



**1997 FROG AND TOAD SURVEY
ISLE ROYALE NATIONAL PARK, MICHIGAN**

RESOURCE MANAGEMENT REPORT 97-1

SEPTEMBER, 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. In 1997 our objectives were to establish a third permanent survey route and to estimate the abundance of calling males by species so that a comparison could be made to the 1996 baseline data.

Frog and toad surveys were conducted at Isle Royale NP in early spring, late spring, and summer by using three park trails as transects. A total of 30 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 3 transects. Three species were located at all of the transects. Mean indices of calls varied among species.

Recommendations are made for 1998.

Jennifer L. Beeman
Biological Technician
Isle Royale National Park

Jack G. Oelfke
Branch Chief, Natural Resource Management
Isle Royale National Park

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 islands 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 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. 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 three transects varied by wetland type. Among the three transects there were six wetland types. 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

Three standardized frog and toad survey routes were used in 1997. The surveys were conducted in early spring, late spring, and summer based upon temperature during these periods. The objectives were to establish a third standardized survey route and to compare the means of indices where species were found to 1996 data.

Selection of study sites--In 1996, two park trails were established as survey transects with 10 sites per transect. In 1997, a third park trail was chosen as a survey transect with 10 sites on the transect. All three transects were in the east region of the park because of accessibility. The transects surveyed were the Mt. Ojibway loop (MTOJ), Three Mile to Lane Cove (TMLC), and Moskey Basin to approximately the north LeSage portage (MBLS) (Figure 1). The new transect was 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, maps of each transect, survey dates, and field data sheets. This file is found in the Natural Resource Management files.

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 1996 and 1997 survey dates are given in Table 1. 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 5 minutes, during which time all species heard were recorded and indexed. A call

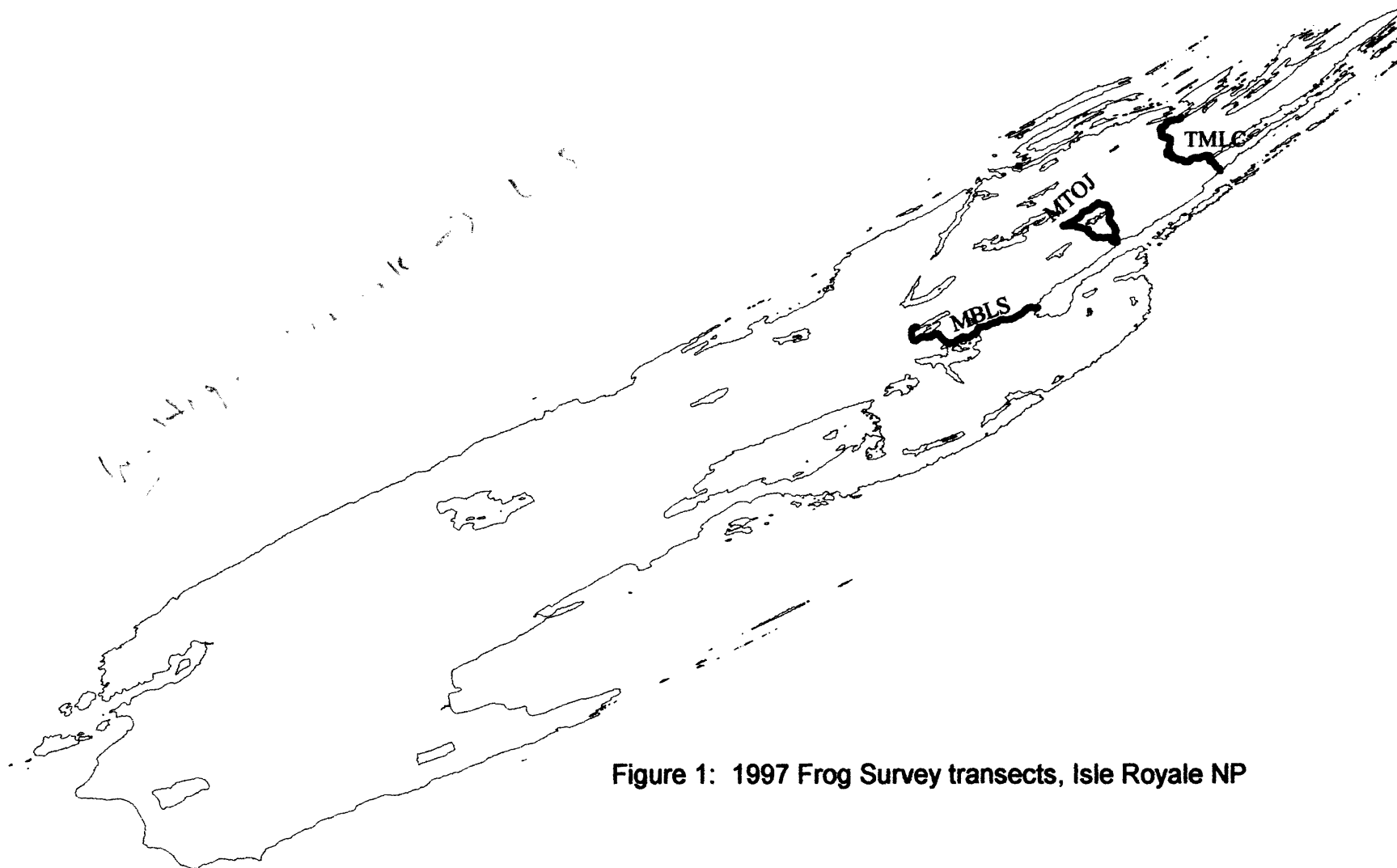


Figure 1: 1997 Frog Survey transects, Isle Royale NP

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).

Table 1. Survey dates by transect and survey period for 1996 and 1997.

	1996	1997
EARLY TEMP. 45+		
TMLC	05-23	05-22
MTOJ	05-20	05-16
MBLS	*	05-21
LATE TEMP. 55+		
TMLC	06-24	06-13
MTOJ	06-19	06-12
MBLS	*	06-11
SUMMER TEMP. 65+		
TMLC	07-17	07-03
MTOJ	07-18	07-03
MBLS	*	07-03

* No surveys were conducted on the MBLS transect in 1996.

Analysis of data--Means of indices (from 0-3) were calculated based upon presence of species by site and a comparison between 1996 and 1997 data is made. 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 2). 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 2.7 for spring peepers. The number of sites occupied by different species varied by sampling period.

Table 2. Means of indices where species were found and percent site occupation (n=30).

	Wood Frog	Chorus Frog	Spring Peeper	American Toad	Mink Frog	Green Frog
EARLY Mean*	1.0	1.0	2.7	0	0	0
No. Sites	2	14	23	0	0	0
% Sites	7.0	47.0	77.0	0	0	0
LATE Mean	0	1.0	1.32	1.0	0	1.27
No. Sites	0	1	19	9	0	15
% Sites	0	3.0	63.3	30.0	0	50.0
SUMMER Mean	0	0	1.17	1.0	0	1.0
No. Sites	0	0	6	3	0	5
% Sites	0	0	20.0	15.0	0	16.7

Six different wetland types were located on our transects (Table 3). Species diversity by wetland type ranged from three to five species. The vernal pond habitat had the highest species diversity in 1997, while the wet meadow habitat was the most diverse in 1996. The bog habitat was the least diverse in both 1996 and 1997. Habitat use varied by species. Wetland type did not appear to affect the occurrence of spring peepers, chorus frogs, or green frogs, as they were present in all wetland types.

Table 3. Species presence by site habitat type (n=30).

	Wood Frog	Chorus Frog spp.	Spring Peeper	American Toad	Mink Frog	Green Frog	# of species
Vernal Pond (n=7)	X	X	X	X		X	5
Wooded Swamp (n=12)		X	X	X		X	4
Bog (n=1)		X	X			X	3
Marsh (n=4)		X	X	X		X	4
Pond (n=4)	X	X	X			X	4
Wet Meadow (n=2)		X	X			X	3

When comparing the mean indices of species in 1997 to those in 1996 there is not a noticeable difference between the two (Table 4). There is some concern due to the lack of mink frog presence on our surveys in 1996 and 1997. 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 or at any of the 30 sites in 1997.

The absence of mink frogs is not unique to Isle Royale, as their abundance seems to be low throughout Michigan (pers. comm., Lori Sargent, Michigan DNR). A "frog logger" (recording instrument) was placed at various locations as an attempt to record this elusive Isle Royale frog species, but unfortunately no mink frogs were heard. It should be noted that a breeding bird survey volunteer reported hearing a mink frog on one of the transects, but when the frog logger was placed at that location no mink frogs were heard. The mink frog should be looked at more closely in 1998.

Table 4. Mean of indices where species were found in 1996 and 1997 (n=30).

	WOOD FROG	CHORUS FROG	SPRING PEEPER	AMERICAN TOAD	GREEN FROG	MINK FROG
MEAN 1996	1.67	1.56	2.50	1.0	1.50	0
MEAN 1997	1.0	1.0	1.96	1.0	1.20	0

RECOMMENDATIONS

One recommendation for 1998 is to have weekly checks of sites that could possibly have mink frogs. The mink frogs calling period may be so brief that we're missing the breeding time on the regularly scheduled survey periods.

The "Frog Logger" that was purchased in 1996 should continue to be used in 1998. 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). A recommended use for the logger is to have it record in both the early morning (0800-1000) and after dusk (2300-0100). With the rapid temperature drops after dusk at Isle Royale it could be useful to compare call intensity during the day and after dusk to see if temperatures get too low at night and affect calling. This could be especially useful for mink frogs since they require a very warm temperature to stimulate calling.

Another recommendation for 1998 is to arrive at site 10 on the Moskey Basin and Lane Cove transects shortly before dusk. Then the observers could start the survey from site 10. This will allow the observer to flag any confusing sites on the way in and it will also limit the amount of time hiking at night. Because it is a loop, the Mt. Ojibway trail can be run the same way as in previous years from site 1 to 10.

LITERATURE CITED

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

Michigan DNR. 1997. Personal communication with Lori Sargent, Michigan Frog and Toad Survey Coordinator, on 9-8-97.

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.



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 _____

FIELD DATA SHEET

[illegible]

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.