

**2013–2014 Georgia Status Surveys for the Florida Pine Snake  
(*Pituophis melanoleucus mugitus*) and the Southern Hognose Snake  
(*Heterodon simus*)**



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## EXECUTIVE SUMMARY

In 2012, the Florida Pine Snake (*Pituophis melanoleucus mugitus*) and the Southern Hognose Snake (*Heterodon simus*) were petitioned for federal listed as Threatened under the Endangered Species Act. The Orianne Society subsequently received a contract from the Georgia Department of Natural Resources to conduct status surveys for these species. Herein, we report the methods and results of our surveys, which included compiling all recent Georgia records (2009–present) for both species.

We located recent records (2009-2014) for the Florida Pine Snake (*Pituophis melanoleucus mugitus*) and the Southern Hognose Snake by: a) broadcasting our interest in recent observations via numerous Facebook announcements by the Orianne Society and Georgia Department of Natural Resources and through e-mails to herpetologists and natural resource personnel; we also developed a webpage where participants could enter snake observation data; b) searching museum collections (University of Georgia Museum of Natural History; Georgia Southern University Herpetology Collection; Valdosta State University; University of Florida Museum of Natural History Herpetology Collection), and; c) consulting the Georgia Department of Natural Resources Biotics database.

Additionally, in our efforts to document records (for both species) we conducted drift fence and road-cruising surveys. We conducted drift fence surveys at three south Georgia sites during both the Spring (May-June) and Fall (September-October) of 2014. We designed and road-cruised 21 different survey routes; we conducted road-cruising surveys during September-October, in both 2013 and 2014 (total distance driven on our survey routes: 6,281 miles).

For the 6-year period January 1, 2009– December 15, 2014, we compiled a total of 71 Florida Pine Snake records for Georgia. These records were from 46 sites located in 33 counties. Twenty of these sites are public lands, preserves or tracts under conservation easements. We found three Florida Pine Snakes via our drift fence surveys; none were found on our road-cruising surveys.

For the same period (2009-2014), we compiled a total of 33 Southern Hognose Snake records for Georgia. These records were from 12 sites located in 11 counties. Six of these sites are public lands, preserves or tracts under conservation easements. We didn't document any Southern Hognose Snakes via our drift fence surveys or road-cruising surveys.

We deposited digital photos or road-killed specimens — as voucher specimens in museum collections — for a number of significant Florida Pine Snake and Southern Hognose Snake records obtained by this study.

## INTRODUCTION

In 2012, the Florida Pine Snake (*Pituophis melanoleucus mugitus*) and the Southern Hognose Snake (*Heterodon simus*) were petitioned for federal listed as Threatened under the Endangered Species Act (Center for Biological Diversity, 2012). The Orianne Society subsequently received a contract from the Georgia Department of Natural Resources to conduct status surveys for these species. Herein, we report the results of our surveys, which included compiling all recent Georgia records (2009–present) for both species.

## METHODS

We employed two field survey methods, each applicable to both species, in our efforts to document Florida Pine Snake and the Southern Hognose Snake localities in Georgia: a) drift fence surveys, and; b) road-cruising surveys. To complement these surveys, we searched for recent records for both species by the following: a) we broadcast our interest in recent observations of these snake species (via numerous Facebook announcements by the Orianne Society and Georgia Department of Natural Resources and through e-mails to herpetologists and natural resource personnel); we also developed a site on our Orianne webpage where participants could enter snake observation data; b) we searched museum collections (University of Georgia Museum of Natural History; Georgia Southern University Herpetology Collection; Valdosta State University; University of Florida Museum of Natural History Herpetology Collection) for recent records; c) we consulted the Georgia Department of Natural Resources Biotics database.

For this study, we consider the Florida Pine Snake to inhabit the entirety of the Coastal Plain and Fall Line physiographic regions of southern Georgia. North of the Fall Line, a different subspecies of pine snake (Northern Pine Snake, *Pituophis melanoleucus melanoleucus*) is present. We did not attempt to catalogue or document observations of the Northern Pine Snake.

We deposited digital photos or road-killed specimens — as voucher specimens in museum collections — for a number of significant Florida Pine Snake and Southern Hognose Snake records obtained by this study (details in separate documents submitted to GA DNR Biotics Program).

### ***Drift Fence Survey Methods***

We conducted drift fence surveys on three sites during both the spring (May-June) and Fall (September-October) of 2014. Our drift fence sites included: a) upland habitat associated with Horse Creek on the Orianne Society's Indigo Snake Preserve (OISP; Telfair County); b) upland habitat associated with the Alapaha River. Drift fence placement was restricted to undeveloped upland habitat patches > 2 ha in size including evergreen, hardwood, or mixed forest, scrub/shrub, agricultural fields, and regenerating clear cuts. Additionally, drift fences were only placed on tier 1, 2, or 3 soil types (United States Department of Agriculture, 2013) as designated for the Gopher Tortoise.

Drift fences were constructed of a single length of 30.5-m siltation fencing standing approximately 60 cm above ground and buried 10-15 cm in the soil (Figure 2). Four mesh funnel traps were placed along each drift fence; traps were shaded with wooden cover boards and contained a damp sponge. Traps were checked between three and six times a week depending on weather.

All reptiles and amphibians captured in funnel traps and found along drift fences were identified to species. Florida Pine Snake captures were uniquely marked by heat branding or by inserting a passive integrated transponder (PIT) tag subcutaneously in the lower third of the body (Weary 1969, Gibbons and Andrews 2004). Morphological data (i.e., snout-vent length, tail length, mass, and sex) were collected for each Florida Pine Snake encountered during the field survey, and those found incidentally while en route to survey sites.

### ***Road-cruising Survey Methods***

Road-cruising surveys were conducted through areas of potential habitat at sites located throughout the Coastal Plain of southern Georgia. The chief criteria we used in selecting survey routes were: a) the majority of the route passed through sandhill or disturbed sandhill habitat; b) public roads, paved or unpaved, allowed us to design a continuous survey route of at least 15 miles. Public roads that we included in survey route designs were roads that experience fairly low volumes of vehicle traffic and could be driven safely by surveyors at slow-moderate speeds.

We designed and road-cruised 21 different survey routes. An individual map for each route is shown in Appendix 1. We conducted road-cruising surveys during the months of September-October, in both 2013 and 2014. Routes were driven during dry and warm weather. On a given survey, we drove each route at slow speeds (ca. 15-20 mph) using a single motor vehicle until we had driven 60 miles total (meaning portions of the same route were often driven 2-4 times in the same survey). For each survey, we recorded the following: Date, Start and End Times, Weather Conditions including Start and End Temperatures. For each snake that we observed on a survey we recorded: Species, Time of Observation, Latitude/Longitude, Total Length, Sex, and whether AOR (alive-on-road) or DOR (dead-on-road).

## **RESULTS AND DISCUSSION**

### **Florida Pine Snake Survey Results**

For the 6-year period January 1, 2009– December 15, 2014, we compiled a total of 71 Florida Pine Snake records for Georgia (attachment to GA DNR). These records were from 46 sites located in 33 counties. Twenty of these sites are public lands, preserves or tracts under conservation easements. We found three Florida Pine Snakes via our drift fence surveys; none were found on our road-cruising surveys (see below). Fifteen of the records are of snakes found by Orianne Society herpetologists incidental to other field studies.

The results of our status survey and other recent (i.e., 2000–2008) records in the Georgia DNR Biotics database indicate or at least strongly suggest that the Florida Pine Snake remains widely, albeit locally, distributed throughout much of the Coastal Plain of southern Georgia. Our study, however, does not provide any data regarding the health or size of individual pine snake populations in Georgia; thus, we cannot comment as to whether pine snake populations are stable, growing or declining at those areas for which there are recent records.

Within the last five years, Florida Pine Snakes have been documented for the first time from a number of counties (e.g., Crawford, Jeff Davis, Lanier, Pierce, Turner) — underscoring that the Georgia distribution of the species is still imperfectly known. We suspect that additional surveys will continue to locate as-of-yet undocumented sites for the species in portions of southern Georgia. The fossorial and secretive habits of this snake, and possibly small or localized populations, significantly complicate our ability to locate individuals in the field (Franz 1992, Miller 2008). Dwindling Southeastern Pocket Gopher (*Geomys pinetis*) numbers have possibly affected local pine snake declines in Georgia, inasmuch as this mammal is a frequent prey, and provides tunnels which are commonly used as refugia by pine snakes where the species coexist (Castleberry 2008, Miller 2008).

### **Southern Hognose Snake Survey Results**

For the 6-year period January 1, 2009– December 15, 2014, we compiled a total of 33 Southern Hognose Snake records for Georgia. These records were from 12 sites located in 11 counties. Six of these sites are public lands, preserves or tracts under conservation easements. We didn't document any Southern Hognose Snakes via our drift fence surveys or road-cruising surveys (see below). Two of these records are of snakes found by Orianne Society herpetologists incidental to other field work. Ten of 24 records for which size was available were of hatchling or juvenile snakes.

The results of our status survey and lack of other relatively recent (i.e., 1990–2008) records indicate or at least strongly suggest that the distribution of the Southern Hognose Snake in Georgia is now highly fragmented (Tuberville et al. 2000). Today, extant populations are found locally—and, apparently, at what are widely separated sites, geographically. Our study does not provide any data regarding population size.

The Georgia distribution of the species remains imperfectly known. We suspect that additional surveys may continue to locate as-of-yet undocumented sites for the species in some portions of southern Georgia, especially the Fall Line sandhills province. The fossorial and secretive habits of this snake (Beane et al. 2014), and possibly small or localized populations, significantly complicate our ability to locate individuals in the field. Although collectors are not currently believed to pose a threat to Southern Hognose Snake populations in Georgia, there are two sites in the state that hobbyists and amateur herpetologists frequently visit in an effort to observe the species in the wild.

### **Drift Fence Survey Results**

Over the course of the spring and fall drift fence surveys, we recorded 177 snake captures of 17 snake species. Unique snake species assemblages were documented at each site. Three Florida Pine Snakes,

including two juveniles and one adult male, were captured in funnel traps during the survey. Though several Florida Pine Snakes were captured with this drift fence design, future surveys targeting Florida Pine Snakes would likely have greater capture success with higher drift fences and a central box trap. No Southern Hognose Snakes were captured during this survey.

### **Road-cruising Survey Results**

In 2013, we drove 20 survey routes (Table 1), conducting a total 69 road-cruising surveys (3,960 miles driven total). Each site was surveyed 3-5 times, with the exception of the Charlton County route which was surveyed twice. No Southern Hognose Snakes or Florida Pine Snakes were found on these surveys. On our 69 surveys, we found 97 snakes of 18 species (Fig. 6). A total of 35 snakes (36%) were found alive-on-road and 62 (64%) snakes were found dead-on-road.

In 2014, we drove 20 survey routes (Table 1), conducting a total 39 road-cruising surveys (2,321 miles driven total). Each site was surveyed twice, with the exception of the Seminole County route, which was surveyed once. No Southern Hognose Snakes or Florida Pine Snakes were found on these surveys. On our 39 surveys we found 56 snakes of 14 species (Fig. 7). A total of 21 snakes (38%) were found alive-on-road and 35 (62%) snakes were found dead-on-road.

Overall, we conducted a total of 108 road-cruising surveys of 21 survey routes, finding a total of 153 snakes of 19 species. Species of interest documented by our road-cruising surveys included the Eastern Indigo Snake (*Drymarchon couperi*), Eastern Diamondback Rattlesnake (*Crotalus adamanteus*), and Eastern Coral Snake (*Micrurus fulvius*). Locality records for these species have been sent to the GA DNR Biotics database.

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## LITERATURE CITED

- Beane, J.C., S.P. Graham, T.J. Thorp, and L. Todd Pusser. 2014. Natural history of the Southern Hognose Snake (*Heterodon simus*) in North Carolina, USA. *Copeia* 2014(1):168–175.
- Castleberry, S. 2008. Survey of the current distribution of the southeastern pocket gopher (*Geomys pinetis*) in Georgia. Final report by Southern Wildlife Consultants to Georgia Department of Natural Resources.
- Center for Biological Diversity. 2012. Petition to list 53 amphibians and reptiles in the United States as Threatened or Endangered under the Endangered Species Act. Petition to the Secretary of the Interior.
- Franz, R. 1992. Florida Pine Snake (*Pituophis melanoleucus mugitus*): Species of Special Concern. Pp. 254–258, *In* P.E. Moler (Ed.), Rare and Endangered Biota of Florida, Volume 3: Amphibians and Reptiles. University Press of Florida, Gainesville.
- Gibbons, J. W., and K. M. Andrews. 2004. PIT Tagging: Simple Technology at Its Best. *BioScience*. 54:447-454.
- Miller, G.J. 2008. Home range size, habitat associations and refuge use of the Florida Pine Snake, *Pituophis melanoleucus mugitus*, in southwest Georgia, U.S.A. M.S. Thesis, University of Florida, Gainesville.
- Tuberville, T.D., J.R. Bodie, J.B. Jensen, L. LaClaire, and J.W. Gibbons. 2000. Apparent decline of the southern hog-nosed, *Heterodon simus*. *Journal of the Elisha Mitchell Scientific Society* 116: 19–40.
- United States Department of Agriculture, Natural Resources Conservation Service. 2013. Working Lands for Wildlife WHIP Guidance: Gopher Tortoise Phase 2 Georgia, p. 22. Georgia State Office, Athens, Georgia.
- Weary, G. C. 1969. An Improved Method of Marking Snakes. *Copeia*. 1969:854-855.

Table 1. Road cruising survey sites for 2013 and 2014.

Site Name	Number of times surveyed	
	2013	2014
Appling	3	2
Brooks-Lowndes	3	2
Bryan-Bulloch	4	2
Burke	5	2
Charlton	2	2
Coffee-Jeff Davis	4	2
Coffee-Atkinson East	3	2
Coffee-Atkinson West	3	2
Coffee South	3	2
Echols	3	2
Effingham	4	0
Emanuel	0	2
Irwin-Turner	4	2
Marion	4	2
Seminole	3	1
Tattnall	3	2
Taylor	4	2
Telfair	3	2
Thomas	4	2
Wayne	3	2
Wheeler	4	2
Total Number of Surveys	69	39



Figure 2. A) A straight-line drift fence for sampling Florida Pine Snakes and Southern Hognose Snakes with B) mesh funnel trap and cover board.

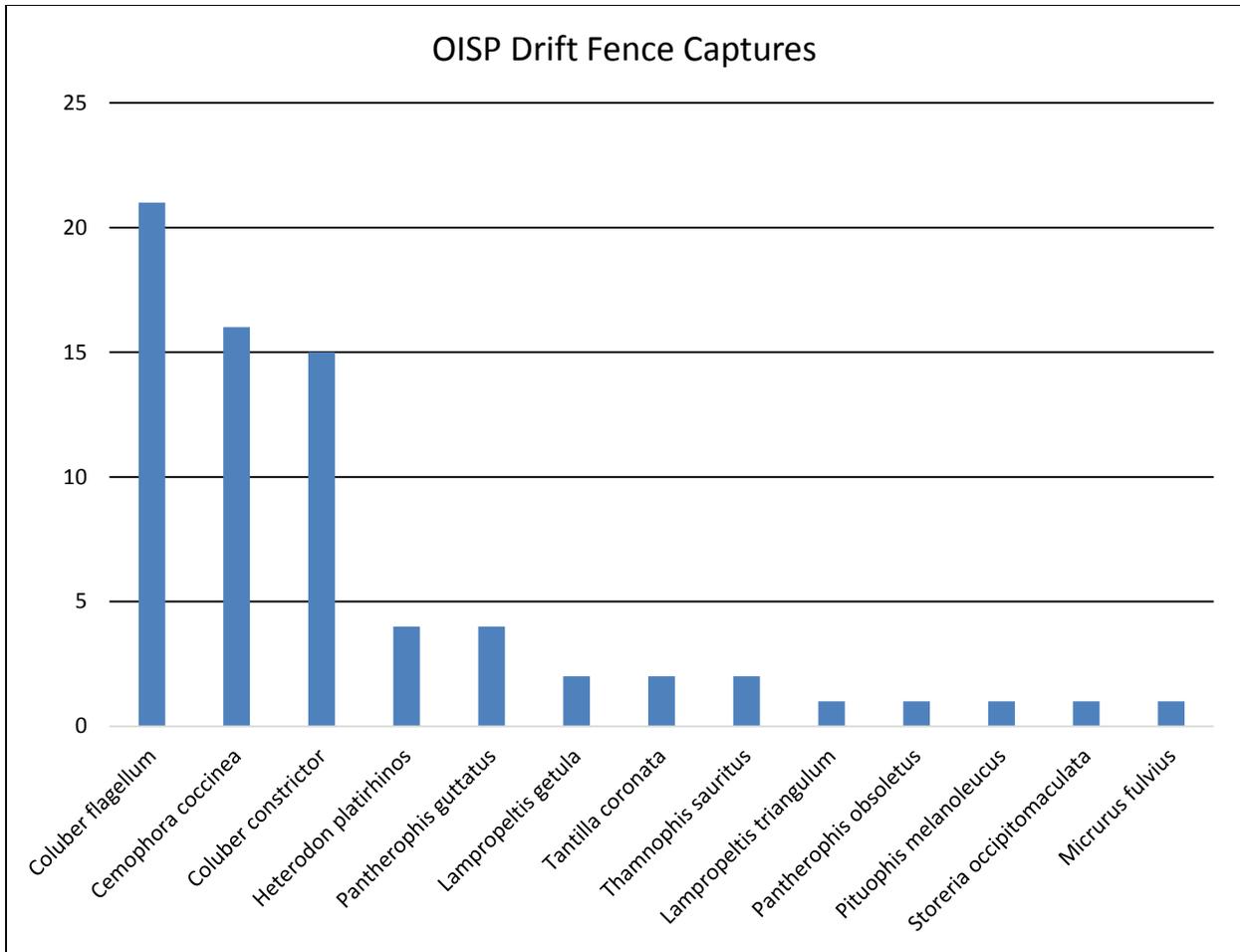


Figure 4. Snake capture totals from 10 drift fences on the Orianna Society Indigo Snake Preserve during spring and fall of 2014.

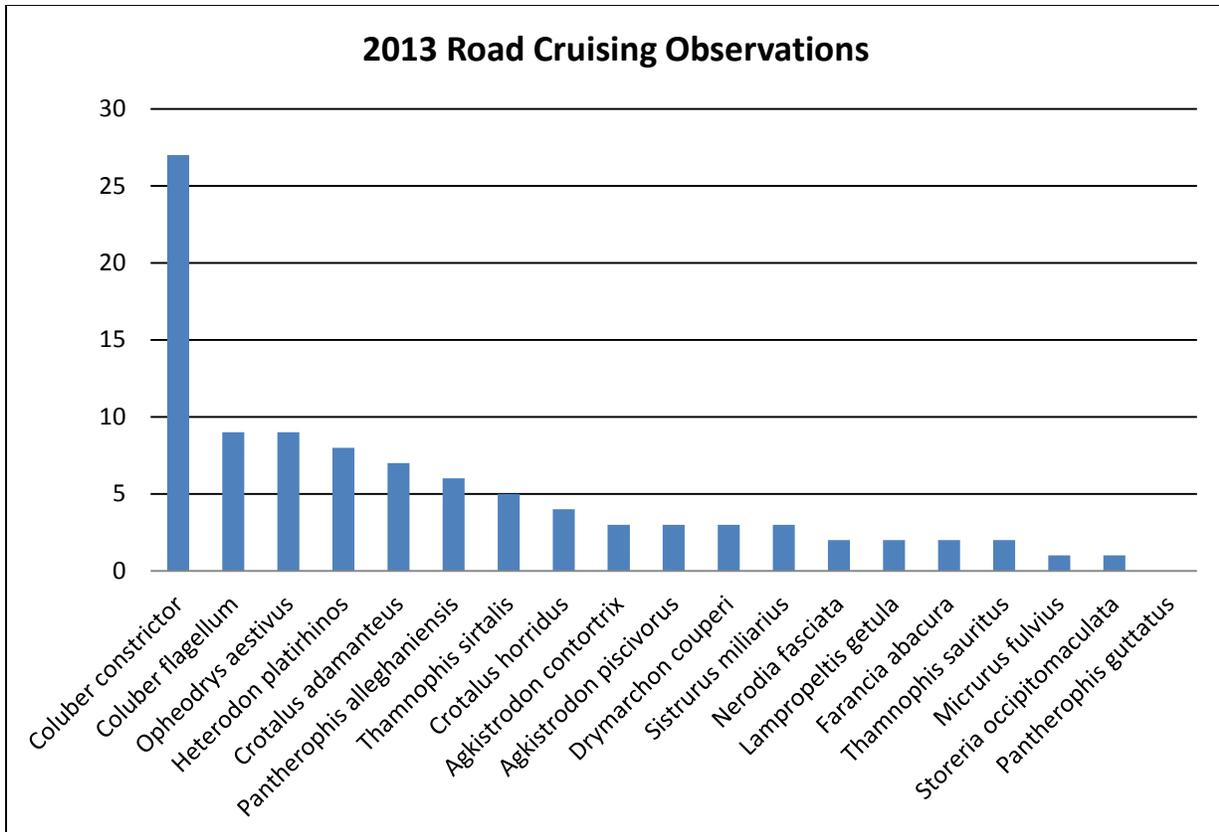


Figure 6. Snake observation totals for 2013 road cruising surveys.

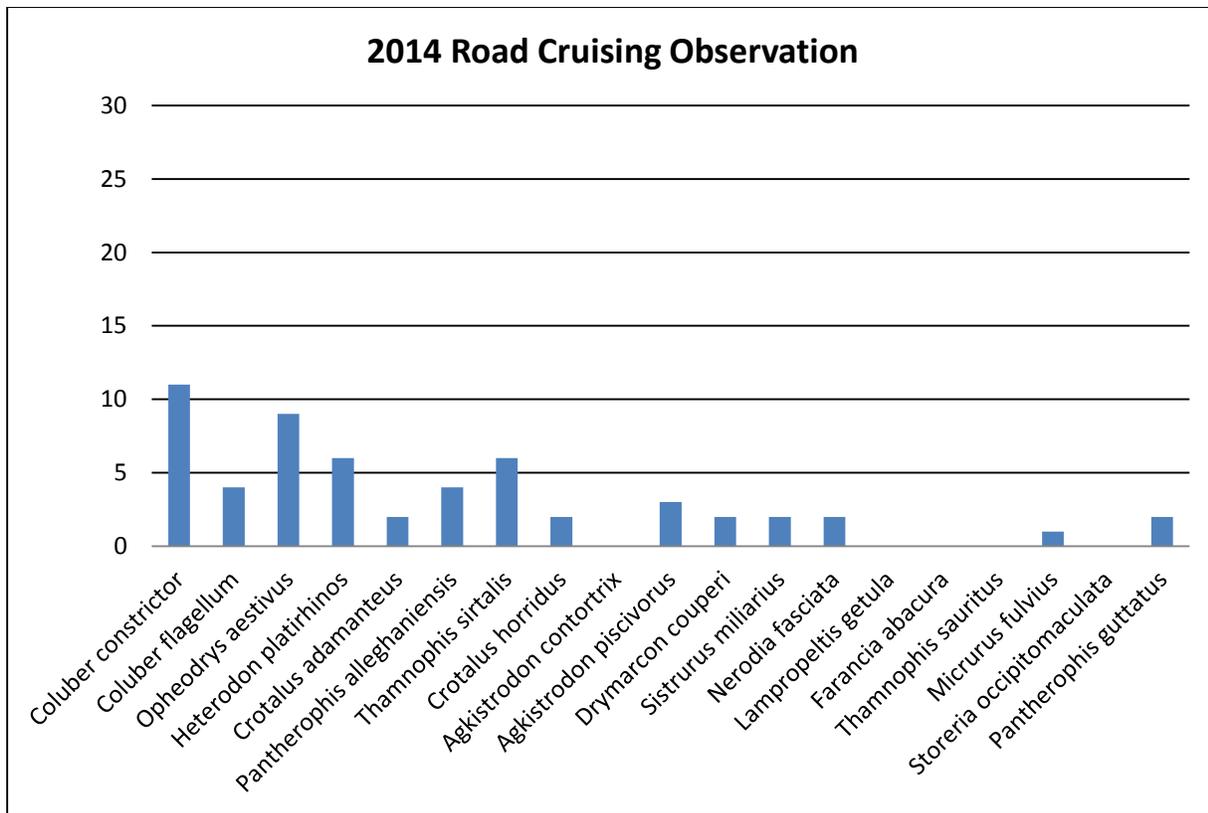


Figure 7. Snake observation totals for 2014 road cruising survey.

