ARIZONA GAME AND FISH DEPARTMENT
HERITAGE DATA MANAGEMENT SYSTEM

Animal Abstract **Element Code:** ARADE03012
Data Sensitivity: Yes

CLASSIFICATION, NOMENCLATURE, DESCRIPTION, RANGE

NAME: *Sistrurus tergeminus* (Say, 1823)
COMMON NAME: Western Massasauga

SYNONYMS: *Sistrurus catenatus tergeminus* (Baird and Girard, 1853)
Sistrurus catenatus (Rafinesque, 1818)
Crotalophrus tergeminus (Agassis 1850)
Crotalus milarius var. *tergeminus* Jan, 1859:153 (part)
Crotalus tergeminus (Say 1823)

OTHER COMMON NAMES: Desert Massasauga
Massasauga

FAMILY: Crotalinae

AUTHOR, PLACE OF PUBLICATION: Say, Thomas. 1823. IN Edwin James, Account of an expedition from Pittsburg to the Rocky Mountains, performed in the years 1819, 1820 … Cary and Lea, Philadelphia. 2:1-5, 1-442.

TYPE LOCALITY: Cowley, Kansas, 5 mi NW of Winfield.

TYPE SPECIMEN: Neotype: USNM 86472. 1931. (ICZN Case 3571, ICZN 2013)

TAXONOMIC UNIQUENESS: The genus *Sistrurus* contains three species: Eastern Massasauga (*S. catenatus*), Pygmy Rattlesnake (*S. miliarius*), and Western Massasauga (*S. tergeminus*) (Nicholson 2025, Uetz 2025). *S. tergeminus* has 2 subspecies, *S. t. tergeminus,* and *S. t. edwardsii* (Nicholson 2025); only *S. t. edwardsii* occurs in Arizona (Holycross and Mitchell 2020).

Formerly treated as *Sistrurus catenatus* (Minton 1983, Crother 2012). Kubatko et al. (2011) conducted a phylogenetic analysis and recognized two clades among the three previous subspecies of *S. catenatus*, consisting of the eastern subspecies (*S. c. catenatus*) and the two western subspecies (*S. c. tergeminus* and *S. c. edwardsii*). They recommended elevating *S. c. catenatus* to species status. However, if the recommendation was followed at that time, it would also have required elevating *S. c. tergeminus* and the formation of three new

combinations. In addition, Holycross et al. (2008) discovered that *S. c. tergeminus* is actually subsumed by *S. c. catenatus* because the type locality of *catenatus* is within the range of *tergeminus*, and that the name *Crotalus massassaugus* Kirtland, 1838 would have been the available and valid name for the eastern subspecies. As such, *tergeminus* was not a valid name, and if the Kubatko et al. recommendation was followed, the specific epithet for the eastern form would have been *massassaugus*. Crother et al. (2011) petitioned the International Commission on Zoological Nomenclature (ICZN) for conservation of the names *catenatus* and *tergeminus*, and the ICZN (2013) subsequently ruled to retain the names *S. catenatus* and *S. tergeminus* by designation of neotypes for both species. Crother et al. (2017) followed the recommendation of Kubatko et al. (2011) and elevated *tergeminus*, leaving no recognized subspecies of *catenatus*, and two subspecies of *tergeminus*: *S. t. edwardsii* and *S. t. tergeminus*.

DESCRIPTION: The Western Massasauga is one of Arizona's smallest rattlesnakes (Lowe et al. 1986). They are known to have a relatively small, narrow head for a rattlesnake and a small rattle (Holycross et al. 2022). The total length for the species ranges from 16–40.5 inches (400–1,000 mm) (Stebbins 2003), but most adults in Arizona are under 18 inches (457 mm) in snout-vent length (SVL) (Lowe et al. 1986), typically ranging from 11.8–15.7 in (300–400 mm) SVL (Schuett et al. 2016). Populations in Arizona are consistently more slender and shorter than eastern populations (Holycross and Mitchell 2020, Holycross et. al 2022). The largest massasauga measured in Arizona was a male at 23.1 inches (588 mm) SVL (Holycross 2002). Females reach weights about 3.4–94 g (0.1–3.3 oz) and males 14.3–112 g (0.5–4.0 oz) (Holycross and Mitchell 2020).

Western Massasaugas have a brown eye stripe bordered by a thin white margin that extends from the eye to behind the corners of the mouth. Two lyre-shaped blotches extend from the back of the head to the neck (Holycross and Mitchell 2020). The tongue is dark brown with black tips. The iris is brown. In Arizona, the dorsal ground color is usually light gray to silver mid-dorsally, becoming reddish brown laterally (Holycross and Mitchell 2020). Darker gray or brownish coloration mid-dorsally is also possible in some individuals. Mid-dorsum, there are roughly elliptical-shaped chocolate colored blotches. Males are reported to have 27–41 of these blotches, and females 31–40 (Holycross and Mitchell 2020). These mid-dorsal blotches have a smooth and highly contrasted margin that is dark at the edges and outlined by a thin white line. This feature is not found in any other rattlesnakes in Arizona (Holycross and Mitchell 2020). Venter is typically uniformly gray to dark brown (Holycross and Mitchell 2020).

The Western Massasauga has nine large plates on top of the head (Lowe et al. 1986). The dorsal scales are keeled, usually in 23 rows, and the anal plate is entire (Degenhardt et al. 1996, Ernst 1992). The young have a paler ground color, with a pattern more conspicuous

than adults, and a yellowish white tail (Stebbins 2003). The tail tip is yellow-orangish at birth and then changes to light gray with 4 to 10 crossbands within a year. The overall pattern between juveniles to adults is about the same (Holycross and Mitchell 2020).

AIDS TO IDENTIFICATION: Enlarged head scales and elongate head markings (extending onto the neck) distinguish Western Massasaugas from other Arizona rattlesnakes (Stebbins 2003). *Sistrurus* species differ from *Crotalus* species by the shape of the squamosal bone in the skull (Holycross and Mitchell 2020), and a smaller size for adults compared to the large-bodied *Crotalus* species (Schuett et al. 2016). Similarly patterned colubrids, including the Mexican Hognose Snake (*Heterodon kennerlyi*), can easily be distinguished by the lack of the rattle present in Western Massasaugas (Holycross and Mitchell 2020). Mexican Hognose Snakes can also be easily distinguished by the upturned rostrum (Schuett et al. 2016). Juveniles of the Arizona Black Rattlesnake (*C. cerberus*), Mohave Rattlesnake (*C. scutulatus*), and Prairie Rattlesnake (*C.viridis*) can have somewhat similar appearances, but the presence of nine large scutes at the top of the head of Western Massasaugas along with a careful examination of color and pattern can help differentiate the species (Holycross and Mitchell 2020). The presence of black and white tail bands easily differentiate juvenile Western Diamond-backed Rattlesnakes (*C. atrox*) and Mojave Rattlesnakes from juvenile Western Massasaugas (Schuett et al. 2016).

ILLUSTRATIONS:

Color photo (Behler and King 1979: plate 632)
Color photo (Lowe et al. 1986: page 57)
Color photo (Campbell and Lamar 1989: figures 437–438)
Color photo (Degenhardt et al. 1996)
Color drawing (Stebbins 2003: plate 45)
Color photos (Schuett et al. 2016, pages 707, 708, 712, 719, 720, 722)
Color photos (Holycross and Mitchell 2020: figures 1-7)
Color photo (Holycross et. al 2022)
Color photos (Arizona Game and Fish Department 2023, https://live-reptilesofaz.pantheonsite.io/snakes-subpages/h-s-catenatus/)
Color photo (AZ AWCS, https://awcs.azgfd.com/species/reptiles/sistrurus-tergeminus)
Color photos (Uetz et al. 2025)

TOTAL RANGE: The Western Massasauga can be found in the United States and Mexico in disjunct, relatively isolated populations. In the United States, the range is from western Iowa, central Montana, Kansas, central Oklahoma, central Texas, to southeastern Colorado and southeastern Arizona (Holycross and Mitchell 2020). In Mexico, they can be found from Cuatro Cienegas, Coahuila, and near Aramberri, Nuevo León (Holycross and Mitchell 2020).

The Desert Massasauga subspecies occurs in Arizona, New Mexico, southwestern Texas, Colorado, and Mexico (Anderson et al. 2009, LandsPKS 2025).

RANGE WITHIN ARIZONA: The Western Massasauga has been documented from the San Bernardino, San Pedro, San Simon, and Sulphur Springs valleys and Fort Huachuca in Cochise County, and from Ash Flat in Graham County (Holycross and Mitchell 2020). It is thought that the species once occurred throughout much of the continuous San Bernardino and San Simon Valleys. There has been a recent lack of vouchers from the southern San Pedro watershed, and it has been over 25 years since the last voucher collection in southern Sulphur Springs Valley. Therefore, only two populations of the species are demonstrably extant; one in Ash Flat and the other in the divide between San Simon and San Bernardino (Holycross and Mitchell 2020, Holycross et.al 2022).

SPECIES BIOLOGY AND POPULATION TRENDS

BIOLOGY: The Western Massasauga is primarily crepuscular and nocturnal and spends most of its time underground in rodent burrows or in the base of tobosa clumps, though occasionally it can be found under surface cover such as rocks, wood piles, and other litter (Holycross and Douglas 1996, Schuett et al. 2016, Holycross et al. 2022). In Arizona, it is active from April to October, with maximum activity during the summer rains. Most of these snakes are observed crossing roads during the early evening hours (Lowe et al. 1986). If they are approached while crawling, they will usually flee rather than coil. When moving on smooth or sandy surfaces, they are fairly adept at “sidewinding” (Lowe et al. 1986). The average age of encountered snakes in Colorado was 3 years old; however, in captivity, lifespans were found to exceed 14 years, with the potential to live over 20 years (Mackessy 2005).

The venom of the Western Massasauga is highly toxic, but yields are low (Holycross et al. 2022). Sanz et al. (2006) reported that venom diversity in a *S. tergeminus* from Colorado was lower compared to other *Sistrus* species (*S. catenatus*, *S. tergeminus* from KS) whose diet is more based on mammal prey. In addition, *S. tergeminus* exhibited a higher venom toxicity to lizards compared to the same two species. The Western Massasauga’s small size and low venom yield keep it from being more dangerous (Lowe et al. 1986). Bites from this species are not likely to be fatal, but can be extremely painful and may cause swelling, faintness, nausea, and a cold sweat (Degenhardt et al. 1996).

Reported predators of Western Massasaugas include Long-tailed Weasel (*Mustela frenata*), Loggerhead Shrike (*Lanius ludovicianus*), Northern Harrier (*Circus cyaneus*) and Swainson’s Hawk (*Buteo swainsoni*) (Holycross and Mitchell 2020). Other predators may include other raptors, carnivorous mammals, and several species of snake (Mackessy 2005). Goldberg et al

(2001) found ascaris nematodes (*Hexametra boddaertif*) in the musculature of the stomach within specimens from Chavez County, New Mexico.

REPRODUCTION: Western Massasaugas mate in both spring and fall, but mating has only been observed in captivity (Holycross and Douglas 1996, Lowe et al. 1986). Males are likely to mature at the end of their second year and females during their third (Mackessy 2005). Wastell and Mackessy (2016) believe that female Western Massasaugas reproduce biennially. Only a small proportion of sexually mature females are likely to reproduce in a given year (Holycross 2003, Mackessy 2005). Females become very stationary for approximately three weeks before giving birth, often basking inside or near a rodent burrow (Mackessy 2007). Males exhibit an aestival spermatogenesis reproductive pattern in which males undergo spermatogenesis from April through October (Schuett et al. 2016).

Young are born in late summer to fall (late August–late September) (Goldberg and Holycross 1999, Holycross and Mitchell 2020). Litter sizes range from four to eight young (Holycross and Douglas 1996, Goldberg and Holycross 1999). The young are then tended to for 5-7 days by the mother (Holycross and Mitchell 2020). The young remain near their natal burrow until their first shed (Mackessy 2007). Newborns of the species as a whole range from 5.5 to 9.9 inches (140–252 mm) in total length (Ernst 1992).

FOOD HABITS: Lizards and small rodents make up the primary prey of Western Massasaugas, but they feed on a variety of prey that also includes invertebrates, frogs, other snakes, and birds (Lowe et al. 1986, Holycross and Douglas 1996, Campbell and Lamar 2004, Holycross and Mackessy 2002, Graham and Kelehear 2015). Holycross and Douglas (1996) identified 58 prey items from 51 Western Massasauga from Cochise County, Arizona with the majority (75.9%) of prey items being diurnal grassland lizards and the rest being small mammals. Holycross and Mackessy (2002) reported prey items for Western Massasauga from Arizona, New Mexico, and Colorado consisted primarily of lizards (58.8%), mammals (30.9%), centipedes (*Scolopendra* sp., 9.1%), one anuran, and one snake.

Juveniles have a yellow-orange tail that is used to lure prey. Those in AZ lure for lizards rather than frogs like is done in other regions (Holycross and Mitchell 2020). Juvenile diets consist exclusively of lizards. possibly due to juveniles being gape-limited which prevents them from feeding on small mammals (Schuett et al. 2016). Cues for identifying mammalian prey appeared to be most reliant on olfactory senses (Holycross and Mitchell 2020).

HABITAT: In Arizona, the Western Massasauga is found only in semi-desert grasslands, primarily in tobosa (*Hilaria mutica*) grassland along sloping bajadas with surface rocks (Lowe et al. 1986, Holycross and Douglas 1996, Holycross and Mitchell 2020, Holycross et.al 2022). It is found in desert grassland, oak habitats, gypsum dunes, mesquite-grassland, and

rocky slopes with incised drainages in other portions of its range (Schett et al. 2016). Many adults spend days in the burrows of small rodents from dry spring to early summer (Holycross and Mitchell 2020). These rodent burrows are likely where they take refuge during hibernation (Mackessy 2007). They can also be found deep in the base of tobosa clumps during the rainy season in late summer (Holycross and Mitchell 2020). This species is most active in temperatures ranging from 14–30°C and retreats underground when air temperatures reach above 32.4°C (Mackessy 2007).

ELEVATION: The elevational distribution of the Western Massasauga primarily ranges from 4,400–4,700 feet (1342–1434 meters) in the San Bernardino Valley (Lowe et al. 1986). The highest recorded elevation is 5,177 feet (1,578 meters) at Ash Flat (Holycross and Mitchell 2020).

PLANT COMMUNITY: Semidesert Grassland plant communities in Arizona include, *Hilaria mutica* (Tobosa Grass)*, Bouteloua* sp. (gramas)*, Aristida* sp. (three-awns), *Yucca* sp. (yucca), *Agave* sp. (agave), *Diasylirion wheeleri* (sotol), *Prosopis* sp. (mesquites), *Mimosa* sp. (mimosa), *Cylindropuntia sp.* (chollas)*, and Opuntia* sp. (prickly pear). Species that are replacing other plants as a result of cattle grazing are *Isocoma tenuisecta* (Burroweed)*, Gutierrezia* sp. (snakeweed), and various shrubs. Non-native *Eragrostis lehmanniana* (Lehmann Lovegrass) is also common in the western areas (Holycross and Mitchell 2020).

POPULATION TRENDS: Western Massasauga populations are declining throughout their range in the western United States, with populations severely reduced (>30% decline) from their historic levels in Arizona (Anderson et al. 2009, Holycross and Mitchell 2020, Arizona Game and Fish Department (AZGFD) 2022). Holycross and Mitchell (2020) suggested the lack of recent vouchers from the southern San Pedro watershed indicate that populations there are either extirpated or present at extremely low densities. They also indicated habitat in Sulphur Springs Valley is deteriorating, but that Western Massasaugas may still persist in low numbers or in very localized populations. Conversion of desert grassland to desertscrub in the San Bernardino and San Simon valleys has resulted in a substantial decline of Western Massasauga distribution in these areas (Holycross and Mitchell 2020). Only two populations of the species remain demonstrably extant in Arizona; one in Ash Flat and the other in the divide between San Simon and San Bernardino (Holycross and Mitchell 2020 Holycross et.al 2022).

SPECIES PROTECTION AND CONSERVATION

AGENCY STATUS

Endangered Species Act:	None
AZGFD:	1 (AZGFD, AWCS 2022)
U.S. Forest Service:	Not Sensitive, (USDA, FS Region 3 2007, 2013)
Bureau of Land Management:	Sensitive, as *S. catenatus edwardsii* (USDI, BLM 2017)
Mexico:	PR, Determined Subject to Special Protection in Mexico, as *Sistrurus catenatus* (Proyecto de Norma Oficial Mexicana 2010, 2018)

OTHER STATUS

Heritage Network Status:	G3T3
	S1
IUCN:	LC, as S. catenatus (Frost et al. 2007)

PREVIOUS STATUS

AGENCY STATUS

Endangered Species Act:	UR, as *S. tergeminus edwardsii* (USDI, FWS 2012)
	PTN (WildEarth Guardians 2010)
AZGFD:	1A, as *Sistrurus catenatus* (AZGFD SWAP 2012)
	WSC, as *S. catenatus* (AZGFD, WSCA 1996 in prep)
	Endangered, as *S. catenatus* (AZGFD, TNW 1988)
U.S. Forest Service:	Sensitive, as *S. catenatus edwardsii* (USDA, FS Region 3 1988, 1999)

MANAGEMENT FACTORS: Arizona is the extreme western edge of the range for Western Massasauga, and it has a limited distribution in Arizona (Stebbins 2003). Its reduced range in Arizona is primarily due to habitat loss, fragmentation, and degradation (Lowe et al. 1986). Other threats faced by the species include water diversion and depletion, intentional killing, collection for the pet trade, and loss of genetic diversity due to population isolation and fragmentation (WildEarth Guardians 2010). Western Massasaugas are likely to be susceptible to anthropogenic landscape alterations due to their relatively narrow ecological tolerances and spotty distributions (Schett et al. 2016). Lack of recent vouchers alongside conversion of desert grassland to desert shrub suggests that the species distribution in San Bernardino and San Simon Valley has substantially decreased (Holycross and Mitchell 2020). Further alteration of the grassland habitat via overgrazing could further impact Arizona populations (Holycross and Douglas 1996). Mackessy (2005) suggested that mesquite tree removal can possibly abate invasion by desertscrub, aiding the persistence of the species at the San Bernardino and San Simon sites. Schett et al. (2016) recommended preserving the remaining Tobosa Grassland and suggested forming a partnership between ranchers and agencies

responsible for management of the species and habitat to formulate a management plan to maintain, or improve, the health of the Tobosa Grasslands, while allowing cattle grazing.

Western Massasaugas have limited replacement potential because of their low fecundity, making them inherently vulnerable to population losses and more at risk to population loss as threats arise (Mackessy 2005). Human interference has led to the reduction in population with collection and extermination (Holycross and Mitchell 2020). Highway mortality are significant sources of non-natural attrition as well (Holycross and Douglas 1996). This mortality likely could be curtailed at Tobosa Grasslands by channeling snakes under the road through existing culverts with the installation of a low barrier along the fence line (Holycross and Douglas 1996). Diseases that are lethal to massasaugas are *Chrysosporium* spp (fungal dermatitis) and *Ophidian paramyxovirus* (OPMV) (Panella and Johnson 2014).

Since the massasauga has limited distribution, small populations, and low fecundity, it is more likely to be susceptible to climate change factors (Mackessy 2005, Bagne and Finch 2013). Increased fire risk along with the spread of invasive grasses (*Pennisetum ciliare* (Bufflegrass) and *Eragrostis lehmanniana* (Lehmann's Lovegrass)) will encourage the conversion of Western Massasauga habitat to grassland, having unknown effects on suitability. The variability of rainfall, and lowering of the water table could also impact the seasonally wet grasslands changing suitability (Bagne and Finch 2013). Future climate scenario modeling predicts that suitable Western Massasauga habitat will expand north but retract from the south under future climate scenarios (Walkup et al. 2022). The habitat loss and fragmentation present in current landscapes likely will limit any distributional response northward and could lead to rapid localized changes in Western Massasauga population size and distribution, making the species highly vulnerable to future climate changes in specific regions (Walkup et al. 2022).

PROTECTIVE MEASURES TAKEN: Western Massasaugas may not be collected from the wild in Arizona without appropriate permits (Arizona Game and Fish Commission Order 43).

WildEarth Guardians (2010) submitted a petition to the U.S. Fish and Wildlife Service (USFWS) in 2010 to have *Sistrurus tergeminus edwardsii* listed under the Endangered Species Act. USFWS (2012) issued a 90-day finding that listing may be warranted and initiated a status review. However, WildEarth Guardians (2020) withdrew their petition in light of new information indicating it is not a distinct subspecies.

SUGGESTED PROJECTS: Recommended projects include monitoring Western Massasauga populations and habitat, constructing diversionary drift fences along highways through its range, investigating its population genetic structure, and determining the density and distribution of snakes on Ash Flat (Holycross and Douglas 1996, Anderson et al. 2009,

Schuett et al. 2016). The spread of disease should also be monitored (Panella and Johnson 2014). To further reduce roadkill signage could be helpful to warn people about snake crossings. In areas where the snakes occur, signage could also be useful to inform the public and reduce killings (Panella and Johnson 2014). Understanding the effects of grazing and grassland composition change as invasive grass species spread. It would be beneficial to understand how births could be related to monsoon timing and to see if there is potential for dispersal to any other suitable habitats (Bagne and Finch 2013). Schuett et al. (2016) suggested developing a citizen science program to report sightings of Western Massasauga and other reptiles.

LAND MANAGEMENT/OWNERSHIP:

DoD - Fort Huachuca Military Reservation
State - State Trust Land
Tribal - San Carlos Reservation
Private

SOURCES OF FURTHER INFORMATION

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ADDITIONAL INFORMATION:

Massasauga means “Great River Mouth” in the Chippewa language and probably alludes to the snake’s habitat in Chippewa County: swampland surrounding mouths of rivers (Minton 1983). Gotch (1995) attributes the common name as a corruption of “Missisauga”, the name of a river in Ontario. *Sistrurus* is derived from the Latin *sistrum*, which is itself derived from the Greek *seistron*, a small rattle combined with the Greek *oura*, meaning tail (Schuett et al. 2016). The specific epithet *tergeminus* probably refers to the three rows of lateral blotches (Holycross and Mitchell 2020), and is derived from a composite of the two Latin words *ter*, meaning three, and *geminus*, meaning twin (Schuett et al. 2016). The patronym *edwardsii* honors L.A. Edwards, a US Army surgeon who collected the type specimen (Minton 1983, Holycross and Mitchell 2020).

External Links:

Arizona Wildlife Conservation Strategy
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Revised: 1991-04-09 (DKW)
1997-01-12(SMS)
2001-05-02 (RAM)
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