of *M. temminckii* populations in New Madrid, Mississippi and Dunkin and Pemmiscott counties in Missouri revealed that in this four-county area, 90 percent of the habitat for the species is gone (NatureServe 2011).

In addition, the species is under some impact from habitat degradation, primarily river engineering which reduces silt load below dams, lowering the main channel and depriving connecting swamp channels (van Dijk and Rhodin 2010).

Biology

Sexual maturity in *M. temminckii* is attained at about 11-13 years in both sexes (Ernst et al. 1994). Because of the species' slow life history, collection of breeding adults can quickly become unsustainable (Reed et al. 2002).

To maintain a stable population using biologically realistic values for fecundity, age at maturity, and survival of nests and juveniles, annual adult survivorship of females must be 98%. Reducing adult survivorship by two percent (to 96%), which would be equivalent to annually removing only two adult females from a total population size of 200 turtles (assuming even sex ratios), will halve the population in only 50 years. Reed et al. (2002) found no evidence that sustainable exploitation of adults would be possible.

Genetic studies have documented past population bottlenecks and extremely low dispersal by females from one drainage basin into another (Echelle et al. 2009).

Population Status

The alligator snapping turtle has experienced an overall averaged decline across its range due to overcollection and habitat loss (van Dijk and Rhodin 2010). See also 65 Fed. Reg. 4220 (Jan. 26, 2000) (proposal to list in CITES Appendix III). Recent population surveys of alligator snapping turtles demonstrate populations are depleted throughout its range and even likely extirpated in its historic range in Iowa, Illinois, Kentucky, Missouri and Tennessee. Pritchard (1989) speculated that this turtle has declined (up to 95%) over much of its range.

The combined effects of targeted harvest, habitat loss, degradation and fragmentation, and perhaps increased predation pressure on nests and juveniles from human-subsidized predators, may amount to a halving of total populations since 1950 with some of these impacts being irreversible (van Dijk and Rhodin 2010). While the species may qualified for an "Endangered" rating from the IUCN Red List, the lack of quantitative data requires a "Vulnerable" rating.

Total adult population size is unknown but presumably is at least a few thousand and likely exceeds 10,000 (Nature Serve 2011). Judging from past harvest rates in Louisiana and Georgia (Johnson 1989), some populations historically must have been very large. One individual trapper legally harvested 4,000-5,000 adult *M. temminckii* from the Flint River and its tributaries between 1971 and 1983 (Johnson 1989).

Threats

Overharvesting and habitat alteration are the major threats to the species (Reed et al. 2002; Riedle et al. 2005). Commercial exploitation and other harvest for human consumption (and to a much lesser extent the pet trade) undoubtedly reduced populations of this species in much of its range (Pritchard 1992; Trauth et al. 1998; Reed et al. 2002; Riedle et al. 2005; Shipman and Riedle 2008). For example, targeted exploitation of the species has depleted populations in the Flint River (van Dijk and Rhodin 2010).

Many of the snapping turtles taken by sport and commercial collectors are gravid females that are on land to nest (Congdon et al. 1994). In addition, inadvertent mortality is a threat. Unattended trotlines have, through inadvertent snagging of turtles, resulted in mortality in Missouri (Santhuff 1993). Jensen and Birkhead (2003) stated that mortality on set-lines and trotlines may inhibit recovery in Georgia.

Dams have blocked passage on many rivers, but it is unclear how effective dams may be in isolating populations and preventing gene exchange; populations can survive in impoundments. However, Riedle et al. (2005) noted a drastic decline of alligator snapping turtles in Oklahoma, due in part to thermal alteration by hypolimnetic releases from impoundments.

Water pollution and erosion may have altered the food chain and otherwise degraded the habitat to the turtle's detriment in some areas (Heck 1998; Riedle et al. 2005). Because this turtle has the capability of achieving weights in excess of 200 pounds and the potential for its life to span a number of decades, it is a primary target for the bioaccumulation of organochlorines (Holt and Tolson 1993).

Dredging river bottoms to maintain shipping channels likely destroys habitat, although the subsequent spoil may be utilized for nesting along certain rivers. Riedle et al. (2005) noted a drastic decline of alligator snapping turtles in Oklahoma, due in part to habitat degradation because of stream channelization. Jensen and Birkhead (2003) stated that stream dredging may inhibit recovery in Georgia. In southeastern Missouri, Shipman and Riedle (2008) found that most sites had been manipulated for channelization or drained and converted to agricultural fields.

Utilization and Trade

The alligator snapping turtle has been intensively exploited for subsistence consumption and trade (van Dijk and Rhodin 2010).

Juveniles are extensively traded in the pet trade and to supply East Asian aquaculture operations (van Dijk and Rhodin 2010). Hatchlings are sold online for $28-50 each (www.netpetfinder.com; www.turtlesellers.com). Some hatchlings offered by dealers are said to have been ''captive-bred,'' although these are likely to have been hatched from eggs collected from nests in the wild. 65 Fed. Reg. 4220 (Jan. 26, 2000).

Larger individuals can sell for hundreds of dollars (www.turtleforum.com). In Asia, dealers sell adult alligator snapping turtles to private turtle collectors, private and public zoos and aquariums because of their huge size and dragon-like appearance.

The alligator snapping turtle meat trade is much larger than the pet trade. In the 1960s and early 1970s, alligator snapping turtles were intensively trapped for the meat trade in Mississippi, Louisiana, Georgia, Alabama, and Texas. In the 1970s alligator snapping turtles were hunted by trappers for a Campbell's soup product, after marine turtles were afforded federal protection under the Endangered Species Act in 1973 (Jensen et al. 2008). In 1982, alligator snapping turtle meat sold for $3.50-$4.50 per pound; a 100 pound turtle can produce 30 pounds of meat (Pritchard 1989).

According to Santhuff (1993), the most serious problem with the commercial take of these turtles is that the efforts of very few trappers can deplete population levels far below self-

sustaining levels. If an area is worked for only two nights, then the population is so severely depleted that it is no longer self-sustaining.

Reed et al. (2002) concluded that "many populations were decimated by commercial harvest in the 1960s and 1970s." Various commercial turtle dealers have indicated that populations in Louisiana and other southern states are seriously depleted (Holt and Tolson 1993). From 1994-2007 turtle dealers in Missouri, Arkansas and Louisiana raced to stockpile adult alligator snapping turtles from the wild under the auspices that they were saving them from being sold at seafood markets in Louisiana, when dealers were genuinely targeting the species and buying adults from collectors as broodstock to support an international food and turtle trade market.

Analysis of trade data obtained from the FWS Office of Law Enforcement showed that live *M. temminckii* have been exported in increasing numbers. In 2009, data indicates that approximately 41,000 live alligator snappers were exported from the United States, with 98 percent of these shipped to China (Weissgold 2010). In contrast, only 1,016 alligator snapping turtles were exported in 1990 (Weissgold 2010).

Exports of wild caught alligator snapping turtles have also remained high since the 2006 listing on Appendix III. From 2006-2010, over 140,000 live, wild caught alligator snapping turtles were exported from the United States.

Although commercial harvest of alligator snapping turtle is now prohibited across its range in states along the Gulf Coast and Mississippi River, wild caught adults are legally sold by licensed turtle dealers in Louisiana, who allege to have possessed the adults prior to November 2004 when Louisiana closed commercial harvest. Adults are also legally sold by a Missouri turtle dealer who utilizes the same allegation. Hatchlings from wild caught adults appear to be the majority of exports to Asia.

The FWS and state agencies have documented illegal hunting of adults to supply the international food and turtle and turtle trade. *See United States v. Guthrie*, 50 F3d 936 (11th Cir. 1995) (defendant conspired to sell alligator snapping turtles in violation of the Lacey Act). In a 2008 incident, a Florida pet shop owner was charged with possession of alligator snapping turtles (O'Connor 2008). In 2009, a New York man was arrested for felony commercialization of wildlife involving a federal protected endangered species and also illegally possessed alligator snapping turtles (Auer 2009).

Legal Status

The alligator snapper is listed or a species of concern in every state within its range (Buhlmann and Gibbons 1997). For example, it is listed as endangered in Indiana and Illinois (Illinois Endangered Species Protection Board 2011; Indiana Dept. of Natural Resources 2011) and harvest is prohibited there (PARC 2011). And it is threatened in Georgia and Texas (GA DNR 2008; Texas Parks and Wildlife 2010). It is a species of special concern in Florida (Florida Fish and Wildlife Conservation Commission 2011). It is one of several species with restricted harvest in Louisiana (Louisiana Dept. of Wildlife and Fisheries 2011). Harvest is regulated as a

nongame species in Kansas and as a game species in Nebraska (PARC 2011). Louisiana prohibits commercial harvest but allows recreational harvest of 1 per day per boat or vehicle. Although commercial use is prohibited in most states, people can take the species for personal use in most States, and there is almost no management of the species by State agencies. 65 Fed. Reg. 4220 (Jan. 26, 2000).

II. Map Turtles Should Be Included In Appendix II

In 1997, the United States submitted a proposal to CoP10 to include nine of the twelve then-recognized species of map turtles (*Graptemys* spp.) in Appendix II (and to leave as unlisted the three more common species). The proposal did not receive the two-thirds majority required for adoption. It missed the necessary two-thirds majority by one vote, with 37 for and 19 against.

Thereafter, on June 14, 2006, FWS decided to include the whole genus in Appendix III, to adequately monitor trade and otherwise obtain the advantages of Appendix III listings. Because of their brilliant topographical patterns and colorations, all 13 now-recognized species of map turtles are highly sought by the international pet trade.

Map turtles were recommended for inclusion in Appendix II by the Conservation, Status & Monitoring Working Group that the FWS convened during the September 2010 conference entitled "Conservation and Trade Management of Freshwater and Terrestrial Turtles in the United States." The Working Group explained that those map turtle species with restricted ranges are of the highest concern but acknowledged that enforcement of anything less than the listing of the entire genus would be difficult because map turtle species can be difficult to distinguish (USFWS 2010).

IUCN Red List Status:

- Critically endangered: Pascagoula map turtle (*Graptemys gibbonsi*)
- Endangered: Cagle's map turtle (*Graptemys caglei*), yellow-blotched map turtle (*Graptemys flavimaculata*), Pearl River map turtle (*Graptemys pearlensis*)
- Vulnerable: Barbour's map turtle (*Graptemys barbouri*), ringed map turtle (*Graptemys oculifera*)
- Near Threatened: Escambia map turtle (*Graptemys ernsti*), Alabama map turtle (*Graptemys pulchra*)
- Least concern: Northern map turtle (*Graptemys geographica*), black-knobbed map turtle (*Graptemys nigrinoda*), Ouachita map turtle (*Graptemys ouachitensis*), false map turtle (*Graptemys pseudogeographica*), Texas map turtle (*Graptemys versa*)

(van Dijk 2010d,e,f,g,h,i,j,k,l,m,n,o,p).

Species Description and Taxonomy

There are a total of 13 species in the genus. Lamb et al. (1994) conducted a mtDNA-based phylogenetic analysis of turtles in the genus *Graptemys* and discovered three monophyletic

lineages: *G. pulchra group* (including *G. pulchra*, *G. gibbonsi*, *G. ernsti*, and *G. barbouri*); *G. pseudogeographica* group (including G. *pseudogeographica*, *G. nigrinoda*, *G. flavimaculata*, *G. oculifera*, *G. versa*, *G. caglei*, and *G. ouachitensis*); and *G. geographica*. Overall genetic divergence was relatively low, and *G. pseudogeographica*, *G. nigrinoda*, *G. flavimaculata*, *G. oculifera*, *G. versa* all shared the same mtDNA genotype. There was no evidence of intraspecific variation in any species. Walker and Avise (1998) reviewed these data and suggested that the *Graptemys* complex has been taxonomically oversplit at the species level.

Ernst and Lovich (2009, p. 272) provides a key to the species of the genus *Graptemys*. Their book also provides detailed descriptions of the 12 species of *Graptemys* recognized at the time of its publication.

The 13th map turtle species is the Pearl River map turtle, *Graptemys pearlensis*, which formerly was included in *G. gibbonsi* but was determined to be a distinct species by Ennen et al. (2010). The Pearl River map turtle is the 57th turtle species native to the United States (Ennen et al. 2010). It is a high-domed *Graptemys* with large females and small males, like *G. gibbonsi*, but typically with a single, generally narrower (relative to *G. gibbonsi*), vertical, yellow bar on the upper surface of each marginal scute. A continuous black to brown vertebral stripe is usually present on the carapace. The yellow pigment bar on the 12th marginal scutes is usually 50% or less of those scute lengths along the same axis as the pigment bar. When longer, the pigment bar tends to be located more distal from the seam between the 12th marginal scutes than it is in *G. gibbonsi*. The head pattern is similar to that of *G. gibbonsi* and usually consists of a prominent, three-pronged, yellow nasal trident on the snout, and the postorbital blotches are connected to the interorbital blotch.

Barbour's map turtle (*G. barbouri*)

Cagle's map turtle (*G. caglei*)

Escambia map turtle (*G. ernsti*)

Northern map turtle (*G. geographica*)

Yellow-blotched map turtle (*G. flavimaculata*)

Pascagoula map turtle (*G. gibbonsi*)

Black-knobbed map turtle (*G. nigrinoda*)

Ringed map turtle (*G. oculifera*)

Ouachita map turtle (*G. ouachitensis*)

Alabama map turtle (*G. pulchra*)

Pearl River map turtle (*G. pearlensis*)

Texas map turtle (*G. versa*)

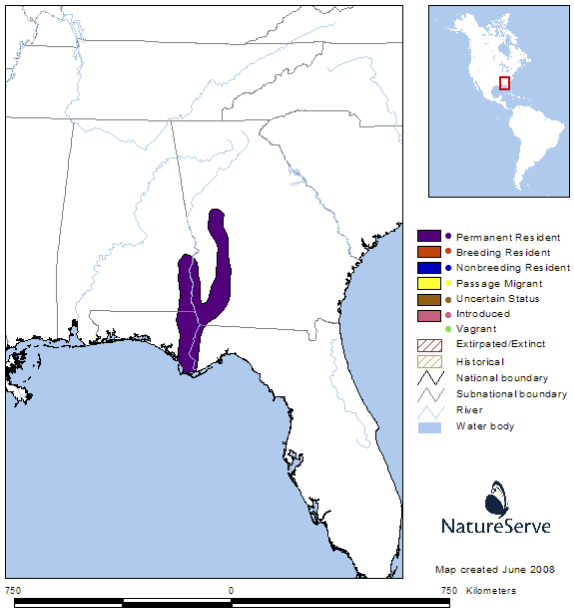
False map turtle (*G. pseudographica*)

Distribution

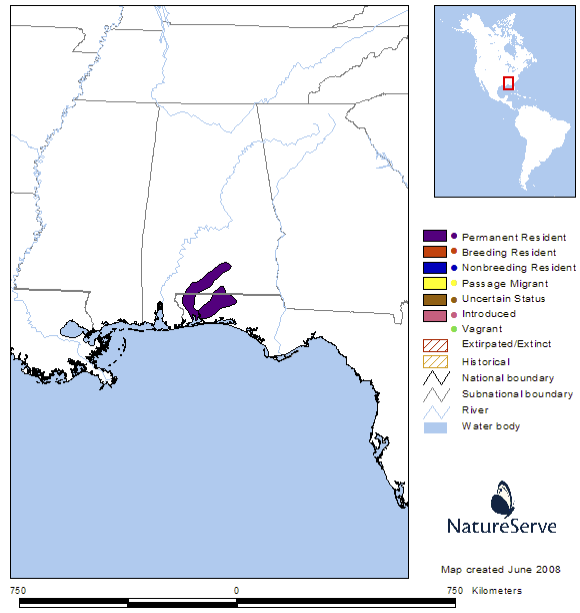
The *Graptemys* species are endemic to the United States, except *G. geographica*, which ranges into southern Quebec. Most species have fairly restricted ranges to one or two river drainages in the southeastern United States. Three species, *G. geographica*, *G.*

pseudogeographica, and *G. ouachitensis*, are widespread and locally common (the Mississippi and Missouri River drainages).

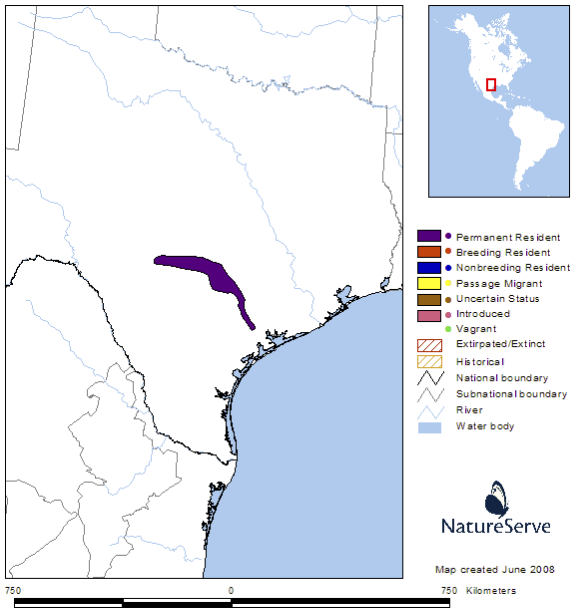
Ernst and Lovich (2009) provide a verbal account of distribution of the 12 map turtle species recognized at the time of publication. Again, it should be noted that *Graptemys gibbonsi* until recently was considered to inhabit the Pascagoula and Pearl Rivers and their major tributaries. But now, the map turtles of the Pearl River are considered to be *G. pearlensis*, a separate species (Ennen et al. 2010). NatureServe (2011) also provides detailed distribution information, and distribution maps are pasted below.



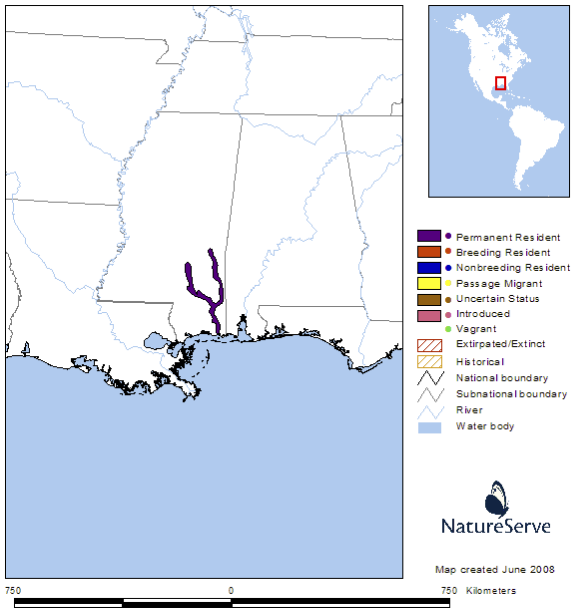
Barbour's map turtle (*G. barbouri*)



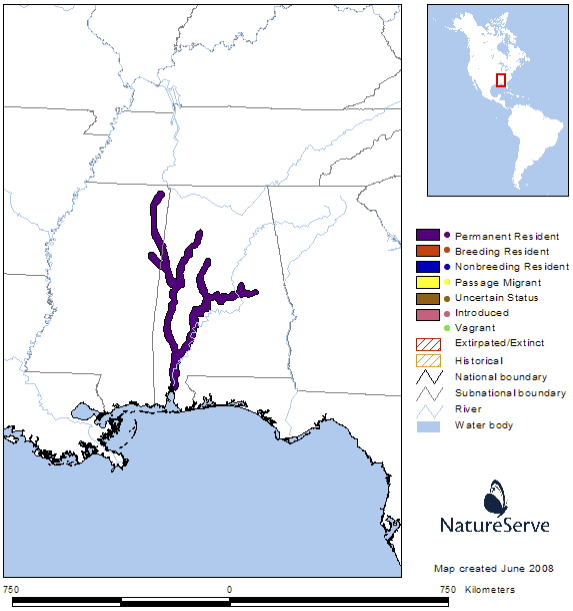
Escambia map turtle (*G. ernsti*)



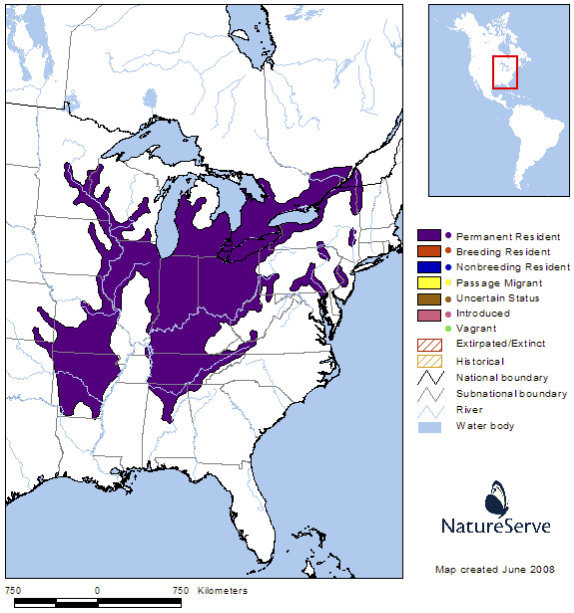
Cagle's map turtle (*G. caglei*)



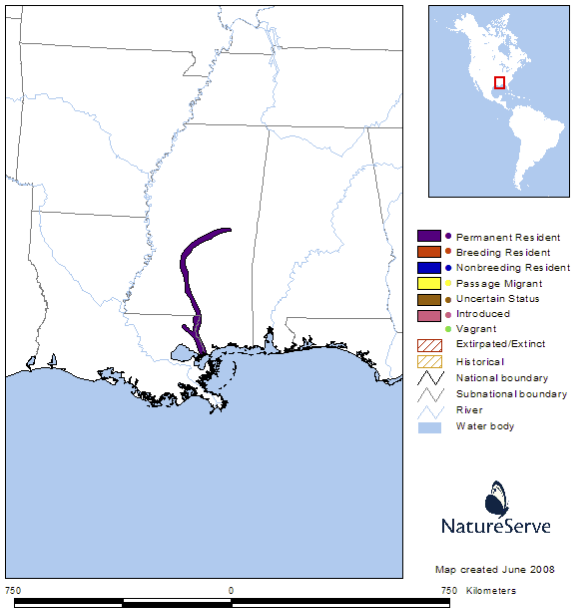
Yellow-blotched map turtle (*G. flavimaculata*)



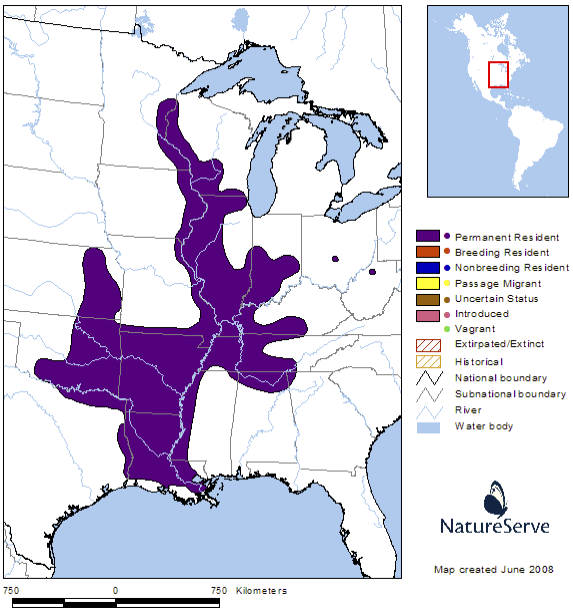
Black-knobbed map turtle (*G. nigrinoda*)



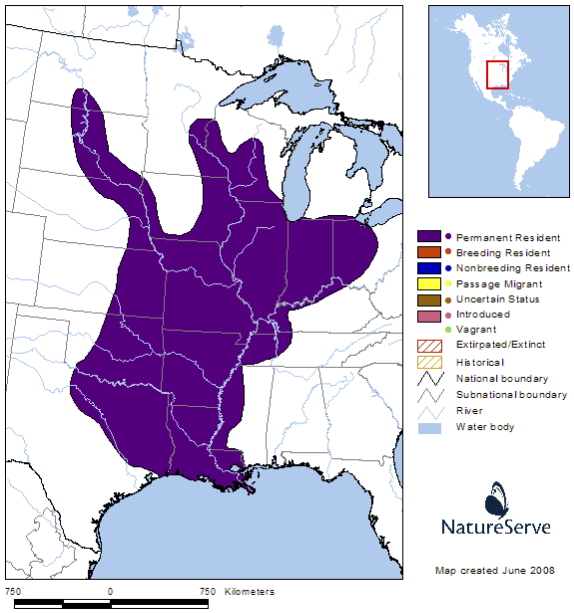
Northern map turtle (*G. geographica*)



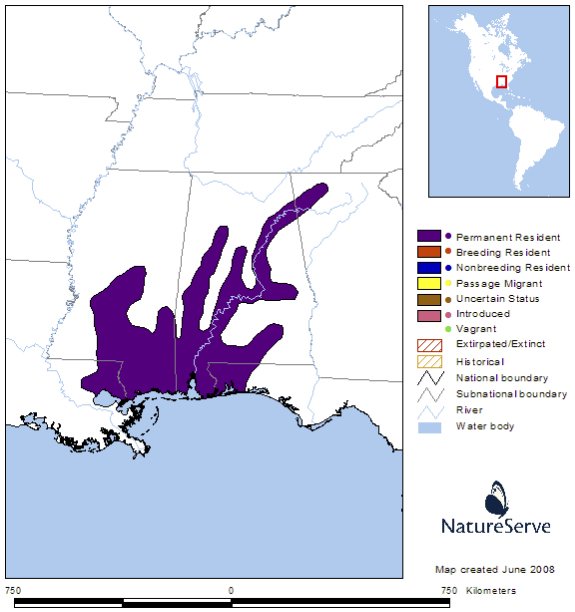
Ringed map turtle (*G. oculifera*)



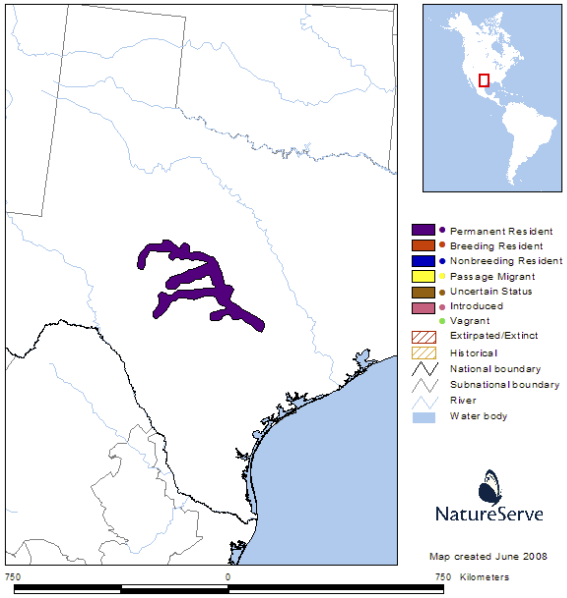
Ouachita Map Turtle (*G. ouchitensis*)



False map turtle (*G. pseudogeographica*)



Alabama map turtle (*G. pulchra*)



Texas map turtle (*G. versa*)

Habitat

Graptemys barbouri: Barbour's map turtle is found in clear, limestone-bottomed streams and large rivers with abundant basking sites in the form of snags and fallen trees, and a plethora of gastropods (Ernst and Lovich 2009, p. 274). But it is also uses silty channels (Ewert et al. 2006). It is inactive at night on submerged limbs just beneath water surface and rests on the bottom in limestone depressions when water becomes cold. The turtle often basks on logs and buries eggs in sand at water's edge (NatureServe 2011).

Pollution is having a detrimental effect on *Graptemys barbouri*. Toxic industrial discharge by paper companies into Lake Blackshear on the Flint River in Georgia has been indicated as the cause of extreme pollution, not only resulting in extensive deformities and shell ulceration in freshwater turtles, but also widespread mortality of the mollusks upon which the females of *G. barbouri* habitually feed (Pritchard 1993). Habitat alteration along the banks of the Chipola was identified by Sanderson (1992) as a potential cause of decreased water quality and reduction of suitable nesting habitat.

Graptemys caglei: The Cagle's map turtle habitat in the Guadalupe River system consists of limestone- or mud-bottomed streams with moderate current, and numerous pools of varying depth. The species may also live in the slow-moving waters 1-3 m deep behind impoundments but not in them (Ernst and Lovich 2009, p. 280). Optimal habitat appears to include both riffles and pools (van Dijk 2010e).

Graptemys ernsti: Although frequently found in small streams, the species reaches greater abundance in large rivers with abundant basking and nesting sites (beaches with fine sands) (NatureServe 2011). It is absent from rivers that lack freshwater mollusks (e.g., Perdido and Blackwater rivers, Florida) and avoids salt water (rarely found within one mile of river

mouth) (NatureServe 2011). It also requires an abundance of basking sites in the form of snags, logs, and brush, and underwater retreats (Ernst and Lovich 2009, p. 283).

Graptemys flavimaculata: The yellow-blotched map turtle prefers wide rivers with strong currents, sandbars, and nesting beaches, and an abundance of basking sites in the form of snags, brush and debris (Ernst and Lovich 2009, p. 289). A lack of basking sites may limit the occupancy of a particular habitat (Moore and Seigel 2006). Brackish habitats are occupied on the lower Pascalgoula River (Seigel and Brauman 1994).

This species is absent from some areas of the Pascagoula River system where it formerly occurred (Seigel and Brauman 1995). The reason for this apparent decline is not known, but it may have involved a disruption of the reproductive biology of local populations resulting from the alteration or elimination through flood control projects of sand bars where turtles nest, extremely high rates of nest predation, and water quality degradation (Seigel and Brauman 1995). In 1986, Lovich visited the Leaf River in Perry County, Mississippi and found *G. flavimaculata* and *G. gibbonsi* to be common upstream from a pulp processing plant, but absent below the point of discharge for an undetermined distance (Ernst and Lovich 2009, p. 292).

Graptemys geographica: The northern map turtle is typically an inhabitant of slow rivers and lakes with mud bottoms, basking logs, and abundant aquatic vegetation, often in mill ponds, oxbows, and river overflow ponds (NatureServe 2011). In the northern parts of its range it is mainly a lake species, whereas in the southern part of its range it seems more associated with rocky-bottomed rivers with deep sections (van Dijk 2010 h). It may occupy burrows in banks when inactive (Minton 1972). Wintering sites include river bottoms (e.g., in hollows, among rocks or other objects) (Graham et al. 2000). It basks on muskrat houses, logs, etc. Eggs are laid in nests dug in soft soil or sand, generally away from beaches (Ernst and Barbour 1972). Large adults avoided areas with emergent vegetation, but congregated in areas with fallen limbs (Ernst and Lovich 2009, p. 295).

Graptemys gibbonsi: The Pascagoula map turtle inhabits large to medium-sized rivers (Lovich and McCoy 1992), especially those with an abundance of mollusks, sandy banks or sandbars, deep pools, and logs or other suitable basking sites. The turtles may venture into shallow water or onto sandy beaches at night, but usually cling to submerged objects just below the surface of the water (Dundee and Rossman 1989). Nests are in sandy banks or sand bars. The Pearl and Pascagoula Rivers in Mississippi and Louisiana have been degraded by industrial pollution. Again, in 1986, a lengthy section of the Leaf River, below the outflow of a pulp processing plant was conspicuously devoid of *Graptemys*, while upstream they were plentiful (Ernst and Lovich 2009, p. 306).

Graptemys nigrinoda: The black-knobbed map turtle prefers sand and clay-bottomed streams with moderate currents and abundant basking sites of brush, logs, debris (Ernst and Lovich 2009, p. 308). Eggs are laid in nests dug on sandy beaches along streams and rivers, usually in open sunny areas within 50 meters of the water line (Ernst and Lovich 2009, p. 309).

Graptemys oculifera: The ringed map turtle prefers wide rivers with strong currents, adjacent white sand beaches, and an abundance of basking sites in the form of brush, logs and debris (Erst and Lovich 2009, p. 314).

Graptemys ouachitensis: Though the Ouachita map turtle is primarily a riverine turtle, inhabiting areas with swift currents and submerged vegetation, it also lives in impoundments, lakes, oxbows, and river-bottom swamps. Sand and silt bottoms are preferred over those of gravel, stone or mud (Ernst and Lovich 2009, p. 320). Stream width, the amount of algae growth on logs, and the availability of basking sites are factors limiting the upstream distribution of this species (Shively and Jackson 1985).

Graptemys pearlensis: Very limited ecological data are available for this recently described species but in most aspects it is probably similar to those reported for *G. gibbonsi* in the Leaf-Pascagoula systems (van Dijk 2010n).

Graptemys pseudogeographica: This species primarily lives in large rivers and their backwaters, but also occupies lakes, ponds, sloughs, bayous, oxbows, and occasionally marshes. It prefers water with abundant aquatic vegetation, places to bask, and slow currents, but can be found in swiftly flowing main channels of large rivers (Ernst and Lovich 2009, p. 328). Mud bottoms are preferred (van Dijk 2010n).

Graptemys pulchra: The Alabama map turtle is an inhabitant of relatively large, swift creeks and rivers (Ernst and Lovich 2009, p. 337). Stream sections with abundant basking sites in the form of logs and brush piles are preferred; the frequent Gulf Coast hurricanes cause trees to fall into water to form new basking sites and hiding places (Lechowicz 2005). Habitats with abundant mollusks are preferred (NatureServe 2011). In rocky piedmont habitats males are usually found in shallow stretches, but females seem to be restricted to deep pools or impoundments (Ernst and Lovich 2009, p. 337). Eggs are laid in nests dug in sand bars and sandy banks (NatureServe 2011).

Graptemys versa: The Texas map turtle is found in rivers with moderate current, abundant aquatic vegetation, and basking logs (van Dijk 2010p). It is also associated with oxbows and lakes (van Dijk 2010p). The portion of the South Llano River occupied by this species is a clear, spring-fed river characterized by alternating pools and rifles. Habitat use differs between the sexes, with adult and juvenile females occupying somewhat different microhabitats than adult males.

Biology

Map turtles, like many turtle species, have slow life histories with high longevity and females taking many years to reach sexual maturity. For example, *G. flavimaculata* has "an exceptionally low rate of reproductive output" with age of first maturity at over eight years (van Dijk and Rhodin 2010).

One study showed that *Graptemys* populations are very sensitive to changes in adult survival and moderately sensitive to changes in juvenile survival. The researchers concluded

that the high nest mortality rates observed in the study cannot be sustained without substantial (and improbable) increases in adult or juvenile survival (Seigel and Brauman 1995).

Ernst and Lovich (2009) provide detailed summaries of the behavior, reproduction, growth and longevity, diet and reproductive behavior, and predation and defense for 12 species of map turtles.

As for the 13th map turtle species, the Pearl River map turtle, *G. pearlensis*, it nests in spring and summer. Individual females lay multiple clutches probably averaging around 4-6 eggs each and females require several years to attain sexual maturity (NatureServe 2011). Raccoons and crows are major nest predators (NatureServe 2011). Adult females depend largely on mollusks, especially clams and snails; males and juvenile females feed mostly on insects and other arthropods (NatureServe 2011).

Population Status

Several species of map turtle are highly endangered because of population declines and restricted geographic range. Other species have suffered declines and range contractions but are still abundant in parts of their ranges.

Herpetologists of the Tennessee Aquarium who have surveyed Georgia and Florida's relatively clear limestone streams with snorkels and masks for nearly three decades report a drastic population depletion and even extirpation of most southern map turtle species. One veteran herpetologist reported in 1998 observing, capturing and releasing more than 30 adult Escambia map turtles (*Graptemys ernsti*) in a 0.25 mile stream segment of the Yellow River in Okaloosa county Florida. He returned to the locale in April of 2006 and could not locate a single map turtle. In another Florida locale in May of 2007, the diver could not locate any Barbour's map turtle (*G. barbouri*) in a 0.25 mile segment of the Chipola River in Jackson County after finding 20 adults and hatchlings in 1995. In eastern Alabama, over the last thirty years the diver has noted a similar trend of Alabama map turtles (*G. pulchra*) on the Locust Fork River in Jefferson County and of Pascagoula map turtles (*G. ernstii*) throughout the Pascagoula River in Mississippi. He believes the depletions are a result of over collection for the pet trade since commercial collectors have been aware of these locales for many years.

G. barbouri: The Barbour's map turtle is considered the fourth rarest Graptemys based on extensive basking surveys (van Dijk 2010d). Total adult population size of Barbour's map turtles is unknown but likely is at least a few thousand, restricted to a maximum of 20 subpopulations (van Dijk 2010d). It is fairly abundant in parts of range, but scarce in others (van Dijk 2010d; NatureServe 2010). The large numbers historically collected are no longer encountered. An IUCN Red List status of "Endangered" could be warranted if better data were available (van Dijk 2010d).

In Florida, a ranking of wild vertebrate taxa according to biological vulnerability, extent of current knowledge of population status, and management needs, gave *Graptemys barbouri* an extremely high biological score, indicating greater vulnerability to extirpation (Enge 1993). Distribution, abundance, and life history were considered in this evaluation (Enge 1993).

G. caglei: The Cagle's map turtle is considered the rarest of all Graptemys (van Dijk 2010e). Its range has apparently reduced by half to two-thirds since 1974, and the species is now restricted to a single stretch of about 120 km of the lower Guadalupe River, where the population appears to be under continuing threat from habitat degradation, disturbance, and water disturbance (van Dijk 2010e). The species appears to have been extirpated in the San Antonio river system (Ernst and Lovich 2009). Yet within its current range, total adult population size is unknown but may exceed 10,000 (NatureServe 2011). The global longterm trend is moderate decline to relatively stable (25% change to 50% decline).

G. ernsti: The Escambia map turtle is considered the seventh rarest Graptemys (van Dijk 2010f). The species is under some decline and continues to be threatened by habitat degradation (van Dijk and Rhodin 2010). NatureServe (2011) considers the Escambia map turtle to be imperiled because it is endemic to two relatively small river systems in western Florida and adjacent southern Alabama. However, it is locally abundant and populations appear to be relatively stable and not subject to immediate threats, though habitat destruction, commercial collecting, and vandalism have some impact (NatureServe 2011). There are probably several thousand individuals, but data are lacking (NatureServe 2011).

G. flavimaculata: The yellow-blotched sawback is the third rarest *Graptemys* and has been of long term concern due to declining populations (van Dijk 2010g). Available information indicates that the species declined substantially in the late 20th Century, and while the severe declines have largely halted, the species has not recovered to historical levels (van Dijk 2010g). Declines have been historically observed in the Chickasawhay River, and more recently, in the Leaf and upper Pascagoula rivers, which together represent 80 percent of the range of the species. Further population declines were observed following the impacts of Hurricane Katrina in 2005 (van Dijk 2010g). The species is now absent from some areas of the Pascagoula River system where formerly abundant (Horne et al. 2003). Its global long term trend is moderate decline to relatively stable (25% change to 50% decline). Total adult population size is unknown but likely is at least a few thousand (NatureServe 2011). Based on a preliminary population viability analysis, Seigel and Dodd (2000) concluded that there is a high probability that this species will become extinct within 50 years.

G. geographica: The total population of the northern map turtle likely exceeds 100,000 and might reach 1 million individuals. The global long term trend is relatively stable (NatureServe 2011). But pollution that destroys the species' molluscan prey, waterfront development that destroys nesting habitat, and automobile traffic that kills females traveling overland to nests, have reduced populations in some parts of the species' range (Ernst and Lovich 2009, p. 301; van Dijk and Rhodin 2010). Declines have been noted in Iowa and Indiana (Ernst and Lovich 2009, p. 301). It is the second commonest *Graptemys* (van Dijk 2010h).

G. gibbonsi: Available information indicates that populations of the Pascagoula map turtle have declined by 80 to 90 percent since 1950, a time period probably representing 2-3 generations. While the worst impacts from habitat destruction and pollution are less severe than in the past, habitat quality has not been restored and impacts from wanton destruction and hurricane aftermath continue to threaten the species (van Dijk and Rhodin 2010).

Total population size of the Pascagoula map turtle is unknown (NatureServe 2011) but it is considered the second rarest Gratemys (van Dijk 2010i). This species is apparently locally abundant in the upper reaches of the Pascagoula River and sections of the Leaf and Chickasaway rivers (Selman and Qualls 2009). But populations in the lower reaches of the Pascagoula and Escatawpa rivers are extremely small (Selman and Qualls 2009). Over the past several decades this species has declined relative to the abundance of *G. flavimaculata* (Lovich et al. 2009; van Dijk 2010i). The steep decline was attributed to water pollution impacting mollusk populations upon which it feeds (van Dijk 2010i). NatureServe (2011) considers the species to be critically imperiled.

G. nigrinoda: NatureServe (2011) considers the black-knobbed map turtle to be vulnerable based on its small range in the Mobile Bay drainage system, Alabama and Mississippi. Its populations are declining and are threatened by pollution, habitat alteration, target shooting, recreational use of habitat, and perhaps collection for the pet trade (NatureServe 2011). The total adult population size is unknown but presumably is at least several thousand (NatureServe 2011). This turtle is fairly common in areas but not as common as in the past (Mirarchi 2004; Blankenship et al. 2008). Its status is in moderate decline to relatively stable (25% change to 50% decline). It is considered the four commonest *Graptemys* (van Dijk 2010j).

G. oculifera: The ringed map turtle is imperiled based on its limited numbers of populations and small range in the Pearl River system (Mississippi and Louisiana) and because its populations are threatened by anthropogenic stream alterations (e.g., point-bar mining) (NatureServe 2011; van Dijk and Rhodin 2010). The species has experienced moderate decline (decline of 25 - 50%), and although it is still relatively abundant at some localities with a total population that likely exceeds 10,000, there has been an overall decline in numbers and it has disappeared from many historical sites (NatureServe 2011). It is considered the sixth rarest *Graptemys* (van Dijk 2010k).

G. ouachitensis: NatureServe (2011) considers the Ouachita map turtle to be secure because of its large range in river systems in the central United States. It has many occurrences and is often locally numerous with a total population size likely exceeding 100,000. But its overall population trend and precise status are uncertain due to historical taxonomic confusion involving *G. pseudogeographica* (NatureServe 2011). And specific populations of the turtle have been impacted by habitat effects, exploitation or other direct human-related mortality (van Dijk and Rhodin 2010). Its global longterm trend is moderate decline to relatively stable (25% change to 50% decline) (NatureServe 2011). It is considered the most common *Graptemys* (van Dijk 2010l).

G. pearlensis: Quantitative data on the Pearl River map turtle are absent (van Dijk and Rhodin 2010). But available information indicates that the species has declined by 80 – 98 percent since 1950, a time period probably representing 2-3 generations. The steep decline was attributed to water pollution impacting its mollusk prey (van Dijk 201n). While the worst impacts from pollution and habitat destruction have been ameliorated, habitat quality has not been restored and impacts from commercial collection, wanton destruction, and hurricane aftermath continue to be a concern (van Dijk 2010n). Over the past several decades this species has declined relative to the abundance of *G. oculifera* (Lovich et al. 2009). It may qualify for a

"critically endangered" status on the IUCN Red List but current data warrants an "endangered" status (van Dijk 2010n). It is considered the second rarest *Graptemys* (van Dijk 201n).

G. pseudogeographica: NatureServe (2011) considers the false map turtle to be secure because it is widespread and possibly abundant in large rivers of the Mississippi River Basin. But localized declines are possible and population trends are not well known. It may be moderately threatened due to loss of habitat and collecting, and in general, its current status is not well documented (NatureServe 2011; van Dijk 2010n). Population declines have been reported from main rivers downstream of Kansas City and St. Louis (attributed to pollution) and elsewhere in Missouri (from pollution, channelization, loss of nesting sites, siltation, and wanton shooting) (van Dijk 201n). Commercial fishermen noted that the species was abundant 25 years earlier in the Missouri and Mississippi rivers but had become uncommon (Ernst and Lovich 2009, p. 335). The global long term trend is moderate decline to relatively stable (25% change to 50% decline) (NatureServe 2011). The subspecies *kohnii* appears to be widespread and abundant but information is lacking for the subspecies *pseudogeographica*.

G. pulchra: The global long trend for the Alabama map turtle is a moderate decline to relatively stable (25% change to 50% decline) (NatureServe 2011). The species is not abundant anywhere in its range but significant local or range-wide declines have not been reported (van Dijk and Rhodin 2010). Impacts on its riverine ecosystem, particularly impacts on populations of freshwater mollusks (its main food), appear less severe than for other *Graptemys* species (van Dijk 2010o).

G. versa: The Texas map turtle is a poorly-known species that is apparently rather abundant in a single river system (van Dijk and Rhodin 2010). The total adult population size of the Texas map turtle is unknown but probably exceeds 10,000 (NatureServe 2011). While it is locally common, its populations have been notably reduced in some of the more readily accessible parts of the range (Bartlett and Bartlett 1999). The global long term trend is moderate decline to relatively stable (25% change to 50% decline) (NatureServe 2011).

Threats

According to Lovich (1995), many members of the genus *Graptemys* have restricted ranges that place them at extreme risk of extinction. In addition, the popularity of many species as pets contributes to the decline of wild populations, as well as disease. For all *Graptemys* species, habitat modifications, such as removal of logs or snags, channelization or impoundment, may eliminate habitat elements, such as basking sites and nesting beaches that are essential to the survival of the species (McCoy and Lovich 1993a, 1993b). In addition, documented impacts of water pollution of key habitats have been observed on several *Graptemys* species.

Another factor that must be taken into consideration is that all map turtles studied to date possess temperature-dependent sex determination (TSD). Change to nesting areas could affect nest temperatures. This, in turn, could alter this species' reproductive success by changing population sex ratios. Any proposed changes to the primary habitat of *Graptemys'* must be evaluated relative to the effects on nesting locations and nest temperatures (Wibbels et al. 1991).

G. barbouri: The Barbour's map turtle is primarily threatened by pollution of its waterways and overcollecting for the pet trade and food (Ernst and Lovich 2009, p. 278; Pritchard 1993). Local harvesting is thought to continue along the Chipola River (Ewert et al. 2006). Some shooting is thought to continue. Other threats include plant overgrowth of its nesting sites and alternation of its waterways by impoundment (with prior water drawdown), dredging, and snag removal. *Graptemys barbouri* are also victims of incidental capture by snagging on "brushhooks" (a type of fishhook) in the Chipola River (Pritchard 1993). In addition, severe flooding from hurricanes may adversely affect the annual reproductive rate; Lechowicz (2005) could find no hatchling *G. barbouri* in Florida in the spring of 2005 following Hurricane Ivan. Sloughing and damaged scutes have been observed in this species at Lake Blackshear on the Flint River, Georgia (Ernst and Lovich 2009, p. 278). Although the cause of the disfigurement is unknown, shell disease seriously affects two other turtle species in that reservoir (Lovich et al. 1996). Habitat alteration along the banks of the Chipola and toxic industrial discharge was identified by Sanderson (1992) as threats to *Graptemys barbouri.* Few Superfunf polluted sites are located within or immediately connected to the turtle's habitat, and the potential for a major industrial spill affected a significant section of the total population cannot be discounted (Ewert et al. 2006).

G. caglei: Threats to Cagle's map turtle include habitat loss due to reservoir construction, water diversions, water quality degradation, and human depredation (collection for pet trade and intentional shooting) (USFWS 2003). Over 50% of the suitable habitat would be eliminated by construction of the Cuero Reservoir; several other reservoirs are proposed along tributaries to the Guadalupe River. Limestone "riffle bar" habitat is threatened by siltation, impoundment, and other alterations (NatureServe 2011). More information on threats is needed (van Dijk 2010e).

G. ernsti: The species is threatened by sport shooting, collection for the pet trade, a variety of pollutants, including heavy metals and PCBs, and channelization and snag removal (Ernst and Lovich 2009, p. 287; Aresco and Shealy 2006; Buhlmann and Gibbons 1997). Flooding during hurricanes may also suppress reproduction by washing out nests (Lechowicz 2005). Recreational vehicle use on riverine sandbanks results in nest and juvenile mortality (Aresco and Shealy 2006).

G. flavimaculata: According to Nature Serve (2011), the species is threatened by habitat modification such as by navigation and flood control projects; changing water levels during the nesting season and more flooding than normal of sand bar nest sites; gravel dredging; sedimentation from gravel mining, timber harvesting, and agricultural activities; loss of basking sites and nesting areas, and by wanton shooting, collecting for pet trade, water quality degradation due to various industries, and nest predation. Other threats include propeller impacts and drowning in fish nets (Ernst and Lovich 2009, p. 293).

In the Pascagoula River, this turtle exhibits low reproductive frequency, high nest mortality, and an unexpectedly high level of nesting in shaded areas along the riverbank, perhaps in response to human disturbance on and near sandbars (Horne et al. 2003). In the absence of extraordinarily high adult survival, this population probably will continue to decline because of low recruitment (Horne et al. 2003).

Graptemys geographica: Significant threats to the northern map turtle include highway mortality of nesting females, commercial harvesting, boat propeller injuries, and habitat destruction, including removal of snags and logjams from rivers for navigation, channelization, flow regulation, construction of impoundments pollution and siltation (Ernst and Lovich 2009, p. 302; Bodie 2001; Lindeman 1999).

G. gibbonsi: The Pascagoula map turtle appears to be highly vulnerable to the negative effects of water pollution and sedimentation on its prey, particularly freshwater mollusks (Lindeman 1999; Jones et al. 2005; van Dijk 2010i). It is absent or very scarce in Bouie and Okatoma creeks (although *G. flavimaculata* persists), where it was historically present, perhaps because of the impact of periodic pollution episodes. Selman and Qualls (2009) noted also that few *G. gibbonsi* occur in the lower Bouie River, which has been severely affected by gravel mining.

Desnagging (removal of snags and logs to facilitate boat navigation) poses a particular threat in the lower Escatawpa River, where the population is very small and disjunct from those in the remainder of the Pascagoula drainage (Selman and Qualls 2009). Incidental capture of *Graptemys* species with various fishing gear and occasional intentional destruction of animals thus captured is an ongoing problem.

G. nigrinoda: Lahanas (1982) reported that delta residents used to collect and eat large numbers of turtle eggs on Gravine Island and a market existed for adult turtles in the region as late as the early 1980s. Recreational use of the delta region of the Alabama River also takes its toll on the population. Adults are drowned in gill nets, nesting is disrupted and nests are destroyed by picnickers and hikers, and two were discovered with carapaces cracked by propellers of outboard motors (Ernst and Lovich 2009, p. 313; Blankenship et al. 2008). Other threats include collection for the pet trade, shooting of basking turtles, the elimination of snags and sandbars, and channelization (Buhlmann and Gibbons 1997).

G. oculifera: Ernst and Lovich (2009, p. 318) explain that the species is declining across its range because of habitat modification and water quality deterioration, reservoir construction, channelization, desnagging for navigation, siltation, and subsequent loss of invertebrate food sources (see Buhlmann and Gibbons 1997; McCoy and Vogt 1980b; Stewart 1988). It was federally listed as a threatened species in 1986. Illegal point-bar mining has occurred in the Bogue Chitto River and currently constitutes the greatest threat (NatureServe 2011). Plans for channelization of an additional 28% of the Chipola River and another 160 km of the Bogue Chitto River remain as a significant potential threat (van Dijk 2010k). Collecting for the pet trade is an additional concern (NatureServe 2011), as is human-subsidized predators such as raccoons (Jones and Selman 2009).

G. ouachitensis: Specific threats have not been documented (van Dijk 2010l). But many Ouachita map turtles die in nets of commercial fisheries. These tend to be discarded, but in some areas the turtles occasionally are consumed by humans. These colorful turtles sometimes are collected for the pet trade (Dundee and Rossman 1989). Generally tolerant of periodic nondestructive intrusion, but frequent human activity in the habitat could interfere with nesting and normal basking behavior (NatureServe 2011).

G. pearlensis: The Pearl River map turtle appears to be highly vulnerable to the negative effects of water pollution and sedimentation on its prey, particularly freshwater mollusks (Lindeman 1999; Jones et al. 2005). In the Columbia reach of the Pearl River drainage, downstream of the Monticello pulp mill, the *G. pearlensis* population has declined relative to that of *G. oculifera* over the past seventeen years, perhaps, because of a decline in the mussel population associated with diminished water quality (Jones and Selman 2009). Exploitation for the pet trade, particularly in the Lower Pearl River drainage in Louisiana, may be significant (Jones and Selman 2009).

G. pseudogeographica: The false map turtle is declining in Mississippi, possibly as a result of several factors, including water pollution, river channelization, reduction of suitable nesting sites, siltation, and unlawful shooting (Johnson 1987). Vandewalle and Christiansen (1996) noted that river modifications in Iowa, including channel straightening, dredging, impoundments, and other changes to the natural environment had negative effects on false map turtle populations. The pet trade also adversely affected map turtle populations. The false map turtle was one of the most heavily traded species (excluding farm raised species) in the Hong Kong pet trade between May 1998 and May 1999 (Lau et al. 2000). There has been a commercial market for this species for a long time (Clark and Southall 1920). Commercial fishermen told Anderson (1965) that the false map turtle had been abundant in the Mississippi and Missouri rivers 25 years prior but had become uncommon. Commercial fishing may contribute significantly to mortality in this species because turtles become entangled as bycatch (Ernst and Lovich 2009). In addition, large female false map turtles (*Graptemys pseudogeographica*) grow larger than other map turtle species and are consumed as food.

G. pulchra: Water pollution, which adversely affects the species' molluscan prey, and other degradation of its waterways, may be reducing *Graptemys pulchra* populations (Ernst and Lovich 2009, p. 339). In particular, channelization and removal of deadwood and snags may be harming the species (Buhlman and Gibbons 1997; Lindeman 1999a; Lovich and Gibbons 1997). Commercial collection and vandalism (e.g., shooting) are also threats (NatureServe 2011).

G. versa: Collection for the pet trade may be a threat (Bartlett and Bartlett 1999). Lindeman (2004) has shown that the species is more common in waterways passing through private lands than those with public access to the water. Threats to the species have not been documented (van Dijk 2010p).

Utilization and Trade

Map turtles are popular in the pet trade and are also sold for human consumption. Turtle farmers in recent years in the Southeast have apparently achieved considerable success with captive-breeding operations, but these operations draw upon the wild to replace breeding stock. Many are illegally collected and legally sold in states where they are not endemic.

Trade data from 2009 indicates that the United States exports about 140,000 live map turtles a year (Weissgold 2010). This number is approximately half of what was exported in 2005, which may reflect increasing rarity of the species or be a consequence of the CITES

listing. Trade in wild caught specimens is also extensive. From 2006-2010, nearly 800,000 wild caught map turtles were exported from the United States. *G. pseudogeographica* accounts for most of the trade but the trade data does not list the species of map turtle for many of the exports. Other than export figures, very little is known about the effect of international commercial trade on *Graptemys* populations.

G. barbouri: Graptemys barbouri is collected from the wild for the pet trade and for human consumption (Ernst et al. 1994). Ernst et al. (1994) stated that these turtles are overcollected for the pet trade and Newman (1970) reported that three people collected 50 *Graptemys barbouri* from a one-mile section of the Chipola River in a single afternoon (Ernst et al. 1994).

G. ernsti: The Escambia map turtle is in some demand in the global pet trade and persistent collection could impact the species significantly (van Dijk 2010f).

G. flavimaculata: The remarkable beauty of this species makes it one of the most sought after turtles in the world. Adult females may sell for as much as $100 each (Floyd 1973).

G. geographica: A market for this species has existed for decades. An estimated 11,583 pounds of turtles (of all species) were harvested from the upper Mississippi River in 1991, and the northern map turtle was one of the species commonly harvested (Ernst and Lovich 2009, p. 302).

G. nigrinoda: Lahanas (1982) reported that residents in the delta area of the Alabama River used to collect and eat large numbers of *Graptemys nigrinoda* eggs on Gravine Island and a market existed for adult turtles in the region as late as the early 1980s (Ernst et al. 1994).

G. ouachitensis: Over 2000 wild-caught Ouachita map turtles were exported from the U.S. between 2007-2008.

G. oculifera: Jones (1995) speculates that illegal collecting, presumably for the pet trade, might be responsible in part for the declines in *Graptemys oculifera* numbers. All of the localities are readily accessible from nearby boat ramps. Knowledgeable collectors could easily have removed significant numbers of *G. oculifera* over a relatively short period of time (Jones 1995).

G. pseudogeographica: Over 750,000 wild-caught false map turtles were exported from the U.S. from 2006-2010.

G. pulchra: Although not as colorful as other species of *Graptemys*, hatchlings and juveniles of this species are popular in the pet trade. A portion of the commercial harvest is used for dissection in physiology labs (Lovich and McCoy 1993).

Legal Status

Two species of map turtles are protected under the ESA due to habitat loss and overcollection for the pet trade: the yellow-blotched map turtle (*Graptemys flavimaculata*) and

the ringed map turtle (*Graptemys oculifera*), both of which are found in Louisiana and Mississippi. The Cagle's map turtle was on the federal list of candidate species for thirty years before being denied protection under the ESA. Five additional species are the subject of an Endangered Species Act listing petition submitted to the FWS on April 20, 2010 by the Center (Center for Biological Diversity 2010). These include: Barbour's map turtle (*Graptemys barbouri*) (FL, GA); Escambia map turtle (*Graptemys ernsti*) (FL); Pascagoula map turtle (*Graptemys gibbonsi*) (LA, MS); black-knobbed map turtle (*Graptemys nigrinoda*) (AL, MS); and Alabama map turtle (*Graptemys pulchra*) (GA).

Harvest of map turtles in Iowa is prohibited (Iowa DNR 2009b). Commercial harvest of map turtles is prohibited in several states, including Indiana and Illinois (PARC 2011). Harvest of map turtles is regulated as a game species in Illinois and a nongame species in Indiana, Michigan, Minnesota, Wisconsin, Missouri, Ohio, and Kansas (PARC 2011).

G. barbouri: The Barbour's map turtle is listed as rare or threatened by the states in which it is found (Ernst and Lovich 2009, p. 278). Most forms of commercial exploitation are prohibited in Alabama, Georgia, and Florida (van Dijk 2010d). It is a species of special concern in Florida (Florida Fish and Wildlife Conservation Commission 2011) and take for personal use is limited (van Dijk 2010d). The species has threatened status in Georgia (GA DNR 2008).

G. caglei: Threatened status in Texas (Texas Parks and Wildlife Dept. 2010). FWS concluded in 2006 that federal protection was not warranted because of conservation actions taken by Texas Parks and Wildlife Department (van Dijk 2010e). 71 Fed. Reg. 53756 (Sept. 12, 2006).

G. ernsti: The species not listed on federal or state protected species lists. But it is protected from most forms of commercial exploitation in Alabama and Florida (van Dijk 2010e).

G. flavimaculata: Threatened under the ESA. Endangered in Mississippi (Mississippi Natural Heritage Program 2003).

G. geographica: Listed as endangered in Maryland (Maryland Dept. of Natural Resources 2010). Considered rare in Georgia (GA DNR 2008).

G. gibbonsi: The Pascagoula map turtle is without special status despite its limited range in Mississippi. But sale of native turtles from Mississippi is prohibited, as is with all native nongame wildlife (Mississippi Wildlife, Fisheries, and Parks 2008). Personal collection of up to four individuals (van Dijk 2010i) (but not of eggs) is allowed.

G. nigrinoda: Declined in Mississippi and now listed as endangered by that state (Mississippi Natural Heritage Program 2003). Categorized as "Moderate Conservation Concern" in Alabama (Mirarchi 2004) and is a protected nongame species there (van Dijk 2010j).

G. oculifera: Threatened under the ESA. Endangered in Mississippi (Mississippi Natural Heritage Program 2003). Threatened in Louisiana (Louisiana Dept. of Wildlife and Fisheries 2011).

G. pearlensis: The Pearl River map turtle is protected from commercial exploitation in Mississippi and possession is limited to four individuals (van Dijk 2010m). Its Louisiana populations are considered of special concern (van Dijk 2010m). It probably qualifies as threatened under the ESA but is not listed (Selman and Quails 2007).

G. pseudogeographica: Threatened in South Dakota (South Dakota Game, Fish, and Parks 2010).

G. pulchra: Considered rare in Georgia (GA DNR 2008) but is unregulated (van Dijk 2010o). It is a protected nongame species in Alabama (van Dijk 2010o).

G. versa: Commercial collection of turtles in Texas public waters ended in 2007 (van Dijk 2010p).

Summary

Given the biological characteristics of turtle species, and the high numbers exported, it is probable that collecting *Graptemys* from the wild for international commercial trade is having a detrimental impact on the species by either exceeding, over an extended period, the level that can be continued in perpetuity, or reducing it to a population level at which its survival could be threatened by other influences. Because the distinguishing characteristics in the external morphology of the various *Graptemys* species are in many cases subtle, all species included in this genus must be placed on Appendix II. Once removed from the wild, it would be extremely difficult for non-experts to distinguish among the *Graptemys* species.

ADDITIONAL SPECIES THAT SHOULD BE INCLUDED IN APPENDIX II

Soft-shell turtles, the spotted turtle, the Blanding's turtle, and the diamondback terrapin qualify for listing in Appendix II under the terms of Resolution Conf. 9.24, Annex 2a. Because each of the species faces an entire suite of threats, including international trade, it can reasonably be inferred that unless trade in the species is regulated, it will meet at least one of the biological criteria for listing in Appendix I (Criterion A.). Likewise, available information indicates that harvesting of specimens from the wild for domestic and international trade has, or may have, a detrimental impact on these species by exceeding, over an extended period, the level that can be continued in perpetuity (Criterion B.i), and by reducing population levels (and, especially, sub-population levels), to at point at which these species would be threatened by other influences (Criterion B.ii).

I. Soft-shell Turtles (*Apalone* spp.) Should Be Included In Appendix II

The IUCN/SSC Tortoise & Freshwater Turtle Specialist Group recommended that the United States propose the Florida softshell, smooth softshell, and spiny softshell turtles for inclusion in Appendix II based on concern for overharvest due to the species' "distinctive reproductive physiology & slow recovery potential." *See* 74 Fed. Reg. 57190 (Nov. 4, 2009). In addition, these softshell turtles were recommended for inclusion in Appendix III by the

Conservation, Status & Monitoring Working Group that the FWS convened during the September 2010 conference entitled "Conservation and Trade Management of Freshwater and Terrestrial Turtles in the United States." The Working Group expressed the need to acquire data and appropriately manage populations (USFWS 2010).

IUCN Red List Status: Least concern (van Dijk 2010r,s,t).

Species Description and Taxonomy

The Florida softshell turtle (*A. ferox*), smooth softshell turtle (*A. mutica*), and spiny softshell (*A. spinefera*) turtles were removed from genus *Trionyx* and placed in genus *Apalone* by Meylan (1987). Molecular data indicate a genetic dichotomy between populations north and west of Louisiana (exclusive of basal Rio Grande drainage populations) and populations from the Gulf Coast in southeastern North America (Weisrock and Janzen 2000). The Florida softshell exhibits relatively low levels of genetic variability across its range (Weisrock and Janzen 2000).

There are six recognized subspecies of *A. spinefera* and three are endemic to the United States. The subspecies *A. spinefera atra*, endemic to Cuatro Cienegas, Mexico, is listed in CITES Appendix I (van Dijk 2010t).

Ernst and Lovich (2009, p. 606) provides a key to the species of the genus *Apalone*, as well as detailed narrative detailed descriptions.

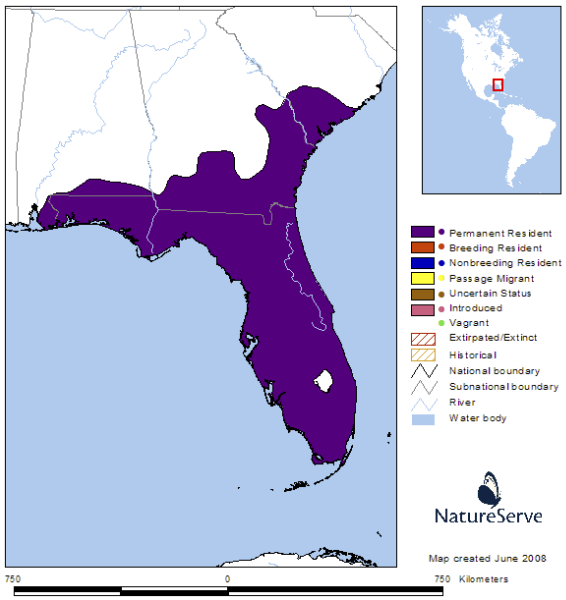

Florida softshell turtle (*A. ferox*)


Smooth softshell turtle (*A. mutica*)

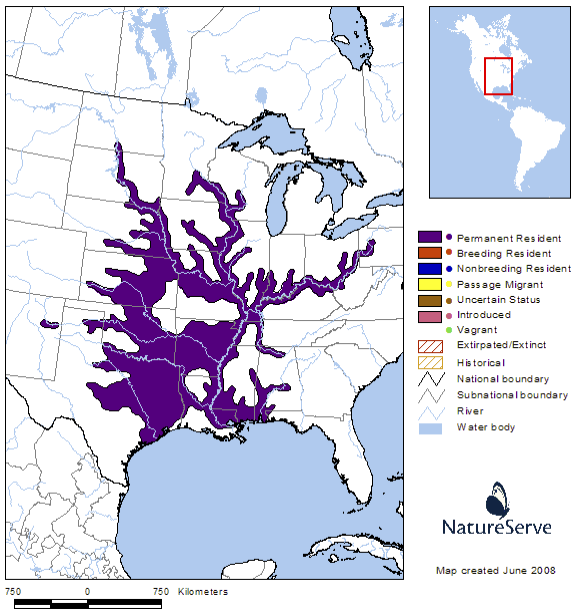
Spiny softshell turtle (*A. spinefera*)

Distribution

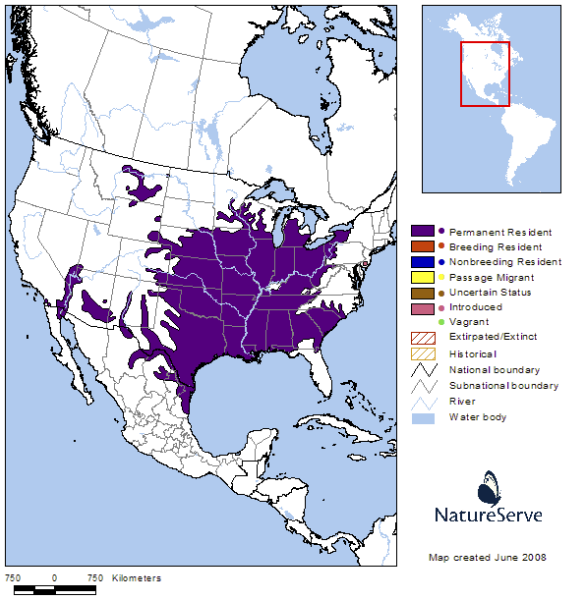
Ernst and Lovich (2009) provide a verbal account of distribution of the three U.S. species of *Apalone*. NatureServe (2011) also provides detailed distribution information, and distribution maps are pasted below.



Florida softshell turtle (*A. ferox*)



Smooth softshell (*A. mutica*)



Spiny softshell (*A. spinifera*)

Habitat

A. ferox: The Florida softshell is usually found in litterol fresh waters up to 1 m deep, including ditches, drainage canals, streams, rivers, marshes, swamps, and lakes. It prefers water with sand or mud bottoms or else bubbling mud-sand springs where there is much aquatic vegetation, and it sometimes enters brackish water near the mouths of streams and rivers, where the tides occasionally carry it to sea (Ernst and Lovich 2009, p. 608). It basks on sand bars and fallen logs and often burrows into sand-mud bottom, leaving only head out. Its eggs are laid in sandy, sunny areas near water (NatureServe 2011).

A. mutica: The smooth softshell is most often observed in the open waters of medium-sized to large rivers and streams with moderate to fast currents and visibility varying from clear to cloudy. Waterways with soft sandy, silty, or gravelly bottoms and a few rocks or aquatic plants are preferred (Ernst and Lovich 2009, p. 614). It often basks on sand bars and mudflats at edge of water (NatureServe 2011). Eggs are laid in nests dug in high open sandbars and banks close to water, usually within 90 m of water (Fitch and Plummer 1975).

A. spinifera: The spiny softshell is primarily a riverine species, but it also inhabits ecotonal areas, small creeks, marsh rivelets, roadside and irrigation ditches, farm and natural ponds, bayous, oxbows, large lakes, and impoundments. A soft bottom with some aquatic vegetation seems essential (van Dijk 2010t). Sandbars, mudflats, and submerged logs, stumps, and rocks are usually present. Fallen trees with spreading underwater limbs are especially frequented (Ernst and Lovich 2009, p. 624). It basks on shores or on partially submerged logs and burrows in bottom of pool during winter inactivity. Its eggs are laid in nests dug in open areas in sand, gravel, or soft soil near water (NatureServe 2011).

Biology

A. ferox: The Florida softshell is characterized by delayed female maturation, a small clutch size (2-6 eggs per clutch), lengthy incubation period, and low neonate survivorship. The species occupies a small range (four U.S. States), is easily located by its distinctive burrowing, and shows little reaction to human disturbance when basking, all of which increase its susceptibility to trapping.

A. mutica: The smooth softshell is characterized by delayed female maturation, a small clutch size (but multiple clutches), high neonate parental involvement, and low neonate survivorship. Males bask in shallow water and nests are often in close proximity to each other, facilitating collection.

A. spinifera: The spiny softshell turtle is native to Canada, the United States, and Mexico, and is characterized by a much-delayed female maturation, small clutch size (laying eggs perhaps twice a year), and a lengthy incubation period. Where habitat is limited, nests may be clumped, facilitating collection.

Population Status

A. ferox: Few data have been published concerning the population dynamics of the Florida softshell turtle but significantly localized declines have been observed and attributed to intensive collection (Ernst and Lovich 2009, p. 612; van Dijk 2010r). Despite intensive harvest pressure, the species apparently remains secure in Florida and Georgia (NatureServe 2011). It is considered imperiled in Alabama (NatureServe 2011).

A. mutica: The smooth softshell is reasonably widespread (22 U.S. states) and locally common with high reproductive potential by turtle standards (van Dijk 2010s). The population status of the smooth softshell is largely unknown and more data may reveal that the species qualifies for "Near Threatened" status on the IUCN Red List (van Dijk 2010s). It is reportedly extirpated from Pennsylvania and possibly extirpated from West Virginia. There have been anecdotal observations of declining populations, as least locally, as well as consistently failing recruitment as a result of water level regulation in large rivers flooding nesting banks (van Dijk 2010s).

A. spinifera: The spiny softshell is wide-ranging (37 U.S. States, 2 Canadian Provinces, and 4 Mexican States), and its conservation status is reported as "secure" or "apparently secure" throughout much of its U.S. range. It is considered "vulnerable" in Florida, Alabama, North Carolina, and Montana. It is considered "imperiled" in South Dakota, New York, and Virginia (NatureServe 2011). Populations of spiny softshells have declined as their environment has been polluted, altered, degraded, or destroyed, making it unfit for the turtles (Lovich and Gibbons 1997). As with the smooth softshell, the spiny softshell is locally common with high reproductive potential by turtle standards (van Dijk 2010t).

Threats

A. ferox: Humans are the greatest threat to the Florida softshell causing habitat destruction, pollution, and automobile strikes (Ernst and Lovich 2009, p. 612). An additional threat is overharvest throughout its range. The species is internationally traded primarily as live specimens, as well as eggs, for the pet trade and consumption. Commercial take of adult softshells has been substantial and is considered the cause of local declines (Melan and Moler 2006).

A. mutica: Water pollution has possibly reduced populations of smooth softshells in some rivers (Trauth et al. 2004). The presumed primary threats to smooth soft-shell turtles are overharvest and habitat loss or habitat degradation, some predation and bycatch, and periodic natural flooding. The species is internationally traded as live specimens for the pet trade and consumption. The impact of commercial exploitation appears to be undocumented but bycatch in commercial fisheries and recreational fishing is suspected to be a factor in the observed decline of some populations (van Dijk 2010s).

A. spinifera: The release of pesticides and both industrial and household chemicals into the waterways of spiny softshells has been especially harmful, and softshells have now been found to contain many heavy metal and PCB contaminents (De Solla et al. 2003; Fontenot et al. 1996; Setmire et al. 1993). The presumed primary threats to spiny soft-shell turtles are overharvest or illegal harvest and habitat loss or degradation, as well as some predation and fishing bycatch. The species is traded internationally as live specimens for the pet trade and consumption.

Utilization and Trade

Adult softshells are exported to Asia to be served as an expensive delicacy that is comparable to shark fin soup. Asian cuisine prizes America's softshell turtles because they appear similar to endemic Asian softshell turtle species that have been depleted by the food trade (Christiansen 2008).

Trade data obtained from the Office of Law Enforcement show extensive trade in wild caught softshell turtles. From 2006-2010, over 150,000 wild caught softshell turtles have been exported from the United States. Most were spiny softshells and Florida softshells but some trade in the rarer smooth softshells also exists.

A. ferox: More than one million specimens were exported from the United States between 2005 and 2008 (Weisgold 2010). Over 110,000 wild caught Florida softshells were exported from the U.S.in the five year period from 2006-2010. This is the most heavily harvested turtle in Florida, and many tons of the turtles are removed from Florida each year for human consumption (Meylan and Moler 2006).

A. mutica: In 2009, just 200 live smooth softshell turtles were exported from the United States (Weissgold 2010). Only 225 wild caught smooth softshell turtles were exported from 2006-2010. These numbers are down from previous years, reflecting the rarity of the species.

A. spinifera: Spiny softshells have long been exploited for consumption and more recently for export of adults for food and of hatchlings as pets and for Asian farming operations (van Dijk 2010t). More than 252,000 individuals were exported from the United States between 2005 and 2008. In 2009, approximately 46,000 individuals were exported (Weissgold 2010). As for wild caught spiny softshells, 40,000 were exported from 2006-2010.

Legal Status

A. ferox: The Florida softshell is considered rare in South Carolina (SC DNR 2010). Since 2009, nearly all commercial harvest of freshwater turtles is prohibited in Florida. In Alabama, commercial and personal take is limited to a daily bag limit of 10 turtles, and softshells can only be taken if over 12" CL (van Dijk 2010r). Take of the species in Georgia remains unregulated (van Dijk 2010r).

A. mutica: Endangered status in Illinois (Illinois Endangered Species Protection Board 2011). Subject to a variety of state laws and regulations (van Dijk 2010s).

A. spinifera: The spiny softshell is listed as a species of special concern in New York and North Carolina (North Carolina Wildlife Resources Commission 2008; New York Dept. of Environmental Conservation 2011). It is threatened in Vermont (Vermont Fish and Wildlife Dept. 2011). It is managed as a nongame resource across much of the United States (van Dijk 2010 t).

Summary

North American softshell turtles (*Apalone* spp.) are threatened by habitat loss and by significant harvest for the food and pet trade but are not listed under CITES. FWS trade data are inadequate to determine the sources involved in this trade, which makes it difficult to monitor the impact on wild populations. Listing these species under CITES would require adequate documentation and ensure that trade is consistent with their survival. While the smooth softshell is the least intensively exploited native softshell, it is in trade and is considered a look-alike species to the spiny and Florida softshells (van Dijk and Rhodin 2008).

II. The Spotted Turtle (*Clemmys guttata*) Should Be Included In Appendix II

The spotted turtle was recommended for inclusion in Appendix II by the Conservation, Status & Monitoring Working Group that the FWS convened during the September 2010 conference entitled "Conservation and Trade Management of Freshwater and Terrestrial Turtles in the United States" (USFWS 2010). In 2000, the United States proposed to include the spotted turtle in Appendix II at the eleventh regular meeting of the Conference of the Parties ("CoP11") but the proposal failed to gain the necessary two-thirds majority for adoption at that meeting. The Parties concluded that the United States had failed to supply enough information on the impact of international trade on the species. This submission updates and supplements the United States' previous proposal.

IUCN Draft Red List Status: Endangered (van Dijk and Rhodin 2010).

Species Description and Taxonomy

The spotted turtle is a small black turtle with small, round, yellow spots on the broad, smooth, keelless carapace. Hatchlings are blue-black and may or may not have yellow spots on the carapacial scutes. The eggs are smooth, white, and elliptical (NatureServe 2011).

Spotted turtle (*Clemmys guttata*)

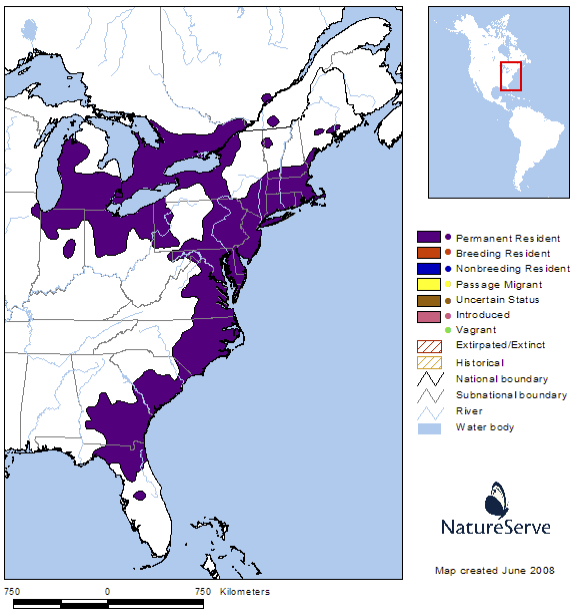
Based on morphological data, Holman and Fritz (2001) split *Clemmys* as follows: *Clemmys guttata* was retained as the only member of the genus; *Clemmys insculpta* and *C. muhlenbergii* were placed in the genus *Glyptemys*; and *Clemmys marmorata* was transferred to the monotypic genus *Actinemys*. Genetic data support the basic features of this arrangement. An analysis of emydid relationships based on molecular data (Feldman and Parham 2002) identified four well-supported clades: *Terrapene*; *Clemmys guttata*; *C. insculpta* and *C. muhlenbergii*; and *Clemmys marmorata*, *Emys orbicularis*, and *Emydoidea blandingii*.

Distribution

The spotted turtle ranges from southern Ontario and Maine southward only from the Atlantic Coastal Plain and Piedmont to northern Florida and westward through Ontario, New York, Pennsylvania, central Ohio, northern Indiana, and Michigan to northeastern Illinois (Ernst and Lovich 2009).

Local extirpations have apparently caused the geographic range to contract or fragment. The spotted turtle's historic range in Illinois likely included much of the Chicago metropolitan area (Cook Co.), but no individuals have been discovered in Cook County since the early 1950s (Dreslik *et al.* 1998). In Maine, the species has disappeared from historic range in southern Cumberland Co. In New York, the spotted turtle was considered to be perhaps the most common turtle in the New York City area at the turn of the century, but today occurs in only a few isolated populations in protected areas.

NatureServe (2011) provides the distribution map below.



Spotted Turtle (*Clemmys guttata*)

Habitat

The spotted turtle occupies a wide variety of shallow wetland habitats across its range and during the year (Joyal et al. 2001). Habitat requirements include clear, clean water; a soft substrate; and aquatic or emergent vegetation (Ernst and Lovich 2009, p. 214). In some parts of the range and during certain times of the year, it spends considerable time on land (Milam and Melvin 2001; Ward et al. 1976).

There are no estimates of the amount of suitable spotted turtle habitat still remaining in Canada or the United States. The bogs and marshes that it inhabits are fragmented and disappearing (COSEWIC 2009).

Biology

The spotted turtle is a typical K-selected species with population dynamics that emphasize the long-term reproductive contributions of adult animals over time. It occurs at low density, has an unusually low reproductive potential, and a long-lived life history (COSEWIC 2009). Wilson et al. (1999) consider the spotted turtle and other *Clemmys* species to be "especially vulnerable to increased mortality because of slow growth, delayed maturity, and high mortality of eggs and juveniles."

The age of sexual maturity is probably more closely related to reaching a specific size than age, although this length is usually obtained by 10 years of age (Ernst 1975). The maximum life span of adults is at least 26 years but may be as high as 50 (Tyning 1990).

Population Status

The sizes of spotted turtle populations vary with the amount of suitable habitat available. A survey of populations presented by Milam and Melvin (2001) and Litzgus and Mousseau (2004) shows that the estimated population sizes reported are usually small. Reported spotted turtle population densities are low in comparison to reported population densities for other North American freshwater turtle species (Litzgus 1996). Several populations have been documented as in decline through loss of adults or lack of recruitment (Ernst and Lovich 2009).

Although some populations are in protected areas, many may have a low probability of persistence, especially because small numbers and isolation reduce population viability. In Canada, the low frequency of juveniles in most studied populations suggests these populations are composed largely of remnant, aged cohorts with low reproductive success (COSEWIC 2009).

The size of the U.S. population has not been estimated but the species is declining throughout much of its range within the United States. The species is likely to have suffered more than 50 percent overall reduction in population size, with much of this loss irreversible given habitat loss (van Dijk and Rhodin 2010). Recolonization of any new sites is slow and constrained by subsidized predators and possibly climate change (van Dijk and Rhodin 2010).

Turtle populations in areas with heavy development likely have suffered the greatest declines in numbers. In Connecticut, spotted turtles are considered to be declining in the Quinnipiac River watershed. Populations in northeastern Illinois have declined such that, at present, there are relatively few spotted turtles, and the numbers are also dropping in other Midwestern states and the Mid-Atlantic region (Wilson 2003). Historically, the spotted turtle was considered the most abundant turtle in Massachusetts, but populations have declined substantially in the past century (Milam and Melvin 1997). Lovich (1989) documented the decline of spotted turtles in Cedar Bog, Champaign County, Ohio. He concluded that "the spotted turtle population at Cedar Bog has declined dramatically during this century to what may be a critical level" (Lovich 1989). The species declined in northwestern Indiana between the 1930s and 1990s (Brodman et al. 2002).

Threats

Spotted turtles are declining over most of their range due to habitat destruction, introduction of invasive plant species, collection for the pet trade, and mortality from vehicular encounters (Ernst and Lovich 2009, p. 221; van Dijk and Rhodin 2010). The species is reasonably specialized in its habitat requirements and is not a good disperser. As a result, habitat destruction and fragmentation leads to disappearance of populations (van Dijk and Rhodin 2010).

Legal and illegal commercial exploitation (for both domestic use and export) and incidental collecting have impacted and continue to impact spotted turtle populations in many parts of the species' range (Smith *et al.* 1973; Minton *et al.* 1982; COSEWIC 2009). Several professional herpetologists have reported known or suspected population declines or extirpations as a result of over-collecting for the pet trade.

Global warming is another threat to the species. The spotted turtle has temperature-dependent sex determination. Should its nesting environment become hotter in the future, the sex ratio is likely to be skewed toward primarily female clutches (the normal sex ratio is 1:1). Also, the spotted turtle is a cold-adapted species (Ernst 1976; Ernst 1982). Warming will adversely affect its behavior and possibly dry up many of the shallow wetlands where it occurs.

Utilization and Trade

Illegal commercial collecting and incidental collection by hobbyists are depleting populations in many areas. 64 Fed. Reg. 36902 (July 8, 1999). Approximately 1,442 live individuals are exported from the United States per year (Weissgold 2010). The number of spotted turtles exported has been steadily increasing since 1995 (Weissgold 2010). This trend may reflect increasing demand for the pet trade. Spotted turtles sell for $219 each online (www.TurtleSale.com).

The number of wild caught spotted turtles exported from the United States is much less. Trade data from 2006-2010 show that 176 wild caught spotted turtles were exported from the U.S. However, it is possible that many wild caught individuals are falsely reported as captive bred.

Although protected from harvest across most of its limited range in the northeastern United States, illegal trade has been documented. For example, in June 1998, state and federal agents raided a house in Bedford County, Pennsylvania and confiscated more than 60 illegally-held turtles, including 28 spotted turtles (Blankenship 1999). In 2009, an undercover investigation by the New York Department of Environmental Conservation called "Operation Shellshock" led to the arrest of two dealers illegally selling spotted turtles (Livingston County News 2009). In addition, over collection has been suggested as a reason for spotted turtle population declines in Indiana and Ohio since the 1970s and 1980s (Smith *et al.* 1973; Minton *et al.* 1982).

Herpetologists report losses of known spotted turtle populations. Carl Ernst reports that a population in Lancaster County, Pennsylvania had 300-400 individuals in 1980, but none were found at the site in 1999. Two other, similarly sized populations in northern Virginia have lacked a significant presence of spotted turtles since the 1980s. James Harding, a herpetologist with the Michigan State University Museum, has strong circumstantial evidence that collectors wiped out his study population of 20-25 spotted turtles in south-central Michigan in the early 1970s. Alvin Braswell of the North Carolina State Museum reports that spotted turtles were difficult to locate in Hyde and Tyrrell counties, North Carolina, after a collector removed more than 1,100 from the wild in 1993-94. Herpetologists have even encountered turtle poachers on study sites (Wilson 1999).

Legal Status

In Canada, the Committee on the Status of Endangered Wildlife in Canada ("COSEWIC") designated the species as "Special Concern" in April 1991 but re-examined the

status and designated it as "endangered" in May 2004. The designation was prompted in part by the "clear threat" from the pet trade (COSEWIC 2009).

The spotted turtle is listed as endangered, threatened, or a species of special concern at the State/provincial level throughout its range. 64 Fed. Reg. 36902 (July 8, 1999). The species is protected as "threatened" or "endangered" in Maine, Vermont, New Hampshire, Illinois, Indiana, South Carolina, Michigan under the respective state endangered species laws (SC DNR 2010; Maine Dept. of Inland Fisheries and Wildlife 2010; Vermont Fish and Wildlife Dept. 2011; New Hampshire Fish and Game 2008; Michigan DNR 2009; Illinois Endangered Species Protection Board 2011; Indiana DNR 2011). This turtle is a species of "special concern" in New York and Georgia (GA DNR 2010; New York Dept. of Environmental Conservation 2011). In Rhode Island, state regulations prohibit taking spotted turtles from the wild or possession of one without a permit issued by the state wildlife agency (Rhode Island Dept. of Environmental Management 2006). The species is without special status in Massachusetts, Connecticut, New Jersey, Delaware, Pennsylvania, Maryland, Ohio (Massachusetts Dept. of Fish and Game 2008; Connecticut Dept. of Energy and Environmental Protection 2010; New Jersey Division of Fish and Wildlife 2004; Delaware Division of Fish and Wildlife 2011; Pennsylvania Natural Heritage Program 2011; Maryland Dept. of Natural Resources 2010; Ohio DNR 2010).

Throughout its range, various Federal, State, and municipal regulations that protect wetlands may provide some indirect protect for the species as well.

Summary

The spotted turtle is threatened by habitat loss and by harvest for the pet trade but is not listed under CITES. FWS records are inadequate to determine the sources involved in this trade, which makes it difficult to monitor the impact on wild populations. Listing these species under CITES would remedy this situation by requiring adequate documentation and by ensuring that trade is consistent with their survival.

III. The Blanding's Turtle (*Emydoidea blandingii*) Should Be Included In Appendix II

The Blanding's turtle (*Emydoidea blandingii*) was recommended for inclusion in Appendix II by the Conservation, Status & Monitoring Working Group that the FWS convened during the September 2010 conference entitled "Conservation and Trade Management of Freshwater and Terrestrial Turtles in the United States" (USFWS 2010).

IUCN Red List Status: Endangered (van Dijk 2010q).

Species Description and Taxonomy

Blanding's turtles have an elongated smooth carapace that is neither keeled nor serrated. The carapace is black and usually each scute has tan to yellow irregularly shaped spots or slightly radiating lines. The plastron is yellow with a large, dark blotch at the outer posterior corner of each major scute. The top and sides of the head are blue gray with a bright yellow chin and neck (Ernst and Lovich 2009).

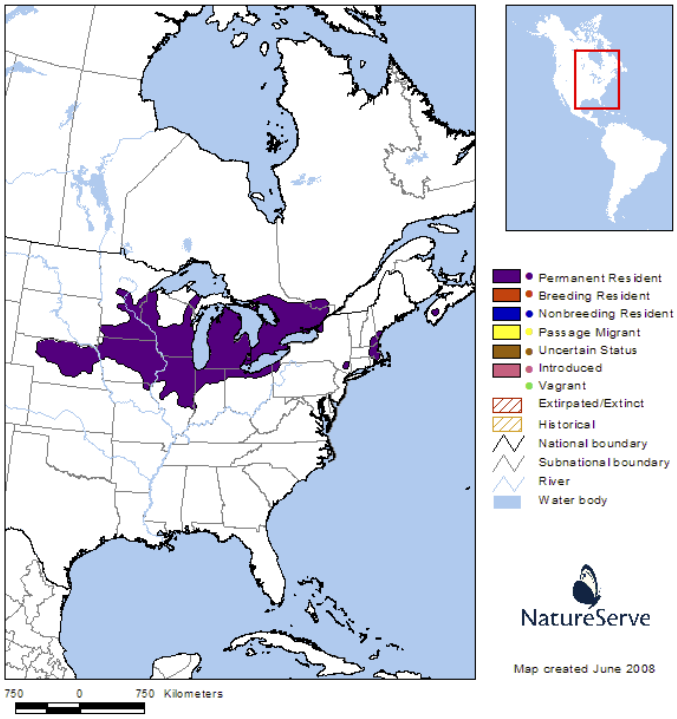
The species *blandingii* has generally been placed in *Emydoidea* in recent years, but has also been argued to belong in the genus *Emys*, based on molecular phylogeny results (van Dijk 2010q).

Distribution

Blanding's turtles are found in Canada and the United States. The species is distributed disjunctly from southeastern Ontario, adjacent Quebec, and southern Nova Scotia, south into New England, and west through the Great Lakes region to western Nebraska, Iowa, and extreme northeastern Missouri (Congdon et al. 2008).

With the exception of two populations in the western portion of their range (Minnesota and Nebraska), populations are frequently small, discontinuous, and often isolated (Congdon et al. 2008).

NatureServe (2011) provides the distribution map below.



Blanding's turtle (*Emydoidea blandingii*)

Habitat

In general, Blanding's turtles occupy a variety of eutrophic wetlands such as swamps, marshes, beaver dams, ponds, and slow moving streams. Blanding's turtles frequently emerge from water to bask on logs and tussocks, or sedge clumps (Congdon et al. 2008). Blanding's turtles nest in well-drained soils with low vegetation cover near wetlands (Congdon et al. 2008).

Blanding's turtle habitat also has a large terrestrial component that consists of nesting areas and movement corridors. The terrestrial component of the core habitat is larger than that of many other aquatic turtle species, and both sexes use terrestrial corridors for movements among wetlands and for nesting migrations (Congdon and Keinath 2006).

Biology

The biology of Blanding's turtles gives them a slow rate of potential recovery and makes them particularly susceptible to disturbance (Congdon and Keinath 2006; van Dijk 2010q). First, Blanding's turtles have temperature-dependent sex determination and some populations have biased adult sex ratios (e.g., a population in southeastern Michigan has an adult sex ratio close to 1 male to 4 females) (Congdon and Keinath 2006). Second, reproductive output of Blanding's turtles is low. Females do not begin to reproduce until they are between 14 and 20 years old, do not reproduce every year, and have small clutch sizes, thus resulting in low fecundity. This means that annual survivorship between ages 1 and maturity must average at least 60 percent to maintain population stability (Congdon and Keinath 2006). Third, Blanding's turtles are long-

lived (even compared to other turtles), and older females appear to have higher survivorship and reproductive output than do younger females. Blanding's turtles have been known to reach 77 years in the wild (Ernst and Lovich 2009). This places primary reproductive importance on a small segment of the population, and because potential reproductive life spans are longer than generation times, it increases the likelihood of inbreeding in isolated populations (Congdon and Keinath 2006).

Having delayed age at maturity, low reproductive output and extreme longevity makes this turtle highly vulnerable to increased rates of mortality of adults (COSEWIC 2009; van Dijk 2010q).

Population Status

Blanding's turtles have suffered extensive slow declines of most of its populations from habitat loss and direct removal, accidental mortality and increased predation (van Dijk 2010q). Some populations appear stable over time, while others are documented as declining (Smith et al. 2006).

Blanding's turtles are secure in Nebraska, and they range from being vulnerable to threatened, or endangered throughout most of the rest of their distribution (Congdon and Keinath 2006). The largest population of Blanding's turtles presently known is on the Valentine National Wildlife Refuge in north central Nebraska, which consists of about 130,000 individuals (Lang 2004). The next largest population exists at Weaver Dunes in southeastern Minnesota, which consists of 2,500-4,600 individuals (Pappas et al. 2000).

In Canada, two populations of Blanding's turtles are recognized: Nova Scotia and Great Lakes. The three small subpopulations of this species found in central southwest Nova Scotia total fewer than 250 mature individuals. Although the largest subpopulation occurs in a protected area, its numbers are still declining. The other subpopulations are also susceptible to increasing habitat degradation, mortality of adults and predation on eggs and hatchlings (COSEWIC 2009). The Great Lakes/St. Lawrence population of this species although widespread and fairly numerous is declining (COSEWIC 2010).

Threats

Blanding's turtles are suffering from degradation of wetlands and the terrestrial portion of their core habitat. Destruction of resident aquatic habitat is of primary conservation concern because it impacts all stages of the life cycle. Reduction in the numbers of such wetlands can increase risks of mortality for adults and reduce hatchling recruitment into populations. Cultivation to the edge of wetlands and the use of fertilizers, pesticides, and herbicides that wash into wetlands can degrade aquatic habitats. Water management activities related to fish management and agriculture can be detrimental to overwintering Blanding's turtle populations if they are conducted during winter (Congdon and Keinath 2006; see also Levell 2000; Ashley & Robinson 1996).

Subpopulations are increasingly fragmented by the extensive road network that crisscrosses all of this turtle's habitat, and Blanding's turtles have been reported as being impacted by road mortality (van Dijk 2010q). Nesting females are especially susceptible to roadkill because they often attempt to nest on gravel roads or on shoulders of paved roads (Congdon and Keinath 2006). Loss of mature females in such a long-lived species greatly reduces recruitment and long-term viability of subpopulations.

The pet trade is another serious ongoing threat (COSEWIC 2009; van Dijk 2010q). In conjunction with their extended longevity and long reproductive lives, collection of adults, juveniles, and hatchlings from small and isolated populations for the pet trade can result in severe reductions and extirpation of populations (Congdon and Keinath 2006).

Utilization and Trade

Blanding's turtles are not consumed and occur in the commercial pet trade at relatively low but persistent numbers in recent years (van Dijk and Rhodin 2010). The species is the second commonest turtle in bycatch of commercial trapping of snapping turtles using baited traps and a ready market exists (van Dijk and Rhodin 2010). 329 Blanding's turtles were exported from the United States between 1989 and 1997 (Franke and Telecky 2001). Available trade data show that trade in wild caught Blanding's turtles is minimal, however, with just 6 traded from 2006-2010. It is possible that many wild caught Blanding's turtles are falsely reported as captive stock. As populations of wood turtles and box turtles become depleted, pet collectors may shift their attention to Blanding's turtles. Lovich observed more than 50 Blanding's turtles in the collection of a Georgia turtle dealer in the 1980s (Ernst and Lovich 2009).

Legal Status

The Blanding's turtle is protected by statute in several states but no federal protection exists. In Minnesota, Wisconsin, Illinois, Indiana, Maine, Massachusetts, New Hampshire, and New York, it is protected as "endangered" or "threatened" (MN DNR 2011; WI DNR 2011; Illinois Endangered Species Protection Board 2011; Indiana Dept. of Natural Resources 2011; Maine Dept. of Inland Fisheries and Wildlife 2010; Massachusetts Dept. of Fish and Game 2008; New Hampshire Fish and Game 2008; New York Dept. of Environmental Conservation 2011). It is a species of special concern in Pennsylvania (Pennsylvania Natural Heritage Program 2011). It has no special status in Michigan, Nebraska, Ohio, South Dakota, and Iowa (Nebraska Game and Parks 2009; Iowa DNR 2009a; Michigan DNR 2009; Ohio Dept. of Natural Resources 2010; South Dakota Game, Fish, and Parks 2010).

The Committee on the Status of Endangered Wildlife in Canada recognizes two populations of Blanding's turtle. Since May of 2005, the Nova Scotia population is listed as endangered and the Great Lakes population is listed as threatened (COSEWIC 2009).

Summary

The Blanding's turtle is threatened by habitat loss and by harvest for the pet trade but is not listed under CITES. Listing these species under CITES would require adequate documentation and ensure that trade is consistent with their survival.

IV. The Diamondback Terrapin Should Be Included In Appendix II

The IUCN/SSC Tortoise and Freshwater Turtle Specialist Group recommended that the United States propose to the CoP15 the diamondback terrapin (*Malaclemys terrapin*) for inclusion in Appendix II because the species is "documented to be vulnerable to over-exploitation" and has an "intrinsically slow capacity to recover." *See* 74 Fed. Reg. 57190 (Nov. 4, 2009). Additionally, the diamondback terrapin was recommended for inclusion in Appendix II by the Conservation, Status & Monitoring Working Group that the FWS convened during the September 2010 conference entitled "Conservation and Trade Management of Freshwater and Terrestrial Turtles in the United States" (USFWS 2010).

IUCN Draft Red List Status: Vulnerable (van Dijk and Rhodin 2010).

Species Description and Taxonomy

The diamondback terrapin (*Malaclemys terrapin*) is the only species of turtle that resides exclusively in salt marshes (Guillen et al. 2011). It is a small to medium sized turtle characterized by concentric markings and grooves on the vertebral and pleural scutes and gray to black skin with dark blotches or stripes. The brown to black carapace is oblong and its posterior marginals may be curled slightly upward and slightly serrated. A vertebral keel is present that may be low and inconspicuous or knobby and prominent. The plastron is variable in color ranging from yellow to green to black (Ernst and Lovich 2009, p. 344). Terrapin eggs are pinkish white, dimpled and leathery (Ernst and Lovich 2009, p. 354).

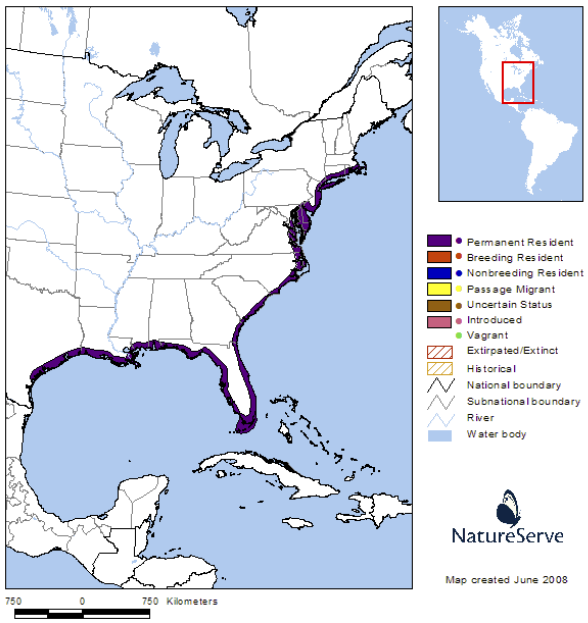
Seven subspecies are recognized. There is a high level of individual variation in this species, and some individuals of a particular subspecies may resemble those of other subspecies. The validity of at least some subspecies is questionable (see Ernst and Bury 1982; Palmer and Braswell 1995). Mitochondrial DNA genotypic diversity and divergence levels are exceptionally low among putative subspecies (Lamb and Avise 1992). Further study of geographic variation in these turtles is needed.

Diamondback terrapin (*Malaclemys terrapin*)

Distribution

The diamondback terrapin is native to the United States and is found along the Atlantic Coast of the eastern United States from Cape Cod, Massachusetts, to the Florida Keys and west along the Gulf Coast to Corpus Christi Texas (Ernst and Lovich 2009, p. 345). The coastline of Florida represents about 20 percent of the entire range (Butler et al. 2006). An island in New York is one of the largest nesting populations observed anywhere in the range, with over 2000 nests observed in one year (Feinberg and Burke 2003).

NatureServe (2011) provides the following distribution map.



Diamondback terrapin (*Malaclemys terrapin*)

Biology

The species is characterized by delayed female maturation, small clutch size, low recruitment and low neonate survivorship, high site fidelity and limited dispersal, and habitat specialization. These life history traits – that are shared by almost all turtles – make them bad candidates for unregulated commercial harvest (Roosenburg 2010). Sexually mature in about 3-6 years in South Carolina (Lovich and Gibbons 1990); males in 2-3 years, females in 4-5 years on the Atlantic coast of Florida (Seigel 1984). An excellent summary of the natural history of diamondback terrapins is provided by Brennessel (2006).

Habitat

The diamondback terrapin is a resident of coastal salt marshes, mangrove thickets, shellfish beds, estuaries, bays, and tidal creeks. Tides play a major role in habitat selection (Ernst and Lovich 2009, p. 346). The general sites selected for nesting are located in areas above high tide with minimal erosion (Ernst and Lovich, p. 354).

Population Status

The diamondback terrapin occupies a large coastal range, but the status of the species differs in various areas throughout its range and adequate data on population trends are not available for most of the range (Seigel and Gibbons 1995). The species is considered vulnerable due to observed population decline resulting from over harvesting, accidental mortality, habitat loss, and human-subsidized predation (van Dijk and Rhodin 2010). NatureServe (2011) estimates that the total population size exceeds 100,000.

Several cases of terrapin population declines have been well documented based on scientific studies conducted both before and after the declines occurred (Ernst and Lovich 2009, p. 362). Subpopulations for which long-term data are available show significant observed declines in population size and/or changes in population structure over the last 20 years (Wood and Herlands 1997; Gibbons et al. 2001; Avissar 2006; Szerlag and McRobert 2006; Dorcas et al. 2007).

For example, detailed population studies of terrapins in South Carolina recorded a decline in part of the study area coincident with the construction of a public boat dock, which gave the public access to the salt marsh for recreational crab trapping (Gibbons et al. 2001). The virtual disappearance of terrapins from the area provided circumstantial evidence of the impact of crab trapping. In Georgia, one abandoned crab pot contained 94 dead diamondback terrapins (Grosse et al. 2009).

While it is not possible to determine a range-wide percentage of decline over specific time periods, declines as steep as 75 percent over a 20-year period have been observed. Based on this information, past range-wide declines over three generations at 30 percent would be a minimum, which is concerning given that most factors driving population decline continue to act (van Dijk and Rhodin 2010). Benton (1996) discusses the decline of diamondback terrapins in some detail.

Threats

The species appears to be primarily threatened by loss of nesting habitat, human harvest, and incidental mortality in crab pots (Ernst and Lovich 2009, p. 361; Roosenburg 2010). Other threats include motor boat impacts, road mortality, and predation by raccoons (Seigel and Gibbons 1995).

The species was considered a gourmet food in the late nineteenth century and early twentieth century and was exploited until its numbers fell to levels that would not support commercial harvest (Carr 1952). Thereafter many natural populations began to recover from years of overharvesting; the fact that their habitat remained intact aided their ability to rebound. Terrapins are still exploited for food in the United States and for the pet trade in the larger market of Asia (Ernst and Lovich 2009, p. 361). Harvest of adult breeding stock from the wild to supply commercial farming operations could have serious consequences over the long term (van Dijk and Rhodin 2008).

Much of the mortality of terrapins occurs in crab traps. Although commercial crab traps kill terrapins, recreational crab traps may be a greater threat to terrapin populations because they are often set in areas where turtles are more concentrated and traps are more likely to be left unattended for long periods (Hoyle and Gibbons 2000; Roosenburg 1992).

Coastal development and pollution is also a threat to diamondback terrapins. Such habitat degradation destroys its feeding grounds, extirpates its shellfish prey, makes its habitat more suitable to raccoons, and makes nesting beaches unsuitable (Ernst and Lovich 2009, p. 362).

Utilization and Trade

Historically, overharvest was a major threat to the species, with many of the diamondback terrapin populations, especially those near coastal metropolitan areas, being nearly extirpated by the 1930s (see, e.g., van Dijk and Rhodin 2008). Even today, the diamondback terrapin is prized both in the pet trade and as food along the eastern coast of the United States. The Texas Diamondback terrapin (*M.t. macrosplita*), for example, sells online for $125 each (http://www.faunaclassifieds.com/forums/showthread.php?p=941627).

Harvesting by indigenous people and the Asian population for meat is a major threat in Texas; under current Texas regulations unlimited take is allowed with a current Texas hunting or fishing license (NatureServe 2011). Substantial unregulated harvest exists in Chesapeake Bay; undetermined numbers of terrapins are transported across state lines for resale in the urban Asian seafood markets in the northeastern United States, chiefly New York City. Growth of U.S. urban Asian market consumption of turtles is on the rise and expected to accelerate in the near future.

Live specimens of the species are traded internationally for consumption and the pet trade. More than 10,000 specimens were exported from the United States between 2005 and 2008. As for wild caught diamondback terrapins, 4646 were exported from 2006-2008. According to trade data, no wild caught diamondback terrapins were exported from 2009-2010.

Again, it is likely that many wild caught specimens are falsely reported as captive bred. In addition, eggs and juveniles are often captured from the wild and raised and then reported as captive bred.

Legal Status

All 16 range States in the United States regulate the harvest of diamondback terrapins; 9 States prohibit harvest from the wild and 7 allow it (of which 4 allow harvest from the wild for commercial purposes). For example, harvest is restricted in Louisiana (Louisiana Department of Fisheries and Wildlife 2011). Harvest of diamondback terrapins is prohibited in Maryland (van Dijk and Rhodin 2008).

The diamondback terrapin is protected as a threatened or endangered species in Massachusetts and Rhode Island (Massachusetts Dept. of Fish and Game 2008; Rhode Island Dept. of Environmental Management 2006). It is a species of special concern in Georgia, North Carolina, and Virginia (GA DNR 2008; North Carolina Wildlife Resources Commission 2008; Virginia Dept of Game and Inland Fisheries 2009.).

Summary

The diamondback terrapin is threatened by habitat loss and by harvest for the pet trade but is not listed under CITES. FWS records are inadequate to determine the sources involved in this trade, which makes it difficult to monitor the impact on wild populations. Listing these species under CITES would remedy this situation by requiring adequate documentation and by ensuring that trade is consistent with their survival.

A SPECIES FOR INCLUSION IN APPENDIX III

Inclusion of a species in Appendix III is a unilateral decision and does not require a proposal to be brought forward to the Conference of Parties. But the Center wishes to take this opportunity to encourage the U.S. to list the common snapping turtle on Appendix III. Listing of the common snapping turtle in Appendix III would provide federal oversight of international trade in this species, helping to ensure that exported specimens are legally obtained and that live specimens are prepared and shipped so as to reduce the risk of injury, damage to health, or cruel treatment. *See* 75 Fed. Reg. 54580 (providing summary of the benefits of Appendix III listing). Over time, this data will provide greater insight into actual trade levels, which are currently not well understood in the absence of regulation. Such information will be useful in clarifying whether or not the species meets the criteria for inclusion in Appendix II.

I. The Common Snapping Turtle (*Chelydra serpentina*) Should Be Included In Appendix III

Common snapping turtles are harvested in large numbers both for food and for the pet trade. Much of the market is domestic, but international trade involving the United States is increasing. In 1999, the FWS concluded that the species did not appear to qualify for listing in Appendix II, given the general abundance of the species throughout most of its range. 64 Fed.

Reg. 36910 (July 8, 1999). Since then, the species has been subjected to increased trade and has suffered local or regional population declines and depletions from overharvest. Regulation under Appendix III would allow the gathering of information needed to assess whether listing in Appendix II might be warranted.

The IUCN/SSC Tortoise and Freshwater Turtle Specialist Group recommended that the United States include the common snapping turtle in Appendix III of CITES. The Specialist Group stated that extensive trade of adult turtles coupled with a lack of consistency in state regulations is causing localized population depletions, particularly at the periphery of the species' range.

IUCN Red List Status: Least concern (van Dijk 2010c).

Species Description and Taxonomy

The common snapping turtle is a large mostly aquatic turtle, weighing as much as 50 lbs. It has a hard shell, often with attached mud or algae. The rear edge of upper shell is saw-toothed with a crest of large bony scales. Its tail bears longitudinal rows of serrated scales and is as long as or longer than carapace, and its head is large, with hooked jaws. It has strong limbs with webbed toes and strong claws. The skin color is variable from black or yellow to tan and usually without a pattern (Ernst and Lovich 2009, p. 113-14). The upper shell of adults is relatively smooth but juveniles have three longitudinal ridges on the carapace. Eggs have shells that are moderately pliable with visible pores (Hammerson 1999).

Common Snapping Turtle (*Chelydra serpentina*)

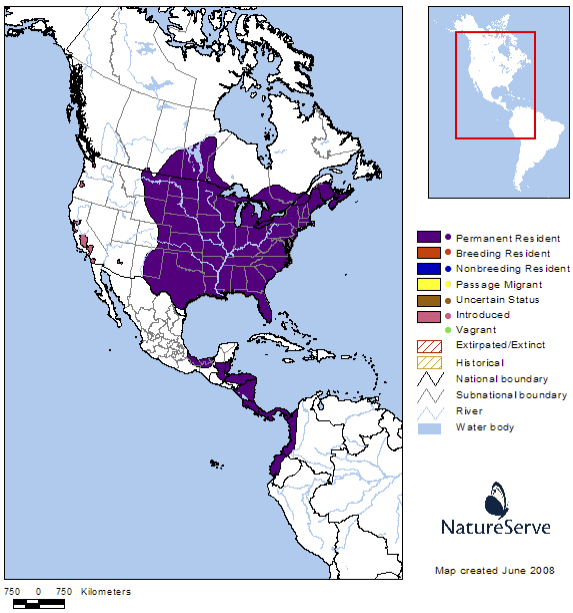
This species represents one of only two living genera (each with one living species) in the family. Two subspecies (*Chelydra serpentina serpentina* (Linnaeus, 1758) and *C. s. osceola* Stejneger, 1918) were recognized until *osceola* was synonymized with *serpentina* by Shaffer *et al*. (2008), based on lack of significant genetic differentiation. Phillips *et al.* (1996) removed the

former subspecies *rossignoni* and *acutirostris* by elevating these to the species level, based on genetic differentiation (van Dijk 2010c).

Distribution

The common snapping turtle is a wide-ranging species occurring in the United States, Canada, throughout Mexico, and as far south as Ecuador. Its range extends from southern Alberta eastward across southern Canada to Nova Scotia, and southward east of the Rockies to the Gulf Coast and through Mexico and Central America to northern South America (though apparently absent from most or all of northern and central Mexico) (NatureServe 2011). Snapping turtles have been introduced in several places in the West, including California (Spinks et al. 2003).

NatureServe (2011) provides the following distribution map.



Common Snapping Turtle (*Chelydra serpentina*)

Biology

The species is characterized by delayed female maturation, relatively low fecundity, low recruitment, and long generation times. Snapping turtles commonly experience low reproductive success due to extensive predation on their eggs, but females produce large clutches and may live and reproduce for several decades, so they usually produce offspring that join the breeding population (NatureServe 2011). Age of sexual maturity varies by locality. For example, females are sexually mature at 10-20 years in Ontario (later in north than in south) (Congdon et al. 1994). In Algonquin Park, the probability of a Snapping Turtle embryo surviving to sexual maturity is less than 0.1% (COSEWIC 2008). Active adult Snapping Turtles have few predators other than

humans, but in some localized cases, mammalian predators have developed techniques for preying upon hibernating adults.

In Michigan, snapping turtles were intensively trapped for 2-3 years in the 1980s, which greatly reduced populations. By 2009, populations were approaching pre-impact levels, suggesting a 25-30 year recovery period after depletion (van Dijk 2010c).

Habitat

Snapping turtles occupy all types of freshwater habitats (streams, lakes, reservoirs, ponds, marshes, swamps), especially those with soft mud bottoms and abundant aquatic vegetation or submerged brush and logs (Ernst and Lovich 2009, p. 115). They occur in brackish water in some areas.

The snapping turtle is one of the more aquatic species of turtle, spending most of its time lying on the bottom of some deep pool or buried in the mud in shallow water with only its nostrils and eyes exposed (Ernst and Lovich 2009, p. 116). Sometimes they bask out of water, especially younger individuals in the far north. The species exhibits good tolerance of altered habitats (NatureServe 2011).

Hibernation occurs singly or in groups in streams, lakes, ponds, or marshes; in bottom mud, in or under submerged logs or debris, under overhanging bank, or in muskrat tunnel; often in shallow water; sometimes in anoxic sites (Brown and Brooks 1994).

Nesting occurs in soft soil in open areas, often hundreds of meters from water (up to 181 m from permanent water in Michigan, Congdon et al. 1987), sometimes in muskrat houses.

Population Status

NatureServe (2011) estimates 10,000 to >1,000,000 individuals. The species is usually common where it is found. The population trend is stable overall but local depletions occur due to urbanization and excessive harvest. Population recovery potential is low, due to a lack of an effective density-dependent response in reproduction and recruitment (Brooks et al. 1991). Some populations cannot withstand even minimal exploitation without undergoing a decline in numbers (Brooks et al. 1988). Life-history models indicate that only slight increases (0.1) in annual adult mortality rate (such as from road mortality or harvesting) will cause a population to be halved in under 20 years (COSEWIC 2008). While local declines have been documented, the species has not reached a 30 percent decline over 50 years (van Dijk 2010c).

Threats

Not significantly threatened overall, though urbanization and excessive harvest has local impacts (NatureServe 2011; van Dijk 2010c). Females are especially susceptible during nesting season, as crossing roads exposes them to injury and death from automobile strikes and makes them easy prey for humans who take them for food (Ernst and Lovich 2009, p. 113). Other threats include water pollution, drainage of water bodies, water impoundment and

channelization, and development leading to increased raccoon populations (Ernst and Lovich 2009, p. 137).

Utilization and Trade

The common snapping turtle is widely exploited for local, subsistence collection, as well as commercial trade for local, national, and international consumption (van Dijk 2010c). The flesh of the snapping turtle is eaten throughout its range and a soup can be made from it (Ernst and Lovich 2009, p. 137). Collection for human consumption has decimated some populations (Harding and Holman 1990; Tucker and Lamer 2004).

In the United States snapping turtle is sold at Asian seafood markets and Asian restaurants. Juvenile snapping turtles sell online for $30 plus $40 shipping (http://www.reptilestogo.com/For_Sale_Common_Snapping_Turtle_Baby.htm). Adult snapping turtles sell for over $200 each online (http://turtleshack.com/store/index.php?main_page=product_info&cPath=1_95&products_id=444).

Collection of snapping turtles from the wild and captive production in turtle farms for export to East Asia increased substantially in recent years, from about 10,000 animals declared as exported from the United States in 1999 to over 600,000 annually in recent years (LEMIS database - total recorded export numbers: 1999 – 10,053; 2000 – 18,486; 2001 – 38,911; 2002 – 63,644; 2003 – 129,683; 2004 – 141,544; 2005 – 316,500; 2006 – 377,408; 2007 – 316,093; 2008 – 558,491; 2009 – 655,541) (van Dijk 2010c; Weissgold 2010). Common snapping turtles are second only to red-eared sliders in terms of number of live individuals exported each year (Moll 2010).

As for wild caught live common snapping turtles, nearly 200,000 were exported from 2006-2010. In 2010 alone, over 32,000 wild caught live snapping turtles were exported, including one shipment to China of 20,000 live wild caught common snapping turtles.

Carefully managed sport harvests of some populations may be sustainable, but "commercial harvests will certainly cause substantial population declines" (Congdon et al. 1994).

Legal Status

Capture of the species from the wild is prohibited in some states, including Michigan and New York (van Dijk 2010c). But many U.S. states within the range of snapping turtles regulate the harvest for commercial and personal use (including Alabama, Maryland, Texas) or allow unlimited commercial take (Iowa, Kentucky, Missouri, Ohio, South Carolina, and Tennessee) (Nanjappa 2010). The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) lists the common snapping turtle as a "special concern" species (COSEWIC 2009).

Summary

The United States should include the common snapping turtle in Appendix III because there are regulations in place to prevent or restrict exploitation and to control trade, but the cooperation of other Parties is needed to control illegal trade. *See* 50 C.F.R. § 23.90(c).

CONCLUSION

The Center for Biological Diversity has reviewed available information on the status of freshwater turtles in the United States and has determined that several species warrant listing in CITES Appendix II. The alligator snapping turtle and map turtles are currently listed on Appendix III but need to be listed under Appendix II to ensure their survival. The softshell turtles, spotted turtle, Blanding's turtle, and diamondback terrapin also need to be listed under Appendix II because they are being imperiled in part by commercial trade. Regulation of trade under Appendix III is needed for the common snapping turtle because this species is facing local and regional population declines due to intensive commercial trade and would benefit from the mandatory reporting requirements that such a listing would provide.

We hope these comments have provided useful information to the FWS, and we appreciate the opportunity to have these comments taken into consideration. Please do not hesitate to call me with questions or concerns.

Sincerely,

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