

CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES  
OF WILD FAUNA AND FLORA



Nineteenth meeting of the Conference of the Parties  
Panama City (Panama), 14 – 25 November 2022

CONSIDERATION OF PROPOSALS FOR AMENDMENT OF APPENDICES I AND II

A. Proposal

Transfer of Genus *Apalone* spp. (Except the subspecies included in Appendix I) to Appendix II, in accordance with Article II, paragraph 2 (a) of the Convention and Resolution Conf. 9.24 (Rev. CoP17), Annex 2a as per:

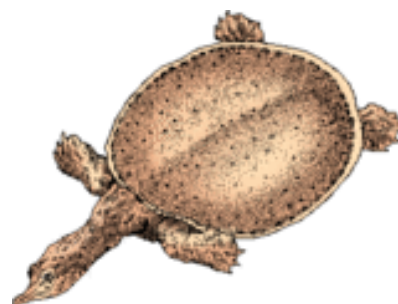
- a) Criteria A. It is known, or can be inferred or projected, that the regulation of trade in the species is necessary to avoid it becoming eligible for inclusion in Appendix I in the near future; and
- b) Criteria B. It is known, or can be inferred or projected, that regulation of trade in the species is required to ensure that the harvest of specimens from the wild is not reducing the wild population to a level at which its survival might be threatened by continued harvesting or other influences.

B. Proponent: United States of America\*

C. Supporting statement

1. Taxonomy

- 1.1 Class: Reptilia
- 1.2 Order: Testudines
- 1.3 Family: Trionychidae (Gray 1825)
- 1.4 Genus: *Apalone* (Rafinesque, 1832)
  - Species: *Apalone ferox* (Rafinesque, 1832 1817)
  - Apalone mutica* (LeSueur, 1827)
  - Apalone spinifera* (LeSueur, 1827)



(Note: *Apalone spinifera atra* which is currently in Appendix I is not considered in this proposal and remains unchanged) as defined in the standard nomenclature reference for turtles, Fritz & Havas (2007)

\* The geographical designations employed in this document do not imply the expression of any opinion whatsoever on the part of the CITES Secretariat (or the United Nations Environment Programme) concerning the legal status of any country, territory, or area, or concerning the delimitation of its frontiers or boundaries. The responsibility for the contents of the document rests exclusively with its author.

## 1.5 Scientific synonyms:

*Testudo loveridgii* Boulenger, 1920

|                   |          |                              |
|-------------------|----------|------------------------------|
| 1.6 Common names: | English: | Softshell Turtle*            |
|                   | Spanish: | Tortugas de caparazón blando |
|                   | French:  | Tortues à carapace molle     |

\* the specific common names of the 3 softshell turtles are Florida Softshell Turtle (*Apalone ferox*); Smooth Softshell Turtle (*Apalone mutica*); and Spiny Softshell Turtle (*Apalone spinifera*)

## 2. Overview

Turtles and tortoises are characterized by low annual fecundity, high rates of nest mortality, delayed maturity, high post-nest emergence survivorship, and longevity (AFWA 2020). While these life history traits lend themselves to population stability, they constrain the ability of turtle and tortoise species to respond to exploitation, ultimately creating long-term negative impacts for any degree of over-harvest (Ernst and Lovich 2009, AFWA 2020). Due to their sensitivity to unregulated trade, freshwater turtles and tortoises have been globally included in CITES since its inception in 1975. As of 2020, 37 freshwater turtles and tortoise species were included in Appendix I, 121 species in Appendix II, and 25 species in Appendix III.

Softshell turtles comprise the family Trionychidae and are characterized by a tubular snout, long neck, and a flat leathery shell with a flexible margin (Meylan 2006). Extant species belonging to Trionychidae can be found in North America, Asia, and Africa (Meylan 2006). There are 16 genera total (Meylan 1987). The genus *Apalone* is found in the Western Hemisphere and is one of the least studied softshell turtle genera in North America (Lovich and Ennen 2013, Meylan 2006).

This proposal focuses on three Trionychidae species in the genus *Apalone* native to the United States, Canada, and Mexico that are currently included in CITES Appendix III (see Annex 1). The southeastern United States is one of three prominent global areas of high turtle and tortoise species richness (TTWG 2021). An IUCN Red List Assessment for the three species outlined in this proposal (*Apalone ferox* [Least Concern], *Apalone mutica* [Least Concern], *Apalone spinifera* [Least Concern]) was done in 2010 and is currently outdated. Since the Appendix III inclusion, CITES data exports had increased prior to the pandemic and demonstrate a growing demand. While these species can be bred in captivity, they are easily caught and trapped in the wild, and it remains unknown if the supply can meet the current commercial demand, thereby, making wild populations vulnerable to over-exploitation.

Globally, freshwater turtles are harvested for food, used in traditional medicine, and traded internationally as pets (AFWA 2020). Unfortunately, turtle harvesting follows a "boom-and-bust" pattern in which populations of species in one area become decimated or restricted, and similar species in a different area subsequently follow suit (Fig.1). For example, populations of softshell turtle species in Asia were over-harvested, resulting in population loss and CITES trade restrictions in 2013. Subsequently, softshell turtle species from Africa were next targeted, until they too suffered substantial population loss and were given increased protection from over-exploitation by CITES in 2017. An increase in trade in North American softshell turtles was anticipated, and several *Apalone* species were included in Appendix III in 2016. These species now qualify for inclusion in Appendix II under Annex 2a, Criteria A because it is known, or can be inferred or projected, that the regulation of trade in the species is necessary to avoid it becoming eligible for inclusion in Appendix I in the near future; and Criteria B because it is known, or can be inferred or projected, that regulation of trade in the species is required to ensure that the harvest of specimens from the wild is not reducing the wild population to a level at which its survival might be threatened by continued harvesting or other influences. Transfer to CITES Appendix II would complement State and other domestic measures and ensure that specimens entering international trade were acquired sustainably as well as legally and will not be detrimental to the survival of the species.

## 3. Species characteristics

### 3.1 Distribution

The species of *Apalone* for which this proposal seeks inclusion in Appendix II occur in the following range states and areas:

*Apalone ferox* is found in the vicinity of Charleston, South Carolina, and from southern Georgia down to Mobile Bay in southern Alabama and throughout Florida (Iverson 1992, Meylan 2006, Webb 1973). The species can also be found in the Florida Keys but is not native to the area (Ernst and Lovich 2009).

*Apalone mutica* is found in the Ohio and the Missouri River drainage systems as well as the Mississippi watershed in Alabama, Arkansas, the panhandle of Florida, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Minnesota, Mississippi, Missouri, Montana, Nebraska, North Dakota, Ohio, Oklahoma, South Dakota, Tennessee, Texas, West Virginia, and Wisconsin (Ernst and Lovich 2009, TTWG 2021, K. Buhlmann – University of Georgia, pers. comm.). An isolated population in New Mexico occupies the Canadian River drainage (Ernst and Lovich 2009). While once present in Pennsylvania's Allegheny River, it has since been extirpated (Ernst and Lovich 2009, TTWG 2021). The species has been introduced in France (Ernst and Lovich 2009).

*Apalone spinifera* has the largest distribution of the three species and is found in the United States in western New York and Pennsylvania, and west ward towards North and South Dakota, Montana, Nebraska, and Wyoming. Its distribution extends southward to North Carolina, South Carolina, and Georgia, then west towards Arizona, covering Arkansas (Ernst and Lovich 2009). Isolated populations occur in Vermont, New Jersey, Colorado, California, Nevada, Utah, Hawaii, Virginia, and New Mexico, some of which have been the result of purposeful introductions (Ernst and Lovich 2009). In addition to the United States, *A. spinifera* can be found in Lake Champlain and the Ottawa River in Québec and Ontario, Canada, as well as in Chihuahua, Coahuila, Tamaulipas, and Nuevo León Mexico and the Rio Grande River (C. Sol Guerrero Ortiz – CITES Scientific Authority of Mexico, pers. comm.) (subspecies *Apalone spinifera atra*, already included in CITES Appendix I and not under consideration in this proposal), and France (Lemos-Espinal et al. 1999, Ernst and Lovich 2009).

### 3.2 Habitat

These freshwater turtles are highly aquatic. *A. ferox* and *A. spinifera* both use most freshwater habitat types, but *A. ferox* prefers shallower still waters and can also be found in brackish waters due to its tolerance of moderate salinity (Crenshaw and Hopkins 1955, Neill 1958, Webb 1962, Ernst and Lovich 2009). *A. mutica* is restricted to riverine habitats with sandbars, and only occupies lakes during periods of flooding when they are connected to rivers (Williams and Christiansen 1981). All three species generally bury in sand or mud at the bottom of a water body and bask on banks, floating vegetation, rocks, logs, or on the water's surface (Duellman and Schwartz 1958). *A. mutica* does not bask any further than 1 m from the water and is known to spend longer periods of time underwater (Ernst and Lovich 2009). Males and juveniles are more likely to be found along shallow edges of sandbars while females frequently occupy deeper waters (Meylan 2006).

### 3.3 Biological characteristics

The three species outlined in this genus under consideration are primarily carnivorous, but can have variable diets that include plant matter, seeds, and fruits. *A. ferox* feeds primarily on snails, insects, fish, and crayfish, but may supplement its diet with clams, snakes, turtles, and birds, with the accidental ingestion of plants (Dalrymple 1977). Their presence in traps baited with chicken entrails or cut fish suggests that they may take advantage of scavenging opportunities (Jensen 1998). *A. mutica* is wide ranging with diets varying between populations. Insects dominate their diet, though fish, clams, millipedes, isopods, spiders, crayfish, adult frogs, young birds, mulberry, and cottonwood seeds have been reported (Meylan 2006, Ernst and Lovich 2009). Dietary data for *A. spinifera* is lacking but available information states that they are primarily carnivorous and feed on crayfish, fish, and insects (Meylan 2006, Ernst and Lovich 2009).

*A. ferox* females nest in sandy soils exposed to full sunlight from mid-March to early August in the southern portion of their range and June to July in the northern and western portions (Ernst and Lovich 2009). Mating occurs from March to May (Meylan et al. 2002). Nests are typically dug with the hind feet in sandy soil and disguised after the eggs are laid (Hamilton 1947, Ehrenfeld 1979). Females lay 2 to 7 clutches a year, with clutch size correlating with body size (Iverson and Moler 1997). Development takes an average of 76.4 days (Ernst and Lovich 2009). One study of 32 eggs calculated a hatching success rate of 81.25% (Heinrich and Richardson 1993). The oldest recorded specimen is 36 years and 8 months at the National Zoo in Washington, D.C. (Ernst et al. 1994, Slavens 1999).

*A. mutica* spends the winters buried underwater (Ernst and Lovich 2009). It is predominately aquatic, except during nesting season for females (Fitch and Plummer 1975). Males mature at 4 years and females at 9 (Ernst and Lovich 2009). Female clutch sizes can vary from 1 to 33 eggs, with an average of 6 to 8 eggs (Plummer 1976, Doody 1996), and up to 3 clutches laid yearly (Webb 1962, Meylan 2006). One study examining *A. mutica* in Louisiana found an 82% hatch rate and 75% nest survivorship rate (Ernst and Lovich 2009). It is likely that lifespan can exceed 20 years in the wild (Ernst and Lovich 2009).

*A. spinifera* is active from April to October throughout most of its range but may be active year-round in warmer climates (Ernst and Lovich 2009). Females nest in sandy areas and clutch sizes range from 3 to 39 eggs with 2 to 3 clutches laid per year (Webb 1962, Meylan 2006, Ernst and Lovich 2009). In Canada, egg survivorship percentages have been reported as 85%, 71%, and 31% for protected nests and 61% and 47% for unprotected nests (De Solla et al. 2003). The oldest specimen of *A. spinifera* was recorded at the Racine Wisconsin Zoo as a female that was 25 years old (Ernst and Lovich 2009).

Turtles have a life history strategy that entails slow growth and late maturity (typically 9 to 15 years) and longevity (can live 6 or more decades with generation times of 25 to 30 years). The key to species persistence for turtles is to reach sexual maturity, be long-lived, and produce enough eggs each year to ensure that sufficient individuals hatch and survive to the next generation (Ernst and Lovich 2009). However, turtles have one of the lowest clutch sizes relative to body mass and females do not reach maturity until approximately age 9 (Iverson 1985), making them more vulnerable to population crashes that take years to recover, if at all, post-harvest (Munscher et al. 2015, AFWA 2020, MDNR 2022). If turtles are compared to commonly managed large mammals (see Fig. 2), turtles are clearly vulnerable to significant harvest because of their life history traits.

### 3.4 Morphological characteristics

All species in the genus *Apalone* possess a tubular snout, long neck, and three clawed digits on webbed feet (Meylan 2006). Their shell is leathery and flat, with the plastron bones being reduced and the suprapygal and peripheral bones being completely absent (Meylan 2006). Females are larger in size and have smaller tails than males (Conant and Collins 1991, Meylan 2006).

*A. ferox* adults are dull in color with a gray, brown, or olive colored carapace, while juveniles are relatively darker with yellow stripes on the head that are lost with age (Ernst and Lovich 2009, Meylan 2006). Females are 3 to 5 times larger than males (Meylan 2006).

*A. mutica* is the smallest North American softshell turtle (Meylan 2006). As the name suggests, the species has a smooth anterior end of their carapace (Meylan 2006). Hatchlings, juveniles, and most adult males have a tan carapace with circular spots while adult females are tanner in color with less noticeable spots (Webb 1959). A light, black-bordered stripe extends from the neck and through the eye (Ernst and Lovich 2009). Males have longer foreclaws than females (Ernst and Lovich 2009).

*A. spinifera* is intermediate in size (Meylan 2006). The anterior margin of its carapace has pointed, small, distinct but soft, spines (Meylan 2006). Hatchlings, juveniles, and most adult males have a tan carapace with small dark dots (Meylan 2006). Parallel dark lines run along the posterior margin of the carapace towards the anterior end of the body, decreasing in number closer to the head (Meylan 2006). Females become a molted brown color in adulthood (Meylan 2006).

### 3.5 Role of the species in its ecosystem

Turtles play large roles in the energy flow, nutrient cycling, dispersal of vegetation, and water quality maintenance in riverine food webs. Softshell turtles often act as ecosystem scavengers (Moll and Moll 2004, Bonin et al. 2006), and consume a variety of species across numerous taxa and additionally provide food for predators at higher trophic levels than themselves both as eggs and as post-hatched turtles (Meylan 2006, Ernst and Lovich 2009). The ecological role of *A. ferox* is not well understood, which may be problematic for species management in determining the maintenance of adequate populations for harvest (Meylan 2006).

## 4. Status and trends

### 4.1 Habitat trends

The species under consideration in this proposal are largely found in river systems. Alterations, such as river training structures, levees, dams, and wing dikes can alter river hydrology and habitat (Alexander et al. 2012). For example, dams impact the immediate location where they are built (restricting access to nesting sites) as well as up-river and down-river habitats by altering water flow. Such alterations may drown nesting areas or change water clarity and the ability of turtles to ambush their prey. Anthropogenic changes of coastline habitat, such as rock revetment or the introduction of coarse rock rubble (riprap) can also limit access to turtle nesting sites (Witherington et al. 2011).

#### 4.2 Population size

Few population studies have been conducted on turtles in the Family Trionychidae. For most traded turtle species, populations size is inferred by the volume in trade and/or the prevalence of availability in food and pet markets. Unfortunately, neither of these data are readily available for *Apalone* softshell turtles. Only partial quantitative population estimates are available, with the best data available for *A. spinifera*.

The population size of *A. ferox* has not been quantified, but they are described as common (van dijk 2011a). Regardless of the seeming abundance of this species, common species are increasingly becoming uncommon over relatively short periods of time (Gibbons et al. 2000), and study sampling scheme may cause estimates to not be truly representative of population numbers (Bancroft et al. 1983).

Studies surrounding *A. mutica* have recorded densities of up to 1.2 individuals per linear meter and basking aggregations of up to 88 animals (Plummer 1977, Trauth et al. 2004). There have been anecdotal reports of declining populations (van Dijk 2011b).

The number of *A. spinifera* varies across their range (Ernst and Lovich 2009). Mature individuals in Canada total only 1,000, and populations are not considered secure, with the last population in Québec having fewer than 50 adult females (Galois et al. 2002, COSEWIC 2016). Reported numbers in the United States are area dependent. A marginal 0.4% of 2,201 turtles caught along a 296 km portion of the Missouri River from 1996 to 1998 were *A. spinifera* (Bodie and Semlitsch 2000). Similarly, less than 1% of 1,000 turtles collected near Jacob, Illinois were *A. spinifera* and 12.9% of total turtle captures were reported to be *A. spinifera* at a study site in Gallatin County, Illinois from 1994 to 1999 (Cagle 1942, Dreslik and Phillips 2005). In contrast, *A. spinifera* comprised 47% of 1,204 turtles trapped over the course of two years in Wisconsin (DonnerWright et al. 1999). One study noted that the species was more prevalent in streams with stronger currents (25 to 67%) than calmer ones (9 to 31%), suggesting that study site location and river conditions may impact population estimates (Cagle and Chaney 1950).

#### 4.3 Population structure

Female *Apalone* softshell turtles are larger than males (Ernst and Lovich 2009), potentially putting them at risk for greater harvest rates. For example, one study in Arkansas with a known turtle harvest of *A. spinifera* five years prior found entire larger sized cohorts of females missing, suggesting large scale removal of only certain sized females, leaving behind only smaller females and males who may not have reached sexual maturity (Massey 2021). One study in Apopka, Florida found a sex ratio of 1:2.6 for *A. ferox* (Munscher et al. 2015). Incubation temperatures (IT) between 27 to 33°C produced roughly the same number of males and females for *A. mutica* (Ernst and Lovich 2009). Sex ratios were also noted to be 1:1 in *A. spinifera* (Ernst and Lovich 2009), though some studies counter this conclusion. For example, one study found a ratio of 4:1 (DonnerWright et al. 1999) while another found a ratio of 0.49:1 (Barko and Briggler 2006).

#### 4.4 Population trends

Population trends are difficult to discern given the limited data available. Very few studies have been published on the population dynamics of *A. ferox* and changes in population numbers are unknown (Ernst and Lovich 2009, van Dijk 2011a). A study in Marion County found that the population of *A. ferox* declined from 14.2 to 0.2% of the total number of turtles collected from 1942 to 1990, which was then further noted to decline in 2003 (Huestis and Meylan 2004). There have been anecdotal reports of declining populations of *A. mutica* but broadly its population trend is also unknown (van Dijk 2011b). *A. spinifera* has been categorized as stable (van Dijk 2011c), but studies have postulated that populations have historically been declining (Lovich and Gibbons 1997). The longevity and advanced age of sexual maturity in turtle species can create a “lag time” in detecting population loss or extirpation, making overall trends appear stable despite large losses at local and regional levels (Tomillo et al. 2008). For example, the species was once common throughout

southern Ontario and Québec, Canada, but only distinct populations remained by the early 2000s (De Solla et al. 2003).

#### 4.5 Geographic trends

Some species have been locally extirpated from water ways and systems. For example, *A. mutica* was once present in Pennsylvania's Allegheny River, but is now absent (Ernst and Lovich 2009, TTWG 2021). Introductions of the species to non-native range areas has also occurred. *A. ferox* can now be found in the Florida Keys, and *A. mutica* as well as *A. spinifera* can be found in France (Ernst and Lovich 2009).

### 5. Threats

Turtle life history puts it at great risk for the detrimental effects associated with harvest. Even minor over-exploitation can have drastic negative impacts on species persistence. One study found that *A. mutica* and *A. spinifera* in Missouri could only be sustainably harvested when demographic rates were at their maximum, which is unlikely to occur in wild populations (Zimmer-Shaffer et al. 2014). Another found that harvests of *A. spinifera* in Arkansas had effects on populations that could be detected years after the initial harvest event (Massey 2021). Over-exploitation of adult turtles leads to too few eggs being laid to survive to maturity, while over-exploitation of eggs leaves too few hatchlings to survive to maturity. Several studies have provided evidence that loss of even 1 to 5% of adults from a population may result in negative population growth for turtle species (Doroff and Keith 1990, Congdon et al. 1993).

The global turtle trade follows a "boom-and-bust" pattern. Once one species is subject to regulations or depleted from the wild, other similar species are exploited for trade in a "boom" until, they too, "bust". For example, the early 2000s saw a peak in the turtle trade in Asia, followed by a crash from 2003 to 2005 and an increase in export numbers from North America, suggesting that exports from Asia decreased because of increased regulations on trade or collapse of wild populations (Luiselli et al. 2016, AFWA 2020). The three species outlined in this proposal are most exploited for the pet trade and to be consumed as food and may be at greater risk of over-exploitation since CITES protections for Asian and African softshell turtles increased at CoP16 and CoP17, respectively. Reports of North American softshell turtle species being poached in Florida to be sold to Asian markets have repeatedly surfaced (Robin des Bois 2014, FWC 2019).

Several additional threats further put these species at risk. Many of these are outlined in the species' IUCN assessments (van Dijk 2011a,b,c). However, these assessments are over 10 years old and more current ones are warranted. Nest predation by foxes, skunks, raccoons, bears, and fish crows is common for *A. ferox* (Hamilton 1947, Meylan 2006, Ernst and Lovich 2009). *A. mutica* nest predation is lower but has been attributed to the aforementioned species, as well as moles, canids, fire ants, and fly larvae (Plummer 1976, Ernst and Lovich 2009). *A. spinifera* also has lower rates of nest predation, but predation can occur even when nests are disguised or covered by snow (Parren et al. 2021). A study on annual sources of mortality from 1993 to 1994 and 2015 to 2016 for *A. mutica* and *A. spinifera* found that nest mortality was 62% in the latter and 26.8% in the former (Godwin et al. 2021). Smaller individuals may succumb to predation by raptors (Woodin and Woodin 1981). Predation of adults by alligators is also possible (Delany and Abercrombie 1986). The stressors associated with natural predation (biotic) and harvest by humans (abiotic) often do not operate independently but rather produce combined additive impacts, intensifying their negative outcomes and challenging the predictability of management (Vinebrooke et al. 2004).

Recreational activities such as ATV use and boating as well as commercial shipping can also cause turtle deaths (Heinrich et al. 2012). For example, ATVs were responsible for 32% of mortality events from 2015 to 2016 (Godwin et al. 2021). *Apalone* species are also subject to death via accidental by-catch by fishermen (Barko et al. 2004). For example, 2,584 turtles were captured via passive fishing techniques over 2,704 net-nights (118 of these being *A. muticus* and 50 being *A. spinifera*). Of those, 18 *A. muticus* and 18 *A. spinifera* died as a result, with fyke nets causing the highest levels of mortality (Barko et al. 2004). Flooding has previously been noted to be problematic for *A. mutica* and *A. spinifera*, often displacing nests and eggs (Plummer 1976, Doody 1996). *A. ferox* occasionally migrate over land and roadways, making them subject to road fatality (Steen et al. 2006).

Reduction in water quality may impact these species, with *A. mutica* likely being the most sensitive to such changes due to their high dependence on riverine habitats, followed by *A. spinifera* and lastly *A. ferox* (K.

Buhlmann – University of Georgia, pers. comm.). In addition, their longevity and trophic level put *Apalone* species at risk of pollutant bioaccumulation (Rowe 2008). *A. ferox* may be especially sensitive since they consume carrion and are subject to secondary poisoning (Ernst and Lovich 2009). One individual seen eating a DDT-killed bluegill was later found dead (Herald 1949). In contrast, contaminants (PCBs) did not appear to effect hatching success for *A. spinifera* in Canada (De Solla et al. 2003).

## 6. Utilization and trade

### 6.1 National utilization

The “boom-and-bust” pattern observed in the global turtle trade has also been observed within the United States. The demand for turtle meat in North America has historically been met using green sea turtle (*Chelonia mydas*) (Carr 1954). Harvest restrictions were placed on marine turtles when they declined due to over-exploitation which in turn increased demand for freshwater turtle species and, specifically, the alligator snapping turtle (*Macroclemys temminckii*) (Roman and Bowen 2000). Decimation of those populations led to most states banning trapping, thus forcing the market to exploit smaller and more common freshwater turtles, such as *A. ferox*, *A. mutica*, and *A. spinifera* (Roman and Bowen 2000, Meylan 2006). One study used molecular genetics to identify species from 32 meat samples purchased in Louisiana and Florida from 1995 to 1998 and found four of them to be *Apalone* species (Roman and Bowen 2000).

### 6.2 Legal trade

The softshell turtle trade can fit into four categories (Moler and Berish 1995). The first consists of hatchlings that enter the pet trade or establish turtle breeding farms overseas. The second consists of turtles larger than 3.5 to 4.5 kg that are butchered and sold as meat. The third consists of smaller turtles that are killed, frozen, and sold whole, while the fourth consists of turtles under 3 kg that are sold live. Commercial turtle farming has become a lucrative aquaculture business in the southeastern United States (Hughes 1999). For example, Florida aquaculture farms reported sales of approximately \$875,000 in 2018, a number which is likely much higher being that less than 33% of farm owners submitted information (USDA 2019). These farms can help to satiate demand via legal trade, though most require the capture of wild individuals for parental breeding stock and to increase genetic diversity. States vary on the legalities of harvest of wild softshell turtles for commercial means (see Section 8.3.2 Domestic). Quantifying the true levels of harvest is challenging, and sites of commercial breeding may not be where wild populations are being exploited (Ceballos and Fitzgerald 2004).

Softshell turtles are captured by dip-netting from boat (Bancroft et al. 1983), drift fence arrays (Aresco 2003), trotlines (Iverson and Moler 1997), hoop nets (Aresco 2009), and hand capture (Johnston et al. 2011). Populations that are harvested may take years to recover, if at all (AFWA 2020). One report estimated that 14,982 wild softshell turtles were harvested from 1990 to 1992 in Florida (Enge 1993). However, this number is likely higher given that 65 to 85% of harvest goes unreported (Enge 1993). A subset of 373 *A. ferox* were reported as entering the pet trade (Enge 1993). *A. spinifera* had only 59 specimens recorded as passing into the pet trade from the wild (Enge 1993).

Declared exports as recorded in the United States Fish & Wildlife Service Law Enforcement Management Information System (LEMIS) database show that 171,007 live *A. ferox* and 1,623 live *A. spinifera* were traded from 2016 to 2021 with declared values of \$194,214 and \$6,079, respectively. While the majority of *A. ferox* individuals were given the source code “F” (animals born in captivity from parents who mated in the wild) at 86.8%, the majority of *A. spinifera* individuals were given source code “W” (animals from the wild) at 81.8%. Export numbers of years reported in the 2011 IUCN assessment of the species reflect a steady and at times drastic increase in *A. spinifera* individuals: 1999-2002: under 1,000 each year; 2003: 16,131; 2004: 22,120; 2005: 31,113; 2006: 56,356; 2007: 32,119; and 2008: 120,723 individuals (van Dijk 2011c) (Fig. 3). The United States exported 363,000 live *A. spinifera* individuals between 2005 to 2010 and 148,650 from 2012 to 2022 for commercial purposes to Mexico (C. Sol Guerrero Ortiz – CITES Scientific Authority of Mexico, pers. comm.). Of concern is the potential inability to accurately differentiate *A. spinifera* and *A. mutica*, which may be skewing numbers reported in trade of each species (K. Buhlmann – University of Georgia, pers. comm.). Exports from Canada are suspected to be low given prohibitions under federal and provincial endangered species legislations; however, the rate of illegal trade is expectedly high due to demand (C. Caceres – Canadian Wildlife Service, pers. comm.).

The three species under consideration in this proposal were included in CITES Appendix III I on November 21, 2016 (41 FR 32664). Thus, some CITES trade data are available. According to these data, 150,762 live North American *Apalone* turtles were exported from 2017 to 2020. These were nearly exclusively *A. ferox* (99.56%), followed by *A. spinifera* (0.41%), and *A. mutica* (0.001%). A peak in exports was reached in 2018, with numbers dwindling in 2019, and drastically dropping in 2020, which may be reflective of the global pandemic. Alternatively, only 85,433 live turtles were reported as imported (a difference of over 65,000 turtles), though percentages were very similar (99.81% *A. ferox*, 0.19% *A. spinifera*, 0% *A. mutica*). This discrepancy seems largely driven by a lack of importer reported numbers from the year 2017, the first year *Apalone* had been included in Appendix III (Fig. 4) (data obtained from CITES WCMC database. Not all CITES annual reports from importing countries may be submitted – missing/incomplete while exports - United States data complete). Consequences of harvest on turtle populations vary depending on the exploitation of hatchlings versus adults (Tomillo et al. 2008). Therefore, lack of information on age class of individual turtles traded is unknown, making it difficult to discern appropriate numbers for making non-detriment findings and the impact of previous less-regulated harvest practices.

Countries importing these species included Austria, Belgium, Canada, China, Czech Republic, France, Germany, the United Kingdom, Hong Kong, Honduras, Hong Kong, Italy, Japan, Republic of Korea, Morocco, Macau, Mexico, Namibia, the Netherlands, and Portugal. Both the CITES trade database and LEMIS data revealed similar trends in that China comprised most live exports as reported by the United States, followed by Macao, and Hong Kong. Austria, Belgium, Canada, Germany, the United Kingdom, Italy, Japan, Morocco, Mexico, the Netherlands, and Portugal collectively constituted only 2.1% of total live *Apalone* species examined (Fig. 5aa, b).

### 6.3 Parts and derivatives in trade

CITES trade data from 2017 to 2020 show that live turtles account for most trade (99.81%), but there was also trade in bodies, bones, derivatives, meat, specimens, and trophies. LEMIS export data from 2016 to 2021 showed a similar trend in that live turtles constituted most trade (99.84%), with whole dead individuals, bones, skeletons, skulls, meat, and trophies being exported. Live turtles are used in the pet trade or sold whole to be raised and later butchered for meat. A study investigating pet markets in five cities in China noted that live young *A. ferox* were readily available and could be purchased for 10 RMB each (approximately 1.50USD) (Meng et al. 2017).

### 6.4 Illegal trade

Even the network of extensive turtle aquaculture farms in the southeastern United States cannot fully relieve harvest pressure on wild populations, resulting in illegal trade to meet demand (Reed and Gibbons 2003). The legal trade in profitable wildlife species can be a cover for the sale of misrepresented or illegally harvested animals (Roman and Bowen 2000). This can be catastrophic for turtle species if not adequately tracked and monitored at a macro-scale level, like the level of oversight that CITES provides.

Several articles and reports have highlighted instances of illegal trade in recent years. The Florida Fish and Wildlife Conservation Commission documented 4,000 turtles (including *A. ferox*) illegally taken from 2018 to 2019 to be sold to Asian markets (FWC 2019). In total, 9 investigations opened by the United States Fish & Wildlife Service Office of Law Enforcement involving soft shell turtle species (4 *A. ferox*, 5 *Pelodiscus sinensis*) have been conducted in the last 10 years, including a seizure of undeclared species during a wildlife import/export shipment that constituted smuggling and other criminal violations (USFWS – OLE, pers. comm.). Between 2017 and 2022, 16 live specimens of *A. spinifera* were seized, mostly in Mexico City (C. Sol Guerrero Ortiz – CITES Scientific Authority of Mexico, pers. comm.). For example, one live *A. spinifera* was seized from a street vendor in late 2018 and another live specimen was found in a package amongst other turtle species in January 2020 (Robin des Bois 2020a). Softshell turtle bones were identified in a package in Cincinnati, Ohio in 2020 (Robin des Bois 2020b). In addition to illegal trade and collection in the United States and Mexico, illegal harvest of juvenile and adult *A. spinifera* has also been confirmed in Canada and has been noted as a threat of high concern (Ministry of National Resources 2011, C. Caceres – Canadian Wildlife Service, pers. comm.).

### 6.5 Actual or potential trade impacts



Amphibians and reptiles are among the most heavily traded animal taxa (Herrel and van der Meijden 2014). Trade in foreign species may have drastic ecological impacts and cause large losses in biodiversity (Kopecky et al. 2013, Meng et al. 2017). Ecosystems where turtles are removed may lose function without their contributions to food webs and other important processes. Trade can also result in genetic changes in a species that ultimately make it less adaptable. For example, harvesting larger individuals inadvertently favors genetic dominance towards smaller or slower growth-rate individuals (Heikinheimo and Mikkola 2004). Alternatively, the introduction of species, often via release of no-longer wanted pets, in non-native habitats can cause extinction of native species. For example, *A. spinifera* is credited with the disappearance of the Sonora mud turtle (*Kinosternon sonoriense*) in the lower part of the Colorado River in Mexico (C. Sol Guerrero Ortiz – CITES Scientific Authority of Mexico, pers. comm.).

Softshell turtle species can be readily farmed, although *A. mutica* is likely the most difficult to rear in farm ponds (K. Buhlmann – University of Georgia, pers. comm.). Regardless, freshwater turtle species from North America are easier to breed than most species native to Asia (Parham and Lau 2007). This has led to demand of *Apalone* specimens from turtle breeding farms in the United States, of which wild-caught specimens are thought to be of superior genetic stock. Not only does this place harvest pressure on wild *Apalone* species, but it also discourages the breeding of freshwater turtle species that are native to Asia, even further eliminating any sort of “safety net” population for those species that are decimated in the wild (Parham and Lau 2007).

Species which are less protected, such as the those in this proposal, are at greater risk for over-exploitation after similar species become subject to more restrictive trading legislation or experience population collapse in the wild. This “boom-and-bust” cycle common in the turtle trade insinuates that North American softshell turtle species in the genus *Apalone* will continue to experience over-exploitation, at levels which will increase, due to greater restrictions put on Asian and African softshell turtle species. Therefore, inclusion of *A. ferox*, *A. mutica*, and *A. spinifera* in Appendix II is needed to ensure sustainable trade and exports of these turtles from the United States.

## 7. Legal instruments

### 7.1 National

The United States Food and Drug Administration for health reasons prohibits turtles with a carapace length of less than 4 inches for sale, held for sale, or offered for any other type of commercial or public distribution, except if the live turtles are intended for export only [provided that the outside of the shipping package is conspicuously labeled "For Export Only"] (21 CFR 1240.62).

States within the United States where these species occur may have their own regulations. CITES can complement State regulations and management efforts to ensure that trade of specimens is legal and sustainable at a national level.

*A. spinifera* in Canada was assessed as Endangered in 2016 (COSEWIC 2016) and is Threatened on Schedule 1 of the Species at Risk Act (SARA) (Environment and Climate Change Canada 2018). At the provincial level it is considered Threatened under the Act Respecting Threatened or Vulnerable Species (R.S.Q. Chapter E-12.01, s.10) in Québec and Threatened under the Endangered Species Act (S.O. 2007, Chapter 6) in Ontario, where it is also afforded protection offered by the Fish and Wildlife Conservation Act (S.O. 1997, Chapter 41). It is illegal to capture, harass, or kill the species.

### 7.2 International

None known, except for CITES. *A. ferox*, *A. mutica*, and *A. spinifera* were included in Appendix III as of November 21, 2016 (TTWG 2021, UNEP-WCMC 2022a, b, c).

## 8. Species management

### 8.1 Management measures

Management measures are currently determined at the state level (see 8.3.2 Domestic Measures) and commercial farming largely constitutes captive breeding or artificial propagation (see 8.4 Captive breeding and artificial propagation). By December 2023, Canada will have one or more action plans to be completed for *A. spinifera* and posted on the SARA registry (Environment and Climate Change Canada 2018). Land ownership in Mexico is largely community based, thereby leaving decisions regarding wildlife management to the individuals who reside there (CEC 2019). This brings about several challenges, but also affords the implementation of a differing management scheme not often used (CEC 2019).

## 8.2 Population monitoring

Population monitoring efforts are sparse, temporally disjointed, and dependent on localized efforts that cannot encapsulate the ranges of *A. mutica* and *A. spinifera*. Most monitoring is tied to state required documentation of commercial use, which has historically been inadequate (Ceballos and Fitzgerald 2004). For example, only 35% of harvest permit owners in Arkansas reported their numbers in 2019, making it impossible to make science-based decisions surrounding harvest limits or quotas (Irwin 2020). A 2001 turtle survey conducted in the Weaver Bottoms area of the Upper Mississippi River on *A. mutica* served as an intensive population monitoring effort in Minnesota and surveys by the Minnesota Biological Survey are ongoing (Pappas et al. 2001, MNDNR 2022). Monitoring in Ontario, Canada has been substantial compared to other populations throughout the species' range (Environment and Climate Change Canada 2018), but most of these have focused on the number of nests and not the number of turtles themselves (COSEWIC 2016). There are no known population monitoring efforts in Mexico, though some isolated sampling in key areas has been done (C. Sol Guerrero Ortiz – CITES Scientific Authority of Mexico, pers. comm.).

## 8.3 Control measures

### 8.3.1 International

No known international control measures known, except for CITES. *A. ferox*, *A. mutica*, and *A. spinifera* were included in Appendix III on November 21, 2016 (TTWG 2021). *A. ferox*, *A. mutica*, and *A. spinifera* are all categorized as Least Concern by IUCN (van Dijk 2011a, b, c). However, the last assessments were done in August 2010 (van Dijk 2011a, b, c). During the last IUCN assessment, it was noted that *A. mutica* may qualify for Near Threatened status (van Dijk 2011b).

### 8.3.2 Domestic

States in the United States with these species vary in level of afforded protections. See Annex 2.

Despite these measures, domestic protection is likely inadequate to control harvest pressure and resources, such as the expertise and time to carefully discern *A. spinifera* versus *A. mutica* as hatchlings as well as their legitimate source, may be unavailable. The species herein, particularly *A. spinifera*, are very wide ranging and require a wholistic macro-scale conservation approach that can monitor trade at the federal level to complement regulations already instituted by states where these species occur.

## 8.4 Captive breeding and artificial propagation

Commercial breeding on a larger scale may alleviate demand for collection of *Apalone* turtles from the wild. However, captive-breeding operations must often rely on wild-sourced parental stock. Freshwater turtle farming became a lucrative business in the southeastern United States in early 1990s (Hughes 1999). Though still thriving in many areas, the total number of turtles produced in the United States has steadily decreased, likely due to the establishment self-sustaining softshell turtle farms in Asia (Mali et al. 2015). In the United States, the turtle farming industry is regulated by state. For example, the Florida Department of Agriculture and Consumer Services (FDACS) is the primary agency that regulates aquaculture in Florida and facilities are subject to laws and governed by best practices. There are currently over 50 certified facilities in the state (P. Sapp – Division of Aquaculture, pers. comm.).

In Mexico, there are ten active captive breeding centers of *Apalone spinifera* that have registration for the species (3 captive breeding Wildlife Management and Sustainable Use Units (UMAs) and 7 Wildlife Farms and Facilities-PIMVS) (C. Sol Guerrero Ortiz – CITES Scientific Authority of Mexico, pers. comm.).

There are no known licensed large-scale turtle farming facilities in Canada (CEC 2019).

## 8.5 Habitat conservation

There are various protected areas throughout regions in which the three species in this proposal are found. For example, Wekiwa Springs State Park in Florida was established in 1970 and has been the research site for studies on *A. ferox* (Munscher et al. 2015). Estimates of protected areas that serve *Apalone* species is largely unknown. One study using GIS data found that only 2.2% of water bodies in Texas were protected under commercial turtle harvest regulations (Brown et al. 2011). Protected areas appear to make a difference in freshwater turtle conservation, the same study also found that *A. spinifera* in an unprotected area were smaller than those sampled in a protected area (Brown et al. 2011).

The National Wild and Scenic Rivers System was created by United States Congress in 1968 (16 U.S. Code Chapter 28). Unfortunately, protection is offered to only a minute fraction of rivers in the United States. For example, Florida has 41,761 km of river and only 79.2 km are protected by the Act (NWSRS 2022). Of the 147,970 miles of river in Minnesota, only 364 miles are protected by the Act (NWSRS 2022).

*A. spinifera* in Canada has portions of its river habitats protected. For example, the Missisquoi National Wildlife Refuge fully protects the mouth of the Missisquoi River and Rivière aux Brochets (Galois et al. 2002). *A. spinifera* in Mexico can be found in Natural Protected Areas where land use is highly restricted and regulated (C. Sol Guerrero Ortiz – CITES Scientific Authority of Mexico, pers. comm.).

Wildlife management and Sustainable Use Units (UMAs) in Mexico started in 1996 and allow for local landowners to benefit through sustainable use of their wildlife (CEC 2019). The program covered 15% of Mexico's land in 2012, protecting critical habitat for at-risk species, including turtles and tortoises (CEC 2019).

## 8.6 Safeguards

Not applicable. Proposal is to transfer three *Apalone* species (all Genus *Apalone* spp. except the subspecies included in Appendix I) from Appendix III to Appendix II.

## 9. Information on similar species

Asian softshell turtles (genus *Pelodiscus*) are commonly consumed for food by humans due to its high palatability (Meylan 2006). Despite established breeding farms, they are commonly removed from the wild to appease demand (Meylan 2006). This exploitation, in combination with restricted ranges and habitat loss, has led to many species being provisionally classified as Vulnerable, Endangered, or Critically Endangered by a panel of turtle experts (TTWG 2021). African/Middle Eastern softshell turtles faced similar concerns and were subsequently included in Appendix II. This proposal submits that, because of the similarity of their biological vulnerabilities and in the ways that they are used in international trade, these remaining North America softshell turtle species warrant transfer from Appendix III to Appendix II.

Two other species of turtle may be confused with members of the Trionychidae because they also have leathery shells. *Derموchelys coriacea* (leatherback sea turtle; included in Appendix I since 1977) may be differentiated from softshell turtles because it is much larger (largest turtle in the world), shows seven longitudinal keels on its carapace and is only found in a marine environment. *Carettochelys insculpta* (pig-nosed turtle; included in Appendix II since 2005) has 2 claws on the forelimbs (softshell turtles have 3), the snout is shorter and faces laterally giving it its pig-like appearance, it has a complete bony shell under its velvety skin so that its shell margins are completely inflexible, and it is only found in Australia (no Trionychidae in Australia), Indonesia, and Papua New Guinea.

## 10. Consultations

In the United States, we have an open, transparent process to engage and consult with the public including: States, Tribes, industry, non-governmental organizations and other interested stakeholders when it comes to CITES issues at a CoP as outlined in PART 23 of Title 50 of our U.S. Code of Federal Regulations (<https://www.ecfr.gov/current/title-50/chapter-I/subchapter-B/part-23#23.87>). We are one of the few

countries in world with such a robust and lengthy process. To see the specific comments on species proposals to amend the CITES Appendices that we received, please see <https://www.regulations.gov/docket/FWS-HQ-IA-2021-0008/document>.

A consultation letter was sent to Canada requesting information on the biology, management, and status of *A. spinifera* in Canada, as well as its views on the proposed inclusion of this taxon in Appendix II. Canada indicated that illegal collection is listed as a high level of concern but that prohibitions under federal and provincial legislation largely prevent any export of *A. spinifera*.

A consultation letter was sent to Mexico requesting information on the biology, management, and status of *A. spinifera* in Mexico, as well as its views on the proposed inclusion of this taxon in Appendix II. Mexico stated that they do not have the information necessary to determine if the species meets the criteria of Resolution Conf. 9.24 (Rev. CoP17).

#### 11. Additional remarks

The IUCN/SSC Tortoise & Freshwater Turtle Specialist Group recommend these species for inclusion in Appendix II (Peter Paul van Dijk – IUCN/SSC Tortoise & Freshwater Turtle Specialist Group, pers. comm.).

This proposal was reviewed by turtle biologist, Dr. Kurt Buhlmann, of the University of Georgia, Savannah River Ecology Laboratory (Aiken, South Carolina). He agrees that the regulation of trade in these species is needed and supports the inclusion of the genus *Apalone* in CITES.

#### 12. References

Alexander, J.S., Wilson, R.C., Green, W.R. 2012. A brief history and summary of the effects of river engineering and dams on the Mississippi River system and delta. US Geological Survey Circular 1375.

Aresco, M.J. 2003. High mortality of turtles and other herpetofauna at Lake Jackson, Florida, USA, and the efficacy of temporary fence/culvert system to reduce roadkills. In: Irwin, C.L., Garrett, P. McDermott, K.P. (Eds.). Proceedings of the International Conference on Ecology and Transportation. Raleigh, NC: Center for Transportation and the Environment, North Carolina State University, pp. 433-449.

Aresco, M.J. 2009. Environmental correlates of the abundances of three species of freshwater turtles in lakes of northern Florida. *Copeia* 2009:545-555.

Association of Fish & Wildlife Agencies (AFWA). 2020. Cast Study: U.S. freshwater turtles and tortoises in the context of the Convention on International Trade in Endangered Species of Wild Fauna and Flora. [https://www.fishwildlife.org/application/files/7815/9352/0162/Case\\_Study\\_U.S.\\_Freshwater\\_Turtles\\_and\\_Tortoises\\_CITES\\_2020\\_FINAL.pdf](https://www.fishwildlife.org/application/files/7815/9352/0162/Case_Study_U.S._Freshwater_Turtles_and_Tortoises_CITES_2020_FINAL.pdf). Accessed on May 16, 2022.

Bancroft, C.T., Godley, J.S., Gross, D.T., Rojas, N.N., Sutphen, D.A., McDiarmid, R.W. 1983. Large-scale operations management tests of the use of white amur for control of problem aquatic plants. The herpetofauna of Lake Conway: species accounts. Misc. Paper A-82-5. Vicksburg, MS: Army Engineer Waterways Experimental Station. 354 pp.

Barko, V.A., Briggler, J.T. 2006. Midland smooth softshell (*Apalone mutica*) and spiny softshell (*Apalone spinifera*) turtles in the middle Mississippi River: Habitat associations, population structure, and implications for conservation. *Celonia Conservation Biology* 5:225-231.

Barko, V.A., Briggler, J.T., Ostendorf, D.E. 2004. Passive fishing techniques: A cause of turtle mortality in the Mississippi River. *The Journal of Wildlife Management* 68:1145-1150.

Bodie, J.R., Semlitsch R.D. 2000. Spatial and temporal use of floodplain habitats by lentic and lotic species of aquatic turtles. *Oecologia (Berlin)* 122:138-246.

Bonin, R., Devaux, B., Dupré, A. 2006. *Turtles of the World*. English translation by P.C.H. Pritchard. Johns Hopkins University Press. 416p.

- Brown, D.J., Farallo, V.R., Dixon, J.R., Baccus, J.T., Simpson, T.R., Forstner, M.R. 2011. Freshwater turtle conservation in Texas: Harvest effects and efficacy of the current management regime. *The Journal of Wildlife Management* 75:486-494.
- Cagle, F.R. 1942. Turtle populations in southern Illinois. *Copeia* 1942:155-162.
- Cagle, F.R., Chaney A.H. 1950. Turtle populations in Louisiana. *American Midland Naturalist* 43:383-388.
- Carr, A.F. 1954. The passing of the fleet. *American Institute of Biological Sciences*. 4:17-19.
- Ceballos, C.P., Fitzgerald, L.A. 2004. The trade in native and exotic turtles in Texas. *Wildlife Society Bulletin* 32:881-892.
- CEC (Commission for Environmental Cooperation). 2019. *Trinational Trade and Enforcement Training Workshop to Support the Legal and Sustainable Trade in Turtles/Tortoises*. Report. Montreal, Canada: Commission for Environmental Cooperation. 2019. 73 pp.
- Conant, R., Collins, J.T. 1991. *A field guide to reptiles and amphibians: eastern and central North America*. Houghton Mifflin Co., Boston, Massachusetts. 450 p.
- Congdon, J.S., Dunham, A.E., van Loben Sels, R.C. 1993. Delayed sexual maturity and demographics of Blanding's turtles (*Emydoidea blandingii*): implications for conservation and management of long-lived organisms. *Conservation Biology* 7:826-833.
- COSEWIC (Committee on the Status of Endangered Wildlife in Canada). 2016. COSEWIC assessment and status report on the Spiny Softshell *Apalone spinifer* in Canada. Ottawa, Canada. xiii + 38 pp. ([http://www.registrelep-sararegistry.gc.ca/default\\_e.cfm](http://www.registrelep-sararegistry.gc.ca/default_e.cfm)).
- Crenshaw, J.W., Hopkins, M.N. 1955. The relationships of the soft-shelled turtles *Trionyx ferox* and *Trionyx ferox aspera* *Copeia* 1955:13-23.
- Dalrymple, G.H. 1977. Intraspecific variation in the cranial feeding mechanism of turtles of the genus *Trionyx* (Reptilia, Testudines, Trionychidae). *Journal of Herpetology* 11:255-285.
- Delany, M.F., Abercrombie, C.L. 1986. American alligator food habits in northcentral Florida. *The Journal of Wildlife Management*. 1:348-353.
- De Solla, S.R., Fletcher, M.L., Bishop, C.A. 2003. Relative contributions of organochlorine contaminants, parasitism, and predation to reproductive success of eastern spiny softshell turtles (*Apalone spiniferus spiniferus*) from southern Ontario, Canada. *Ecotoxicology* 12:261-270.
- DonnerWright, D.M., Bozek, M.A., Probst, J.R., Anderson, E.M. 1999. Responses of turtle assemblage to environmental gradients in the St. Croix River in Minnesota and Wisconsin, U.S.A. *Canadian Journal of Zoology* 77:989-1000.
- Doody, J.S. 1996. Summers with softshells. *Bulletin of the Chicago Herpetological Society* 31:132-133.
- Doroff, A.M., Keith, L.B. 1990. Demography and ecology of an ornate box turtle (*Terrapene ornata*) population in south-central Wisconsin. *Copeia* 1990:387-399.
- Dreslik, M.J., Phillips, C.A. 2005. Turtle communities in the upper Midwest, USA. *Journal of Freshwater Ecology*. 20:149-164.
- Duellman, W.E., Schwartz, A. 1958. Amphibians and reptiles of southern Florida. *Bulletin of the Florida State Museum, Biological Sciences* 3:181-324.
- Ehrenfeld, D.W. 1979. Behavior associated with nesting. In: Harless, M., and Morlock, H. (Eds.). *Turtles: Perspectives and Research*, John Wiley & Sons, New York, pp. 305-332.
- Enge, K.M. 1993. Herptile use and trade in Florida, Florida Game and Fresh Water Fish Comm. Nongame Wildlife Program Final Performance Report. 102 p, Tallahassee, Florida.
- Environment and Climate Change Canada. 2018. Recovery Strategy for the Spiny Softshell (*Apalone spinifer*) in Canada, Species at Risk Act Recovery Strategy Series. Environment and Climate Change Canada, Ottawa. ix + 60 pp.

- Ernst, C., Lovich, J., Barbour, R. 1994. Turtles of the United States and Canada. Washington: Smithsonian Institution Press.
- Ernst, C., Lovich, J.E. 2009. Turtles of the United States and Canada. The Johns Hopkins University Press. Baltimore, USA.
- Fitch, H.S., Plummer, M.V. 1975. A preliminary ecological study of the soft-shelled turtle *Trionyx muticus* in the Kansas River. *Israel Journal of Zoology* 24:28-42.
- Florida Fish and Wildlife Conservation Commission (FWC). 2019. FWC busts wildlife trafficking ring smuggling thousands of turtles, returns turtles to wild. <https://myfwc.com/news/all-news/turtle-traffic/>. Accessed May 16, 2022.
- Galois, P., Léveillé, M., Bouthillier, L., Daigle, C., Parren, S. 2002. Movement patterns, activity and home range of the eastern spiny softshell turtle (*Apalone spinifera*) in Northern Lake, Champlain, Québec, Vermont. *Journal of Herpetology* 36:402-411.
- Gibbons, J.W., Scott, D.E., Ryans, T.J., Buhlmann, K.A., Tuberville, T.D., Mets, B.S., Greene, J.L. 2000. The decline of reptiles. *BioScience* 50:653-666.
- Godwin, C.D., Doody, J.S., Crother, B.I. 2021. The impact of ATVs on survival of softshell turtle (*Apalone* spp.) nests. *Journal of Herpetology* 55:201-207.
- Hamilton, W.J. 1947. Egg laying of *Trionyx ferox*. *Copeia* 1947:209.
- Heikinheimo, I., Mikkola, J. 2004. Effect of selective gill-net fishing on the length distribution of the European white fish (*Coregonus lavaretus*) in the Gulf of Finland. *Annales Zoologici Fennici* 41:357-366.
- Heinrich, G.L., Richardson, D.E. 1993. *Apalone ferox* (Florida softshell): Reproduction. *Herpetological Review* 24:31.
- Heinrich, G.L., Walsh, T.J., Jackson, D.R., Atkinson, B.K. 2012. Boat strikes: a threat to the Suwannee cooter (*Pseudemys concinna suwanniensis*). *Herpetological Conservation and Biology* 7:349-357.
- Herald, E.S. 1949. Effects of DDT-oil solutions upon amphibians and reptiles. *Herpetologica* 5:117-120.
- Herrel, A., van der Meijden A. 2014. An analysis of the live reptile and amphibian trade in the USA compared to the global trade in endangered species. *Herpetological Journal* 24:103-110.
- Huestis, D.L., Meylan, P.A. 2004. The turtles of Rainbow Run (Marion County, Florida): Observations on the genus *Pseudemys*. *Southeast Naturalist* 3:595-612.
- Hughes, D.W. 1999. The contribution of the pet turtle industry to the Louisiana economy. *Aquaculture Economics and Management* 3:250-214.
- Irwin, K. 2020. 2019 Commercial Aquatic Turtle Harvest Report. Arkansas Game and Fish Commission.
- Iverson, J.B. 1985. Reproduction in the Florida softshell turtle, *Trionyx ferox*. *Florida Scientist* 48:41-44.
- Iverson, J.B. 1992. A revised checklist with distribution maps of turtles of the world. Privately printed Richmond, Indiana. 363 p.
- Iverson, J.B., Moler, P.E. 1997. The female reproductive cycle of the Florida softshell turtle (*Apalone ferox*). *Journal of Herpetology* 31:399-409.
- Jensen, J.B. 1998. *Pseudemys concinna suwanniensis* (Suwannee River cooter), USA: Georgia *Herpetological Review* 29:50-51.
- Lemos-Espinal, J.A., Webb, R.G., Smith, H.M. 1999. Emory's softshell turtle, *Apalone spinifera emoryi*, in Mexico. *Bulletin of the Maryland Herpetological Society* 35:40-42.
- Luiselli, L., Starita, A., Carpaneto, G.M., Segniagbeta, G.H., Amoria, G. 2016. Short review of the international trade of wild tortoises and freshwater turtles across the world and throughout two decades. *Chelonian Conservation and Biology* 15:167-172.

Lovich, J.E., Ennen, J.R. 2013. A quantitative analysis of the state of knowledge of turtles of the United States and Canada. *Amphibia-Reptilia* 10:1-13.

Lovich, J.E., Gibbons, J.W. 1997. Conservation of covert species: Protecting species we don't even know, ph. 426-429. In Van Abbema, J. (ed.), *Proceedings: Conservation, Restoration, and Management of Tortoises and Turtles – An International Conference*. New York Turtle and Tortoise Society, New York.

Johnston, G.R., Lau, A., Kornilev, Y.V. 2011. Composition of a turtle assemblage in a northern Florida blackwater stream. *Florida Scientist* 74:125-133.

Kopecky, O., Kalous, L., Patoka, J. 2013. Establishment risk from pet-trade freshwater turtles in the European Union. *Knowledge and Management of Aquatic Ecosystems* 410: 02.

Mali, I., Wang, H.H., Grant, W.E., Feldman, M., Forstner, M.R.J. 2015. Modeling commercial freshwater turtle production on US farms for pet and meat markets. *PLoS ONE* 10(9):e0139053.

Massey, A.D. 2021. The effects of commercial harvest on the density and demography of aquatic turtles in Arkansas. Graduate Theses and Dissertations. University of Arkansas. <https://scholarworks.uark.edu/etd/4301>.

Meng M., Ma, J., Yin, F., Chen, W., Ji, J. 2017. Investigation of the current trade situation of alien vertebrate species in China and analysis of corresponding management strategies. *Biodiversity Science* 25:1137-1143. Meylan, P.A. 1987. The phylogeny of softshell turtles (Family Trionychidae). *Bulletin of the American Museum of Natural History* 186:1-101.

Meylan, P.A. 2006. Introduction to softshell turtles: family Trionychidae. In: Meylan, P.A. (ed.) *Biology and Conservation of Florida Turtles*. Chelonian Research Monographs 3:158-159.

Ministry of National Resources. 2011. \$8,000 fines for illegal possession of spiny softshells. Ontario Ministry of Natural Resources News, Canada, 1p.

Minnesota Department of Natural Resources (MDNR). 2022. *Apalone mutica*. <https://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=ARAAG0102>. Accessed on May 17, 2022.

Moler, P.E., Berish, J.E. 1995. Impact of commercial exploitation on softshell turtle populations. Florida Game and Freshwater Fish Comm., Final Report. 11 p. Tallahassee, Florida.

Moll, D., Moll, E.O. 2004. *The ecology, exploitation, and conservation of river turtles*. Oxford University Press. New York, NY. 393p.

Munscher, E.C., Walde, A.D., Riedle, J.D., Kuhns, E.H., Weber, A.S., Hauge, J.B. 2015. Population structure of the Florida softshell turtle *Apalone ferox*, in a protected ecosystem, Wekiwa Springs State Park, Florida. *Chelonian Conservation and Biology* 14:34-42.

National Wild and Scenic Rivers System (NWSRS). 2022. Explore designated rivers. <https://www.rivers.gov/map.php>. Accessed on May 24, 2022.

Neill, W.T. 1958. The occurrence of amphibians and reptiles in saltwater areas, and a bibliography. *Bulletin of Marine Science, Gulf and Caribbean* 8:1-97.

Pappas, M.J., Congdon, J., Pappas, A. 2001. Weaver Bottoms, 2001 turtle survey; management and conservation concerns. Report submitted to the Nongame Wildlife Program, Minnesota Department of Natural Resources and the United States Fish and Wildlife Service. Unpaged.

Parham, J.F., Lau, M.W.N. 2007. Farming endangered turtles to extinction in China. *Conservation Biology*. DOI:10.1111/j.1523-1739.2006.00622\_2.x.

- Parren, S.G., Parrent, M.K., Gieder, K.D. 2021. Nest counts and hatching emergence timing for the spiny softshell (*Apalone spinifera*) and associated turtle species at managed sites in Vermont, USA. *Herpetological Conservation and Biology* 16:194-202.
- Plummer, M.V. 1976. Some aspects of nesting success in the turtle, *Trionyx muticus*. *Herpetologica* 32:353-359.
- Plummer, M.V. 1977. Activity, Habitat and Population Structure in the Turtle, *Trionyx muticus*. *Copeia* 1977(3): 431-440.
- Pope, C.H. 1939. *Turtles of the United States and Canada*. Alfred A. Knopf, New York.
- Tomillo, P.S., Saba, V.S., Pidra, R., Paladino, R.V., Spotila, J.R. 2008. Effects of illegal harvest of eggs on the population decline of leatherback turtles in Las Baulas Marine National Park, Costa Rica. *Conservation Biology* 22:1216-1224.
- Reed, R.N., Gibbons, J.W. 2003. Conservation status of the live U.S. nonmarine turtles in domestic and international trade. U.S. Department of the Interior, U.S. Fish and Wildlife Service. Report 92p.
- Robin des Bois. 2014. Tortoises and Freshwater Turtles. On the Trail: Information and analysis bulletin on animal poaching and smuggling #6 1 Jul to 30 Sept. 2014. [https://robindesbois.org/wp-content/uploads/2015/11/ON\\_THE\\_TRAIL\\_6.pdf](https://robindesbois.org/wp-content/uploads/2015/11/ON_THE_TRAIL_6.pdf). Accessed on May 16, 2022.
- Robin des Bois. 2018. Tortoises and Freshwater Turtles. On the Trail: Information and analysis bulletin on animal poaching and smuggling #23 1 Oct. to 31 Jan. 2019. [https://robindesbois.org/wp-content/uploads/ON\\_THE\\_TRAIL\\_23.pdf](https://robindesbois.org/wp-content/uploads/ON_THE_TRAIL_23.pdf). Accessed on May 23, 2022.
- Robin des Bois. 2020a. Tortoises and Freshwater Turtles. On the Trail: Information and analysis bulletin on animal poaching and smuggling #28 1 Jan. to 31 Mar. 2020. [https://www.robindesbois.org/wp-content/uploads/ON\\_THE\\_TRAIL\\_28.pdf](https://www.robindesbois.org/wp-content/uploads/ON_THE_TRAIL_28.pdf). Accessed on May 23, 2022.
- Robin des Bois. 2020b. Tortoises and Freshwater Turtles. On the Trail: Information and analysis bulletin on animal poaching and smuggling #30 1 Jul to 30 Sept. 2020. [https://www.robindesbois.org/wp-content/uploads/ON\\_THE\\_TRAIL\\_30.pdf](https://www.robindesbois.org/wp-content/uploads/ON_THE_TRAIL_30.pdf). Accessed on May 23, 2022.
- Roman, J., Bowen, B.W. 2000. The mock turtle syndrome: genetic identification of turtle meat purchased in the south-eastern United States of America. *Animal Conservation* 3:61-65.
- Rowe, C.L. 2008. "The calamity of so long life": life histories, contaminants, and potential emerging threats to long-lived vertebrates. *BioScience* 58:623-631.
- Slavens, F. 1999. *Reptiles and Amphibians in Captivity-Breeding-Longevity and Inventory*. Seattle, WA: Slavewear.
- Steen, D.A., Aresco, M.J., Beilke, S.G., Compton, B.W., Condon, E.O. Dodd Jr., C.K., Forrester, H, et al. 2006. Relative vulnerability of female turtles to road mortality. *Animal Conservation* 9:269-273.
- TTWG [Turtle Taxonomy Working Group: Rhodin, A.G.J., Iverson, J.B., Bour, R., Fritz, U., Georges, A., Shaffer, H.B., and van Dijk, P.P.] 2021. *Turtles of the World: Annotated Checklist and Atlas of Taxonomy, Synonymy, Distribution, and Conservation Status (9<sup>th</sup> Ed.)*. In: Rhodin, A.G.J., Iverson, J.B., van Dijk, P.P., Stanford, C.B., Goode, E.V, Buhlmann, K.A., and Mittermeier, R.A. (Eds.). *Conservation Biology of Freshwater Turtles and Tortoises: A Compilation Project of the IUCN/SSC Tortoise and Freshwater Turtle Specialist Group*. *Chelonian Research Monographs* 8:1-472. doi:10.3854/crm.8.checklist.atlas.v9. 2021.
- Trauth, S.E., Robison, H.W. and Plummer, M.V. 2004. *The Amphibians and Reptiles of Arkansas*. University of Arkansas Press, Little Rock, Arkansas.
- UNEP-WCMC. 2022a. United National Monitoring Programme-World Conservation Monitoring Centre. Species Database for *Apalone ferox*. CITES-Listed Species. Available online at: <https://checklist.cites.org/#/en>; accessed on May 12, 2022. See also: [https://checklist.cites.org/#/en/search/output\\_layout=alphabetical&level\\_of\\_listing=0&show\\_synonyms=1&sh](https://checklist.cites.org/#/en/search/output_layout=alphabetical&level_of_listing=0&show_synonyms=1&sh)



[ow\\_author=1&show\\_english=1&show\\_spanish=1&show\\_french=1&scientific\\_name=Apalone+ferox&page=1&per\\_page=20](https://checklist.cites.org/#/en?ow_author=1&show_english=1&show_spanish=1&show_french=1&scientific_name=Apalone+ferox&page=1&per_page=20)

UNEP-WCMC. 2022b. United National Monitoring Programme-World Conservation Monitoring Centre. Species Database for *Apalone mutica*. CITES-Listed Species. Available online at: <https://checklist.cites.org/#/en>; accessed on May 12, 2022. See also: [https://checklist.cites.org/#/en/search/output\\_layout=alphabetical&level\\_of\\_listing=0&show\\_synonyms=1&show\\_ow\\_author=1&show\\_english=1&show\\_spanish=1&show\\_french=1&scientific\\_name=Apalone+mutica&page=1&per\\_page=20](https://checklist.cites.org/#/en/search/output_layout=alphabetical&level_of_listing=0&show_synonyms=1&show_ow_author=1&show_english=1&show_spanish=1&show_french=1&scientific_name=Apalone+mutica&page=1&per_page=20)

UNEP-WCMC. 2022c. United National Monitoring Programme-World Conservation Monitoring Centre. Species Database for *Apalone spinifera*. CITES-Listed Species. Available online at: <https://checklist.cites.org/#/en>; accessed on May 12, 2022. See also: [https://checklist.cites.org/#/en/search/output\\_layout=alphabetical&level\\_of\\_listing=0&show\\_synonyms=1&show\\_ow\\_author=1&show\\_english=1&show\\_spanish=1&show\\_french=1&scientific\\_name=Apalone+spinifera&page=1&per\\_page=20](https://checklist.cites.org/#/en/search/output_layout=alphabetical&level_of_listing=0&show_synonyms=1&show_ow_author=1&show_english=1&show_spanish=1&show_french=1&scientific_name=Apalone+spinifera&page=1&per_page=20)

United States Department of Agriculture (USDA). 2019. 2018 Census of Aquaculture.

van Dijk, P.P. 2011a. *Apalone ferox* (errata version published in 2016). The IUCN Red List of Threatened Species 2011: e.T165597A97397831. <https://dx.doi.org/10.2305/IUCN.UK.2011-1.RLTS.T165597A6065209.en>. Accessed on 09 May 2022.

van Dijk, P.P. 2011b. *Apalone mutica* (errata version published in 2016). The IUCN Red List of Threatened Species 2011: e.T165596A97398190. <https://dx.doi.org/10.2305/IUCN.UK.2011-1.RLTS.T165596A6064798.en>. Accessed on 09 May 2022.

van Dijk, P.P. 2011c. *Apalone spinifera* (errata version published in 2016). The IUCN Red List of Threatened Species 2011: e.T163451A97398618. <https://dx.doi.org/10.2305/IUCN.UK.2011-1.RLTS.T163451A5607536.en>. Accessed on 09 May 2022.

Vinebrooke, R.D., Cottingham, K.L., Norberg, J., Scheffer, M., Dodson, S.I., Maberly, C., Sommer, U. 2004. Impacts of multiple stressors on biodiversity and ecosystem function: the role of species co-tolerance. *Oikos* 104:451-457.

Webb, R.G. 1959. Description of a new softshell turtle from the southeastern United States. *University Kansas, Publications of the Museum Natural History* 13:429-611.

Webb, R.G. 1962. North American recent soft-shelled turtles (Family Trionychidae). *University of Kansas Publications of the Museum of Natural History* 13:429-611.

Webb, R.G. 1973. *Trionyx ferox*. *Catalogue of American Amphibians and Reptiles*. 138:1-3.

Williams, T.A., Christiansen, J.L. 1981. The niches of two sympatric softshell turtles, *Trionyx muticus* and *Trionyx spiniferus*, in Iowa. *Journal of Herpetology* 15:303-308.

Witherington, B., Hirama, S., Mosier, A. 2011. Sea turtle responses to barriers on their nesting beach. *Journal of Experimental Marine Biology and Ecology* 401:1-6.

Woodi, M.C., Woodin, C.D. 1981. Everglades kit predation on the soft-shelled turtle. *Florida Field Naturalist* 9:64.

Zimmer-Shaffer, S.A., Briggler, J.T., Millsaugh, J.J. 2014. Modeling the effects of commercial harvest on population growth of river turtles. *Chelonian Conservation and Biology* 13:<https://doi.org/10.2744/CCB-1109.1>.

Figures

Figure 1. Effects of CITES Actions: Exports by Specimen. (Credit: IUCN Tortoise and Freshwater Turtle Specialist Group; CITES CoP15).

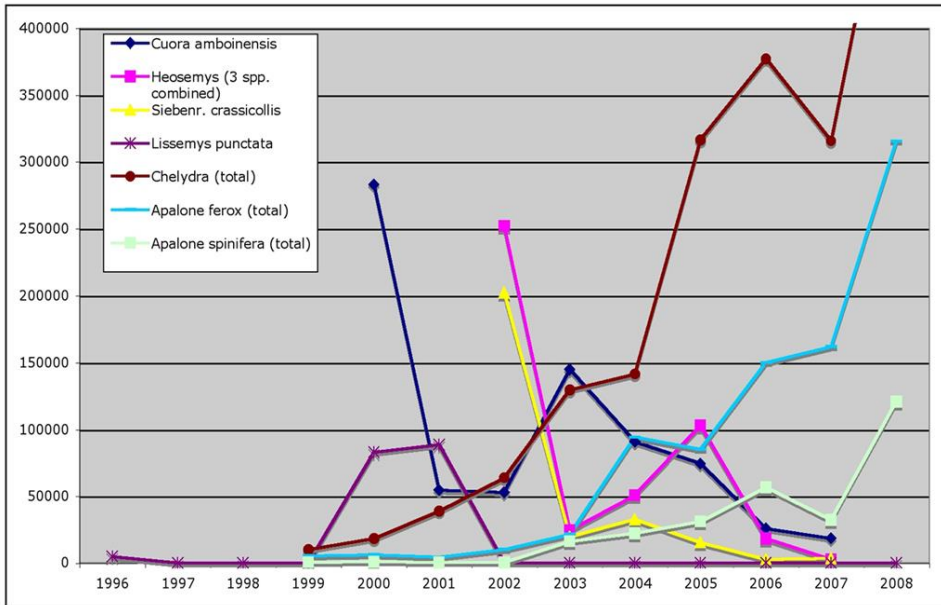
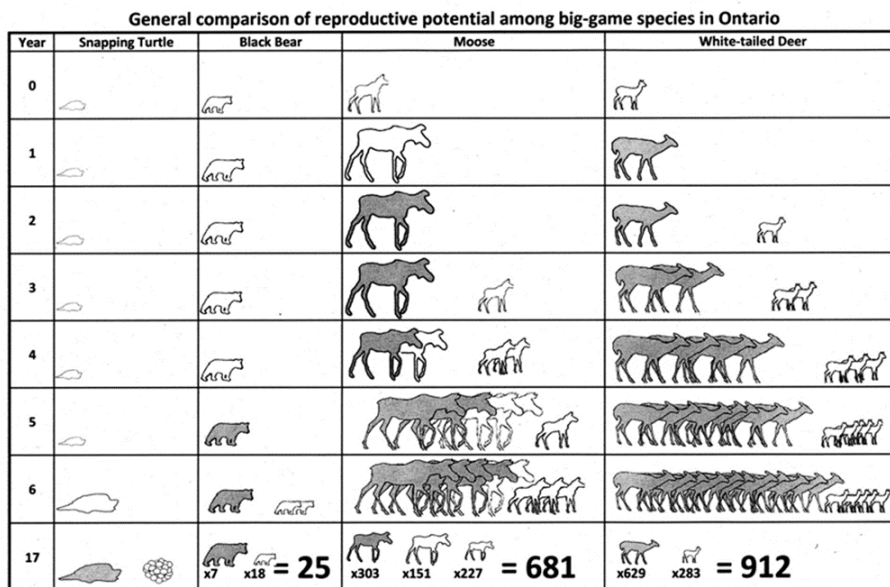


Figure 2. Comparison of reproductive output of a North American Snapping turtle to Managed North American Game Species: Bear, Moose, and Deer. (Credit Ron Brooks Co-Chair of OMSTARRT (Ontario Multi-Species of Turtles At Risk Recovery Team)).



Note this chart does not take mortality into consideration.  
 This chart was developed by the OMNR Black Bear Technical Team in 2005 based on an original idea by George Kolenosky.  
 Snapping Turtle column was added by the Ontario Multi-Species Turtle Recovery Team in 2008.  
 Please note that up to 1400 eggs need to be laid by a snapping turtle before one offspring reaches maturity. This may not occur until year 50.  
 = young of the year     = sexually immature     = sexually mature

Figure 3. Reported numbers of *Apalone spinifera* individuals (age class unknown) traded from 1999 to 2008 according to the LEMIS database as reported by van Dijk 2011c. Note: Years 1999 to 2002 are reported as estimated numbers under 1,000 individuals.

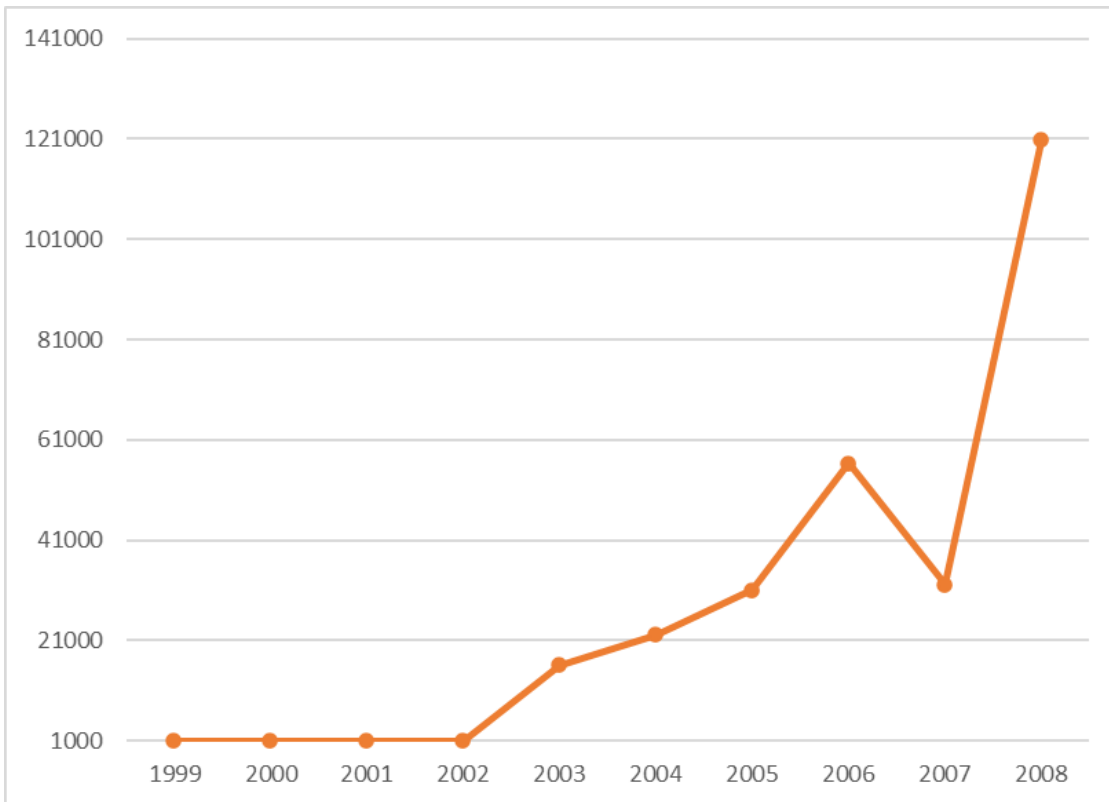


Figure 4 Reported number of live *Apalone* turtles annually traded from 2017 to 2020 as reported by exporting country and importing country from the CITES trade database.

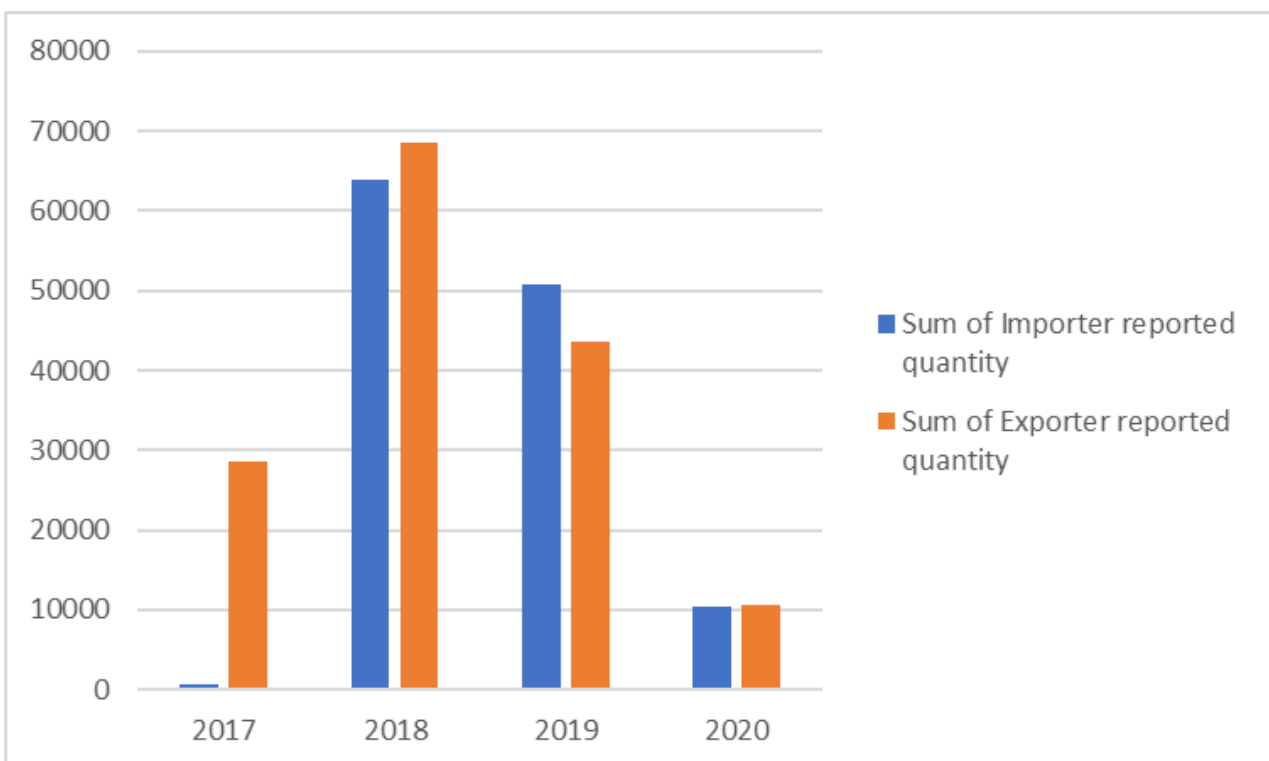
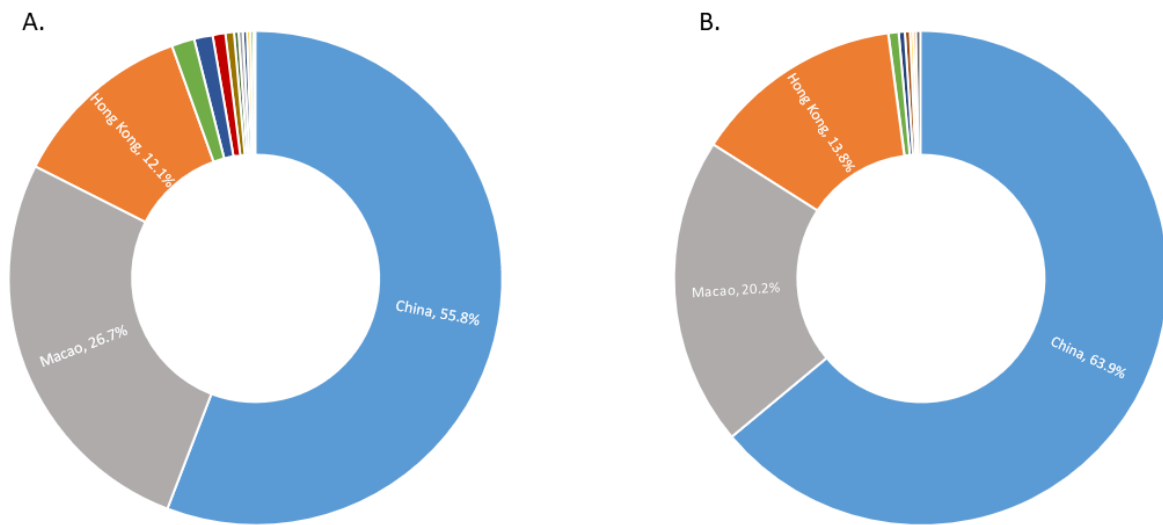

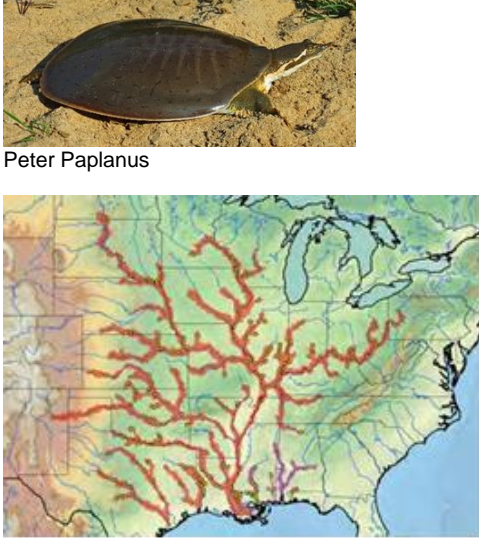
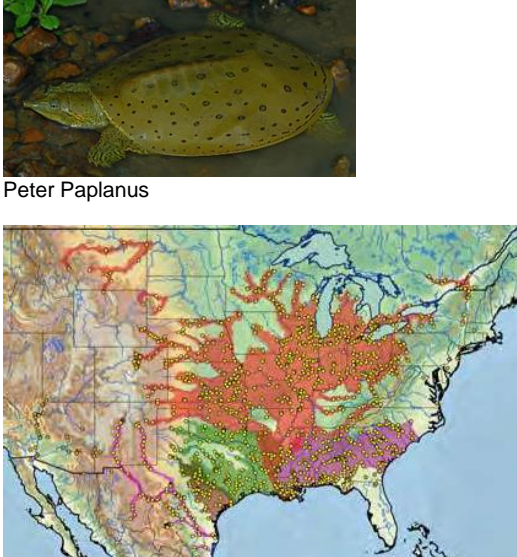


Figure 5. The percentages of live *Apalone* species exported as A) LEMIS data from 2016 to 2021 provided by the United States Fish & Wildlife Service Office of Law Enforcement, and B) reported by the United States from 2017 to 2020 via the CITES trade database



Annex 1

| Genus, species                         | <i>Apalone ferox</i> (Florida softshell turtle)   | <i>Apalone mutica</i> (smooth softshell turtle)   | <i>Apalone spinifera</i> (spiny softshell turtle)   |
|--|---|---|---|
| <p><b>Picture and Distribution</b></p> |  <p>Hans Hilewaert</p> <p>Credit: TTWG 2021</p>  |  <p>Peter Paplanus</p> <p>(subspecies: <i>mutica</i> = red, <i>calvata</i> = purple)Credit: TTWG 2021</p>                            |  <p>Peter Paplanus</p> <p>(subspecies: <i>spinifera</i> = red, <i>aspera</i> = purple, <i>atra</i> = blue, <i>emoryi</i> = pink, <i>guadalupensis</i> = brown, <i>pallida</i> = green; overlap = intergrades; orange dots = probable introduced)<br/>Credit: TTWG 2021</p> |
| <p><b>IUCN Status</b></p>              | <p>Least Concern<br/>Population Trend: Unknown</p>  | <p>Least Concern<br/>Population Trend: Unknown</p>  | <p>Least Concern<br/>Population Trend: Stable</p>   |
| <p><b>Population Size</b></p>          | <p>Only partial quantitative population estimates or trade data are available.</p> <p>Noted to be “common” or “very common” throughout most of its range (van Dijk 2011).</p> | <p>Can reach high densities, up to 1.2 individuals per linear meter with a basking aggregation of 88 animals (Plummer 1977, Trauth et al. 2004).</p> <p>There have been anecdotal reports of declining populations.</p> | <p>A marginal 0.4% of 2,201 turtles caught along a 296 km portion of the Missouri River from 1996 to 1998 were <i>Apalone spinifera</i> (Bodie et al. 2000).</p> <p>Less than 1% of 1,000 turtles collected near Jacob, Illinois and 12.9% of total turtle captures at a study site in Gallatin County,</p>   |

|   |   |  |  |
|---|---|--|--|
|   |   |  | Illinois from 1994 to 1999 (Cagle 1942, Dreslik et al. 2005).<br><br>Comprised 47% of 1,204 turtles trapped over the course of two years in Wisconsin (DonnerWright et al. 1999).  |
| <b>Range</b>                            | Found in South Carolina, southern Georgia down to Mobile Bay in southern Alabama and throughout Florida (Iverson 1992, Meylan 2006, Webb 1973). The species can also be found in the Florida Keys but it not native (Ernst and Lovich 2009).  | Found in the Ohio and the Missouri River drainage systems as well as the Mississippi watershed in Alabama, Arkansas, the panhandle of Florida, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Minnesota, Mississippi, Missouri, Nebraska, North Dakota, Ohio, Oklahoma, South Dakota, Tennessee, Texas, West Virginia, and Wisconsin (Ernst and Lovich 2009, TTWG 2021). An isolated population in New Mexico occupies the Canadian River drainage (Ernst and Lovich 2009). Has been extirpated from Pennsylvania's Allegheny River, (Ernst and Lovich 2009, TTWG 2021). The species has been introduced in France (Ernst and Lovich 2009). | Found in the United States in western New York and Pennsylvania, North and South Dakota, Montana, Nebraska, and Wyoming. Southward towards South Carolina, North Carolina, and Georgia, and west towards Arizona and New Mexico (Ernst and Lovich 2009). Isolated populations occur in Vermont, New Jersey, Colorado, California, Nevada, Utah, Hawaii, Virginia, and New Mexico (Ernst and Lovich 2009). Can also be found in Canada, Mexico, and France (Haffner 1997, Lemos-Espinal et al. 1999). |
| <b>Generation Length / Reproduction</b> | <p>Females reach sexual maturity between 25 and 30 cm CL, at an unknown age. Males reach sexual maturity between 15 and 21 cm CL, at unknown age (Meylan and Moler 2006).</p> <p>Females lay 2 to 7 clutches within one year, with clutch size correlating with body size (Iverson and Moler 1997). Annual output may be more 225 eggs (Iverson and Moler 1997).</p> <p>One study of 32 eggs calculated a hatching success rate of 81.25% (Heinrich and Richardson 1993).</p> | <p>Males mature at 4 years and females at 9 years (Ernst and Lovich 2009).</p> <p>Female clutch sizes can vary from 1 to 33 eggs, with an average of 6 to 8 eggs (Plummer 1976, Doody 1996), and up to three clutches laid yearly (Webb 1962, Meylan 2006).</p> <p>One study in Louisiana found an 82% hatch rate and 75% nest survivorship rate (Ernst and Lovich 2009).</p> <p>It is unknown how long individuals can live in the wild, but likely exceeds 20 years (Ernst and Lovich 2009).</p>   | <p>Males mature at over 15 cm CL, females mature at over 28 cm CL (van Dijk 2011).</p> <p>Female clutch sizes range from 3 to 39 eggs with 2 to 3 clutches a year (Webb 1962, Meylan 2006, Ernst and Lovich 2009).</p> <p>In Canada, the egg survivorship percentages have been reported as 85.4%, 70.8%, and 30.9% for protected nests and 61% and 47.3% for unprotected nests (De Solla et al. 2003).</p> <p>Generation length of 10 years. Maximum longevity is probably well over 30 years</p>   |

|                |   |   |   |
|----------------|---|---|---|
|                | <p>Oldest recorded specimens of the species include one that 25 years old at the Frankfurt Zoo in Germany (Pope 1939) and another that was 36 years and 8 months at the National Zoo in Washington, D.C. (Ernst et al. 1994, Slavens 1999).</p>   |   | <p>(Breckenridge 1955). Oldest specimen was recorded at the Racine Wisconsin Zoo as a female that was 25 years old (Ernst and Lovich 2009).</p>   |
| <b>Habitat</b> | <p>Inhabit permanent freshwater bodies as well as ephemeral waterbodies and brackish situations.</p> <p>Primarily carnivorous, feeding on snails, insects, fish, crayfish, and clams or tetrapod vertebrates (van Dijk 2011).</p>   | <p>Typically occur in medium-sized to large rivers with moderate to fast currents. Standing water bodies like lakes, ponds, and marshes that are connected to rivers are also used.</p> <p>Carnivorous omnivores, feeding mainly on insects but also eating plant seeds and fruit (van Dijk 2011).</p>  | <p>A generalist aquatic species that inhabits almost any type of permanent waterbody, from fast-flowing large rivers to lakes and reservoirs to small marsh creeks, farm ponds, and desert springs (Ernst et al. 1994).</p> <p>Carnivorous, feeding on crayfish and other crustaceans, fish (carrion and small, live fish), insects (aquatic larvae and fallen adults), other aquatic invertebrates, and some vegetable matter (Webb 1962, Ernst et al. 1994).</p>  |
| <b>Threats</b> | <p>Nest predators (foxes, raccoons, skunks, and fish crows), nestlings may also be consumed by raptors while adults may be taken by alligators (Meylan and Moler 2006).</p> <p>Commercial harvest of adults either targeted or as by catch (Meylan and Moler 2006). Exploitation of the species is widespread and sometimes intensive.</p> <p>Was one of the most intensively collected turtle species in Florida up to 2009 (7,500 adults annually) (Meylan and Moler 2006).</p> <p>Ranching of the species, specifically egg collection from confined wild-caught animals, produces substantial quantities of hatchlings for the global pet trade and for rearing facilities in China. Annual exports</p> | <p>Impact of commercial exploitation is undocumented and unquantified, though bycatch may be a factor in observed declines.</p> <p>Water pollution has been implicated in population reductions (Trauth et al. 2004). Frequent flooding events preclude successful reproduction.</p> <p>Exported as part of the general food trade to East Asia, and as juveniles into the global pet trade, but numbers or declared exports of this species are much less than <i>A. ferox</i> or <i>A. spinifera</i>.</p> | <p>Has long been exploited for local consumption (Webb 1962). More recently, adults have been exploited for export for food and hatchlings as pets for Asian farming operations.</p> <p>Since 1990, large numbers of adults (mostly females), have been exported from the United States to East Asia. Large quantities of hatchlings have also been exported (from both farms/ranches and wild-harvested eggs). Numbers may decrease as domestic turtle aquaculture operations start in Chin (van Dijk 2011).</p> <p>Declared exports are recorded in the LEMIS database, but available numbers do not allow separating the data by subspecies, area of origin, or whether collected from the wild or produced in captive conditions.</p> |

|                   |  |  |  |
|-------------------|--|--|--|
|                   | <p>amount to well over 100,000 in recent years (1999 to 2008 via LEMIS data) (van Dijk 2011).</p> <p>Females sometimes killed when crossing roads from nesting sites.</p>  |  | <p>Export numbers of recent years are: 1999-2002: under 1,000 each year; 2003: 16,131; 2004: 22,120; 2005: 31,113; 2006: 56,356; 2007: 32,119; and 2008: 120,723 individuals recorded as exported.</p> <p>Some individuals succumb to death as bycatch or roadkill. Habitat pollution also an issue. Certain populations and subspecies are more at risk than others.</p>  |
| <b>References</b> | <p>Iverson, J.B. 1992. A Revised Checklist with Distribution Maps of the Turtles of the World. Privately published, Richmond, Indiana.</p> <p>Meylan, P.A. and Moler, P.E. 2006. <i>Apalone ferox</i> - Florida Softshell Turtle. In: P.A. Meylan (ed.), <i>Biology and Conservation of Florida Turtles</i>, pp. 160-168. Chelonian Research Foundation, Lunenburg, MA.</p> <p>van Dijk, P.P. 2011. <i>Apalone ferox</i> (errata version published in 2016). The IUCN Red List of Threatened Species 2011: e.T165597A97397831. <a href="https://dx.doi.org/10.2305/IUCN.UK.2011-1.RLTS.T165597A6065209.en">https://dx.doi.org/10.2305/IUCN.UK.2011-1.RLTS.T165597A6065209.en</a>. Accessed on 09 May 2022.</p> | <p>Iverson, J.B. 1992. A Revised Checklist with Distribution Maps of the Turtles of the World. Privately published, Richmond, Indiana.</p> <p>Plummer, M.V. 1977. Activity, Habitat and Population Structure in the Turtle, <i>Trionyx muticus</i>. <i>Copeia</i> 1977(3): 431-440.</p> <p>Trauth, S.E., Robison, H.W. and Plummer, M.V. 2004. <i>The Amphibians and Reptiles of Arkansas</i>. University of Arkansas Press, Little Rock, Arkansas.</p> <p>van Dijk, P.P. 2011. <i>Apalone mutica</i> (errata version published in 2016). The IUCN Red List of Threatened Species 2011: e.T165596A97398190. <a href="https://dx.doi.org/10.2305/IUCN.UK.2011-1.RLTS.T165596A6064798.en">https://dx.doi.org/10.2305/IUCN.UK.2011-1.RLTS.T165596A6064798.en</a>. Accessed on 09 May 2022.</p> <p>Webb, R.G. 1973. <i>Trionyx muticus</i>. <i>Catalogue of American Amphibians and Reptiles</i> 139: 1-2.</p> | <p>Ernst, C.H., Lovich, J.E. and Barbour, R.W. 1994. <i>Turtles of the United States and Canada</i>. Smithsonian, Washington, DC. 578 pp.</p> <p>Webb, R.G. 1962. <i>North American Recent Soft-shelled Turtles (Family Trionychidae)</i>. University of Kansas Publications Museum of Natural History 13(10): 429-611.</p> <p>van Dijk, P.P. 2011. <i>Apalone spinifera</i> (errata version published in 2016). The IUCN Red List of Threatened Species 2011: e.T163451A97398618. <a href="https://dx.doi.org/10.2305/IUCN.UK.2011-1.RLTS.T163451A5607536.en">https://dx.doi.org/10.2305/IUCN.UK.2011-1.RLTS.T163451A5607536.en</a>. Accessed on 09 May 2022.</p> |



Annex 2.

| <b>State</b>      | <i>Apalone ferox</i> (Florida softshell turtle)   | <i>Apalone mutica</i> (smooth softshell turtle)  | <i>Apalone spinifera</i> (spiny softshell turtle)  |
|-------------------|---|--|--|
| <b>Alabama</b>    | Not protected   | Not protected  | N/A  |
|                   | Unlawful to take, sell, or possess any turtle egg or turtle parts from the wild for commercial purposes, except turtle farmers who may take nuisance turtles under a specially issued permit. | Unlawful to take, sell, or possess any turtle egg or turtle parts from the wild for commercial purposes, except turtle farmers who may take nuisance turtles under a specially issued permit.  | N/A  |
|                   | Two turtles per day can be taken for private purposes.  | Two turtles per day can be taken for private purposes.   | N/A  |
| <b>Arizona</b>    | N/A   | N/A  | Not protected  |
| <b>Arkansas</b>   | N/A   | Unlawful to take or attempt to take aquatic turtle eggs from the wild; take or attempt to take aquatic turtles for commercial purposes by any means other than hoop nets or box type (basking) turtle traps; possess commercial aquatic turtle harvest gear in closed water and harvest can only occur in specified counties and/or bodies of water. | Unlawful to take or attempt to take aquatic turtle eggs from the wild; take or attempt to take aquatic turtles for commercial purposes by any means other than hoop nets or box type (basking) turtle traps; possess commercial aquatic turtle harvest gear in closed water and harvest can only occur in specified counties and/or bodies of water. |
|                   | N/A   | N/A  | Private landowners can obtain a Private Land Commercial Aquatic Turtle Permit to allow for harvest.  |
|                   | N/A   | It is unlawful for aquatic turtle harvest/dealers permittees to fail to mail or deliver to the Commission on or before the 10th of each month a legibly completed and itemized aquatic turtle harvest form for all wild-caught aquatic turtles the prior month.  | It is unlawful for aquatic turtle harvest/dealers permittees to fail to mail or deliver to the Commission on or before the 10th of each month a legibly completed and itemized aquatic turtle harvest form for all wild-caught aquatic turtles the prior month.  |
| <b>California</b> | N/A   | N/A  | Native reptiles may not be sold, possessed, transported, imported, exported or propagated for commercial purposes. Only California kingsnake, California subspecies of the gophersnake, and the northern three-lined boa can be sold.  |
| <b>Colorado</b>   | N/A   | N/A  | Categorized as Nongame Wildlife  |

|                |   |   |   |
|----------------|---|---|---|
|                | N/A   | N/A   | Considered Unregulated Wildlife. It can be imported, sold, bartered, traded, transferred, possessed, propagated and transported provided that all importation, disease requirements and any other state, local or federal requirements are met. Statutory restrictions still apply.   |
| <b>Florida</b> | Not listed as a Endangered or Threatened  | Not listed as a Endangered or Threatened  | N/A   |
|                | No person shall take more than one turtle per day; turtle eggs may not be taken from the wild; No softshell turtles may be taken from the wild from May 1st to July 31st; any certified aquaculture facility may harvest freshwater turtles as bood stock for scientific or commercial aquaculture as authorized by permit. No person shall buy, sell, or possess and turtle, their eggs or parts thereof that have been taken from the wild..  | No person shall take more than one turtle per day; turtle eggs may not be taken from the wild; No softshell turtles may be taken from the wild from May 1st to July 31st; any certified aquaculture facility may harvest freshwater turtles as bood stock for scientific or commercial aquaculture as authorized by permit. No person shall buy, sell, or possess and turtle, their eggs or parts thereof that have been taken from the wild. | N/A   |
| <b>Georgia</b> | Not listed as a Protected Species   | N/A   | Not listed as a Protected Species   |
|                | It is unlawful for any person to export native freshwater turtles without a valid commercial permit; unlawful to possess more than ten native freshwater turtles without a valid commercial permit issued by the department; unlawful for any person to collect native freshwater turtle eggs from the wild; unlawful for any person to sell, hold for sale, or distribute viable native freshwater turtle eggs or live freshwater turtles with a carapace length less than 4 inches unless for export from the state authorized by a permit. | N/A   | It is unlawful for any person to export native freshwater turtles without a valid commercial permit; unlawful to possess more than ten native freshwater turtles without a valid commercial permit issued by the department; unlawful for any person to collect native freshwater turtle eggs from the wild; unlawful for any person to sell, hold for sale, or distribute viable native freshwater turtle eggs or live freshwater turtles with a carapace length less than 4 inches unless for export from the state authorized by a permit. |
|                | Application for a commercial turtle farming permit shall be submitted on forms provided by the department and may be submitted at any time. The permit year is from April 1 to March 31; Prior to issuing a commercial turtle farming permit to an individual who intends to operate a turtle farm, department personnel shall inspect the facilities and/or  | N/A   | Application for a commercial turtle farming permit shall be submitted on forms provided by the department and may be submitted at any time. The permit year is from April 1 to March 31; Prior to issuing a commercial turtle farming permit to an individual who intends to operate a turtle farm, department personnel shall inspect the facilities and/or  |

|                 |  |   |  |
|-----------------|--|---|--|
|                 | review the specifications of proposed facilities to ensure such facilities meet requirements; A commercial turtle farming permit shall not be issued to any person who has been convicted within the past five years of any violation of O.C.G.A. Title 27.                                    |   | review the specifications of proposed facilities to ensure such facilities meet requirements; A commercial turtle farming permit shall not be issued to any person who has been convicted within the past five years of any violation of O.C.G.A. Title 27.                                    |
|                 | Commercial turtle farming permit holders may annually stock up to two hundred native, wild caught freshwater turtles into a Georgia turtle farm, including up to one hundred turtles provided from authorized "catch outs", notwithstanding other special permits as issued by the department. | N/A   | Commercial turtle farming permit holders may annually stock up to two hundred native, wild caught freshwater turtles into a Georgia turtle farm, including up to one hundred turtles provided from authorized "catch outs", notwithstanding other special permits as issued by the department. |
|                 | Any person holding a valid commercial turtle farming permit may acquire live native freshwater turtles from any source or direct trapping of wild caught freshwater turtles in accordance with O.C.G.A. 27-4-91, provided that such turtles have been lawfully taken.                          | N/A   | Any person holding a valid commercial turtle farming permit may acquire live native freshwater turtles from any source or direct trapping of wild caught freshwater turtles in accordance with O.C.G.A. 27-4-91, provided that such turtles have been lawfully taken.                          |
|                 | Any person with a commercial turtle farming permit shall maintain accurate and complete records of transactions and instances of wild collection to be submitted annually.   | N/A   | Any person with a commercial turtle farming permit shall maintain accurate and complete records of transactions and instances of wild collection to be submitted annually.   |
| <b>Hawaii</b>   | N/A  | N/A   | Not listed as Threatened or Endangered Wildlife  |
| <b>Illinois</b> | N/A  | For indigenous Illinois amphibian and reptile taxa (excluding common snapping turtles and bullfrogs), the possession limit is eight collectively with no more than four per taxa. | N/A  |

|                  |     |  |   |
|------------------|-----|--|---|
|                  | N/A | The taking of reptiles and amphibians is prohibited in the LaRue-Pine Hills/Otter Pond Research Natural Area in Union County. The closed area shall include the Research Natural Area as designated by the U.S. Forest Service and the right-of-way of Forest Road 345 from the intersection of Forest Road 345 with Forest Road 236 to the intersection of Forest Road 345 with the Missouri Pacific railroad tracks. | N/A   |
| <b>Indiana</b>   | N/A | All reptiles and amphibians native to Indiana are protected by law and a license must be issued for take.  | All reptiles and amphibians native to Indiana are protected by law and a license must be issued for take.   |
|                  | N/A | An individual may take no more than four per day, singly or in aggregate.  | An individual may take no more than four in a day, singly or in aggregate. Spiny softshell turtles may be taken only between July 1 and March 31 of the following year and be at least twelve inches in carapace length.  |
| <b>Iowa</b>      | N/A | Not listed as an endangered, threatened, or special concern animal.  | Not listed as an endangered, threatened, or special concern animal.   |
|                  | N/A | Lawful to commercially and noncommercially (recreationally) collect smooth softshell ( <i>Apalone mutica</i> ) turtles from July 16 to May 14; The taking of turtle eggs from nests is prohibited; Daily catch limit is one, possession limit for commercial is five.  | Lawful to commercially and noncommercially (recreationally) collect smooth softshell ( <i>Apalone mutica</i> ) turtles from July 16 to May 14; The taking of turtle eggs from nests is prohibited; Daily catch limit is one, possession limit for commercial is five. |
| <b>Kansas</b>    | N/A | Not listed as a threatened or endangered species   | N/A   |
|                  | N/A | Not designated as nongame species in need of conservation  | N/A   |
|                  | N/A | Open season for taking of soft-shelled turtles is January 1 through December 31 with a collection bag limit of eight and possession limit of three.  | N/A   |
| <b>Kentucky</b>  | N/A | Can be hunted year round day or night with no bag limit but not for commercial purposes.   | N/A   |
| <b>Louisiana</b> | N/A | Not a restricted turtle species and not considered a species of conservation concern.  | Not a restricted turtle species and not considered a species of conservation concern.   |

|                       |     |  |   |
|-----------------------|-----|--|---|
| <b>Minnesota</b>      | N/A | Not specifically mentioned.                              | May be taken by an individual possessing a turtle seller's, turtle seller's apprentice, or recreational turtle or angling license. Must submit reports on the 10th day of each month for the preceding month for the months of March through November; must be at least 12 inches in length; a person may not collect turtle eggs from nests, a person may not possess or sell turtle eggs unless they have an aquatic farm license; a person with a turtle seller's license may take the eggs from legally harvested gravid turtles and place eggs back into man made nests in the wild within 48 hours of taking. |
| <b>Mississippi</b>    | N/A | Turtles are not specifically mentioned.                  | N/A   |
| <b>Missouri</b>       | N/A | Turtles are not specifically mentioned.                  | N/A   |
| <b>Montana</b>        | N/A | N/A  | Turtles are not specifically mentioned.   |
| <b>Nebraska</b>       | N/A | Not listed as a threatened or endangered species.        | Not listed as a threatened or endangered species.   |
|                       | N/A | Not listed as a nongame species in need of conservation. | Not listed as a nongame species in need of conservation.  |
| <b>Nevada</b>         | N/A | N/A  | Not listed as protected.  |
|                       | N/A | N/A  | It is unlawful for a person to collect unprotected wildlife for commercial purposes without a permit.   |
| <b>New Jersey</b>     | N/A | N/A  | Not listed as having conservation status in the state as a nongame wildlife species.  |
| <b>New Mexico</b>     | N/A | Not listed as a threatened or endangered species.        | Not listed as a threatened or endangered species.   |
| <b>New York</b>       | N/A | N/A  | No open season.   |
|                       | N/A | N/A  | Listed as species of special concern.   |
| <b>North Carolina</b> | N/A | N/A  | Listed as species of special concern; any species of wild animal native or once native to North Carolina that is determined by the Wildlife Resources Commission to require monitoring but that may be taken under regulations adopted under the provisions of Article 25.  |

|                     |     |  |  |
|---------------------|-----|--|--|
| <b>North Dakota</b> | N/A | No person may engage in the commercial taking, trapping, or hooking of turtles without obtaining a permit.   | No person may engage in the commercial taking, trapping, or hooking of turtles without obtaining a permit. |
| <b>Ohio</b>         | N/A | Not listed as threatened.  | N/A  |
|                     | N/A | Not listed as endangered   | N/A  |
|                     | N/A | Unlawful for any person to take softshell turtles from January 1st through June 30th; unlawful to take, collect or possess eggs of softshell turtles unless legally acquired from outside the state, or propagated under the authority of a commercial or noncommercial propagating license issued under section 1533.71 of the Revised Code; unlawful for any person to take softshell turtles with a straight-line carapace length of less than 11 inches; unlawful for any person possessing, buying, selling, trading, bartering, receiving or gifting reptiles or amphibians to fail to maintain accurate records; unlawful to fail to retain a certificate of origin, a bill of sale, receipt, record of acquisition or invoice legible in English, for each individual reptile or amphibian produced in captivity or legally obtained from out of state | N/A  |
| <b>Oklahoma</b>     | N/A | All softshell turtles, except as provided in Title 29 O.S., Section 4-102, greater than 16 inches in length shall not be kept in possession or sold or purchased and must be returned to the water immediately; all persons licensed as a commercial turtle buyer must keep accurate records of all turtles purchased within and exported from Oklahoma; a copy of each transaction along with a monthly summary must be mailed to the Department by the 15th of each month by each turtle buyer.  | N/A  |

|                       |   |  |   |
|-----------------------|---|--|---|
|                       | N/A   | Non-commercial harvest of turtles shall be lawful in all waters of the state throughout the year provided turtles are not sold commercially, persons taking the turtles are authorized and have a fishing license. | N/A   |
|                       | N/A   | All waters of the state of closed to commercial turtle harvest.  | N/A/  |
| <b>Pennsylvania</b>   | N/A   | N/A  | It is unlawful to damage or disrupt the nest or eggs of a reptile or to gather, take or possess the eggs of any reptile.  |
|                       | N/A   | N/A  | Not specifically outlined by season and possession limits - falls under "not closed season" with 1 take per day and 1 as a possession limit.  |
|                       | N/A   | N/A  | it is unlawful to take, catch, kill or possess for purposes of selling or offering for sale or to sell, offer for sale, import or export for consideration, trade or barter, or purchase an amphibian or reptile that was taken from lands or waters wholly within this Commonwealth, and its progeny, whether dead or alive, in whole or in parts, including eggs or any life stage. |
| <b>South Carolina</b> | Not listed as endangered non-game wildlife.   | N/A  | Not listed as endangered non-game wildlife.   |
|                       | Not listed as non-game species in need of management.   | N/A  | Not listed as non-game species in need of management.   |
|                       | No native reptile or amphibian, including parts, products, eggs, and derivatives may be sold, purchased, traded, exchanged, bartered, exported or shipped, transferred and/or re-homed. | N/A  | No native reptile or amphibian, including parts, products, eggs, and derivatives may be sold, purchased, traded, exchanged, bartered, exported or shipped, transferred and/or re-homed.   |
|                       | A person shall not possess more than five total.  | N/A  | A person shall not possess more than five total.  |
| <b>South Dakota</b>   | N/A   | The limit on all species of turtles is two daily with a possession limit of four for each species.   | The limit on all species of turtles is two daily with a possession limit of four for each species.  |
|                       | N/A   | A person may not buy, sell, barter, or trade any species of turtle.  | A person may not buy, sell, barter, or trade any species of turtle.   |
|                       | N/A   | Not listed as an endangered reptile.   | Not listed as an endangered reptile.  |

|                     |     |  |   |
|---------------------|-----|--|---|
|                     | N/A | Not listed as a threatened reptile.  | Not listed as a threatened reptile.   |
| <b>Tennessee</b>    | N/A | Not listed as threatened, endangered, or in need of management.  | N/A   |
| <b>Texas</b>        | N/A | No person may collect, acquire, possess, import, export, cause the import or export of, or engage in a commercial activity involving nongame wildlife. | N/A   |
|                     | N/A | Not listed as threated species.  | N/A   |
|                     | N/A | Not listed as endangered species.  | N/A   |
| <b>Utah</b>         | N/A | N/A  | A person may not take, posses, import, export, transfer, or release to the wild a reptile or amphibian or their parts, or attempt to undertake such activity, except as provided in this rule or in a proclamation or guidebook issued by the Wildlife Board.       |
|                     | N/A | N/A  | Not listed as a prohibited species, not listed as a non-controlled non-native species, not listed as a non-controlled native species, not listed as a controlled species. Must have a collection permit to remove from the wild. Possession is 25 daily, 100 total. |
| <b>Vermont</b>      | N/A | N/A  | Listed as a threatened species; no person shall take or possess an endangered or threatened species.  |
| <b>Virginia</b>     | N/A | N/A  | Not listed as an endangered or threatened species.  |
|                     | N/A | N/A  | Lawful to capture and possess live for private use but not for sale or export;can have no more than one individual of any native species.   |
| <b>West Virgina</b> | N/A | No person may take or possess snake eggs, lizard eggs, skink eggs, turtle eggs, amphibian eggs, tadpoles, or larvae of any species.                    | N/A   |
|                     | N/A | A person may take and possess a daily creel limit of 10 live eastern spiny softshell and the possession limit in aggregate is 20.                      | N/A   |
| <b>Wisconsin</b>    | N/A | Not listed as Endangered or Threatened.  | N/A   |



|                |     |  |  |
|----------------|-----|--|--|
|                | N/A | No closed season, bag limit, size limit, or possession limit applies | N/A  |
| <b>Wyoming</b> | N/A | N/A  | All amphibians and reptiles not specifically referenced may be taken throughout the calendar year for personal use without a permit; shall be confined at their final destination and shall not be released, abandoned or allowed to escape. |
|                | N/A | N/A  | Not listed as protected animal.  |