

Backyard observations of the behavior and role of the male woodchuck (*Marmota monax*)

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Abstract - There are recent and decades past reports in scientific books and in refereed scientific journals that, for the specific habitat territory observed, the role of the male Woodchuck (*Marmota monax*) is primarily limited to reproductive efforts, that male-female relationships terminate after breeding season, and that the male and female do not develop long-term relationships with their mates. Reportedly, males are not paternalistic toward the young. There are differing reports in some books and refereed journals of male-female social interactions, possibly due to Woodchuck behavior varying across populations. There is an insufficiency of detailed reports of observed behavior of specific breeding Woodchuck pairs.

For over 18 years, we have spent countless hours observing Woodchucks within approximately three acres that surround our rural Michigan home. We document observations of Woodchucks' behavior with photographs or videotapes throughout the season. In the area observed, we found that relationships of mated Woodchucks typically did not terminate after mating season and that long-term relationships with females occurred. We also documented some males who took part in raising the young.

Introduction. Some, but not all, refereed journal articles report that adult male-female associations are limited to copulation, with relationships terminating after the breeding season (Blumstein and Armitage 1999; Bronson 1964; Grizzell 1955; Kwiecinski 1998). The females are said to run off their mates (Schoonmaker 1966; Whitaker Jr. and Hamilton Jr. 1998), and males are said not to help raise the young (Schoonmaker 1966). Studies in Maine using microsatellite DNA markers documented a promiscuous mating system where multiple paternity occurs (Maher and Duron 2010). Although Maher (2004) found male and female home ranges overlap, she observed neither amicable nor agonistic interactions between Woodchuck males and females. By contrast, Hamilton (1934) reported burrow sharing by adults after the breeding season and said field reports provided considerable evidence of the male remaining with the family. Seton (1929) said that some fathers stay and assist in caring for the offspring. In an Ohio study, Meier found mated Woodchucks associated with each other throughout the year and often in subsequent years (Meier 1992).

Barash (1989) stated that generalizations about Woodchuck behavior are difficult to make due to infrequently observed interactions. He hoped that an evolutionary perspective on animal behavior would integrate a greater value of individual behavior. Maher (2010), in her studies, found that Woodchucks' sociality is more extensive than had been thought, but she found no long-term-pair-bonds and paternal behavior.

Among reported challenges in observing Woodchucks is that the animals can smell or hear the observer, which may cause the animal to run off and hide (Anthony 1962; Schoonmaker 1966). Observations may also become limited due to family dispersion or the summer's vegetation growth making sightings more difficult (Meier 1992; Maher 2004, 2009). The Gorilla experiment (Simons and Chabris 1999), where about 1/2 the people asked to keep track of game activity occurring in a video did not see the unexpected appearance of an individual in a Gorilla suit strolling into the center of the game activity, proved we may not always see what goes on around us.

Observation Site. Our house, located hundreds of feet from a paved road, is central to the Woodchucks' activities we observe. Our ten-acre Michigan property combines lawn, field, and woods with deciduous and evergreen trees. The property to our north is farmland; to our south is field and woods. The west and south sides of our barn, which



F. 1. Sam, S. East southeast property section. [2019 DSC06001.jpg]

houses the long-established hibernacula/natal burrow, are easily seen from our house. There are areas of rock piles and boulders. Additional to the two burrows in our barn, there are dens beneath our decks, shed, and in the woods. There is a birdbath located near the back deck den (F.1).

Methods. We identify Woodchuck adults by markings, wounds, deformities, or other physical characteristics (F.2-F.5). We determine the sexual identity of suspected males by using the zoom feature of our camera to observe scrotal testes during the mating season or before they are internal in late summer (F.6). Woodchucks are not trapped, marked,



F. 2. Sam, S. Wilhelmina with damaged ear and white spot on nose. [2009 DSC00404.jpg]



F. 3. Sam, S. Wounds and scrotal testes are used to identify this individual. [2019 DSC04283.jpg]



F. 4. Sam, J. Deformed foot is used for identification. [2016 DSC05965.jpg]



F. 5. Sam, S. Patchy fur is used for identification. [2018 DSC00266.jpg]



or provided with supplemental food. Anthony (1962) conducted research on the activities of Woodchucks in Illinois without marking the animals. He points out that there were no earlier studies on the effect of trapping and marking on the behavior

F. 6. Sam, J. Presence of scrotal testes confirms sex of woodchuck. [2021 DSC03741.jpg]

of Woodchucks. Using the live trapping technique described by Grizzell (1955), Anthony reported a reluctance of adult Woodchucks to enter the traps and a tendency to abandon burrows after trapping attempts. Young of the year did not exhibit this behavior.

Our observation method has the advantage of not encountering issues that may occur with trapping or marking. Admittedly, the identification of unmarked individuals is significantly challenging. Differences in markings may be subtle and difficult to see in some circumstances, if not impossible. Behavior differences can sometimes help identify individuals.

Our house is a photographer's blind where Woodchucks are photographed and videotaped through our home windows. Their physical spacing makes observing them challenging. One camera is insufficient because Woodchuck activities may co-occur in the areas surrounding our home. In 2005, we began using a camcorder and subsequently increased the number and types of cameras used. We now have six cameras and two camcorders set up on tripods in different rooms of our house, enabling us to have quick access to photograph or videotape activities occurring in different locations. Partly due to the low resolution of early camera photographs and shooting through our windows, our photographs and videotape quality vary. Our priority is documenting the behavior of Woodchucks, not necessarily getting a perfect shot.

The use of trail cameras, mounted in and outside our barn, began in 2016. Primary cameras focus on two separate burrows in our barn. Outdoor camera locations fluctuate. Currently, one focuses on the back deck burrow area, and another faces the barn. We also periodically use a baby monitor set up in the barn.

Photographic documentation can supplement, validate, and clarify observations. A video recording captures movement and can document Woodchucks spaced too far apart to capture in a photograph. Photographic and video footage reviews allow further examination and reveal details not noted when personally observing. There have been occasions where we revised our initial impression after reviewing video footage or photographs. Comparison of photographs helped to resolve questions about individual identity in some cases.

Trail cameras are a needed and convenient way to record activity when personally observing is not possible. Though they are valuable observation tools, they may miss significant activities. Significant activity can occur in five seconds. We found that the trail camera did not capture some activity watched on a baby monitor installed in the barn when using a five-second delay setting. Trail cameras sometimes missed capturing images of Woodchucks personally observed taking burrow material to the barn. We suggest a one-second delay setting to better capture activities.

Results.

Our observations of the Woodchucks on our property reveal some similarities to Meier's (1992) Ohio findings of male-female relationships continuing after mating season and lasting two or more years. Like Seton (1929), we found that some males remain and assist in raising the young. The most detailed case Seton told of was on a farm in Grand

Rapids, Michigan, where both parents foraged together with the young. Grand Rapids is in southwest Michigan; our location is in southeast Michigan. Southeast lower Michigan has a common border with Ohio. As Maher (2010) found in her Woodchuck population, multiple paternity within a litter is possible in our population.

The behavior we have observed between males and females is complex, ranging from peaceful foraging together to squabbles and chases. We have observed males and females making burrow checks together. Males and females may forage near each other or 10m or more from each other. We have seen mated Woodchucks in our yard within feet of each other foraging (F.7). Sometimes the male will approach his mate with a raised tail, and she may give him what we can only describe as “*the look*.” If he does not back off, he will likely get chased. Sometimes they will pause before continuing. Whereas females indeed chase their mates, interpreting this behavior as an attempt to terminate their relationship needs re-evaluation. We have never observed copulation in the open but have seen the female lead the male seeking to do so to one of the burrows. A trail camera in our barn has captured mating.

In our observations of male Woodchucks, we found they perform patrols and assist in maintaining the burrows. While the female tends to the young, the male helps maintain



F. 7. Sam, S. June 23, 2017. Male Reggie (upright) with mate Ira in yard. [DSC00522.jpg]

ownership of the territory by patrolling, marking, and physically occupying burrows. We have also observed and documented interactions between males and juveniles, including play-fighting. In our seventh year observing Woodchucks, we first witnessed and recorded a male named George playing with a pup. Initial concerns that George was attacking the pup turned to relief when both proceeded to forage peacefully in the yard together. Since then, we have documented several other males interacting with the young.

In our observations continuing interactions between males and females past reproductive efforts are typical, even in years when no babies were born. In 2007, resident female Wilhelmina did not have offspring with her mate from previous years, Gregory. Their relationship continued until the sightings of Gregory ceased in the early summer of that year. In 2009, Wilhelmina did not have offspring with her mate from 2008, Woodrow. Their relationship continued after mating season, and he was her mate again in 2010. Wilhelmina's final mate was George in 2011. They did not have offspring. Their relationship continued until we last saw her in late May. George remained, joined by an unknown juvenile we named Little One.

In 2015 our female Heidi's mate was Luke though she may have had a second mate in that year named Raggedy. In 2016 Heidi's mate was Raggedy, with a second male named Fred arriving in June. Later in June of 2016, Heidi led three of eight offspring to the front deck, where presumed father Raggedy watched over them. Luke, Raggedy, and Fred were all documented interacting with the young. In 2017 male Reggie sometimes would be observed foraging in the yard nearby one or more pups.

In later April 2021, our resident female Ash lost her mate due to a spinal injury. Subsequently, another male named Milo arrived and became a companion and helper to Ash. Though Milo may have had previous contact with Ash, we first observed him after the birth of the pups. What was extraordinary with Milo is that he took care of the pups after the mother's disappearance in mid-June. Milo's paternal behavior included play-fighting with the young (F.8-F.10).

Anthony (1962) observed adults sometimes attacking the young and described one incident in mid-August of an adult mauling a juvenile. We have not observed any occasions where an adult mauled a juvenile. In March of 2007, we recorded a female yearling, Whiteface, who traveled from the barn to the shed where her presumed father, Gregory, was. An intense fight developed and lasted several minutes. Gregory chased her to

F. 8. Sam, S & J. June 19, 2021. The barn trail camera captured this image of Milo playing with a pup. [IMG_2198.jpg]





F. 9. Sam, S. June 19,2021 Milo play-fights with pup. [DSC01855.jpg]



F. 10. Sam, S & J. July 01, 2021. Milo on the deck step with two pups. [IMG_0972.jpg]
(NOTE: This trail camera image of adult male Milo with pups is one of a series of photos captured that morning. There were over 200 photos from 9:47 am to 10:28 am.)

the barn. Shortly after that, he exited the barn and went to the front deck area, where we saw and recorded his head wound. Later we saw Whiteface with facial swelling foraging near the barn.

We do not know of any literature that describes the paternal play-fight behavior we have witnessed and documented. We suspect play-fighting with the male teaches the young self-defense and helps to prepare them for encounters with an animal bigger than themselves. This behavior between the male and young may occur more in rural areas with more extensive home ranges and more natural predators than in more suburban or urban areas. In her observations, Lehrer (2010) found that urban living Woodchucks have fewer burrows than rural Woodchucks; their home ranges are approximately 90% smaller with fewer natural predators. There may be less need for male protection of burrows or teaching the young self-defense in an urban environment.

Male Woodchucks are challenging to observe. Visits may be random as they perform patrols. They may be stationed at any family territory burrows or gathering burrow material. We have often seen just the head of a male peeking out from under our shed (F.11). They may be hidden under bushes, in vegetation, observing from a tree, or among rocks and boulders. We have seen males on patrol run from burrow to burrow, not necessarily by the most direct route. There are times the male is present throughout the day. Some other days sightings are brief or non-existent. Trail camera use has revealed male presence to be more frequent than we have personally observed.



F. 11. Sam, S. Milo peeking out from under shed. [2021 DSC03613.jpg]



F. 12. Sam, S. Observant male named Scruffy sitting on a boulder. [2019 DSC04214.jpg]

We do not have the means to do DNA testing on Woodchucks and do not know if our females mated with more than one male. We do know that males George, Luke, Raggedy, Fred, Reggie, and Milo were present after mating season and displayed paternal behavior to pups.

We conclude by urging long-term studies of the Woodchuck mating systems and family relationships throughout the season in varying environments. Photographic and video documentation of Woodchuck activities allow for repeated reviews, help identify behavioral similarities and differences within populations and alert researchers to significant changes in social behavior.

Acknowledgments

We thank Dr. John M. Worrell Jr. for his helpful suggestions and review of this manuscript.

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