



Session Description

Biologists consider rattlesnakes to be model organisms; organisms that when studied extensively can offer insight into the workings of other creatures and larger concepts. Featuring radiotelemetry and PIT tag technology based data and information on an extensively studied population of prairie rattlesnakes in Aurora, CO, this presentation will reveal sexually disparate behaviors, dispel common myths, and foster appreciation for a creature many of our visitors are loathe to encounter.

Session Goals:

- Provide an overview of the fascinating sex lives of prairie rattlesnakes.
- Review and dispel or confirm common and not-so-common myths and misinformation about rattlesnakes.
- Explore relevant findings from an extensive rattlesnake study conducted in Aurora, CO.
- Provide access to additional information and resources regarding the behavior and biology of prairie rattlesnakes.
- Provoke thought about what open space agencies and organizations can do to change attitudes toward rattlesnakes.

Session Outline

Section 1:

Why teach about rattlesnakes? Changing attitudes toward rattlesnakes will make your job easier.

“It is in our own best interest to reduce anxiety, fear, and negative attitudes towards snake encounters. Negative public perceptions can negatively influence management decisions.”

-Toronto Zoo, 1999

Most Americans know very little about wildlife and nature. This affects their ability to make intelligent, rational, and well-considered decisions. Published articles on successful rattlesnake education programs indicate that the most successful public education efforts:

- Focus on biology; replacing false or misinterpreted information with fascination for the facts.
- Focus on snake conflict and snake bite avoidance.
- Focus on venom as a means of prey capture, not as a danger to humans.

Section 2:

Sex is interesting, but rattlesnake sex is very interesting.

Final taxonomy is debated, but sexual selection and geographic separation in rattlesnake populations has resulted in 16 species of rattlesnake (32 including subspecies).

In Colorado:

- Massasauga *Sistrurus catenatus* (SE Colorado)
- Prairie Rattlesnake *Crotalus viridis* (up to 9,500' Eastern and Western Colorado)
- Midget Faded Rattlesnake *Crotalus oreganus concolor* (Green River Formation, Western Colorado)

-Society for the Study of Amphibians and Reptiles, January 2008

How to discern male and female rattlesnakes:

Male: Tail is longer and has a gentle taper. In Aurora, males average 26 subcaudal scales. Male’s tail serves as storage unit for hemipenis.



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Female: Tail is shorter and thinner, with a sudden marked narrowing at the vent. In Aurora, females average 20 subcaudal scales.

Courtship and mating:

Females rattlesnakes are widely and unpredictably distributed. Additionally, not all females are receptive.

Males search and sometimes compete for receptive females. Receptive or “ripe” females take 2-5 years to “yolk up”. Post partum females just gave birth the previous summer have small ovaries and are not receptive.

Males use high frequency tongue flicking and straight-line movements to increase their chances of finding a receptive female. Combat dances allow males of similar size and strength to compete for access to receptive females without injury.

Males court females by pressing their chin along the side of the female while wrapping their tail around the vent. Copulation lasts from 1.5 – 12 hours.

Fertilization:

Female snakes delay fertilization by storing spermatozoa in the posterior portion of the oviduct all winter. Physical blockage from the hemipenis and uterine secretions keep sperm in place. Ovulation into anterior oviduct permits fertilization in the spring.

Gestation and behavior during gestation:

Rattlesnakes are ovoviviparous, meaning that maturing eggs are retained in the female until they are ready to hatch. Gravid females generally do not eat and they have a smaller home range than non-gravid females (22.6 acres compared to 44 in a non-gravid female). In Aurora, female rattlesnakes give birth about the third week of August. Litter sizes vary from 4-21 neonates. Neonates (and often the adult female) tend to stay together for about 10 days, then they disperse.

Section 3:

The truth about rattlesnakes is far more interesting than the lies that sully their reputation.

Rattlesnakes are poisonous.

Lie. Rattlesnakes are venomous, which means toxins are delivered by a bite from fangs that rotate from a resting to an acting position. Rattlesnakes can meter total amount of venom released and they can control release from left to right fang. Rattlesnake venom is a complex cocktail of at least 21 different protein components. Venom functions to immobilize, facilitate the location of, and predigest prey.

Young rattlesnake venom is more dangerous than adult venom.

The truth is more interesting than that. Studies indicate that venom composition is tuned to the needs of the rattlesnake and varies as the snake matures. Juvenile rattlesnake venom is 2-3 times more lethal than adult rattlesnake venom. Contrary to popular myth, juveniles can meter the dose of venom delivered. Adult rattlesnake venom contains more digestive proteins than juvenile venom. Adults need the added digestive features to assist with proper digestion of larger prey. The goal is to keep the victim alive long enough to let the digestive enzymes spread and begin to work before prey dies. Mature rattlesnakes can release 17 times more venom than juveniles, but the dose of toxins ends up being only about 2.3 times as much.

Rattlesnake warning signs creep people out; managers should not post them.

Lie. Signs are functional in soliciting appropriate behaviors and giving priority to snakes, but they are also very popular tourist photo opportunities.

People fear snakes because they have had a bad experience with them.

Lie. Primate threat detection experiments showed that primates were alarmed by opening a basket with snakes in it. Further research showed that a large range of stimuli can elicit this response. Our fear of snakes probably comes from polyvalent feature detection (PFD), which means that we naturally react with alarm to things that have numerous fear-eliciting attributes.

The rattlesnake is considered a symbol of American independence.

Truth. Prior to the Revolutionary War, American colonists identified with the rattlesnake for the following reasons:

- Rattlesnakes always warn the enemy before striking.
- Concealed fangs make rattlesnakes appear defenseless.
- Small and fragile fangs can inflict fatal wounds.
- Each segment of the rattlesnake's rattle is independent, yet firmly united with the other segments.
- Unblinking eyes make the rattlesnake appear vigilant.
- Rattlesnakes are uniquely American.

Rattlesnakes are aggressive creatures.

Lie. Given space and time, rattlesnakes will move away from threats such as people and pets. Head hiding is one response to harassment. Many animals, including potential prey species harass prairie rattlesnakes. Prairie dogs have been observed harassing (throwing dirt, swatting, and lunging at) rattlesnakes.

If I see a rattlesnake near people, I should try to move it.

Lie. No one has even been bitten by a snake that was left alone. Avoidance is the best policy. Striking distance increases from 30% to 40% of body length in defensive strikes. Many bites occur on the hands and face because the victim attempted to handle the snake rather than leave it alone.

A snake bite kit is a must for all serious hikers.

Lie. The best first aid for a snake bite is to stay calm and lie flat or keep the bite location body neutral. Call 911 and monitor for allergic reactions.

Hikers and joggers that wear bells and make noise are less likely to encounter a snake.

Lie. Snakes lack external ears. Snakes perceive sound as vibrations transmitted from the ground via their lower jaw to the inner ear. Just like a ship bobbing in the water, the jaw moves in many different directions and provides detailed information about the location and distance of the sound. It is likely footsteps provide better warning than bells or noise makers.

Rattlesnakes use heat-sensing pits on their face to find prey.

The truth is more interesting than that. Thermally sensitive pits on a rattlesnake's face not only allow it to see warm-bodied prey, but they also allow rattlesnakes to make better thermal escape choices.

Rattlesnakes rattle to get attention.

Truth. Research shows rattling is a deimatic—designed to frighten the signal receiver—display. The rattle is designed to attract and hold the attention of potential predators or larger animals that might step on and injure the snake.

Rattlesnakes hunt differently than bullsnakes.

Truth. Rattlesnakes are ambush predators, meaning they select a place likely to be visited by prey. Rattlesnakes wait motionless for prey to wander into striking range. Rattlesnakes strike and release prey to avoid injury.

Rattlesnakes are cold-blooded.

The truth is more interesting than that. Rattlesnakes are ectotherms, but they demonstrate an ability to control their body temperature and fine tune temperatures in certain parts of their body.

- In the Aurora study, body temperature was often significantly (as much as 35 degrees) different than that of the soil the snake was lying on.
- Rattlesnakes can specifically cool the area around their thermal pits, keeping them at a narrow optimum operating temperature.
- Neonate aggregations during daylight hours showed a stable core temp in spite of extreme thermal ranges in the environment.
- In adult aggregations, body temp decreased more slowly in the group than when alone.

You can tell how old a rattler is by counting the number or rattles in its string.

Lie. Neonates are born with a prebutton (no rattle). First shed results in a button. Aurora snakes shed 2-5 times a year. Rattle strings can be incomplete or absent due to wear or injury.

Rattlesnake roundups are a great way to manage rattlesnakes and to teach citizens about rattlesnakes.

Lie. Roundups perpetuate negative attitudes toward venomous snakes. Take focuses on older, larger individuals, which can result in population declines.

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