THE ILLINOIS REDSPOTTED SUNFISH PROJECT: NOT POSSIBLE WITHOUT NANFA

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The Redspotted Sunfish (*Lepomis miniatus*) (Figure 1) occurs in clear, sluggish, well-vegetated streams and backwater lakes from the Illinois River basin, Illinois, south through the Mississippi River Valley (e.g., Cumberland and Jacks Fork rivers) to the Gulf Slope (Warren, 1992). The fish had a limited and fragmented distribution in Illinois (Forbes and Richardson, 1920; Smith, 1979) that included bottomland ponds and streams within the Wabash and Ohio river basins in the south-southeast, along the Mississippi River in the west-southwest, and within the Sangamon and Illinois river basins in the central portion of the state (Figure 2). Although never abundant in Illinois, evidence suggested the distribution of *L. miniatus* has been reduced in the state due to habitat destruction (Smith, 1979; Burr et al., 1988). Smith (1979) suggested threats to the species included loss of habitat associated with drainage practices, a general deterioration of water quality, and the arrival of Common Carp and Grass Carp. The species was listed as "Threatened" under the Illinois' Endangered Species Act in 1989, and was identified as a Species in Greatest Need of Conservation under the Illinois Wildlife Action Plan in 2005. In response, biologists from the Illinois Department of Natural Resources (IDNR) and the Illinois Natural History Survey (INHS) initiated a conservation program in 2005 to secure this species' presence and viability within the state.

Supported by a State Wildlife Grant and permitted through the Illinois Endangered Species Protection Board, we first conducted a status assessment in 2005 for populations in more than 30 previously identified locations throughout the state. From these data, only habitats in two locations appeared to support the species—one location in the Sangamon River basin in central Illinois and one in the Saline River basin in southern Illinois. In 2007, a new, promising, and previously undocumented location was communicated to us by citizen-scientists—NANFA's own Uland Thomas and Richard Kik.

Uland and Richard's story: Uland and Richard were hoping to collect gar in the Vermilion River of the north (Illinois River drainage). However, rain and water levels chased them out of the Vermilion and forced them elsewhere. They decided upon Fish Creek in central Illinois. While there, they encountered the elusive Redspotted Sunfish. When they returned home, Uland contacted Jeremy about his find.

Figure 1. Redspotted Sunfish *Lepomis miniatus* (Photo by Jeremy Tiemann).

This story is an approved modified version of Tiemann, J.S., T.D. Thomas, W.M. Schelsky, and J.M. Epifanio. 2014. Translocation and Refuge Populations as a Means of Conservation for Imperiled Redspotted Sunfish in Illinois. Illinois Natural History Survey Reports No. 411:3.

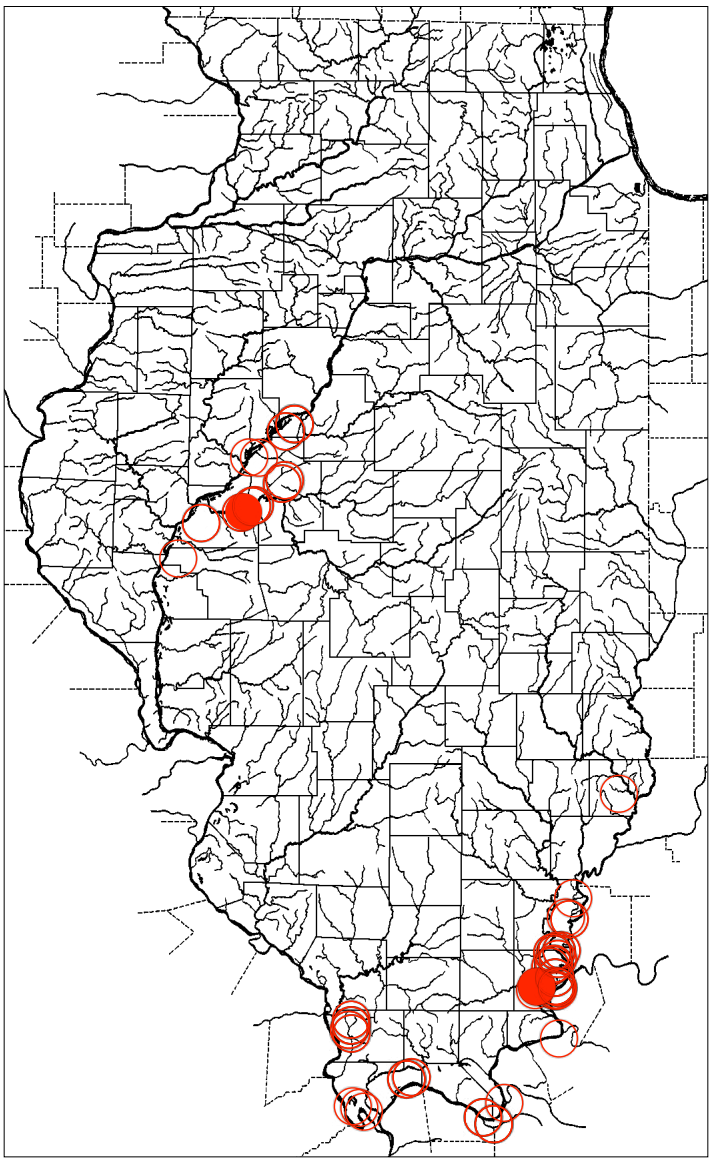

Figure 2. Distribution map of Redspotted Sunfish in Illinois. Open circles designate historical locations, whereas solid circles are the locations (N = 2) that appeared to support stable populations based upon our status survey of the fish.

Shortly thereafter, IDNR and INHS biologists, with the assistance of Uland, discovered that this location supported what appeared to be the most robust (albeit small) population of Redspotted Sunfish in the state.

As a result of the statewide assessment, the status of the fish was changed to state-endangered in 2009. The biologists working with the Redspotted Sunfish decided that in order to secure the species, additional populations would be needed to safeguard against any future losses. They recognized that a conservation breeding program and establishment of off-site refuge populations would be necessary. Conservation breeding programs differ from traditional enhancement breeding and stocking programs in that they follow brood selection strategies to maximize local genetic diversity and structure. Moreover, these programs are often shorter in duration and not intended to overcome great demands on a population such as that created by harvest. To address this issue, we took fin clips from individuals we collected in Illinois, as well as those from surrounding states. Based upon our genetics study, the most local evolutionary lineage of Redspotted Sunfish (e.g., from Fish Creek)—rather than more distant out-of-state sources such as southern Missouri or Indiana—was chosen for breeding, specifically to capitalize on adaptation for local environmental conditions and to avoid any unintended mixing of lineages. Also, wild-caught broods were used to minimize any domestication and founder bottlenecks.

Redspotted Sunfish broodstock were collected and transferred to rearing ponds in 2008, 2009, and 2010. To avoid permanently removing breeders from the natural population (commonly called *brood-mining*), mature parents were used only once over the three years of breeding and were returned to their collection site after the breeding season. The subsequent juveniles (Figure 3) were collected and translocated to eight sites across central Illinois that contained

Figure 3. Juvenile Redspotted Sunfish (Photo by Rob Hilsabeck, Illinois DNR).

Figure 4. A restored backwater lake where Redspotted Sunfish was reintroduced (Photo by Trent Thomas).

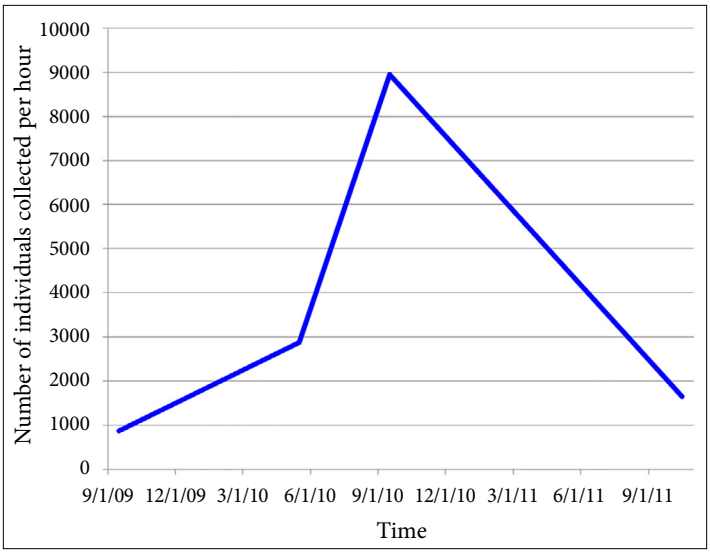

Figure 5. Catch rates of Redspotted Sunfish at one of the established refuge sites.

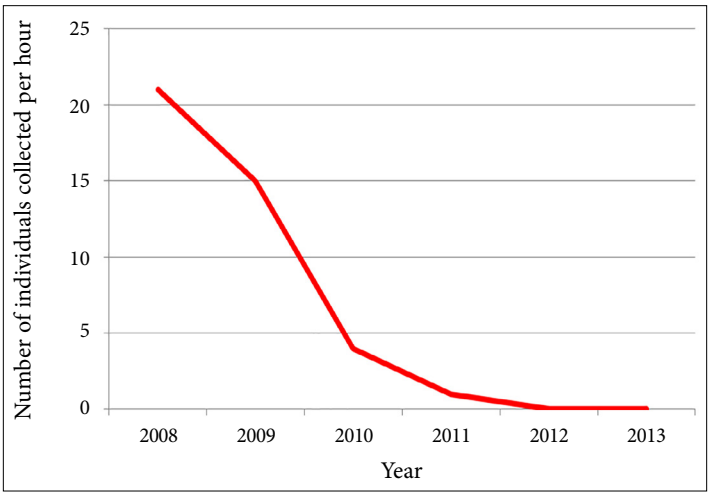

Figure 6. Catch rates of Redspotted Sunfish at Fish Creek.

aquatic vegetation, low predator densities, and are within a protected area, such as a state park or natural area (Figure 4). Each of the refuge populations in the established network has demonstrated evidence of high survival and reproduction. Mean catch rates at refuge sites have varied from 16 to nearly 3,600 individuals per hour collecting, with a variety of size classes (e.g., age classes) present! At one site, catch rates have varied from 875 to nearly 9,000 individuals per hour collecting (Figure 5). We are monitoring the genetic diversity in young produced relative to brood and the wild population to evaluate the effectiveness of the breeding program at capturing genetic diversity within the donor source population.

Unfortunately, the original donor site—Fish Creek—has experienced severe de-watering associated with near-drought conditions during the last few years, and has seen an increase in the abundance of Grass Carp. Follow-up monitoring has failed to uncover any remnants of the population in the last two survey years (Figure 6). Thus, if the population is truly extirpated, the refuge populations will hold the remnant genetic legacy of the central Illinois stock.

This project could not have happened if it was not for the collaboration between NANFA, IDNR, and INHS. Natural resource agencies are often constrained by time, money, and man-power, and often look to and welcome the help of citizen scientists. The prognosis is cautiously optimistic for Redspotted Sunfish in Illinois thanks to the conservation actions described here. Biologists from the IDNR and INHS (along with citizen scientists) will maintain a vigilant watch over the refuge populations to evaluate their viability as a network of self-sustaining populations and continue to look for remnant populations in Fish Creek and other locations in hopes of conserving a colorful member of Illinois' native fish fauna.

Literature Cited

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