

# Population and Community Responses of Reptiles to Golf Courses

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## Objectives:

1. Examine diversity, distribution and relative abundance of reptiles using the golf course.
2. Implant radio transmitters into Gila monsters, and use florescent powder tracking, to examine movement patterns, habitat use, and behavioral responses to man-made features of the environment.
3. Using radiotelemetry data, examine movement patterns and home range characteristics of tiger rattlesnakes in response to features of the golf course and surrounding residential development.
4. Inform residents, golfers and golf course personnel about local reptiles via interactions in the field and through formal presentations to club members and residents.
5. Develop recommendations for golf course designers and managers that can be used to retrofit existing courses and design new courses to maximize benefits to reptiles.

**Start Date:** 2008

**Project Duration:** two years

**Total Funding:** \$59,994

The demand for golf course communities in Arizona has steadily increased, especially as aging baby boomers transition into retirement. The more information we have on how to design and manage golf course communities, the better we will be at maximizing the benefits that golf courses can provide for wildlife. We hope to strengthen these potential benefits by means of education and involvement of golf course professionals and the local community, and through development of recommendations for both retrofitting and design of new courses.

We used mark-recapture to determine relative abundance and distribution of reptiles using golf courses in Arizona. We have documented literally thousands of tortoises, snakes, and lizards using various features of golf courses. Irrigated vegetation along fairways and surrounding greens and tee boxes are used well out of proportion to their availability, while open fairways appear to be avoided, especially



We have observed changes in home range size, use, and configuration by tiger rattlesnakes in response to both features of the golf course and the construction of new homes.

by snakes. Areas of the golf course where natural desert has been incorporated into the design of the course correspond to areas of greater relative abundance of most species.

We have been radio tracking Gila monsters to gain a better understanding of how they are responding to the golf course and its surroundings. Gila monsters tend to spend more time on the edges of fairways and greens, presumably searching for prey in the dense, irrigated vegetation. We have observed individual Gila monsters to change the location and use of their home ranges as newly constructed homes become more common. Interestingly, the Gila monsters have started to concentrate more of their activity in areas immediately adjacent to the golf course that are off limits to development.

In 2008, we began using a new technique that allows us to quantify the exact movement path taken by a Gila monster. We obtained data from 102 Gila monster powder tracks, greatly bolstering our data set. The technique involves the use of florescent powder that we apply to the Gila monster by gluing rabbit fur onto its belly and loading up the fur with the powder. With a UV light, we can follow its exact track. This technique allows us to determine if Gila monsters are avoiding certain features of their habitat, such as fairways and roads. Using radiotelemetry, we only get the straight-line distance between successive fixes, but florescent powder allows us to determine the exact distance moved. So far, we have found that Gila monsters typically move up to two times farther than their straight-line distances would indicate.

We added data from an ongoing, long-term study of tiger rattlesnakes to our objectives. This data set includes information from over 60 individual snakes, locat-



University of Arizona scientists have been radio tracking Gila monsters to gain a better understanding of how they are responding to the golf course and its surroundings.

ed over 8,000 times, which is an unprecedented sample size for snake radiotelemetry. We have observed changes in home range size, use, and configuration in response to both features of the golf course and the construction of new homes.

## Summary Points

- Reptile species vary in their use of golf course features, but most species tend to avoid open fairways.
- We have observed a greater abundance of reptiles using thick, irrigated vegetation adjacent to fairways and greens.
- The placement and layout of the golf course helps to determine the distribution of reptiles, and certain species alter their distributions to take advantage of irrigated vegetation and natural areas that are incorporated into the golf course as hazards or rough.
- Using radiotelemetry and florescent powder tracking, we have determined that Gila monsters tend to avoid open fairways, and tend to utilize irrigated areas along the edges of the golf course out of proportion to their availability.
- Tiger rattlesnakes change the configuration of their home ranges to accommodate features of the golf course and newly constructed homes.