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**1996 FROG AND TOAD SURVEY
ISLE ROYALE NATIONAL PARK, MICHIGAN**

RESOURCE MANAGEMENT REPORT 96-4

MAY, 1997

ABSTRACT

In recent years, there has been a growing concern for the apparent decline in several species of anurans (frogs and toads). There is not only concern for the individual species but for the role these populations serve as an indicator of environmental quality. Isle Royale National Park, Michigan, established a frog survey program in 1996 to monitor and integrate island population data with the Michigan Department of Natural Resources Frog and Toad Survey program. The objectives of our program were to establish permanent survey routes and to estimate the abundance of calling males by species as a basis to monitor populations over the long term.

Frog and toad surveys were conducted at Isle Royale NP in early spring, late spring, and summer by using two park trails as transects. A total of 20 points were surveyed in each of the 3 survey periods. The mean indices where species were observed was calculated for each survey period. A call index was used to estimate the numbers of calling males of a particular species.

A total of 5 species of anurans were recorded on the 2 transects. Four species were located at both transects. Mean indices of calls varied among species; but call intensity, by species, was similar for the 2 transects.

Recommendations are made for 1997.

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INTRODUCTION

There has been concern about the plight of some of Michigan's frog species for several years (Michigan DNR 1996). Frogs and toads are especially vulnerable to human uses and misuses of the land and water. Changes in their populations can serve as an index of environmental quality, therefore it is important to be aware of any changes in their distribution or abundance. Isle Royale's participation in a frog and toad survey could help Michigan determine the cause for apparent frog declines by comparing the island data with mainland information. With the assistance of the Michigan Department of Natural Resources, Isle Royale National Park was able to develop a frog and toad survey in 1996.

The last known analysis of Isle Royale's herpetofauna was in 1963-64 and found that six species of anurans were present on the island (Johnson 1965). They were the American toad (*Bufo americanus*), Spring peeper (*Pseudacris crucifer*), Boreal chorus frog (*Pseudacris triseriata maculata*), Green frog (*Rana clamitans melanota*), Mink frog (*Rana septentrionalis*), and the Wood frog (*Rana sylvatica*). Through the work done in 1963-64 by Johnson it was found that the herpetofauna of Isle Royale likely arrived due to Lake Superior surface currents from Ontario, Canada.

A survey of Isle Royale's frogs and toads will provide extensive records of the occurrence of all species and allow us to compare species information with presence/absence data from 1963-64. These records will provide a sensitive index upon which to determine current status and to follow population trends. They will also provide the baseline information necessary for conducting intensive, follow-up surveys on species that appear to be declining. This survey may also assist the Michigan Department of Natural Resources in determining the ranges and population sizes of many species.

STUDY AREA

Isle Royale National Park (Keweenaw Co., Michigan) is an archipelago of more than 200 islands in northwestern Lake Superior, approximately 118 km (73 miles) from Michigan's Keweenaw Peninsula. Encompassing approximately 544 km² (210 mi²) of land and water, Isle Royale is a roadless park with 99% of its land base protected as federal wilderness.

The listening points for the 2 transects varied by wetland type. Six wetland types were present on 1 transect and 5 wetland types were available on the second. The wetland types as described by the Michigan Department of Natural Resources were as follows:

Vernal Pond--small body of standing water that forms in the spring from meltwater and is often dry by mid-summer. The area is usually dominated by annual vegetation.

Wet Meadow--looks similar to a fallow field except that they are dominated by waterloving grasses and sedges. They contain nearly 100% vegetative cover with very little or no open water.

Bog--located on saturated, acidic peat soils. They support low shrubs, herbs, and often tamarack (*Larix laricina*) or black spruce (*Picea mariana*). Some are totally overgrown and some consist of open water surrounded by floating vegetation.

Marsh--have standing water from less than an inch up to 3 ft deep. They are dominated by soft-stemmed emergent plants. Vegetative cover is usually around 50%.

Wooded Swamp--soil is saturated throughout the growing season. At Isle Royale, trees found here include northern white-cedar (*Thuja occidentalis*) and balsam fir (*Abies balsamea*).

Pond--open body of water that is less than 20 acres in size and do not dry up in the summer months. There is little emergent vegetation present.

METHODS

Two standardized frog and toad survey routes were established in 1996. The surveys were conducted in early spring, late spring, and summer based upon temperature during these periods. The objectives were to establish standardized survey routes and to determine the means of indices where species were found.

Selection of study sites--In 1996, two park trails were established as survey transects with 10 sites per transect. Both transects were in the east region of the park because of accessibility. The transects surveyed were the Mt. Ojibway loop (MTOJ) and Three Mile to Lane Cove (TMLC). Transects were hiked prior to the first survey period to determine the suitability of the transect and to mark site locations. At each site a tree was selected and permanently marked with a numbered tag. A file labeled "ISRO Frog Survey Transects" was created and contains information on site locations, site wetland type, site number, and maps of each transect.

Census techniques--Each transect was visited once in early spring, late spring, and summer by one skilled observer and one recorder. The dates for the surveys were determined by a combination of breeding date guidelines and air temperature. The census would begin at dusk on each sampling date and continue until the transect was completed. Weather conditions were recorded at the start and conclusion of each transect. No counts were taken if heavy rain or high wind speeds affected the audibility of calls. Upon arrival at each site the observer and recorder would pause for approximately 1 minute to ensure that observer disturbance would not affect calling. The observer would then listen for 3-5 minutes, during which time all species heard were recorded and indexed. A call index was used to get a estimate of numbers of calling males of a particular species (Michigan DNR 1996). The index is as follows:

1. Individuals can be counted; there is space between calls
2. Calls of individuals can be distinguished but there is some overlapping of calls
3. Full chorus. Calls are constant, continuous and overlapping.

The data was recorded on data sheets provided by the Michigan DNR (Appendix 1).

Analysis of data--Means of indices (from 0-3) were calculated based upon presence of species by site. The number of species by wetland type was also determined. Other comparisons and statistical analysis will be made when future data is available.

RESULTS

Five of the six previously known anuran species found on Isle Royale were present during our survey (Table 1). The only anuran not heard during any of the three sampling periods was the mink frog. The calling index mean where species were present ranged from 0 for mink frogs to 2.8 for spring peepers. The number of sites occupied by different species varied by sampling period.

Table 1. Means of indices where species were found and percent site occupation(n=20).

	Wood Frog	Chorus Frog	Spring Peeper	American Toad	Mink Frog	Green Frog
EARLY Mean*	1.67	1.63	2.8	0	0	0
No. Sites	3	16	20	0	0	0
% Sites	15.0	80.0	100.0	0	0	0
LATE Mean	0	1.0	1.5	0	0	1.33
No. Sites	0	2	6	0	0	9
% Sites	0	10.0	30.0	0	0	45.0
SUMMER Mean	0	0	0	1.0	0	1.8
No. Sites	0	0	0	3	0	5
% Sites	0	0	0	15.0	0	25

Six different wetland types were located on our transects (Table 2). Species diversity by wetland type ranged from three to five species. The wet meadow habitat had the highest species diversity; while bog, marsh, and pond habitats had the least diversity. Habitat use varied by species. Wetland type did not appear to affect the occurrence of spring peepers or chorus frogs since they were present in all wetland types. American toads were on the other extreme, occupying only vernal ponds and wet meadows.

Table 2. Species presence by site habitat type (n=20).

	Wood Frog	Chorus Frog spp.	Spring Peeper	American Toad	Mink Frog	Green Frog	# of species
Vernal Pond (n=5)		X	X	X		X	4
Wooded Swamp (n=7)	X	X	X			X	4
Bog (n=1)	X	X	X				3
Marsh (n=2)		X	X			X	3
Pond (n=3)		X	X			X	3
Wet Meadow (n=2)	X	X	X	X		X	5

No conclusions can be drawn from the mean indices of species since this is the first year of the study and is intended to be used as baseline data for future comparisons. There is some concern due to the lack of mink frog presence on our surveys. Mink frogs had been recorded on Isle Royale previously in 1963-64, but this species was not heard at any of the 20 sites in 1996. There is the possibility that with the late spring in 1996 that typical breeding times were skewed, thus making it possible to have missed the mink frog breeding period. This species should be looked at more closely in 1997.

RECOMMENDATIONS

One recommendation for 1997 is that another frog survey route be established. Ideally this transect should have some lake or large pond habitat sites to help increase the probability of hearing mink frogs. A possible transect location is to start at

the Lake Richie campground and end at West Chickenbone campground (3.4 mi).

In 1997, to standardize the survey, the observer should collect frog call data at each site for 5 minutes.

A "Frog Logger" was purchased in 1996. The "Frog Logger" is a audio recording device that can be programmed to record at specified time intervals, which allows the unit to be used for long periods of time (up to a week). Our main purpose for the "Frog Logger" is to record frog calls at wetland sites. This will help determine if there are any species there that were not heard during the surveys. We are particularly interested in the mink frog and the boreal chorus frog.

An inexpensive piece of equipment that should be purchased is a thermometer. This will help in determining temperature throughout the survey time. Isle Royale can be characterized by rapid temperature drops which can affect frog vocalizations. Having the thermometer readily available will give some indication if frogs may stop calling due to temperature.

LITERATURE CITED

Michigan DNR. 1996. Natural history information for Michigan Frog and Toad Survey. Michigan Department of Natural Resources Wildlife Division Report. 12pp.

Johnson, W.J.W. 1965. A zoogeographical analysis of the herpetofauna in northern Michigan and adjacent Isle Royale. M.S. Thesis Michigan State University. 90pp.



Michigan Department of Natural Resources

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MICHIGAN FROG AND TOAD SURVEY

By authority of Part 439, of PA 451 of 1994

Observer name(s), RUN 1 _____ Route No. _____
(Add addresses and RUN 2 _____ Year _____
phone on back.) RUN 3 _____ County _____

INSTRUCTIONS: Use this form for new or established survey routes. Each route consists of 10 listening sites, and is repeated 3 times during the breeding season, according to the minimum air temperatures and approximate range of dates each survey period. Run surveys after dark, when wind velocity is less than 8 mph. Listen for 3-5 minutes at each site and record a call index of 1, 2, or 3 (see below) for each species calling. See back of sheet for wind and sky codes and additional comments. Return to above address by September 1.

FIELD DATA SHEET

		FIRST RUN Air Temp. 45°F+											SECOND RUN Air Temp 55°F+											THIRD RUN Air Temp 65°F+																
		Date:		Time:		Wind:		Sky:		Air temp. (°F)		Date:		Time:		Wind:		Sky:		Air temp. (°F)		Date:		Time:		Wind:		Sky:		Air temp. (°F)										
SITE NAME		Site Number	CALL INDEX*										Site Number	CALL INDEX*										Site Number	CALL INDEX*															
		Fowler's toad	Wood frog	Chorus frog	Spring peeper	Leopard frog	Pickens frog	American toad	E. gray tree frog	C. gray tree frog	Chickadee frog	Mink frog	Green frog	Bullfrog	Fowler's toad	Wood frog	Chorus frog	Spring peeper	Leopard frog	Pickens frog	American toad	E. gray tree frog	C. gray tree frog	Chickadee frog	Mink frog	Green frog	Bullfrog	Fowler's toad	Wood frog	Chorus frog	Spring peeper	Leopard frog	Pickens frog	American toad	E. gray tree frog	C. gray tree frog	Chickadee frog	Mink frog	Green frog	Bullfrog
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*The call index is a rough estimate of the numbers of calling males of a particular species, according to the following index values:

1. Individuals can be counted; there is space between calls.
2. Calls of individuals can be distinguished but there is some overlapping of calls (intermediate between "1" and "3").
3. Full chorus. Calls are constant, continuous and overlapping.