The Illinois chorus frog (*Pseudacris streckeri illinoensis*)

and the dredge material deposition sites


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EXECUTIVE SUMMARY

The Illinois chorus frog (*Pseudacris streckeri illinoensis*), a state threatened amphibian, occupies a location where the U.S. Army Corps of Engineers’ dredge material placement operations may cause incidental take. The purpose of this report is to summarize results from five years (2001-2005) of study at the site in reference to the goals of the USACE’s conservation plan at two placement sites and breeding sites to be constructed in the future. The goals for these studies were to arrive at population estimates and to gauge the effect on recruitment of breeding ponds constructed at the site. In years where population estimates could be made they ranged from 230 frogs to 1404 frogs in 2005. The general increase in the estimates may reflect improved breeding success or be an effect of the limited base (2001 frogs only) for the estimates.

Moreover, there is no mechanism to estimate survivorship of adults so the base number for the estimate may be inflated without correction for mortality in the 2001 marked frogs. Regardless, there is no direct or indirect evidence that dredge material deposition has adversely affected chorus frog numbers at the site. To date, poor rainfall during the springs of 2003-2004 precluded any estimate of the effect on recruitment by the breeding ponds. No transformation occurred in the breeding ponds due to unusually dry spring weather and the lack of water in the ponds. In 2005, sufficient newly transforming froglets were marked to allow an estimate of recruitment. However, this estimate can only be made by continuing the project into 2006 to allow recapture of frogs marked at transformation.
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INTRODUCTION

The Illinois chorus frog (*Pseudacris streckeri illinoensis*) is an anuran amphibian that occurs in areas of sandy soils in Arkansas, Illinois, and Missouri (Conant and Collins, 1991). This highly fossorial frog occurs in Illinois mainly along the central part of the Illinois River (Smith, 1961; Brown and Rose, 1988; Phillips et al., 1999).

This frog occurs in the Beardstown area where the District has placed dredge material from previous navigation channel maintenance on the Illinois Waterway. Future dredged material operations may cause incidental take of this Illinois threatened species. The District has developed a conservation plan for the species to comply with Illinois Department of Natural Resources (IDNR) incidental take authorization.

OBJECTIVES

The purpose of the project is to monitor changes in population size and to determine recruitment rate of the species at the dredged material deposition sites, and utilization at constructed breeding ponds in response to the District’s conservation plan and conditions of the Incidental Take Authorization issued by the Illinois Department of Natural Resources. The first step in accomplishing this objective is to mark adult and newly transforming froglets for future recapture.

METHODS

Study sites: The study sites are located at sixth street in the city of Beardstown, Illinois (SE, sec. 16, T18N, R12W). These border the east side of the levee on the eastern bank of the Illinois Waterway. The study area included two sites (Sites 1 and 5). Site 1 includes a previously established dredged material placement site of about 13 acres (5.2 ha) of which 4.8 acres (1.9
ha) has dredged material currently on it. Site 5 is about 7.83 acres (3.13 ha) in size and has never been used for dredged material previously.

**Study organism:** The Illinois chorus frog (*Pseudacris streckeri illinoensis*) has been confirmed in the project area. A voucher specimen had been previously deposited in the collection of the Illinois Natural History Survey (INHS 12952).

**Drift fence methods:** The primary method of study was drift fence (*sensu lato*) monitoring (Corn 1994). Drift fences have proven effective in another monitoring project with *Pseudacris s. illinoensis* (Tucker and Philipp, 1999).

Drift fence deployment varied among years. In 2001-2002, the dredge material deposition area at site 1 was completely surrounded by silt fencing and had 25-cm tall aluminum flashing fences deployed inside the larger silt fence array. After construction of two breeding ponds, drift fences were limited to site 1 and associated with the breeding ponds. One pond (the sand pond) was completely encircled by fencing, whereas the other (the soil pond) had one side fenced. This array was used from 2003 to 2005. All drift fences had pitfall traps installed to effect capture of small animals. Further details can be found in reports for the years 2001-2005.

Drift fences were monitored daily from March 1 to June 30 in 2001 and 2002. Monitoring varied from 2003 to 2005 depending on weather conditions. Previous work had indicated that Illinois chorus frog activity was closely associated with rainfall. In 2003-2005, fences were checked at least three times weekly and after every rain event. Frogs were also captured in choruses during nocturnal visits to Site 1. Reptiles and amphibians were marked by toe clipping, measured, and weighed and have the fence number and pit number recorded (Corn, 1994). Each animal was then immediately released on the opposite side of the fence. Toe clipping (ARMI SOP no. 110, Green, 2001) was used to mark each frog. Toe clips identified year of capture and
whether the frog is an adult or juvenile when marked. Toe clips were not used for individual recognition. Toe clips were preserved in 70% ethanol for possible later use in studies of skeletochronology or for DNA analysis. The scissors used to perform toe clips, besides being kept as sharp as possible, were stored in alcohol (70% ethanol) while in the field to reduce the possibility of disease transmission.

Each anuran then had its snout to vent length (SVL) measured to 1 mm with a mm rule and was weighed to 0.1 g with a portable O'haus digital balance. Sex was recorded for adults when possible. Finally the reproductive state (i.e., gravid or spent) of females was determined when possible (e.g., Tucker, 2000). Reptiles and salamanders also had the SVL measured along with tail length for salamanders, lizards, and snakes. They were weighed as for anurans. Lizards and salamanders were marked by toe clipping whereas scale clipping was used with snakes. Turtles were marked by notching marginal scutes.

Basic meteorological data was recorded at each site. These included precipitation measured with a rain gauge and air and soil temperature at 12 cm depth measured with Reo-temp brand thermometers.

**Chorus intensity**: Chorus intensity during night visits was recorded from 2003 to 2005. Three ratings were used. Choruses were considered weak when only one or two males were heard calling simultaneously. Choruses were rated moderately strong when five or more males were thought to be calling continuously for at least five minutes. Choruses were rated strong when many males were calling simultaneously for at least five minutes.

**RESULTS**

**Population estimates and recruitment**: Overall 156 Illinois chorus frogs were caught at site 1 and 25 at site 5 (Table 1). Because site 5 frogs moved to site 1 for breeding in years following
2001 frogs from both sites were combined. Of these frogs 79 were later recaptured. Unfortunately the bulk of these recaptures were made in 2001 of frogs initially marked in 2001. The high number of recaptures in 2001 is due to the closed perimeter methods used over large areas. Eseentailly all frogs entering site 1 were later caught leaving site 1. This is not ideal for population estimates but one was made regardless (Table 1). In 2002 sufficient 2001 marked frogs were recaptured to give a better estimate (Table 1). No estimates could be made in 2003 or 2005 due to absence of recaptures of 2001 frogs. However, 2005 work resulted in recapture of two frogs marked in 2001 among 18 frogs caught. These recaptured frogs from 2001 yielded a preliminary estimate of 1404 frogs. Thus estimates have climbed from 230 in 2001 to 525 in 2002 to 1404 in 2005. This trend suggests that numbers of frogs at the site have increased possibly by as much as 6 fold.

The rate of recruitment is more difficult to estimate. Up until 2005, no newly transforming froglets have been caught. Without an initial group of marked known froglets, no estimate of recruitment rate can be made. In 2005, 71 froglets were caught leaving the sand pond at site 1. These frogs had successfully developed in this pond. Survivorship to transformation was estimated at about 4% based on the number of females thought to have entered the pond. Recruitment rate cannot be estimated without a continuation of the study into 2006.

**Chorus intensity**: Generally, calling intensity was low with only 1 to 5 estimated to be calling at site 1. Frogs did not call at site 5 as in any year of the study but do live there. The first night that frogs called in any of the five years always coincided with a rain event of at least 2.5 cm. In years with little spring rain (2003, 2004), frogs did not call and apparently skipped breeding in those years.
DISCUSSION

**Population estimates and recruitment:** The population estimates and estimates of the percentage of frogs marked are important estimates because changes in this estimate are indirect measures of recruitment. If the estimate increases, then new frogs were likely added to the population. Taken at face value results of the five years of study suggest a steady increase in the number of frogs at the site. This would imply that recruitment has increased or is good. Study of the sand pond from 2003-2004 would suggest that recruitment was bad in those years. Here no new froglets were caught and no evidence of breeding at the site was found.

Nonetheless, population estimates do trend higher. In part the reliability of these estimates is reduced because without an estimate of annual mortality there is no way to correct the base number upon which the estimate is based. This is a complication directly related to poor rainfall years in 2002, 2003, and 2004. In those years, essentially no new frogs were added to the base of marked frogs. Thus, estimates can only be made using frogs caught in 2001. Regardless, the available evidence at least suggests that the USACE activities at the deposition site have not adversely affected the frogs.

The remaining question is have the construction of the breeding ponds helped increase recruitment. Simple examination of the population estimate does not answer this question because the frogs have many other breeding areas at site 1 besides the constructed ponds. Increase numbers of frogs may simply suggest that these other breeding areas were unaffected by USACE work. At present there is no way to estimate the impact of the breeding ponds on recruitment of Illinois chorus frogs at the sixth street site. Such an estimate could only be made if the work is continued into 2006. Such an extension of the work would allow potential
recapture of marked newly transformed froglets from 2005. This would then yield an estimate of recruitment. At present two of the three years (2003, 2004) suggest that the breeding ponds do not work and need to be reconsidered. This conclusion is complicated by the unusually dry springs in 2003 and 2004, which may have kept the frogs from using the ponds in those years.

**Chorus intensity**: Chorus intensity is an indirect measure of population size. However, it is not an accurate one. Thus variation in chorus intensity due to variation in environmental conditions renders estimates based on chorus intensity suspect. Between 2001 and 2005, Illinois chorus frogs were heard calling at site 1 and many other sites in Cass, Morgan, and Scott County. Chorus intensity was uniformly low in these years suggesting small populations. However, the low percentage of previously marked frogs (2/18 = 11%) caught suggests a fairly large population uses the site (see Table 1). Estimating chorus intensity seems to be an unreliable method of estimating frog population size for this species.
LITERATURE CITED


Table 1. Captures of Illinois chorus frogs at site 1.

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