

CONSIDERATION OF PROPOSALS FOR AMENDMENT OF APPENDICES I AND II

Other proposals

A. PROPOSAL

Inclusion of the species *Crotalus horridus* in CITES Appendix II.

B. PROPONENT

The United States of America

C. SUPPORTING STATEMENT

1. Taxonomy:

1.1 Class: Reptilia

1.2 Order: Lepidosauria
Suborder: Squamata

1.3 Family: Viperidae

1.4 Genus and species: *Crotalus horridus*

Based on geographical, morphological and coloration variations, three phases of the timber rattlesnake are known: 1) Eastern timber rattlesnake 2) Western timber rattlesnake and 3) Canebrake rattlesnake. The southeastern canebrake rattlesnake has been formally recognized as a subspecies *Crotalus horridus atricaudatus* by some herpetologists because of differences in morphology. Although the bands and blotches are more angular for the canebrake than for the eastern timber rattlesnake, Martin (1992) noted that there is a tendency in the northeastern fourth of the range for many specimens [of canebrake rattlesnakes] to possess bands and blotches whose shape resembles that of eastern timber rattlesnakes. Because there is no consensus among herpetologists that the western and southeastern populations are separate subspecies, all subsequent discussion in this proposal will treat the three geographical groups as one species--*Crotalus horridus*.

1.5 Scientific synonyms:

1.6 Common names:

Timber rattlesnake
Banded rattlesnake
Canebrake rattlesnake
Western timber rattlesnake

2. Biological Parameters:

2.1 Distribution and Habitat:

Endemic to North America. The distribution of *Crotalus horridus* includes 27 states from New Hampshire south through the Appalachians to northern Florida, eastern Texas, Oklahoma and Kansas, southeastern Minnesota, eastern Wisconsin and southern Illinois, Indiana, and Ohio (Possardt and Tying, unpublished, Reinert 1985). It has been significantly reduced in the following 20 states: Alabama, Connecticut, Georgia, Indiana, Illinois, Iowa, Kansas, Maryland, Massachusetts, Minnesota, Nebraska, New Hampshire, New Jersey, New York,

North Carolina, Ohio, Pennsylvania, South Carolina, Vermont, and Wisconsin (Possardt and Tynning, unpublished). *Crotalus horridus* was extirpated from Maine in the 1860s and from Rhode Island in the 1970s (Possardt and Tynning, unpublished). It formerly occurred in southern Ontario, Canada, but is believed to have been extirpated there for over 50 years.

Crotalus horridus is a migratory, non-aggressive, secretive inhabitant of remote and rugged terrain whose habitat varies regionally: mountainous slopes with steep ledges, rocky outcroppings in primary and secondary deciduous forests in the Northeast; steep, rocky bluffs and dry ridges in deciduous forests in the Midwest; and hardwood bottomlands, pine flatwoods, river bottoms, swamps and floodplains, cane fields, and deciduous woodland in the South (Brown 1993, Martin 1992). Populations in the southern Appalachians inhabit high altitudes above 2,000 feet (Martin 1992, Klauber 1972).

Brown (1993) has classified three distinct habitat types in the Northeast range based on seasonal activity: den sites, transient habitat and summer range. Den sites, also called hibernacula, are used for overwintering; they are usually rocky outcroppings, open scree slopes, or fallen rock that provide underground crevices for protection from predation and weather (Brown 1993). Rattlesnakes hibernate collectively (and with other snake species) during the winter for an average of six months. The length of hibernation varies according to geographical region--in the South hibernation may last 4-5 months, while in parts of New England, it may last as long as seven months (Brown 1993).

Transient habitat is an area close to a den in which snakes migrate through as they leave or return to their dens (Brown 1993). These areas are characterized as outcroppings with specific shelter rocks that are repeatedly used by individual rattlesnakes.

A five-year radio-telemetry study by Reinert and Zappalorti (1988) in the coastal plain of southern New Jersey demonstrated that summer habitat use by gravid (pregnant) females differs from that used by males and non-gravid females. Males and non-gravid females inhabit primary or secondary forest with significant canopy closure (50-75%) and few fallen logs. Gravid females inhabit more open habitat with significantly less canopy closure (25%), more fallen logs and higher temperatures (Reinert and Zappalorti 1988). Because of their preference for open habitat, gravid females were also found along road edges or walls in this same study.

2.2 Habitat Availability:

Although it is difficult to estimate habitat availability for the timber rattlesnake, it is assumed that it has decreased where housing development, agriculture and road densities have increased (New England and the South). Locally within these areas, hunting for rattlesnake roundups and commercial collection are reasons for further population decline and suitable habitat is probably still available. Pennsylvania's population, in particular, appears to have been impacted more from collection for roundups and commercial sale (Brown 1992) than by habitat loss. Martin (1992) attributes much of the population decline in the Northeast to sport hunting and believes depleted populations can recover if gravid females are not collected.

Distribution of *C. horridus* in approximately 90 localities in New England at the beginning of European settlement had been reduced to 23 localities by the last two decades (Martin 1992).

2.3 Reproductive Biology and Population Status:

Timber rattlesnakes exhibit certain attributes characteristic of k-selected species: delayed first year reproductive age and a low frequency of reproduction. Research on populations in the Northeast has shown that females do not begin their first year of reproduction until they reach eight or nine years of age with an average range of 7-11 years (Brown 1993). Reproduction thereafter occurs, on average, at least every two years and more often only once every three years. Based on an eight-year mark-recapture study in New York, Brown (1991) found that 22% of his sample reproduced for the first time at nine years of age.

70% of those females reproduced on a three-year cycle and 23% percent on a four-year cycle (Brown 1991). Martin's (1993) nineteen year study in the Appalachian Mountains of West Virginia demonstrated that the mean age of first-year reproduction was 7.8 and that 43% of the sample reproduced on a three-year cycle and 31% on a four-year cycle. For southern and midwestern populations, where a longer active period occurs outside of the wintering dens, the average age of first reproduction has been shown to be 4-6 years, with females reproducing at least every two years (Brown 1993). Assuming an average lifespan of 16-22 years in the wild, females may only have a total of three to five reproductive years available (Brown 1991).

As stated in section 2.1, during the summer gravid females usually inhabit open areas such as rocks, exposed walls, or roadsides with less canopy closure than areas used by males and nongravid females. During the 3-4 month gestation period, they feed very little or not at all, spending most of their time in one restricted, visible area (Reinert and Zappalorti 1988). The behavior of gravid females therefore makes them potentially more visible and disproportionately prone to capture.

2.4 Population Trends:

Although there are no quantitative data on actual numbers or densities over large areas, evidence from long-term monitoring programs, scientific studies and observations by snake hunters indicate that *C. horridus* populations are declining over much of the species' range; in many states only relict populations remain (Brown 1992, Martin 1992, Galligan and Dunson 1979). Biologists gathered for the 1991 symposium, Conservation of the Timber Rattlesnake in the Northeast, all concurred that serious declines have occurred in Connecticut, Massachusetts, Minnesota, New York, New Jersey, and Vermont. Of the 139 known dens surveyed in New York, only 5% now contain large populations (Stechert 1992). Housing development, illegal snake hunting and logging are believed to be the reason for declines in New York and northern New Jersey (Stechert 1992). Zappalorti and Reinert (1992) estimated a 50-66% population decline for six counties in southern New Jersey. Vermont's population has declined from 25 known population centers to only two at present (DesMeules 1992). Martin (1982) found that according to long-time observers and snake hunters, den populations are down to 15-40% of levels typical of forty years ago and that "only 25% are believed to have populations of 45 or more snakes (the minimum size that we would consider viable)."

Based on a three year radio-telemetry study and extensive interviews with snake hunters in Pennsylvania, Galligan and Dunson (1979) found evidence that, although historically the distribution of the timber rattlesnake in Pennsylvania was statewide, its populations are declining and large colonies are rare. They concluded that *C. horridus* is approaching extinction in that state and that "large rattlesnake populations are so rare today that many new hunters doubt that large concentrations ever existed" (Galligan and Dunson 1979). Historical accounts record that 250 snakes inhabited one hibernaculum in 1906 and populations of 100-200 were not uncommon during the late 19th and early 20th centuries (Galligan and Dunson 1979). Based on a survey of 42 sites in western Wisconsin, Oldfield and Keyler (1989) found rattlesnakes at only 38% of the sites, and the largest concentration at any one visit was only five rattlesnakes. Historical records indicate that aggregations of 30 snakes were common in Wisconsin (Schorger 1968).

2.5 Geographic Trends:

Except for its disappearance from Canada during the twentieth century, this species occupies most of its original range, but at many fewer localities and in greatly depleted numbers.

2.6 Role of the Species in its Ecosystem:

Crotalus horridus is a carnivore that preys primarily on mammals (rodents, shrews, chipmunks, squirrels, rabbits, bats) and also birds, bird eggs, other snakes and amphibians (Reinert 1985, Klauber 1972). Three separate studies demonstrated that the timber rattlesnake

is an important predator of mice (*Peromyscus* sp.), comprising 65%, 91% and 58%, respectively, of the timber rattlesnakes diet (Reinert et al. 1984, Savage 1967, Smyth 1949). Predators of the timber rattlesnake include deer, badgers, large birds such as hawks, king snakes and racers (Klauber 1982).

2.7 Threats:

Major threats to the long-term survival of *C. horridus* include habitat loss and destruction, collection for rattlesnake roundups and the commercial pet trade, intentional killing, and highway mortality. Other threats include bounty hunting (now illegal in most states), natural succession of vegetation, which has led to increased shading in some forests, and resource extractive industries (logging, mining, and gas wells) (Brown 1993).

Brown (1993) and Martin (1992) concurred that human exploitation has caused a decline in *C. horridus* populations in recent times, in particular because of lowered recruitment due to collection of gravid females. Dodd (1987) listed collection for the pet trade and malicious killing as the two major reasons for this species decline. According to Martin (1992), "summertime snake hunting is by far the biggest factor in the extirpation and reduction of timber rattlesnake populations." Collection of large numbers of gravid females, injury to individuals (and other wildlife species) by gassing of dens, improper use of nooses and hooked sticks during collection (Reinert 1990), disturbance and intentional destruction of den sites, and re-release of captured rattlesnakes at sites other than natal sites all contribute to the depletion of the population. In their survey of timber rattlesnake populations in Pennsylvania, Galligan and Dunson (1979) were not able to find one undisturbed den site in fifteen areas surveyed across the state. Most commercial snake hunters interviewed by Galligan and Dunson (1979) stated that almost all the big dens in their area had been hunted out and they were now hunting dens which would have been considered too small ten years ago.

These threats to *C. horridus* are exacerbated by the species' significantly delayed first year reproductive age, low frequency of reproduction, high first-year mortality, low recruitment, and a preference for open habitats by gravid females. Concentrations of males and females in hibernacula during winter in the Northeast facilitate capture, because only den sites and birthing rookeries, not individuals, need to be located.

3. Utilization and Trade:

3.1 National Utilization:

Crotalus horridus are captured for utilization in "rattlesnake roundups", the live pet trade, skin trade, meat trade and for sale as "novelties" (stuffed and mounted snakes, jewelry, etc...). Enge (1993) reported that from 1990 through 1992, 109 *Crotalus horridus* were reported taken from the wild and sold in the Florida pet trade; 366 dead ones taken in Florida were purchased by Florida hide dealers; and 4,346 were purchased from other southeastern states, primarily from Georgia. Enge (1993) believes the levels of domestic trade in dead snakes reported (mainly animals harvested for their skins) are considerably lower than actual levels.

3.2 Legal International Trade:

Although many unlisted species in international trade are not identified to species level, the following minimum estimates of exports of *Crotalus horridus* from the United States are provided, based on records of the U.S. Fish and Wildlife Service's Division of Law Enforcement:

ITEM	1992 QUANTITY	1993 QUANTITY	1994 QUANTITY
live individuals	58	76	60
leather pieces cut for boots	752	450	216
novelties*	451	-	21

*knife cases, key rings, money clips, buckles, jewelry, etc.

3.3 Illegal Trade:

The most well-known case of illegal trade in *C. horridus* was the conviction of snake handler Rudy Komarek for poaching and trafficking illegal snakes in 1993. Scientists say that Komarek, in collecting thousands of snakes illegally, devastated the populations of rattlesnakes in New York and Massachusetts and had a major impact on those of Connecticut and New Jersey (Brown et. al., 1994). In both New Hampshire and in Minnesota, one primary snake collector is reported to account for the species' decline in those states. In part because of the stigma associated with poisonous snakes, regulations pertaining to their taking are often poorly enforced or not at all.

3.4 Actual or Potential Trade Impacts:

(see 2.7 Threats:)

3.5 Captive Breeding or Artificial Propagation for Commercial Purposes Outside Country of Origin:

Not known.

4. Conservation and Management:

4.1 Legal Status:

4.1.1 National: The following information on the legal status of *Crotalus horridus* is taken from Brown (1993) unless indicated otherwise.

Crotalus horridus is listed as an Endangered Species by and protected from harvest and sale in Connecticut, Massachusetts, New Hampshire, New Jersey, Vermont, and Ohio. It is state-listed as a Threatened Species in New York, Texas, Illinois (Illinois Endangered Species Protection Board, 1994) and Indiana (McCollam, 1996). Similar protection is given the species in Kansas, where it is identified as "in need of conservation."

Though listed as a Threatened Species in Ohio and as "a species of special concern" in Minnesota, legal protection is lacking. Virginia law only designates the canebrake population, which is located in the extreme southeast corner of the state, as Endangered.

Regulatory efforts in Maryland, North Carolina, Arkansas and Tennessee effectively prohibit commercial harvests and sales. Limited takes are permitted in both Mississippi (Jones, 1996) and Missouri (Johnson, 1996) though sale is prohibited. Nebraska, similarly, prohibits "commercial exploitation" of the species (Figgs, 1996).

Oklahoma attempts to regulate exploitation by setting a hunting season on the species (Levell, 1995). Pennsylvania has attempted to place take limits and other controls on traditional rattlesnake roundups in the state (Shiels, 1996). Protection of the species is completely

lacking in West Virginia, Louisiana, Kentucky, Wisconsin, South Carolina, Alabama and Iowa.

4.1.2 International:

Unknown.

4.2 Species Management:

4.2.1. Population Monitoring: Populations of *Crotalus horridus* are being monitored by the states of New York (Hunsinger, 1996) and Connecticut (Victoria, 1996), where it is protected from harvest. Pennsylvania is involved in a timber rattlesnake occurrence mapping project (Shiels, 1996). No states that permit commercial harvests of this species monitor their populations. Florida, alone, collects, compiles and reports on information pertaining to the sale and trade of this species (Enge, 1993).

4.2.2. Habitat Conservation:

No specific measures known.

4.2.3. Management Measures:

Except for total protection in some states, there are generally no specific management measures. Oklahoma attempts to regulate take by setting a hunting season on the species (Levell, 1995).

4.3 Control Measures:

4.3.1 International Trade:

None

4.3.2 Domestic Measures:

(see 4.1.1 National Legal Status)

5. Information on Similar Species:

Within its range, this species is unlikely to be confused by non-herpetologists with other species, given the availability of suitable identification keys.

6. Other Comments:

Given the biological characteristics of *Crotalus*, it is probable that collecting this species from the wild for international commercial trade could have a detrimental impact on the species by either exceeding, over an extended period, the level that can be continued in perpetuity, or reducing it to a population level at which its survival could be threatened by other influences. This situation meets the criteria of Resolution Conf. 9.24, Annex 2a, for inclusion in Appendix II under the provisions of Article II (a).

7. References:

- Brown, W.S. 1991. Female Reproductive Ecology in a Northern Population of the Timber Rattlesnake, *Crotalus horridus*. *Herpetologica* 47(1): 101-115.
- Brown, W.S. 1992. Biology and Conservation of the Timber Rattlesnake. Pages 9-13 in T.F. Tynning, ed. *Conservation of the Timber Rattlesnake in the Northeast*. Massachusetts Audubon Society, Lincoln, MA.

- Brown, W.S. 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 22: 1-78.
- Brown, W. S., Jones, L., and Stechert, Randy. 1994. A Case in Herpetological Conservation: Notorious Poacher Convicted Of Illegal Trafficking in Timber Rattlesnakes. Bull. Chicago Herp. Soc. 29(4):74-79.
- DesMeules, M. 1992. Vermont's Timber Rattlesnake: Historic Distribution, Current Status, and Conservation Outlook. Pages 4-5 in T.F. Tynning, ed. Conservation of the Timber Rattlesnake in the Northeast. Massachusetts Audubon Society, Lincoln, MA.
- Dodd, C.K., Jr. 1987. Status, Conservation and Management. Pages 478-513 in A. Seigel, J.T. Collins and S.S. Novak, eds. Snakes: ecology and evolutionary biology. McGraw-Hill, New York, 529 pp.
- Enge, K.M. 1993. Herptile Use and Trade in Florida: Final Performance Report. Florida Game and Fresh Water Fish Commission, Quincy, FL, 102 pp.
- Figgs, Daylan. 1996. Nebraska Game and Parks Commission, in litt., March 18, 1996.
- Galligan, J.H. and W.A. Dunson. 1979. Biology and status of Timber Rattlesnake (*Crotalus horridus*) populations in Pennsylvania. Biological Conservation 15: 13-58.
- Hunsinger, Kimberley Corwin. 1996. New York State Department of Environmental Conservation, in litt., March 25, 1996.
- Illinois Endangered Species Protection Board. 1994. Checklist of Endangered and Threatened Animals and Plants of Illinois.
- Johnson, Tom R. 1996. Missouri Department of Conservation, in litt., March 25, 1996.
- Jones, Robert L. 1996. Mississippi Department of Wildlife, Fisheries and Parks, in litt., March 13, 1996.
- Klauber, L.M. 1972. Rattlesnakes: Their Habits, Life Histories, and Influence on Mankind. Volume I. University of California Press, Berkeley, 740 pp.
- Levell. 1995. Field Guide to Reptiles and the Law.
- Martin, W.H. 1982. The Timber Rattlesnake in the Northeast: Its Range, Past and Present. Bulletin of the New York Herpetological Society 17: 15-20.
- Martin, W.H. 1992. The Timber Rattlesnake: Its Distribution and Natural History. Pages 13-22 in, T.F. Tynning [ed.], Conservation of the Timber Rattlesnake in the Northeast. Massachusetts Audubon Society, Lincoln, Mass.
- Martin, W.H. 1993. Reproduction of the Timber Rattlesnake (*Crotalus horridus*) in the Appalachian mountains. Journal of Herpetology 27(2): 133-143.
- McCollam, Gregg. 1996. Indiana Department of Natural Resources, in litt., March 21, 1996.
- Oldfield, B.L. and D.E. Keyler. 1989. Survey of Timber Rattlesnake (*Crotalus horridus*) Distribution Along the Mississippi River in Western Wisconsin. Western Academy of Sciences, Arts, and Letters 77: 27-34.
- Reber, D. L. and Reber, A.S. 1994. Kansas Herpetological Society Position Paper on Rattlesnake Roundups (January 1994).
- Reinert, H.K. 1985. Timber Rattlesnake. Special Publication of Carnegie Museum of Natural History No. 11.
- Reinert, H.K. 1990. A Profile and Impact Assessment of Organized Rattlesnake Hunts in Pennsylvania. Journal of the Pennsylvania Academy of Science 64(3): 136-144.

- Reinert, H.K., D. Cundall and L.M. Bushar. 1984. Foraging Behavior of the Timber Rattlesnake, *Crotalus horridus*. *Copeia* 1: 976-981.
- Reinert, H.K. and R.T. Zappalorti. 1988. Timber Rattlesnakes (*Crotalus horridus*) of the Pine Barrens: Their Movement Patterns and Habitat Preference. *Copeia* 4: 964-978.
- Savage, T. 1967. The Diet of Rattlesnakes and Copperheads in the Great Smoky Mountains National Park. *Copeia* 1: 226-227.
- Schorger, A.W. 1968. Rattlesnakes in Early Wisconsin. *Transactions of the Wisconsin Academy of Sciences, Arts, and Letters*.
- Shiels, Andrew L. 1996. Pennsylvania Fish and Boat Commission, in litt., April 5, 1996.
- Smyth, T. 1949. Notes on the Timber Rattlesnake at Mountain Lake, Virginia. *Copeia* 1: 78.
- Stechert, R. Distribution and Population Status of *Crotalus horridus* in New York and Northern New Jersey. Page 1 in T.F. Tynning, ed. Conservation of the Timber Rattlesnake in the Northeast. Massachusetts Audubon Society, Lincoln, MA.
- Victoria, Julie. 1996. Connecticut Department of Environmental Protection, in litt., March 28, 1996.
- Zappalorti, R.T. and H.K. Reinert. 1992. Pages 1-2 in T.F. Tynning, ed. Conservation of the Timber Rattlesnake in the Northeast. Massachusetts Audubon Society, Lincoln, Mass.