Original language: English CoP19 Prop. XXX

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

Inclusion of timber rattlesnake (*Crotalus horridus*) in Appendix II, in accordance with Article II Paragraph 2 (a) of the Convention and satisfying Criterion B in Annex 2a of Resolution Conf. 9.24 (Rev. CoP17). Specifically for 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 (ITIS)

1.1 Class: Reptilia

1.2 Order: Squamata

1.3 Family: Viperidae

1.4 Genus and species: *Crotalus horridus*

(Linnaeus, 1758)

Figure 1. A timber rattlesnake (*Crotalus horridus*) in Florida. Source: New York State Department of Environmental Conservation; Photo: William Hoffman

This North American rattlesnake species notably differs morphologically (in both color and pattern) between its respective northern and southern geographic ranges (Gloyd 1940). Due to increasing habitat fragmentation (sections 3.1, 4.1, 5) and variable biological traits observed between populations, research investigating potential *C. horridus* subspecies, distinct subpopulations, and overall population genetics has become a priority for conservation management of this historically wide-ranging species (Clark et al. 2003, Allsteadt et al. 2006, Januszkiewicz et al. 2018). Inferences

* *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.*

of *C. horridus* subspecies and speciation were proven invalid by mtDNA analyses (Clark et al. 2003, Stengle 2018, Margres et al. 2021). Herein, all morphological varieties and common names (section 1.6) are referencing one monotypic species, *Crotalus horridus.*

1.5 Scientific synonyms: *Crotalus horridus atricaudatus* (Latreille, 1802)
Crotalus horridus horridus (Linnaeus, 1758)

1.6 Common names:
English: Timber rattlesnake, Canebrake rattlesnake, Banded rattlesnake
French: Crotale des bois
Spanish: Cascabel de los bosques
German: Wald-Klapperschlange

The species is generally called the timber rattlesnake in its northeastern range and the canebrake rattlesnake in its southern range.

1.7 Code numbers: Not applicable

2. Overview

This proposal aims to address and regulate unsustainable trade practices affecting *C. horridus*. The United States submitted a proposal at CITES CoP10 in 1997 to include the species in Appendix II (see CoP10 Prop. 10.63) and therefore this is the second attempt to include the species in CITES Appendix II. Since CoP 10, the species has continued to decline, and illegal trade and unsustainable use remains a threat. If this proposal is adopted, *C. horridus* would become the first North American viper species included in the CITES appendices.

C. horridus is long-lived with a high age at maturity and low annual fecundity (Orianne Society 2022). The survival of adults, and particularly females, is paramount to population viability (Orianna Society 2022). Unfortunately, the species is threatened with extinction in 47% of its southern range and is extirpated in two States in the United States as well as Canada in its northern range (see Table 1). A total of 23 of the 31 States within the United States that have extant *C. horridus* populations classify the species as Vulnerable, Threatened, or Endangered (see Table 1). A survey on the primary threats to the species, completed by all States within the United States in the species' range, revealed roadways and road mortality as the largest threat (27/31 States) to species survival and poaching and illegal collection as the fourth (23/31 States) (Breisch 2021). *C. horridus* is observed in the live pet trade, in "rattlesnake roundups", in the reptile skin trade, venom trade, and for sale as "novelty" items (e.g., taxidermy, tail rattle jewelry). This is problematic, as their biological characteristics make the harvest of any individuals from the wild detrimental to species survival, and their behavioral characteristics (communal denning) make it particularly easy for large numbers (42 to 558 individuals (Brown 2008)) to be collected at one time.

While many States in the United States with *C. horridus* have regulations surrounding harvest, these are likely not sufficient to adequately monitor the demand and trade volume of the species at the macro level necessary to ensure its persistence and recovery. State regulations are highly variable (see Table 2) and can only provide localized monitoring efforts. Inclusion of the species in Appendix II would complement State and other domestic measures and regulate any trade in this species nationally. It will ensure specimens entering international trade were acquired sustainably as well as legally and will not be detrimental to the survival of the species. It will monitor and ensure that

individuals reported in trade as bred in trade are in fact bred in captivity per the requirements of Resolution Conf. 10.16 (Rev). The inclusion of this species to Appendix II is in accordance with the Precautionary Approach, as outlined in paragraph 2 in Annex 4 of CITES Resolution Conf. 9.24 (Rev. CoP17), which resolves that Parties should "act in the best interest of the conservation of the species concerned and adopt measures that are proportionate to the anticipated risks to the species". While trade volumes in this species are low, the species is highly vulnerable to unregulated harvest and illegal trade and therefore, an Appendix II inclusion is in keeping with the pre-cautionary approach to ensure legal and non-detrimental trade in this rattlesnake.

3. Species characteristics

3.1 Distribution

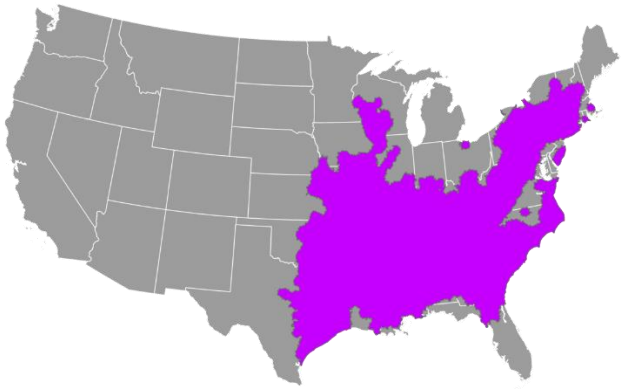

Figure 2. Range of the timber rattlesnake (*Crotalus horridus*) in the United States denoted in purple. Source: U.S. Geological Survey (USGS) Gap Analysis Project (GAP) 2018

C. horridus is endemic to North America. Historically, the species was found in 33 midwestern, southern, and northeastern States in the United States and in the Canadian province of Ontario along the Niagara Escarpment. There are past reports of the species occurring in extreme southern Quebec along the United States border (Canadian Wildlife Service [CITES Management Authority], pers. comm.). In 2001, the species was considered extirpated in Canada after it had not been seen since 1941 (Environment Canada 2010). Maine and Rhode Island have also declared *C. horridus* extirpated (NatureServe 2014). According to U.S. State conservation listings, *C. horridus* is threatened with extinction (classified as Vulnerable or Endangered) in 74% (23/31) of the U.S. States in which it occurs (see Table 1).

Although widely found, the species' distribution is increasingly fragmented and continuing to decline range-wide, leading to the species being considered rare or uncommon (Brown 1993, Hammerson 2007, Martin et al. 2008, Breisch et al. 2021). Levels of fragmentation vary in severity. Many midwestern and northeastern *C. horridus* populations have higher levels of fragmentation and decline than in the past (see Table 1), and some States in the United States (e.g., Missouri) note that there is no population of *C. horridus* large enough to support any degree of harvest (Breisch et al. 2021).

3.2 Habitat

C. horridus is generally terrestrial and found in a variety of habitat types, including temperate forests, inland wetlands, rocky areas, and pastureland (Hammerson 2007). Thermally suitable gestation and shedding sites are considered microhabitats in the northeastern U.S. and may be a limited resource (Bauder et al. 2018). In most of its range, the species requires denning sites to occupy over the winter (Martin 1989). Undisturbed and connected habitats surrounding dens during the spring, summer, and fall are important to the creation and maintenance of viable populations (Clark et al. 2008, Clark et al. 2010, NatureServe 2014). Habitats are increasingly becoming more fragmented by roadways and residential development as well as agricultural development, creating substantial migration barriers that hinder gene flow (Breisch et al. 2021).

3.3 Biological characteristics

C. horridus are long-lived ectotherms that exhibit high age at maturity and low annual fecundity, with prolonged life history traits that become even slower at higher elevations (Bauder et al. 2018). Individuals as old as 31 and 33 years have been identified (Brown 2008). Female timber rattlesnakes are late-maturing, exhibit low-frequency birth rates (range: 2 to 7 years, average: 3 years) with an average clutch size of 9 neonates (Brown 1991, 2016; Falk 2002, NatureServe 2014). Brown (2016) conducted a 36-year reproductive study on northeastern *C. horridus* populations and found that most females only reproduced once throughout their lifetime and reached reproductive maturity at a mean age of 9.6 years. Sexual maturity in male *C. horridus* varies across the species' range and is correlated with body size and condition (Aldridge & Brown 1995). Unfortunately, delayed sexual maturity and low fecundity in females makes the species extremely sensitive to over-exploitation because already low-reproductive outputs are magnified, increasing the likelihood of extirpation (Breisch et al. 2021). For example, the sharp decline of *C. horridus* in New York, New Jersey, Connecticut, and Massachusetts was attributed to only one individual poacher operating in the area (Brown 1993).

C. horridus behaviors (e.g., foraging, digestion, ecdysis, and gestation) have been linked to temporal and spatial habitat conditions (Hoffman et al 2021). Adult *C. horridus* sociality is described as cryptic (Clark et al. 2012) and relies on evolutionarily complex behaviors (e.g., chemical scent trailing, communal winter denning, communal basking for seasonal thermoregulation) (Fitch 1956, Brown & MacLean 1983, Reinert and Zappalorti 1988, Hammerson and Lemieux 2001, Adams 2005, Cobb et al. 2005, Clark et al. 2012).

Aggregates of *C. horridus* can be observed for various reasons. For example, gravid females may come together after gestation (Graves and Duvall 1995), and both males and females are often found grouped together when shedding their skins (Gregory et al. 1987; Ashton 1999). Females providing parental care can be found clustered with their neonates until the natal skin is shed (Greene et al. 2002). Scent trails of one individual may be followed by another for no immediate rationale and unrelated to mating, though collective group movements of individuals appear to be spatially and temporally correlated (Clark 2004), bringing multiple individuals together (Brown & Maclean 1983; Scudder et al. 1988). Denning during hibernation is done by both males and females, with hibernation time contingent on climate (Ulev 2008). One range-wide study noted hibernation to last 7.4 months in the northern reaches of their range and 2 months in the southern reaches (Martin et al. 2008), and one study from Tennessee found hibernation to last 5 months on average (Nordberg 2013). This communal denning can bring 42 to 558 individuals together (Brown

2008). The number of dens available for exploitation vary by state. For example, New York alone has an estimated 218 active dens while Vermont, a state approximately one-fifth the size of New York, has a mere 5 (NYDEC 2013).

There are numerous benefits to group living in rattlesnakes, all predominately associated with defense. First, vigilance is increased, and defensive mechanisms are more at the ready (Duvall et al. 1985). Second, clustering creates a 'dilution' effect to confuse predators (Calvert et al. 1979), and third, pheromones from one snake to another can communicate imminent threats (Graves and Duvall 1988). Defense mechanisms for the species even align with 'inclusive fitness theory' in that individuals exhibit kin recognition and are more likely to aggregate with members they share genetic information with so as to protect their biological lineage even if they themselves are killed (Hamilton 1964, Clark 2004). Unfortunately, these mechanisms do little to protect against humans, and instead make the species more susceptible to the detrimental impacts of harvest given that so many individuals can be taken at one time.

3.4 Morphological characteristics

The timber rattlesnake is one of 15 rattlesnake species in North America and is morphologically distinguishable from others by the dark W-shaped bands or zig-zag chevron patterns across their dorsal scales (Conant and Collins 1991, Martin, in Tyning 1992). Adult *C. horridus* are larger-bodied and vary in coloration throughout the species' range (Brown 1993). Northern populations are generally darker when compared to lighter colored southern "canebrake" populations. "Yellow" color morphs are found range-wide while "black" morphs are typically only found in northern regions.

3.5 Role of the species in its ecosystem

Rattlesnakes have long been perceived as a species that needed to be removed for the greater good of the public and ecosystem balance (Weir 1992). In actuality, *C. horridus* plays a large role in maintaining primary ecological structure and function as well as pest control. Diet can vary greatly, even within small geographic distances (Reinert et al. 2011). Vole, mouse, shrew, rabbit, squirrel, chipmunk, avian species, and gypsy moth have been identified in collective diets of *C. horridus* from Pennsylvania and Virginia (Reinert et al. 2011). One study synthesizing dietary data from previous studies and museum specimens reported that amphibians, lizards, snakes, pheasants, sparrows, woodpeckers, bats, rats, hares, minks, voles, shrews, and mice were identified (Clark 2002). As prey, *C. horridus* are a food source to hawks, raccoons, opossums, skunks, weasels, bobcats, and coyotes, as well as other snake species, and can even be consumed by ants (Ernst and Ernst 2003, Herr et al. 2020). The species is extremely sensitive to food availability and can thus serve as an indicator of ecosystem function. For example, *C. horridus* showed poorer body condition, no evidence of reproductive activity, and lower metabolic rate during years of low prey availability (Beaupre 2008).

4. Status and trends

4.1 Habitat trends

C. horridus prefers forested habitat and is mainly found in coastal plain areas (e.g., swampy areas, wet pine flatwoods, hardwood forests, and cane fields) across their southern range

(NatureServe 2014). It can be inferred that southern populations of *C. horridus* that occur in East Gulf Coastal Plain pineland habitats (The Nature Conservancy 2001), such as wet pine flatwoods, are experiencing extreme levels of habitat loss.

The extent of habitat loss and fragmentation is so severe that Canada has determined recovery to be "not feasible" because sufficient habitat is no longer available (Canadian Wildlife Service [CITES Management Authority], pers. comm.).

4.2 Population size

Total population size is unknown. NatureServe (2014) estimated a global abundance ranging from 100,000 to >1,000,000 individuals and noted this abundance as 'highly vulnerable'. A total of 23 out of 31 States in the United States with extant populations consider them at population numbers that constitute a Threatened, Vulnerable, or Endangered status (see Table 1).

4.3 Population structure

Viable *C. horridus* populations generally exist in a metapopulation structure and rely on seasonal habitat connectivity (Brown 2016). Adults living in regions with harsh, long winters (e.g., rocky microhabitats) brumate communally and show high natal philopatry (Clark et al 2008). Local seasonal migrations (e.g., spring egress, summer foraging, fall ingress) have been formally observed (Brown et al. 1983).

Uneven sex ratios can result in populations faced with anthropogenic threats. For example, males are more susceptible to road mortality during the reproductive season because they are actively searching for females and may skew the population towards females (Breisch et al. 2021). Alternatively, other work has found *C. horridus* populations to be male-biased, perhaps due to the harvest vulnerability of gravid females during denning (Brown 1993, Berish 1998).

4.4 Population trends

According to the IUCN (Hammerson 2007), *C. horridus* is classified as "Least Concern" with a decreasing population trend, but this assessment is from 2007 and updated notes and population monitoring research on *C. horridus* are needed. Available state-level population trend details are provided by five of the species range States in the United States: Virginia, New York, Massachusetts, New Hampshire, and Connecticut (see Table 1). NatureServe (2014) reported an observed long-term global population decline of 30 to 50% and a projected short-term decline of 10 to 30% over 3 *C. horridus* generations (20 to 30 years).

4.5 Geographic trends

C. horridus was once one of the most wide-ranging North American rattlesnake species; however, current populations of *C. horridus* are now fragmented (Galligan 1979, Brown 1993, Garst 2007, Bauder et al. 2018, Breisch et al. 2021). *C. horridus* has been extirpated from two U.S. States and from the entirety of its historical range in Canada.

5. Threats

The general public's fascination with and fear of rattlesnakes has added a layer of complexity to their conservation and has led to population declines (Sasaki et al. 2008). For example, there is an unfortunate, false, and long-standing belief in the United States that rattlesnake populations cannot be extirpated (Kilmon and Shelton 1981). In reality, *C. horridus* is subject to ongoing road mortality, persecution, illegal collecting and poaching, habitat loss and fragmentation range-wide. The Partners in Amphibian and Reptile Conservation (PARC) timber rattlesnake conservation plan (2021), created with the help of more than 75 rattlesnake biologists, identified the largest current threats to the species. The most notable identified threats in order of severity include: roadways and road mortality (27/31)*, human development (24/31), persecution (24/31), poaching and illegal collecting (23/31), habitat loss (19/31), and habitat fragmentation (17/31) (Breisch et al. 2021).

*Note: Numbers in parentheses represent the frequency of range States in the United States that reported the threat over the total (N = 31) remaining *C. horridus* range States in the United States.

Snake fungal disease and "listless syndrome" have been confirmed in *C. horridus* populations. Although their effects are not fully understood, they may serve as a significant threat (Brown 2008, Breisch et al. 2021). Emerging threats surrounding human activity in *C. horridus* habitat include hiking, biking, camping, and educational viewing (Breisch et al. 2021). Mere human presence may alter behavior, and important habitats such as gestation sites, may be avoided by snakes all together (Breisch et al. 2021). Of consequence to educational viewing is the tendency for individuals to make social media posts, which may alert others with ill intentions of poaching or collecting as to where *C. horridus* hot spots can be found (Breissch et al. 2021).

The biological, life history characteristics of *C. horridus* make the collection of even a few individual adults detrimental to the survival of the species (Webb et al. 2002, Rulon et al 2011, NatureServe 2014). Historically, northeastern populations have been subject to massive mortality and extreme population declines through direct human persecution (Galligan & Dunson 1979, Brown 1993). This is driven in part by the species' use of communal hibernacula, making them particularly vulnerable to overexploitation at concentrated denning sites (Gibbon 1972, Greene 1997, Fitzgerald and Painter 2000). Both males and females will occupy dens during winter months for hibernation (Ulev 2008). Winter denning sites are typically in shrubby areas with high deciduous cover and rocky features (Ulev 2008). Denning is dependent on environmental temperature and is a period characterized by little to no activity (Gregory 1982). This makes *C. horridus* vulnerable to large volumes of harvest in a single collection event, removing a substantial number from a population, which may include gravid females. As many as 42 to 558 individuals can be found in a single den (Brown 2008). Illegal poaching and collecting have caused the extirpation of entire populations within the species' range (Rubio 1998).

It is inferred that *C. horridus* is affected by trade. Collection from the wild to supply the pet trade is reportedly a threat in most range states in the United States (74%) (Breisch et al. 2021). Any adult harvest is estimated to have detrimental impacts on the viability of fragmented *C. horridus* populations (Bauder et al. 2018). The IUCN Red List assessment (Hammerson 2007) noted trade management as a needed conservation action for *C. horridus*.

6. Utilization and trade

Observed use of *C. horridus* in trade, is projected or inferred to continue.

6.1 National utilization

Domestic commercial use of *C. horridus* is observed in the live pet trade, skin trade, venom trade, in rattlesnake roundups, and for sale as “novelty” items (e.g., taxidermy, rattle jewelry). Live *C. horridus* are also still used by Christian “serpent handling” churches in Appalachia (Duin 2021). Historically, the availability of live individuals has been driven by the popularity of rattlesnake roundups, hunts, and shows (Fitzgerald and Painter 2000). Snakes are purchased at these events for resale into the commercial market (Fitzgerald and Painter 2000). Though largely considered an antiquated practice, rattlesnake hunts and roundups in which it is not required to return the snakes to the wild are still practiced in Texas (http://www.rattlesnakeroundup.net/), Oklahoma, Georgia, and Alabama (see Table 2). The species is readily available for purchase online with no information regarding the origin of the snake for as much as 250 USD (Underground Reptiles 2022).

Figure 3. Examples of *C. horridus* products in online US trade (eBay). Item prices in USD from left to right as of May 2022 are: $319.95 (shoe), $649.99 (guitar strap), and $795.00 (taxidermy).

6.2 Legal trade

Rattlesnake harvest for trade was fairly low until 1982 when the demand for exotic reptile skins skyrocketed (Fitzgerald and Painter 2000). It has been difficult to determine the degree of harvest and trade since that time because there is very little to no oversight by an authority that is wide-ranging, such as CITES. Harvest by the public is undocumented, including those operating through rattlesnake roundups, whose organizers typically do not keep records of snake number or poundage collected (Adams 1994). In addition, commercial traders in the 1980s and 1990s were reluctant to discuss their harvest numbers or dealings (Fitzgerald and Painter 2000). From 2013 to 2019, United States Fish and Wildlife Service Law Enforcement Management Information System (USFWS LEMIS) export data reported almost all live (n = 15) legal trade of *C. horridus* was from captive bred individuals (~89%); however, 100% of *C. horridus* specimens [not necessarily live, can be

parts/products for commercial, scientific or medical use] (n = 20) exported from the US were reportedly taken from the wild and approximately 83% of those wild specimens were legally traded internationally for commercial purposes (compared to ~17% for scientific purposes). Recent trade volume is relatively low (total N = 35 (15 live, 20 specimens)) compared to past trade volumes in *C. horridus*. For example, 36 live timber rattlesnakes were traded internationally from July 1990 to June 1991 from Florida alone, with Italy and Germany being the largest importers at 17 and 14 live individuals, respectively (Enge 1993). This decrease could possibly be attributed to a decrease in demand; however, it more likely represents increasingly rare *C. horridus* populations coupled with the increase in U.S. State protections from State-level conservation status uplistings.

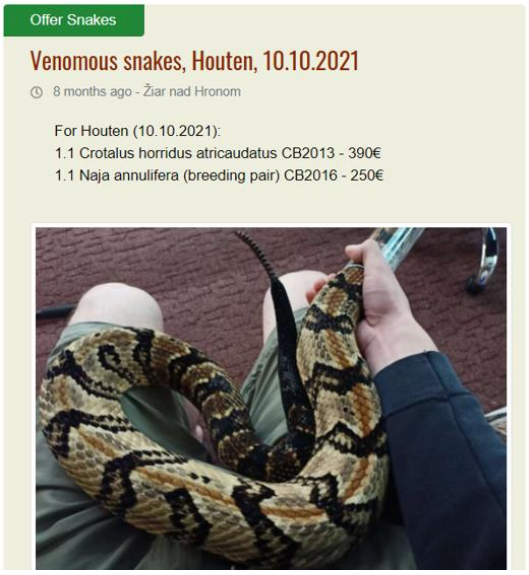

Figure 4. A screenshot of a Slovak citizen selling a timber rattlesnake on a German pet trading website (www.terraristik.com) for 408.91 USD.

The LEMIS data reported Canada, Thailand, Germany, Austria and Japan as the top five importing countries by number of *C. horridus* specimens from 2013 to 2019. Demand for *C. horridus* has also been shown in the South African pet trade where timber rattlesnakes were for sale at a local reptile show (P. Moler 2022, pers. comm.). Overall, there is extensive evidence of rattlesnake (genus *Crotalus*) parts and derivatives in international trade (https://robindesbois.org/en/).

6.3 Parts and derivatives in trade

Live animals, dead animals, museum and research specimens, and derivatives (e.g., venom extracts, medicinal products, skeletons, skins, and trophies) are known to be in international and domestic trade (USFWS LEMIS 2013–2019).

6.4 Illegal trade

All venomous snakes have market value (Breisch et al. 2021) but is unknown and practically impossible to estimate the degree of unregulated international trade in wild or captive bred timber rattlesnakes (Fitzgerald and Painter 2000).

One of the most lucrative illegal international trade busts of *C. horridus* was reported in 2013. In violation of the U.S. Lacey Act (16 U.S.C. §§ 3371-3378), a Florida man was convicted for illegally purchasing and transporting 20 protected, wild-caught northeastern *C. horridus* across state lines. Evidence from the trial showed the snakes were destined for the European pet trade, where a single timber rattlesnake can sell for over 800 USD at reptile shows. Protections afforded by inclusions in CITES Appendix II could appropriately regulate *C. horridus* international trade.to ensure that any trade is legal and sustainable.

6.5 Actual or potential trade impacts

Fragmented and declining wild *C. horridus* populations cannot withstand adult removal from the wild (Bauder et al. 2018). A CITES Appendix II listing could help address one of the timber rattlesnake's biggest threats (poaching and illegal collection for the pet trade) by regulating the international trade of this biologically vulnerable, docile natured, unique, and U.S. flagship species.

7. Legal instruments

7.1 National

C. horridus is not listed or afforded direct national protection; however, many United States range States provide various legal protections with 18 of the extant 31 United States range States directly prohibiting harvest (Breisch et al. 2021) (see Table 2). Unfortunately, such statutes are often not enforced (Breisch et al. 2021). CITES can complement State regulations and management efforts to ensure that trade is legal and use is sustainable at a national level.

7.2 International

None known.

8. Species management

8.1 Management

According to NatureServe (2014), three protection, secrecy, and patrolling management programs are underway to prevent uncontrolled wild harvest of vulnerable and endangered *C. horridus* populations. Species management initiatives and programs in the United States are State-dependent and vary across species range (see Table 2).

8.2 Population monitoring

Population monitoring has been recommended as a conservation action by rattlesnake experts through the Partners in Amphibian and Reptile Conservation (Breisch et al. 2021). Translocated individuals (Reinert and Rupert 1999) and head-start wild-caught individuals (Conner et al. 2003) continue to be studied to measure their ability to augment endangered northern populations. Some States in the United States have specific programs that may allocate resources towards monitoring *C. horridus.* For example, New Jersey's Endangered and Nongame Species Program monitors den locations and critical habitat for the species (NJDEP 2022). Population monitoring in the majority of *C. horridus* southern range states in the United States is lacking when compared to monitoring efforts in the midwest and northeast (Breisch et al. 2021).

8.3 Control measures

8.3.1 International

None known.

8.3.2 Domestic

No national (U.S. federal government) protections are given. See Table 2 for synopses and resource links to local control measure laws in States within the United States.

8.4 Captive breeding and artificial propagation

Captive breeding programs for the conservation of *C. horridus* have proven difficult (Puskar 1999). A Rhode Island zoo has one of the only known captive breeding programs for the state extirpated reptile and is the augmentation source (using neonates) for northeastern head-starting efforts. According to the ZIMS 360 database, there are 14.7.7 *C. horridus* individuals in 20 institutions (18 in the United States, 1 in Russia, and 1 in Cyprus) with no births in the previous year (June 6, 2021 to June 6, 2022) (ZIMS 2022). While the species is not considered "easy" to breed, they have been reproduced in a captive setting and a genetically managed *ex situ* population may be a reasonable conservation action (B. Aucone – Denver Zoological Foundation, pers. comm.).

8.5 Habitat conservation

Many State protective laws do not mandate habitat protection for threatened or endangered species (NatureServe 2014). Some *C. horridus* populations are found in protected areas and state lands. For example, Pennsylvania provides 2.2 million acres of Forest State land, with the largest continuous blocks of *C. horridus* habitat in the northeast (PA DCNR 2022). National wetland protection laws, in accordance with the U.S. Environmental Protection Act (1969), indirectly protects portions of the rattlesnake's southern wetland habitat range. This helps to offset lack of conservation measures in certain U.S. States, such as Florida (Breisch et al. 2021).

8.6 Safeguards

Not applicable.

9. Information on similar species

Four "New World" pit viper species are also commercially exploited to supply the international rattlesnake trade: the western diamondback (*Crotalus atrox*), the eastern diamondback (*C. adamanteus*), the prairie rattlesnake (*C. viridis*), and the blacktail rattlesnake (*C. molossus*) (Fitzgerald and Painter 2000). Despite numerous similarities, *C. horridus* can be described as one of the most vulnerable species to over-harvest. For example, female *C. afrox* and *C. viridis* reach sexual maturity at approximately 2 to 4 years instead of 9 years and produce at least every other year instead of maybe only 2 to 3 times per lifetime (Tinkle 1962, Brown 1993). *C. atrox* can produce a clutch size of 9 to 18 neonates while *C. adamanteus* can produce 7 to 29 per clutch and *C. horridus* produces an average of 9 (Palmer and Braswell 1995, Degenhardt et al. 1996). Under most circumstances, *C. horridus* parts and derivatives are distinguishable from other similar species in trade.

10. Consultations

In the United States, we have an open, transparent process to engage and consult with the public, including States, Tribes, industries, 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 visit https://www.regulations.gov/docket/FWS-HQ-IA-2021-0008/document.

Canada: Canada confirmed that *C. horridus* is considered an extirpated species in Canada and that there are no recovery efforts in place at this time (Letter dated May 19, 2022 from Canadian Wildlife Service [CITES Management Authority]).

11. Additional remarks

No additional remarks.

12. References

Adams CE, Thomas JK, Strnadel KJ, and Jester SL. 1994. Texas rattlesnake roundups: implications of unregulated commercial use of wildlife. Wildlife Society Bulletin 22:324-330.

Adams JP. 2005. Home Range and Behavior of the Timber Rattlesnake (*Crotalus horridus*). Thesis, Marshall University, Huntington, West Virginia, USA.

Alabama Department of Conservation and Natural Resources (ADCNR). 2015. Alabama's Wildlife Action Plan 2015-2025. Division of Wildlife and Freshwater Fisheries, Montgomery, AL. Available from: https://www.outdooralabama.com/sites/default/files/Research/SWCS/AL_SWAP_FINAL%20June2017.pdf (accessed May 2022).

Alabama Natural Heritage Program (ALNHP). 1994. Amphibians and Reptiles of Alabama: Conservation status of species and selected subspecies. Available from: https://ecos.fws.gov/ServCat/DownloadFile/25766?Reference=26984 (accessed May 2022).

Aldridge RD, and Brown WS. 1995. Male reproductive cycle, age at maturity, and cost of reproduction in the timber rattlesnake (*Crotalus horridus*). Journal of Herpetology: 29(3): 399-407.

Allsteadt J, Savitzky A, Petersen C, and Naik D. 2006. Geographic Variation in the Morphology of *Crotalus Horridus* (Serpentes: Viperidae). Herpetological Monographs:1–63.

Ashton KG. 1999. Shedding aggregations of *Crotalus viridis concolor.* Herpetological Review 30:211-213.

Bauder JM, Stengle AG, Jones M, Marchand M, Hess B, Clifford B, and Jenkins CL. 2018. Population Demographics, Monitoring, and Population Genetics of Timber Rattlesnakes in New England:308.

Beaupre SJ. 2008. Annual variation in time-energy allocation by timber rattlesnakes *(Crotalus horridus*) in relation to food acquisition*.* In The Biology of Rattlesnakes Pp 111-122. Hayes WK, Beaman KR, Cardwell MD, Bush SP (eds). Loma University Press. Loma Linda, California.

Berish J. 1998. Characterization of rattlesnake harvest in Florida. Journal of Herpetology 32:551-557.

Breisch A, Martin HW, Sealy BJ, Petersen EC, and Possardt E. 2021. The Timber Rattlesnake: Life History, Distribution, Status, and Conservation Action Plan. Amphibian & Reptile Conservancy, Incorporated.

Briggler J. and Johnson TR. 2013. Snakes of Missouri. Missouri Department of Conservation. Available from: https://fisheries.tamu.edu/files/2013/10/Snakes-of-Missouri.pdf (accessed May 2022).

Brown WS. 1984. Background information for the protection of the timber rattlesnake in New York state. Bulletin of the Chicago Herptetological Society 19:94–97.

Brown WS. 1988. Timber rattlesnake: background information for protection as a threatened species in New York State. New York Herpetological Society Newsletter.

Brown WS. 1993. Biology, status, and management of the timber rattlesnake (*Crotalus horridus*): a guide for conservation. Society for the Study of Amphibians and Reptiles, Herpetological Circular, Lawrence, Kan.

Brown WS. 2008. Sampling timber rattlesnakes *(Crotalus horridus*): Phenology, growth, intimidation, survival, and a syndrome of undetermined origin in a northern population*.* In The Biology of

Rattlesnakes Pp 253-256. Hayes WK, Beaman KR, Cardwell MD, Bush SP (eds). Loma University Press. Loma Linda, California.
Brown WS. 2016. Lifetime Reproduction in a Northern Metapopulation of Timber Rattlesnakes (*Crotalus horridus*). Herpetologica 72:331–342. Allen Press Publishing Services Inc.
Brown WS. and MacLean FM. 1983. Conspecific Scent-Trailing by Newborn Timber Rattlesnakes, *Crotalus horridus*. Herpetologica 39:430–436. [Herpetologists' League, Allen Press].
Calvert WH, Hederick LE, and Brower LP. 1979. Mortality of the monarch butterful (*Danaus plexippus*): Avian predation at five overwintering sites in Mexico. Science 204:847-851.
Clark R. 2002. Diet of the timber rattlesnake, *Crotalus horridus*. Journal of Herpetology 36:494-499.
Clark R. 2004. Kin recognition in rattlesnakes. Proceedings of the Royal Society B 271:S243-S245.
Clark R, Brown W, Stechert R, and Greene H. 2012. Cryptic sociality in rattlesnakes (*Crotalus horridus*) detected by kinship analysis. Biology letters 8:523–5.
Clark R, Brown W, Stechert R, and Zamudio K. 2008. Integrating individual behaviour and landscape genetics: The population structure of timber rattlesnake hibernacula. Molecular ecology 17:719–30.
Clark R, Brown W, Stechert R, and Zamudio K. 2010. Roads, Interrupted Dispersal, and Genetic Diversity in Timber Rattlesnakes. Conservation biology : the journal of the Society for Conservation Biology 24:1059–69.
Clark A, Moler P, Possardt E, Savitzky A, Brown W, and Bowen B. 2003. Phylogeography of the Timber Rattlesnake (*Crotalus horridus*) Based on mtDNA Sequences. Journal of Herpetology 37:145–154.
Cobb VA, Green JJ, Worrall T, Pruett J, Glorioso B. 2005. Initial den location behavior in a litter of neonate *Crotalus horridus* (timber rattlesnakes). Southeastern Naturalist 4:723–730
Conant R, Collins JT. 1991. A field guide to reptiles and amphibians of eastern and central North America. Houghton Mifflin Co., Boston 3. Massachusetts, USA.
Conner RN, Rudolph DC, Saenz D, Schaefer RR, and Burgdorf SJ. 2003. Growth rates and post-release survival of captive neonate timber rattlesnakes *Crotalus horridus*. Herpetological Review 34(4): 314-317. Available from http://www.fs.usda.gov/treesearch/pubs/7014 (accessed May 2022).
Degenhardt WG, Painter CW, and Price AH. 1996. Amphibians and reptiles of New Mexico. University of New Mexico, Albuquerque, USA.
Duin J. 2021. Appalachian snake handlers put their faith in God—and increasingly, doctors. National Geographic, United States. Available from https://www.nationalgeographic.com/animals/article/snake-handlers-appalachia-changing-practices (accessed May 2022).
Enge KM. 1993. Herptile use and trade in Florida. Florida Game and Freshwater Fish Commission. Nongame Wildlife Program Final Performance Report 102p. Tallahassee, Florida, USA.
Environment Canada. 2010. Recovery Strategy for the Timber Rattlesnake (*Crotalus horridus*) in Canada . Species at Risk Act Recovery Strategy Series. Environment Canada, Ottawa, Canada
Ernst CH.and Ernst EM. 2003. Snakes of the United States and Canada. Smithsonian Books, USA.
Falk A. 2002. "*Crotalus horridus*" (On-line), Animal Diversity Web. https://animaldiversity.org/accounts/Crotalus_horridus/. Accessed June 7, 2022.
Fitch HS. 1956. Temperature responses in free-living amphibians and reptiles of northeastern Kansas. University of Kansas publications. Museum of Natural History 8:417–476. USA.
Fitzgerald LA, Painter CW. 2000. Rattlesnake Commercialization: Long-Term Trends, Issues, and Implications for Conservation. Wildlife Society Bulletin (1973-2006) 28:235–253. Wiley, Wildlife Society.
Galligan JH, and Dunson WA. 1979. Biology and status of timber rattlesnake (*Crotalus horridus*) populations in Pennsylvania. Biological Conservation 15:13–58.

Garst DW. 2007. Distribution, Habitat Analysis, and Conservation of the Timber Rattlesnake in Virginia. Master's thesis. Virginia Polytechnic Institute and State University, Blacksburg, Virginia, USA.
Gibbons JW. 1972. Reproduction, growth, and sexual dimorphism in the canebrake rattlesnake (*Crotalus horridus atricaudatus*). Copeia 1972:222–226.
Gloyd HK. 1940. The rattlesnakes, genera Sistrurus and Crotalus. Chicago Academy of Sciences Special Publications 4:1–266.
Golden DM, Schwartz V. 2002. Field Guide to Reptiles and Amphibians of New Jersey. New Jersey Department of Environmental Protection (NJDEP).
Graves BM, Duvall D. 1988. Evidence of an alarm pheromone from the cloacal sacs of prairie rattlesnakes. Southwest Naturalist 33:339-345.
Graves BM, Duvall D. 1995. Aggregation of squamate reptiles associated with gestation, oviposition, and parturition. Herpetology Monographs 9:102-119.
Greene HW. 1997. Snakes: the evolution of mystery in nature. University of California, Berkeley, USA.
Greene HW, May PG, Hardy DL, Sciturro JM, and Farrell TM. 2002. Parental beahvior in vipers. In Biology of the pitvipers (ed. GW Schuett, M Hoggren, ME Douglas, HW Greene). Pp. 179-205. Eagle Mountain, Utah: Eagle Mountain Publishing.
Gregory PT. 1982. Reptilian hibernation. In Biology of the Reptilia Physiology D, Vol 13. Pp 53-154. Cags C, Pough FH (eds). Academic Press. New York.
Gregory PT, Macartney JM, and Larsen KW. 1987. Spatial patterns and movements. In Snakes: ecology and evolutionary biology (ed. RA Seigel, JR Collins, SS Novak). Pp. 366-395. New York: Macmillan. USA.
Hamilton CM. 2009. Home range size and habitat selection of timber rattlesnakes (Crotalus horridus) in southwestern Wisconsin. Master's thesis. University of Wisconsin, Stevens Point, Wisconsin, USA.
Hamilton WD. 1964. The genetical evolution of social behaviour, I, II. Journal of Theoretical Biology 7:1-52.
Hammerson GA. 2007. IUCN Red List of Threatened Species: *Crotalus horridus*. IUCN Red List of Threatened Species. Available from https://www.iucnredlist.org/en (accessed April 2022).
Hammerson GA, Lemieux R. 2001. Population status, movements, and habitat use of timber rattlesnakes (*Crotalus horridus*) in central Connecticut, 1998-2000: final report. Unpublished report submitted to Connecticut Department of Environmental Protection, Hartford. 88 pp.
Herr MW, Avery JD, Langkilde T, Howey CAF. 2020. Trade-off between thermal quality and predation risk at timber rattlesnake gestation sites. Journal of Herpetology 54:196-205.
Hoffman A, Tutterow A, Gade M, Adams B, Peterman W. 2021. Variation in behavior drives multi-scale responses to habitat conditions in timber rattlesnakes (*Crotalus horridus*). Ecosphere 12.
Illinois Department of Natural Resources (ILDNR). 2020. Timber rattlesnake (*Crotalus horridus*). Springfield, Illinois, USA. Available from: https://www2.illinois.gov/dnr/education/CDIndex/TimberRattlesnake.pdf (accessed May 2022).
Iowa Department of Natural Resources (IADNR). 2015. 6 Animals you might not know are protected in Iowa. Available from: https://www.iowadnr.gov/About-DNR/DNR-News-Releases/ArticleID/195/6-Animals-You-Might-Not-Know-are-Protected-in-Iowa (accessed May 2022).
Irwin KJ, Williams J. 2004. Arkansas Snake Guide. Arkansas Games and Fish Commission. Available from: https://www.landcan.org/pdfs/Arkansas%20Snake%20Guide.pdf. Accessed on May 1, 2022.
Januszkiewicz E, Chinnici N, and LaDuke T. 2018. Optimization of a multiplex PCR analysis for Crotalus horridus. Journal of the Pennsylvania Academy of Science 92:88.

Keyler BD. and Oldfield BL. 1992. Timber rattlesnake *Crotalus horridus* field survey on southeastern Minnesota state lands (1990-1991). Minnesota Department of Natural Resources Nongame Wildlife Program Park, Minneapolis, Minnesota, USA 55415:33.

Kilmon J. and Shelton H. 1981. Rattlesnakes in America and a history of the Sweetwater Jaycees rattlesnake roundup. Shelton, Sweetwater, Texas, USA. Library of Congress Catalog Card Number 81-50209.

Klemens MW. 1993. Amphibians and Reptiles of Connecticut and Adjacent Regions. State Geological and Natural History Survey of Connecticut: 318.

Lind C, Flack B, Rhoads D, and Beaupre S. 2016. The Mating System and Reproductive Life History of Female Timber Rattlesnakes in Northwestern Arkansas, USA. Copeia 104:518–528.

Massachusetts Division of Fisheries and Wildlife (MADFW). 2015. Timber Rattlesnake Fact Sheet. MassWildlife's Natural Heritage and Endangered Species Program (NHESP), Westborough, MA. 5 pp. Available from: https://www.mass.gov/doc/timber-rattlesnake-factsheet/download. Accessed May 1, 2022.

Margres M, Wray K, Sanader D, McDonald P, Trumbull L, Patton A, and Rokyta D. 2021. Varying Intensities of Introgression Obscure Incipient Venom-Associated Speciation in the Timber Rattlesnake (*Crotalus horridus*). Toxins 13:782.

Martin WH. 1989. Phenology of the timber rattlesnake (*Crotalus horridus*) in an unglaciated section of the Appalachian Mountains. In The Biology of Pitvipers. Symp. Texas Herpetol. Soc. and University of Texas at Arlington. Unpublished.

Martin WH, Brown WS, Possardt E, Sealy J. 2008. Biological variation, management units, and a conservation plan for the timber rattlesnake (*Crotalus horridus*). Pages 447–462 The Biology of Rattlesnakes.

Martin WH & Smith WH. 1990. Distribution and status of the timber rattlesnake (*Crotalus horridus*) in Pennsylvania. Report to the Carnegie Museum of Natural History and the Pennsylvania Fish Commission.

Maryland Natural Heritage Program (MD NHP). 2021. List of Rare, Threatened, and Endangered Animals of Maryland. Maryland Department of Natural Resources, Annapolis, MD 21401. DNR 03-111921-291.

Minnesota Department of Natural Resources (MN DNR). 2009. Timber Rattlesnake Recovery Plan (*Crotalus horridus)*. Division of Ecological Resources, Minnesota. Available from: https://www.dnr.state.mn.us/eco/nongame/projects/timber_rattle.html (accessed May 2022).

Minton SA. 2001. Amphibians & Reptiles of Indiana, Revised Second Edition. Indiana University Press, Indianapolis, USA.

Missouri Department of Conservation (MDC). Timber rattlesnake field guide. Available from: https://mdc.mo.gov/discover-nature/field-guide/timber-rattlesnake (accessed May 2022).

Mohr JR. 2012. Movements of the timber rattlesnake (*Crotalus horridus*) in the South Carolina mountains. Bulletin of the Florida Museum of Natural History 51:12.

Moore B, and Slone T. 2002. Kentucky Snakes. Kentucky Department of Fish and Wildlife Resources. Available from: https://fw.ky.gov/Wildlife/Documents/kysnakebook.pdf (accessed May 2022).

Nebraska Game and Parks (NE Game and Parks). 2018. Timber Rattlesnake (*Crotalus horridus*) Proposed as Threatened in Nebraska. Nebraska Game and Parks Commission. Lincoln, NE. 5 pp. Available from: http://outdoornebraska.gov/wp-content/uploads/2018/04/TimberRattlesnake_Summary_23Apr2018.pdf (accessed May 2022).

NatureServe. 2014. *Crotalus horridus* Timber Rattlesnake. Downloaded on June 2, 2022.

New Jersey Department of Environmental Protection (NJDEP). 2022. Timber Rattlesnake, *Cortalus horridus.* https://www.nj.gov/dep/fgw/ensp/pdf/end-thrtened/tmbrrattler.pdf. Accessed on May 26, 2022.

New York Department of Environmental Conservation (NYDEC). 2013. Species Status Assessment: Timber rattlesnake. Available from: https://www.dec.ny.gov/docs/wildlife_pdf/sgcntimberrattlesnak.pdf. Accessed on June 7, 2022.

New York Natural Heritage Program. 2019. Online Conservation Guide for *Crotalus horridus*. Available from: https://guides.nynhp.org/timber-rattlesnake/. (accessed May 2022).

Nordberg EJ. 2013. Thermal ecology and behavioral activity in hibernation timber rattlesnakes (*Crotalus horridus*). MS thesis. Middle Tennessee State University.

Ohio Division of Wildlife. 2018. Reptiles of Ohio field guide. Ohio Department of Natural Resources. Columbus, OH. Publication 5354 (0118). 56 pp. Available from: https://ohiodnr.gov/static/documents/wildlife/backyard-wildlife/Pub%205354_Reptiles%20of%20Ohio%20Field%20Guide.pdf (accessed May 2022).

Orianne Society. 2022. Timber Rattlesnake. https://www.oriannesociety.org/priority-species/timber-rattlesnake/?v=400b9db48e62. Accessed on May 26, 2022.

Palmer WM. and Braswell AL. 1995. Reptiles of North Carolina. University of North Carolina, Chapel Hill, USA.

Pennsylvania Department of Conservation and Natural Resources Bureau of Forestry (PA DCNR). 2022. Timber rattlesnake – Life history through the seasons. http://elibrary.dcnr.pa.gov/PDFProvider.ashx?action=PDFStream&docID=1742352&chksum=&revision=0&docName=sf-RattlesnakeBrochure&nativeExt=pdf&PromptToSave=False&Size=396683&ViewerMode=2&overlay=0. Accessed on May 26, 2022.

Pennsylvania Fish and Boat Commission (PFBC). 2010. The Timber Rattlesnake in Pennsylvania. Natural Diversity Section, Bellefonte, PA. 2 pp. Available from: https://www.fishandboat.com/Resource/AmphibiansandReptiles/Documents/TimberRattlesnakePApamphlet.pdf (accessed May 2022).

Puskar AM. 1999. Captive Breeding of the Timber Rattlesnake (*Crotalus horridus*). Bull. Chicago Herp. Society: 34(6):156–158.

Reinert HK, MacGregor GA, Esch M, Bushar LM, Zappalorti RT. 2011. Foraging ecology of timber rattlesnakes, *Crotalus horridus*. Copeia 3:430-442.

Reinert HK, Rupert RR. 1999. Impacts of translocation on behavior and survival of timber rattlesnakes, *Crotalus horridus*. Journal of Herpetology 33:45–61.

Reinert HK, Zappalorti RT. 1988. Field observation of the association of adult and neonatal timber rattlesnakes, *Crotalus horridus*, with possible evidence for conspecific trailing. Copeia 1988(4):1057–1059.

Rubio M. 1998. Rattlesnake: Portrait of a predator. Smithsonian Institute Press, Washington D.C. 272pgs.

Rudolph CD. and Burgdorf SJ. 1997. Timber Rattlesnakes and Louisiana Pine Snakes of the West Gulf Coastal Plain: Hypotheses of Decline. The Texas Journal of Science 49(3):111–122.

Rulon WC, Michael NM, Brendan JC, Randy S, Sierra S. 2011. Decline of an isolated timber rattlesnake (*Crotalus horridus*) population: Interactions between climate change, disease, and loss of genetic diversity. Biological Conservation 144:886–891.

Sasaki K, Place AJ, and Gaylor KN. 2008. Attitudes towards rattlesnakes by the peoples of North America and implications for rattlesnake conservation. In The Biology of Rattlesnakes Pp 473-484. Hayes WK, Beaman KR, Cardwell MD, Bush SP (eds). Loma University Press. Loma Linda, California.

Scudder KM, Chiszar D, Smith HM, and Melcer T. 1988. Response of neonatal prairie rattlesnakes (*Crotalus viridis*) to conspecific and heterospecific chemical cues. The Psychological Record 38:459-471.

Sealy J. 2002. Ecology and behavior of the timber rattlesnake (*Crotalus horridus)* in the upper piedmont of North Carolina: identified threats and conservation recommendations. Pages 561–578.

Selman W, Aughtman S, Anderson A, Carter D, Leblanc R, Bethi S, Casias K et al. 2018. Thirty-six New County Records for Herpetofauna of Mississippi, Louisiana, and Tennessee, USA: Results from an Undergraduate Herpetology Class Assignment. Herpetological Review 49:85–88.

Sievert G. 2005. A field guide to Oklahoma's amphibians and reptiles. Wildlife Diversity Program. 1st Edition.

State of Connecticut Department of Energy & Environmental Protection (CT DEEP). 2018. Timber Rattlesnake Fact Sheet. Available from https://portal.ct.gov/-/media/DEEP/wildlife/pdf_files/outreach/fact_sheets/rattlepdf.pdf

Steen DA, Smith LL, Conner LM, Brock JC, and Hoss SK. 2007. Habitat Use of Sympatric Rattlesnake Species within the Gulf Coastal Plain. The Journal of Wildlife Management 71:759–764. [Wiley, Wildlife Society].

Tennessee State Wildlife Action Plan (TN SWAP) Team. 2015. Tennessee State Wildlife Action Plan 2015. Tennessee Wildlife Resources Agency. Nashville, TN.

Tinkle DW. 1962. Reproductive potential and cycles in female *Crotalus atrox* from northwestern Texas. Copeia 1962:306-313.

The Nature Conservancy. 2001. East Gulf Coastal Plain Ecoregional Plan. The Nature Conservancy, Arlington, Virginia, USA. Available from http://www.conservationgateway.org/ConservationByGeography/NorthAmerica/UnitedStates/edc/Documents/ED_terrestrial_ERAs_SE_egcp_ERA_june03.pdf (accessed May 2022).

Tyning TF, editor. 1992. The timber rattlesnake: Its distribution and natural history. Conservation of the Timber Rattlesnake in the Northeast. Massachusetts Audubon Society, Lincoln, Massachusetts.

Ulev E. 2008. *Crotalus horridus*. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). https://www.fs.fed.us/database/feis/animals/reptile/crho/all.html#INTRODUCTORY. Accessed on May 26, 2022.

Underground Reptiles. 2022. Canebrake Rattlesnake. https://undergroundreptiles.com/product/canebrake-rattlesnake/. Accessed on May 27, 2022.

U.S. Fish and Wildlife Service (USFWS). 2021. Law Enforcement Management Information System (LEMIS) Imports and Exports of *Crotalus horridus*. U.S. Fish and Wildlife-Office of Law Enforcement, Arlington, Virginia, USA. (unpublished).

U.S. Lacey Act (16 U.S.C. §§ 3371-3378). https://www.govinfo.gov/content/pkg/USCODE-2020-title16/pdf/USCODE-2020-title16-chap53-sec3371.pdf. Accessed on June 9, 2021.

Vermont Fish and Wildlife Department. 2015. Vermont Timber Rattlesnake Recovery Plan. Agency of Natural Resources. Montpelier, VT.

Virginia Department of Game and Inland Fisheries (VDGIF). 2011. Canebrake Rattlesnake Conservation Plan. Bureau of Wildlife Resources. VDGIF, Richmond, VA. 25 pp.

Webb JK, Brook BW, and Shine R. 2002. What makes a species vulnerable to extinction? Comparative life-history traits of two sympatric snakes. Ecological Research 17:59–67.

Weir J. 1992. The Sweetwater rattlesnake round-up: a cast study in environmental ethics. Conservation Biology 6:116-127.

Wisconsin Department of Natural Resources (WI DNR). 2018. Wisconsin's Amphibians and Reptiles. Bureau of Natural Heritage Conservation. Madison, Wisconsin, USA. 2 pp. Available from: https://widnr.widen.net/s/fcmrotsuqk/er0110 (accessed May 2022).

Zoological Information Management System (ZIMS) Species 360. 2022. www.zims.species360.org. Accessed June 6, 2022.

Table 1: State level conservation status and available population details. State statuses that specifically list the species as "threatened" have been translated to "vulnerable" for comprehension. Northeast, midwest, and southern state categories were distinguished by the Census Bureau's four geographic regions of the US.

State / Range	Status	Population Details	Reference
Northeast			
Maine	Extirpated	No remaining populations are found in the state of Maine (ME), with the last sighting in 1822.	Garst 2007
Rhode Island	Extirpated	The timber rattlesnake was last seen in the state of Rhode Island (RI) in the late 1960s.	Breisch et al. 2021
Vermont	Endangered	Only 2 denning populations still persist in one Vermont (VT) county of Rutland at approx. 12km apart. In 2012, the lethal snake fungal disease (*Ophidiomyces ophiodiicola*) was confirmed in the VT *C. horridus* populations.	VT Fish and Wildlife Dept. 2015, Bauder et al. 2018
New Hampshire	Endangered	Only 1 subpopulation (n=40) persist in the state and was observed as stable from 1995-2005. In one unusually wet year (2006-2007), the surveyed population is believed to have declined by up to 50% due to a snake fungal pathogen outbreak.	Bauder et al. 2018
Massachusetts	Endangered	Historically found in 10 Massachusett (MA) counties but currently only extant in 5 localized mountain populations (total n~200) with 2 of the 5 fragmented populations at "very high risk of imminent extirpation." Using the above data, an informal observed long-term decline of at least 50% and a projected short-term decline of 40% are reported in MA's distribution of *C. horridus*.	MA Division of Fisheries and Wildlife 2015
Connecticut	Endangered	Historically found in 20 Connecticut (CT) towns, but populations are now isolated to an estimated 10 towns. Using the above data, an informal observed long-term decline of ~50% is reported in CT's distribution of *C. horridus*.	Klemens 1993, CT DEEP Fact Sheet 2018
New Jersey	Endangered	Historically found throughout New Jersey (NJ), now restricted to a northern region of the state and in the Pinelands regions of NJ.	Golden & Schwartz 2002
New York	Vulnerable	Brown (1984, 1988) estimated a long-term decline of 50-75% in New York denning populations. Short-term trends (25 years) show decline and extirpation in some remaining subpopulations and are expected to continue.	Brown 1984, Brown 1988, NYNHP Guide 2019
Pennsylvania	Vulnerable	Martin and Smith (1990) visited 312 known snake dens in PA and concluded 75% were not viable sites, showing a projected decline. Specifically listed as a "species of immediate concern" by Pennsylvania (PA) and is one of seven PA reptiles included in the state's highest conservation priority tier. Listed as "vulnerable" by NatureServe (2014).	Martin & Smith 1990, PFBC 2010, NatureServe 2014
Midwest			

Ohio	Endangered	Historically found in 24 Ohio (OH) counties but now remain in remnant, scattered colonies in 7 southern OH counties. Using the above data, an informal observed long-term decline of roughly 71% is reported in OH's distribution of *C. horridus*.	Ohio Division of Wildlife 2018
Indiana	Endangered	One substantial population apparently exists in an Indiana (IN) county (Brown county) and restricted populations exist in two adjacent counties.	Minton 2001, INDNR
Minnesota	Endangered	Historically found in 8 Minnesota (MN) counties but now only found in extreme southeastern counties. In the 1940s, nearly 6,000 rattlesnakes were recorded in one MN county bounty. By 1987, fewer than 200 were reported for the same county (DNR 2009). Listed as "imperiled" by NatureServe (2014).	Keyler & Oldfield 1992, MNDNR 2009, NatureServe 2014
Illinois	Vulnerable	Populations exist in multiple Illinois (IL) counties that border the Mississippi River and that have forested river bluffs.	IPFW, ILDNR 2020
Kansas	Vulnerable	Remaining populations are restricted to the eastern third of Kansas (KS). Specifically state-listed as "species in need of conservation (SINC)" by KS. NatureServe (2014) listed the KS populations of *C. horridus* as "vulnerable."	KS Wildlife and Parks, NatureServe 2014
Nebraska	Vulnerable	Nebraska *C. horridus* population size is estimated at <1,000 individuals and only exists in the extreme southeast portion of the state. Specifically proposed as threatened in the state of NE and listed as "critically imperiled" by NatureServe 2014.	IPFW, NatureServe 2014, NE Game and Parks 2018
Missouri	Vulnerable	Historically found state-wide in 114 Missouri (MO) counties. *C. horridus* populations are now only found in 70 MO counties and are likely extirpated from several localities. Using the above data, an informal observed long-term decline of 39% is reported in MO's distribution of *C. horridus*. Listed as "vulnerable" by NatureServe (2014).	IPFW, MDC, Briggler & Johnson 2013, NatureServe 2014
Wisconsin	Vulnerable	Wisconsin (WI) *C. horridus* populations are mostly confined to counties surrounding the Mississippi River corridor. Specifically listed as a "special concern species" in the state of WI and as "imperiled" by NatureServe (2014).	WIDNR 2018, NatureServe 2014, Hamilton 2009
Iowa	Vulnerable	Currently found in 11 eastern and southern Iowa (IA) counties but are described as "rare" in the state. Listed as "vulnerable" by NatureServe (2014).	IPFW, IADNR, NatureServe 2014
Southern			
Maryland	Vulnerable	Historically found in 7 Maryland (MD) counties but is now only found in 4 western counties. Listed as "vulnerable" by NatureServe (2014).	MD DNR, NatureServe 2014, MD NHP 2021
West Virginia	Vulnerable	In 2017, WV begane a rattlesnake citizen science research project to better understand the current distribution of *C. horridus* in WV. Listed as "vulnerable" by NatureServe (2014).	WVDNR, NatureServe 2014

North Carolina	Vulnerable	*C. horridus* currently has a discontinuous distribution in the state of North Carolina (NC). Sealy (2002) found a population of *C. horridus* was negatively impacted by human disturbance in a protected state park. Specifically listed as “special concern” by North Carolina (NC) and “vulnerable” by NatureServe (2014).	Sealy 2002, NatureServe 2014
Virginia	Endangered /Apparently Secure	Historically found throughout the state, there are two remaining, mountain (apparently secure) and coastal (endangered) populations of *C. horridus* in Virginia (VA). Mitchell (1993) determined 55% (32 of the 58) of the known coastal population occurrences recorded and observed in southeastern VA from the 1940s were now extinct; An additional short-term (10-20 years) decline of 39% was projected due to ongoing threats.	Mitchell 1993, VDGIF 2011, NatureServe 2014
Florida	Vulnerable	Enge (2005) reported a total of 7,659 *C. horridus* goods traded nationally over four years (1990-1994) by just two northern Florida (FL) snake-skin dealers; also, Enge reported a total of 202 live, wild-caught timber rattlesnakes were traded over the four year study period. Listed as “vulnerable” by NatureServe (2014).	Enge 2005, NatureServe 2014
Oklahoma	Vulnerable	Apparently still found in multiple eastern Oklahoma counties. Listed as “vulnerable” by NatureServe (2014).	Sieverts 2005, NatureServe 2014
Louisiana	Vulnerable	Apparently still found state-wide but is currently uncommon in southeastern Louisiana (LA). Specific state-listing is unknown. Listed as “vulnerable” by NatureServe (2014).	NatureServe 2014
Georgia	Apparently Secure	Apparently still found throughout most of Georgia (GA). A habitat use study, in the endangered *Pinus palustris* ecosystem, associated *C. horridu*s with specific microhabitats compared to the other studied species (*C. adamanteus*). Specific state-listing is unknown. Listed as “apparently secure” by NatureServe (2014).	Steen et al. 2007, NatureServe 2014
South Carolina	Apparently Secure	Apparently still found throughout most of South Carolina (SC). Specific state-listing is unknown. Listed as “apparently secure” by NatureServe (2014).	Mohr 2012, NatureServe 2014
Texas	Apparently Secure	In 1992 the state of Texas listed *C. horridus* as threatened. Current TX state listing and distribution is unknown. One of the biggest remaining “rattlesnake roundups" is still legally held every year in Sweetwater, TX. Listed as “apparently secure” by NatureServe (2014).	Rudolph & Burgdorf 1997, NatureServe 2014
Arkansas	Apparently Secure	Apparently found state-wide and occurs in a variety of forested, rocky, and field habitats of Arkansas (AK). A reproductive ecology study reported smaller litter sizes in an AK population compared to 15 other *C. horridus* state populations. Listed as “apparently secure” by NatureServe (2014).	Irwin & Williams 2004, NatureServe 2014, Lind et al. 2016
Tennessee	Apparently Secure	*C. horridus* still occurs throughout Tennessee (TN) and is most common in heavily wooded areas away from human disturbance. Ongoing research is being done to monitor the presence of *O. ophiodiicola* in TN’s *C. horridus*. Listed as “apparently secure” by NatureServe (2014).	TN SWAP 2015, NatureServe 2014

Mississippi	Secure	Information and scientific interest in the herpetofauna, including *C. horridus*, of Mississippi is lacking in comparison to other range-states in the United States (Selman et al 2018). Specific state-listing is unknown. Listed as "secure" by NatureServe (2014). A genetically rare blonde morph was found in Yazoo, MS in 2021.	NatureServe 2014, Selman et al. 2018
Alabama	Secure	Currently found in all 67 Alabama (AL) counties. Specifically listed as "lowest conservation concern" by AL. The presence of the Snake Fungal Disease (SFD) has been confirmed in AL *C. horridus* populations. Listed as "secure" by ALNHP (1994) and NatureServe (2014).	ALNHP 1994, NatureServe 2014, ADCNR 2015
Kentucky	Secure	Found in a majority of Kentucky (KT) and is one of the few U.S. range-states with a "relatively healthy" *C. horridus* population. Listed as "secure" by NatureServe (2014).	Moore & Slone 2002, NatureServe 2014

Table 2. A synopsis and resource table regarding laws, regulations, and species management initiatives for C*rotalus horridus* by state. Hyperlinks accessed on May 27, 2022.

State	Regulation Name	Regulation Text
Vermont	Endangered Species Law	Considered state endangered since 1987.
Vermont	12-089 Code Vt. R. 12-010-089-X	Wild animals, other than protected birds or game or fur-bearing animals, may be taken at any time, by any lawful means, by any person, holding a valid license for such taking or by any person permitted by law to harvest game without a license.
	12-021 Code Vt. R. 12-010-021-X - REGULATION #881	Except as otherwise provided by law, it is unlawful for any person to bring into or possess in the State of Vermont any live wild animal, or live ovum or semen thereof, of any kind, unless upon application in writing, the person obtains from the commissioner a permit to do so; or the species of animal, ovum, or semen is listed as a Domestic Bird or Animal, Domestic Pet, or Unrestricted Wild Animal.
	https://vtfishandwildlife.com/learn-more/vermont-critters/reptiles/timber-rattlesnake#:~:text=The%20timber%20rattlesnake%20is%20a,historic%20sighting%20information%20is%20useful.	The timber rattlesnake is a rare species and has been designated as a Species of Greatest Conservation Need (high priority) in Vermont's Wildlife Action Plan. The public is encouraged to report all current and historical sightings of the species.
New Hampshire	N.H. (RSA) § 212-A:2	The species is considered Endangered. Protected by state law. It is illegal to harass, chase, disturb, capture, harm or kill a rattlesnake. Anyone destroying a timber rattlesnake will face a fine of $1,000.
Massachusetts	321 CMR 10.03 (1)	It is illegal to harass, chase, disturb, capture, harm or kill a rattlesnake.

	Breisch et al. 2021	The Massachusetts Department of Conservation and Recreation protects all den sites and foraging habitat for the Norfolk County metapopulation. The Massachusetts Division of Fisheries and Wildlife protects most of the habitat in Hampden County. Head-starting efforts (relocating neonates) have been taking place since 2011.
Connecticut	https://portal.ct.gov/-/media/DEEP/wildlife/pdf_files/outreach/fact_sheets/rattlepdf.pdf	Protected by Connecticut's Endangered Species Act in 1992 and persons who kill or collect this endangered snake on state land could be faced with fines of legal action.
	Breisch et al. 2021	Public awareness campaigns and access to volunteers who can help relocate rattlesnakes that wander into yards. Sections of state forests known to have a high number of dens and basking females are closed to the public from April 15 to October 17 and require a Special Use Permit.
New Jersey	New Jersey Endangered and Nongame Species Conservation Act	The timber rattlesnake was listed as an endangered species in 1979. Under state endangered species laws, it is illegal to harm, harass, or collect a timber rattlesnake.
	Pinelands Comprehensive Management Plan N.J.A.C. 7:50 Freshwater Wetlands Protection Act Rules N.J.A.C. 7:7A Flood Area Hazard Area Control Act Rules N.J.A.C. 7:13	Prohibits development that would result in irreversible adverse impacts on habitats necessary for the survival of endangered species.
	Breisch et al. 2021	A program called Connecting Habitat Across New Jersey was launched in 2012 to make the state's landscape and roadways more permeable to wildlife movement, including wildlife passage systems.
New York	6NYCRR Part 182, New York State Environmental Conservation Law § 11-0535, Endangered Species Law of New York	Classified as threatened. Collecting timber rattlesnakes from the wild is prohibited by law.
	New York State Department of Environmental Conservation	Biologists are consulted prior to proposed land development projects.

	Breisch et al. 2021	Removal and relocation programs for rattlesnakes are active. Several den sites are found on state owned and protected land as well as private conservation lands owned and managed by conservation organizations.
Pennsylvania	https://www.fishandboat.com/Resource/AmphibiansandReptiles/Documents/TimberRattlesnakePApamphlet.pdf	Listed on Pennsylvania's Wildlife Action Plan as a species of greatest conservation need. It is one of seven reptiles in this highest priority tier. It is therefore protected under specific regulations by the Pennsylvania Fish & Boat Commission (PFBC). New regulations took effect in 2007 to increase the protection for the species. Taking, killing, injuring, or harassing a timber rattlesnake without a permit is illegal.
	58 Pa. Code §79.6	Timber rattlesnakes can be legally collected or killed throughout most of the state from June 9 to July 31 with a valid Venomous Snake Permit. The permit allows for the harvest of one timber rattlesnake over 1.1 meters with more than 21 caudal scales.
	58 Pa. Code §79.9	The sale or purchase of timber rattlesnakes or their parts is prohibited.
	58 Pa. Code §79.7	Organized snake hunts are allowed during open season with a permit but sacking contests (contests in which individuals put live rattlesnakes in fabric sacks) are prohibited.
	Breisch et al. 2021	The Pennsylvania Wild Resource Conservation Fund has published articles, brochures, and a film for public education.
Ohio	Ohio Admin. Code 1501:31-23-01	Classified as Endangered. It is unlawful for any person to take, transport, sell, offer for sale or possess any of the native endangered species of wild animals, applying to endangered wild animals that are either resident within or migrate into or through Ohio, or hides or parts thereof listed in this rule or any other wildlife order without first obtaining a written permit from the wildlife chief. The penalty for violation is six months in jail and up to $1,000 in fines. The penalty for selling a timber rattlesnake is up to $2,500 in fines and 12 months in jail along with a potential civil penalty for up to $2,500 per animal.
Indiana	https://www.in.gov/dnr/fish-and-wildlife/nongame-and-endangered-wildlife/amphibians-and-reptiles/reptiles-of-indiana-list/	Considered a State Endangered species.
	Breisch et al. 2021	A wild animal permit is needed to hold the species in captivity.
Minnesota	https://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=ARADE02040	Designated as special concern species in 1984. Bounty was repealed in 1989. Classified as threatened in 1996.
	Breisch et al. 2021	The Department of Natural Resources has limited access to state parks and natural areas where gestation and

		birthing areas are known to be present from July 15 to September 15 since 1998. Several public awareness programs.
Illinois	https://www2.illinois.gov/dnr/education/CDIndex/TimberRattlesnake.pdf	Listed as a threatened species in 1994.
	Breisch et al. 2021	Several legal statutes, including under the Illinois Natural Areas Preservation Act, the State Parks Act, the Illinois Dangerous Animals Act, the Fish and Aquatic Life Code, Taking of Reptiles and Amphibians, and Endangered Species Consultation Process. The Illinois Natural Areas Inventory Natural Areas Evaluation Committee and Illinois Department of Natural Resources Division of Resource Review and Coordination have proposed a radius of protection around denning sites, radius of 3.2 km was adopted. There are public education efforts by the Department of Natural Resources and state-permitted volunteers assist in rattlesnake removal.
Kansas	https://www.ksoutdoors.com/Services/Law-Enforcement/Regulations	Listed as Species In Need of Conservation (step before Threatened). It is illegal to kill a time rattlesnake or destroy its dens.
Nebraska	163 Neb. Admin. Code, ch. 4, § 010	Considered nongame species in need of conservation. It shall be unlawful for any person to take, possess, transport, export, process, sell or offer for sale, or ship nongame wildlife in need of conservation unless authorized to do so by the Commission under the authority of a scientific collection permit.
	163 Neb. Admin. Code, ch. 4, § 004.03A2	Killing a timber rattlesnake is not unlawful if it is done for the protection of the health of humans, livestock, or pets.
	Breisch et al. 2021	Recognized as a Natural Heritage Species by the Nebraska Game and Parks Commission. A program called WILD Nebraska provides landowners with financial compensation for making improvements on their land that benefit wildlife
Missouri	https://mdc.mo.gov/discover-nature/field-guide/timber-rattlesnake	Not considered Endangered.
	Wildlife Code of Missouri, 3 CSR § 10~9.110	Classified as a non-game species with no open season. Possession and collecting from the wild is not allowed by residents or non-residents. Anyone caught killing or collecting live snakes for hobby or commercial purposes will be charged with a Class A misdemeanor and fined $1,000.
	Wildlife Code of Missouri, 3 CSR § 10~9.425	A Wildlife Collector's Permit must be obtained prior to possessing a timber rattlesnake, and this can only be used for scientific or education purposes.

	Wildlife Code of Missouri, 3 CSR § 10~9.130	Landowners can kill a venomous snake on their property for public safety or for damaging property.
	Breisch et al. 2021	Several allotments of land that provide denning habitat have been purchased by the Missouri Department of Conservation and other wildlife agencies. Public education materials via brochures and books are available.
Wisconsin	Wis. Admin. Code Department of Natural Resources § NR 27.03	Considered a Special Concern and Protected Wild Animal, but not Threatened or Endangered.
	Chapter NR 10.02 (9)	No person may take, attempt to take, transport, or possess any protected wild animal at any time unless authorized by the Wisconsin Department of Natural Resources. Violating this law will result in a misdemeanor and may include a fine ranging from $250 to $300 per snake.
	Breisch et al. 2021	Timber rattlesnakes may be killed in emergency situations when the snake is a threat to human life or domestic animals. Each person who kills a snake should provide information about the kill to the Wisconsin Department of Natural Resources. The state bounty program was repealed in 1975.
Iowa	571—76.1(481A) Species	Timber rattlesnakes are not protected except in Allamakee, Appanoose, Clayton, Delaware, Des Moines, Dubuque, Fayette, Henry, Jackson, Jones, Lee, Madison, Van Buren, and Winneshiek Counties but not including an area of 50 yards around houses actively occupied by human beings in those counties.
Maryland	MD Code, Natural Resources, § 10-2A-01 - 09 Nongame and Endangered Species Conservation Act	All snakes protected since 1993. A person may not export the species from the state, take the species within the state, possess, process, sell or offer for sale, deliver, carry, transport, or ship the species by any means.
West Virginia	https://wvdnr.gov/plants-animals/surveys/rattlesnake-survey/	The public is encouraged to report any observations of timber rattlesnakes in West Virginia from January 1, 2017 to the present.
	https://wvdnr.gov/wp-content/uploads/2021/04/2021.03.05-Federally-Threatened-Endangered-Species-in-WV.pdf	Not listed as threatened or endangered wildlife in West Virginia.
	§58CSR73 West Virginia Reptile and Amphibian Rule	Possession of the reptiles and amphibians, as defined by the §58CSR73 West Virginia Reptile and Amphibian Rule, is prohibited by any area under agreement with, owned, controlled, or administered by the West Virginia Division of Natural Resources.
	Breisch et al. 2021	Only residents of the state may possess one individual timber rattlesnake of 42 inches or greater.

North Carolina	North Carolina Endangered Species Act G.S. Chapter 113, Article 25	Timber Rattlesnake is listed as species of Special Concern in 1998. It is unlawful to harvest or possess any species of special concern without an endangered species permit. Timber rattlesnakes can only be killed in defense of one's own life or the lives of others.
	https://www.ncwildlife.org/Portals/0/Learning/documents/Profiles/Reptile/RattlesnakeSightingsWanted.pdf	Citizens are encouraged to submit a photo and information of any timber rattlesnake sightings.
	Breisch et al. 2021	The North Carolina State Park system is among the largest holder of rattlesnake populations and provides conservation management training to staff as well as educational campaigns to the public. Public education is also done by the North Carolina Herpetological Society and the North Carolina Partners in Amphibian and Reptile Conservation. The North Carolina Museum of Natural Sciences maintains a large research collection of voucher specimens and tissue for genetic material.
Virginia	§§ 29.1-103 and 29.1-521	It is unlawful to take, possess, import, cause to be imported, export, cause to be exported, buy, sell, offer for sale, or liberate within the Commonwealth any wild animal unless otherwise specifically permitted by law or regulation. Considered non-game wildlife. Up to five individuals may be kept in captivity. Considered endangered (canebrake rattlesnake) and cannot be possessed, killed, harmed or harassed.
	Breisch et al. 2021	The canebrake rattlesnake has a completed Conservation Plan done by the Virginia Department of Game and Inland Fisheries.
Florida	https://myfwc.com/media/1945/threatened-endangered-species.pdf	Not listed as endangered or threatened. Reptiles may be taken throughout the year in any manner not conflicting with other provisions of these rules.
	Briesch et al. 2021	No conservation measures specifically for the species, but much of the habitat is protected.
Oklahoma	https://www.wildlifedepartment.com/hunting/regs/reptile-amphibian-regulations	The following reptiles are legal to harvest March 1, 2022 through June 30, 2022 with no daily limit: prairie rattlesnake, western diamondback rattlesnake, timber rattlesnake and massasauga. A permit is needed for collection.
	Breisch et al. 2021	A five-day rattlesnake permit for hunting events and festivals is available. Persons possessing a resident or nonresident hunting license may collect and sell rattlesnakes lawfully to individuals holding a commercial or noncommercial

		wildlife breeders license during the open rattlesnake season. A commercial wildlife breeders license is needed for anyone buying or reselling live rattlesnakes. Out of season collection and holding can occur via approval by the Director of the Oklahoma Department of Wildlife Conservation There are currently no conservation actions implement for the species.
Louisiana	La. Admin. Code tit. 76, § XV-101	Not listed as an endangered or threatened reptile, Removal from the wild of potentially tending individuals of species known to tend nests should, as a general principle, be avoided during the nesting season unless justified for scientific reasons. Must apply for a permit to possess a venomous snake.
	Breisch et al. 2021	The species can be killed, possessed, and sold in unlimited numbers but an appropriate license is required. Public awareness and education campaigns are present.
Georgia	Ga. Comp. R. & Regs. R. 391-4-10-.09	Not listed as a protected species.
	Georgia Fish and Game Title 27-1-30	Dens are protected and it is unlawful to disturb, mutilate, or destroy them.
	Breisch et al. 2021	Rattlesnake roundups still occur but have changed capture policies, and some are now transitioning to wildlife festivals that do not involve the wild capture of snakes.
South Carolina	Title 50, Chapter 15, Article 5, Chapter 123-150	It is unlawful to possess, transfer, sell, barter, trade, ship, or remove from this State, or attempt to possess, transfer, sell, barter, trade, ship, or remove from this State native reptile and amphibian species, including parts, products, eggs, offspring, and derivatives thereof, in violation of a limit or a permit condition established by the department pursuant to this section.
	Breish et al. 2021	Considered a species of special concern in the Blue Ridge Province. It is only protected in heritage preserves, state parks, and Department of Natural Resources preserves.
Texas	Texas Parks and Wildlife Code Title 5 § 68.001 - 021	Listed as Threatened species since 1987. People cannot take, transport, have in their possession or sell timber rattlesnake without a permit.
Arkansas	https://www.agfc.com/en/wildlife-management/endangered/	Not listed as an Endangered Species.
	Breisch et al. 2021	No conservation measures in place for the species.
Tennessee	Tenn. Comp. R. & Regs. 1660-01-32-.02	Not listed as a Threatened or Endangered Species.
	Tenn. Comp. R. & Regs. 1660-01-32-.03	Not listed as Wildlife in Need of Management.

	Article 70-8-104	Protected on non-game wildlife. It is unlawful for any person to take, attempt to take, possess, transport, export, process, sell, or offer for sale or ship non-game wildlife. Violation of this law is a Class B misdemeanor with up to six months in jail or a fine of up to $500.
	Breisch et al. 2021	Currently listed as a species of greatest conservation need. Over 100 court cases have been prosecuted in the last 28 years involving illegal activity with timber rattlesnakes.
Mississippi	https://www.mdwfp.com/museum/seek-study/science-resources/endangered-species/	Not listed as Threatened or Endangered.
	§49-5-107 Mississippi Code	Since 1972, it has been illegal to commercially exploit a non-game species unless it is the result of captive breeding. A Mississippi Commercial Propagator's Permits is necessary. Rattlesnake round-ups are illegal.
Alabama	https://www.outdooralabama.com/hunting-wildlife-regulations/nongame-reptiles-protected-alabama-regulations	Not protected.
	Breisch et al. 2021	No conservation measures in place for the species.
Kentucky	https://fw.ky.gov/Hunt/Pages/Other-Hunting-Seasons.aspx	Not protected or restricted.
	Breisch et al. 2021	Up to five can be possessed without a permit, but it is illegal to sell, buy, or trade snakes (including their skins and body parts) without a commercial wildlife permit.