

**Preliminary Report to the Lois Webster Foundation of the
Audubon Society of Greater Denver Report**

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November 2011

Funding from the LWF was used to purchase radiotelemetry equipment, including receiver, antenna, and transmitters, to track garter snakes in urban Denver. This project is a partnership with Dr Jennifer Gagliardi-Seeley of Metropolitan State College of Denver and P.S. 1 Charter School, a small, public high school in downtown Denver where I taught through June 2011 (now sadly defunct). The western terrestrial garter snake (*Thamnophis elegans*) and plains garter snake (*T. radix*) have disparate lineages and generally inhabit different ecosystems, but overlap here in the Front Range of Colorado. Radiotracking allowed us gather data on habitat use, spatial ecology, and movement patterns of these snakes in urbanized environments (see Photo 1 below). We will compare these observations with those from non-urbanized landscapes. Such information is vital to our understanding of urban wildlife and will allow planning and development to account for the habitat requirements of these and other vertebrate species. While we haven't yet analyzed the spatial data in detail, the ability to follow snakes for several weeks offered insights about when they disperse from hibernation dens, how far they travel, what habitat they used, and some evidence of predation. For example, at Bluff Lake Nature Center, we radiotracked a number of snakes as they emerged from a shared hibernation den. These snakes remained in or near the den for several weeks, entering and exiting as weather permitted. In early April, these snakes dispersed to a wide area of the nature preserve from this common site, utilizing both grasslands and riparian habitat. We often found radiotracked snakes in areas where we had not found snakes previously. Additionally, snakes were found using habitat in areas that were actively under construction or other high-impact use, especially at the Lowry Wetlands site (see Photo 2 below). Interestingly, no snake was tracked leaving the boundaries of its study site or crossing any roads. Some preliminary numbers on the radiotracking are listed in Table 1 (below).

Additionally, the radiotelemetry equipment was used in various educational settings. Students from P.S. 1 Charter School and Metropolitan State College of Denver operated the equipment to gain hands-on field experience as part of their science curricula (see Photos 3 & 4 below). Additionally, several presentations and demonstrations to audiences of all ages provided an enhanced understanding of scientific fieldwork and an appreciation for local ecosystems. In addition to these classes and presentations (see table below), one intern from Colorado State University and 3 interns from MSCD conducted fieldwork and gained valuable scientific experience. Education data are listed in Table 2 (below).

Although I moved to Iowa this past July to pursue my PhD in Ecology and Evolutionary Biology, fieldwork and radiotracking continued through October, conducted by Dr Gagliardi-Seeley and the MSCD interns. Currently, the project has marked and collected data on 152 snakes at 5 sites in the greater Denver area. We presented a poster describing variation in musking anti-predator behaviors

at the annual meeting of the Animal Behavior Society in July and are currently completing a manuscript which we will submit for publication to a peer-reviewed scientific journal. Additionally, as a component of my PhD program, I am conducting a population-level genetic analysis of these urban snakes, which will provide an understanding of gene flow between habitats, population size, inbreeding, and long-term viability of these populations. We will also be analyzing the spatial data collected this field season and data from education programs in the coming months. The LWF will be acknowledged in all future presentations and publications. Fieldwork will continue in the spring of 2012, including a continuing partnership with MSCD and trip back to Colorado for me to collect additional tissue samples and data.

I have included a manuscript published in the most recent issue of *Herpetological Review* which details the attitudinal shifts of my high school students in a fall 2010 class at P.S. 1 Charter School. This may provide some background to the educational component of this project. It should be noted that this manuscript was submitted in November 2010, before the grant from LWF was received (which is why you are not mentioned in the acknowledgements).

It has been a busy, fruitful field season. On behalf of Dr Gagliardi-Seeley and myself, we would like to express our most sincere gratitude to the board of the LWF and the Audubon Society of Greater Denver for supporting this project and promoting this scientific and education work in our community.

# of study locations	# of snakes radiotracked	# of GIS datapoints collected
4	20	74

Table 1: Preliminary data on radiotracking observations.

School	Age	Class	Duration	# of students
P.S. 1 Charter School	15-19 yrs	Spring Break Field Research	One week intensive	6
P.S. 1 Charter School	13-19 yrs	Shedding Skin	8 weeks	20
Metropolitan State College of Denver	College students of various ages	Vertebrate Zoology	One day guest lecture/outing	25
Bluff Lake Nature Center	6-10 yrs	Junior Naturalist Summer Camp	Two one-hour presentations/demonstrations	~20
Audubon Society of Greater Denver	Families of all ages	Family Presentation: Snakes on the Plains	One 2-hour presentation/demonstration	~30

Table 2: Demographic and attendance details of education presentations utilizing radio telemetry equipment.



Photo 1: A western terrestrial garter snake (*Thamnophis elegans*) with attached radiotracking device.



Photo 2: Snake habitat at the Lowry Wetlands site, currently under construction. The snake was found for several weeks living under the black plastic construction fence in the foreground.



Photo 3: A student from P.S. 1 Charter School learns the fine art of radiotelemetry.



Photo 4: P.S. 1 students practice their telemetry skills.

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