Sabbatical Leave Report: Fall 2006

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Natural History of the Introduced Italian Wall Lizard (Lacertila: *Podarcis sicula*) on the Fort Hays State University Campus.

The Italian wall lizard is a relatively small (50 -75 mm snout to vent length), sexually dimorphic lizard. Females are generally smaller, have narrower head widths relative to head length, and in general less distinct color patterns. The dorsum base color is green interrupted by central and lateral bands of brown and white mottling, including scattered small, indistinct black and yellow spots. Coloration is most striking on the dorsum and fades to light green and brown laterally and finally to white on the venter. Males have more distinctive spotting patterns on the dorsum and two large black blotches just above and slightly posterior to the forelimbs. The base green color in males is generally brighter and often in larger individuals there is a distinctive blue coloration along the sides of the jaw and to a lesser extent laterally between the limbs.

The Italian wall lizard is native to the Mediterranean region of Europe where it is a quite common member of local faunas. In Europe is prefers or is most often found in areas of mild relief having rocky outcrops with south-facing slopes and scattered woody debris and shrubs. In locally, the species and its congeners are often referred to as the "ruin" lizards because of their common occurrence in the numerous antiquated and dilapidated structures that are so common in the Mediterranean region. In fact, the species seems one of the more pliable ecologically with regard to association in urban settings and occurred frequently in common garden habitats and vacant lots containing retaining walls or old foundations with the proper exposure. In their native Europe, Italian wall lizards are territorial with males defending areas from other males and females less so with other females such that the home range of several females overlaps the territory of a single male.

In North America, populations have been established in New York, Ohio, Vancouver, and Kansas, and generally as the result of some accidental release from the pet-trade. In New York, Ohio, and Kansas localized populations have been established in urban areas and individuals appear to be clumped into relatively high densities in presumably preferred habitat (but perhaps it is the only suitable habitat). Investigators in Ohio indicated that densities were much higher and less evenly distributed than in Italy and proposed that the territorial system typical of the species transformed into a hierarchical system due to overcrowding and associated increases in aggressive interactions. They also implied that the inability to successfully disperse from these core areas contributed to the modified social system.

In Kansas, well established populations occur in Topeka and Hays. The Topeka population has been extant since the 1960's when a pet store owner inadvertently released an unknown number of individuals. The population like other locations is within an urban center and has slowly expanded but remains localized within a couple block radius of the presumed introduction site. At least at present none of the study populations has expanded or has had access to non-urban or typical native habitats in their respective regions. In Hays, (the smallest of urban centers where releases have been made) populations have been established on the Fort Hays State University campus on the extreme western edge of the city and in the downtown area along the railroad-right-of-way. Accordingly, the opportunity for dispersal to native grassland

and riparian zones might be much more likely here than in other locations where Italian wall lizards have been introduced. Should this be the case, the Hays area is the most likely location where this introduced species could have significant interactions with native lizards. The two species most likely to have interaction are the prairie lizard (*Sceloperus undulatus*) and the prairie-lined racerunner (*Cnemodophorus sexlineatus*). It was concerns over the expansion of populations of Italian wall lizards and the potential for negative interactions with the native fauna that really stimulated my interest in documenting some natural history of this species and its potential for interactions with native forms.

The objectives of my investigation were to document the area of occurrence of Italian wall lizards in and around the Fort Hays State University campus. Estimate population size and relative density and attempt to ascertain the potential for negative interactions with native species.

During the summer 2006, I evaluated capture techniques for Italian wall lizards on the Fort Hays State University campus. I used funnel traps in association with drift fences, pit-traps with drift fences, long-handled nooses, and capture by hand, to attempt to capture individuals in order to collect body form measurements snout-to-vent-length, tail-length, weight, and sex, and to uniquely mark individuals with paint.

Individual marks that could be identified at a distance would allow me to better assess special variables like home range size and the degree or rate of dispersal from core areas.

I was very surprised at the difficulty in capturing this species relative to native forms. Funnel traps and pitfall traps work very well on native species but were ineffective with Italian wall lizards. Apparently the adaptations to a more arboreal life history allowed these lizards to escape funnel-traps and all except the deepest pits (600 mm). In addition, these lizards exhibited a much lower propensity to "drift" along the low obstructive fencing designed to direct them to the pitfall traps than other lizard species I have worked with. Noosing has been used effectively with this species by some investigators however given the constancy of prevailing winds at my study site, noosing also was frustrating and ineffective at best. Essentially, the only capture technique that allowed access to sufficient numbers of individuals was the "capture by hand" method with the assistance of a number of student volunteers.

An additional complication was the realization that the paint marking was a relatively short-term mark (regardless of brand used) and lasted only about a week with an individual in-hand, and was unreliable after a single day at a distance even with binoculars. I suspect three possible reasons for the lack of success relative to other investigators 1) the escape habitats were more abrasive (crevices around limestone buildings), 2) other investigators had access to a wider array of permanent paints (model airplane paint had been used successfully in the past) 3) during initial markings ecdyscis was occurring in a near uniform frequency.

Given the setbacks associated with capture and marking, I modified survey strategies to include walking "transects" across campus to estimate relative abundance and the extent of

the population range on campus. In addition, I used some short-term intense capture efforts aided by a number of student volunteers, to generate mark-recapture population estimates.

I conducted 15 transect surveys across the FHSU campus in late morning during August and September 2006. I generally walked along the south facing sides of Albertson, McCartney, and Sheridan halls, then walked north along the east-facing side of Sheridan to Picken and Rarick halls. From the south-facing walls of Rarick Hall I walk west and south through the Rose Garden and west to the Memorial Union and finally back to the southwestern corner of Albertson Hall. These observations yielded an average of 106 individuals per survey (range 66 to 154).

In addition, to these core transects on campus, I walked in expanding arcs to include most of the campus and similar habitats to the core area. Three individuals were observed near Tomaneck Hall over the course of the study and all appeared to be juveniles. Four individual were observed on the south side of Davis Hall and I had a report from personnel in the Grounds Department that they encountered at least one individual near the President's residence but I was unable to confirm the later. Interestingly, I did not observe any individuals in the riparian zone along Big Creek as it flows through campus or along the campus bypass. At least thus far the introduction appears to be restricted to the campus proper.

With the help of a number of student volunteers, I attempted to better estimate population size with one intensive effort to mark and recapture as many individuals as possible. The single-census-recapture estimate was 482.8 individuals (95% C.I. = 966 – 284) and included adults of both sexes and juveniles. By comparison 89 individuals were captured, weighed and measured including 29 adult males, 50 adult females and 10 juveniles. Males were larger and females (mean SVL and weight 60.2 mm, 6.6 g; 51.6 mm, 3.8 g, respectively). Males were nearly half as numerous in the catch which may be a function of the social system or perhaps females were easier to catch. The later was certainly the case when females were gravid.

Within the core area, individuals were not evenly distributed over the area, even if only south-facing walls of buildings are considered (apparently preferred habitat). Overall 64% of captures were made around Sheridan Hall. This is the area where the presumed introduction was made in 2001 based on unconfirmed accounts (there is now no objective way to definitively establish the point of introduction). Given that both the number of captures and the number of survey observations decrease with increasing distance from Sheridan Hall however, seems to support these statements. Alternatively, the introductions could have been made elsewhere and the area near Sheridan Hall is simply better habitat for this more "urban" species.

Over the last 5 years Italian wall lizards have established themselves on the FHSU campus however the rate of dispersal thus far appears to be rather slow. There are few observations outside main campus and at least so far they do not appear to be established in adjacent riparian or grassland habitats. Nonetheless, we might expect that as population densities increase dispersal to these habitats and interactions with local fauna would ensue. Accordingly, studies of behavioral interactions among native species and the introduced Italian wall lizard might provide important insight into the effect of this introduce species on native populations. These data have yet to be analyzed but initial observations suggest that Italian wall lizards exhibit more aggressive actions to other species than do native species.

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