2003 Squaw Creek National Wildlife Refuge
Amphibian Deformity Monitoring Report

Submitted By

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Introduction

In 1997 the Region 3Assistant Regional Director (ARD) requested that all staffed field stations conduct amphibian deformity surveys. The purpose of these surveys was to conduct a first-level screening of national wildlife refuges (NWRs) and wetland management districts (WMDs) for the presence of deformed frogs (R3 ARD, 1997). This request was based on the noticeable and documented increase in amphibian deformities in the mid-western United States. Although many factors including solar radiation due to ozone loss, pollution and disease have been suggested as causes for this increased deformity rate, little is known and research efforts are ongoing. Collection of this data is important as it provides both a baseline for future amphibian monitoring on refuges and WMDs and additional data for identifying the extent of the problem on a national basis. Squaw Creek NWR (SCNWR) complied with this request and collected data in 1997 and has continued with this effort through 2001. Due to the importance and need for this type of information SCNWR will continue to dedicate additional effort toward the collection of frog deformity data on an annual basis. Monitoring efforts from 1997-2002 were conducted by a combination of refuge volunteers and refuge staff. All of SCNWR's data, to date, has been incorporated into the United States Geological Survey North American Reporting Center for Amphibian Malformations (USGS NARCAM). SCNWR will continue to submit all amphibian deformity data to USGS NARCAM as this information is valuable to research efforts on amphibian deformities, as well as the refuge, especially in light of the possibility that high deformity rates could be a function of water quality.

Materials and Methods

Survey efforts were coordinated by refuge wildlife biologist Durbian. The sampling protocol suggested by Mattsson (1998) was followed with the following exception: 1) Instead of randomly choosing 2 wetlands to sample, an effort was made to sample several (6) wetlands holding water on SCNWR. This provided a broader range of areas to sample based on water conditions in SCNWR's seasonally flooded impoundments and more complete coverage of the refuge. Surveyors attempted to capture as many frogs as possible, with a minimum target of 200, using hands, dip-nets, and seines. Frogs examined were identified using a field guide prepared by Johnson (1987). All age brackets of frogs captured were examined, although froglets and metamorphs were the primary target. All data was submitted to the USGS NARCAM.

Results

The 2003 survey effort resulted in the capture of 202 frogs representing 4 species - Bull Frog (*Rana catesbeiana*), Plains Leopard Frog (*Rana blairi*), and Cricket Frog (*Acris crepitans blanchardi*) and Western Chorus Frog (*Pseudacris triseriata trisariata*) (Table 1). Four deformities (2.0% deformity rate) were identified in this sample (Table 2).

To date 1,180 frogs, representing a minimum of 4 species, have been captured

and examined for deformities on SCNWR (Tables 1). Species examined thus far include Bull Frog, Plains Leopard Frog, Cricket Frog (*Acris crepitans blanchardi*) and Western Chorus Frog (*Pseudacris triseriata*). In previous surveys not all Leopard Frogs (*Rana* sp.) were identified to genus and are listed as Leopard Frog sp. Deformity rates range from 0.0% in 1997, 1998, and 2001 to 4.2% in 2000. The types of deformities encountered included extra limbs/digits; missing feet; missing digits; missing limbs; and digits shortened, fused or clubbed (Table 3).

Discussion

The 2003 survey exceeded the minimum desirable capture rate of 200 frogs with a total capture of 202. The deformity rate (2.0%) for this years survey is within the range of what is considered normal for frogs (≤3%) (Briggler, 2000). Although the deformity rate for the 2000 survey (4.2%) exceeded the ≤3% mark, the overall trend in deformity rates for all years surveyed appears to be fairly stable with only 4/7 years revealing any deformed frogs and an overall deformity rate of 1.0%. Future efforts should continue to emphasize larger sample sizes, with a minimum of 200 frogs sampled/year.

Management Implications

None at this time.

Table 1. Total number of frogs captured, by species, for each year of the survey.

Year	Bullfrog	Plains Leopard Frog	Leopard Frog sp.	Cricket Frog	Western Chorus Frog	Totals
1997	45	0	59	0	0	**104**
1998	188	1	9	2	0	**200**
1999	131	0	70	0	0	**201**
2000	54	86	0	0	2	**142**
2001	4	73	0	0	0	**77**
2002	236	15	0	3	0	**254**
2003	8	173	0	20	1	**202**
Totals	**666**	**348**	**138**	**25**	**3**	**1180**

Table 2. Total number of deformities, by species, and total percent of deformities for each year of the survey. NC = none captured.

Year	Bullfrog	Plains Leopard Frog	Leopard Frog sp.	Cricket Frog	Western Chorus Frog	Total Number Deformed	Total Percent Deformed

1997	0	NC	0	NC	NC	**0**	**0**
1998	0	0	0	0	NC	**0**	**0**
1999	0	NC	1	NC	NC	**1**	**0.5**
2000	4	2	NC	NC	0	**6**	**4.2**
2001	0	0	NC	NC	NC	**0**	**0**
2002	1	0	NC	0	NC	**1**	**0.4**
2003	0	4	NC	0	0	**4**	**2.0**
Totals	**5**	**6**	**1**	**0**	**0**	**12**	**1.0**

Table 3. Total numbers and types of deformities from 1997 to 2002.

Date	Foot Missing	Digits Missing	Digits Shortened, Fused or Clubbed	Missing Limbs	Extra Limbs/ Digits	**Totals**
1997	0	0	0	0	0	**0**
1998	0	0	0	0	0	**0**
1999	1	0	0	0	0	**1**
2000	1	1	4	0	0	**6**
2001	0	0	0	0	0	**0**
2002	0	0	0	0	1	**1**
2003	1	1	0	1	1	**4**
Totals	**3**	**2**	**4**	**1**	**2**	**12**

Literature Cited

Briggler, J. 2000. Personal communication with MDC herpetologist.

Johnson, T.R. 1987. The amphibians and reptiles of Missouri. Missouri Department of Conservation, Jefferson City, Missouri. 368 pp.

Mattsson, J. 1998. Memo. Subject: Voluntary Frog Monitoring. 6pp.

US Fish and Wildlife Service. R3 ARD . 1997. Memo. Subject: Monitoring frogs on NWRs and Wetland Management Districts in 1997. 6pp.