

**EXECUTIVE SUMMARY FOR  
RESOURCE MANAGEMENT REPORT 98-2**

**1998 FROG AND TOAD SURVEY AT ISLE ROYALE NATIONAL PARK, MICHIGAN**

During a survey of Michigan's herpetofauna in 1963 and 1964 it was discovered that Isle Royale National Park was home to six species of anurans. 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*).

Since that time, 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 to monitor and integrate island population data with the Michigan Department of Natural Resources Frog and Toad Survey program.

In 1996 two transects were created. The first transect followed the Mount Ojibway loop (MTOJ) the second was established along the trail between Three Mile and Lane Cove (TMLC). In 1997 a third transect was created between Moskey Basin and the north LeSage portage. Each transect was visited once in early spring, in late spring, and in summer during the 1998 study. A call index was used to obtain a measurement of calling males for future comparison.

During the 1998 survey all of the previously known anurans were heard. This includes the mink frog which had been absent in the two previous years. Comparison between the first three years has demonstrated a decline in the mean of indices for four out of the six species where present. However, there has also been an increase in species abundance per habitat type for four of the six wetland types in the same time period.

A seventh species of anuran may have a population within Isle Royale National Park. The gray tree frog (*Hyla versicolor* or *Hyla chrysoscelis*) was reported by two members of the trail crew, Kenny Kipina and Dave Paavola, in the Island Mine vicinity. They saw and heard the frog repeatedly between the 11<sup>th</sup> and 14<sup>th</sup> of July, 1998. An attempt was made to locate this species using the "frog logger" between the evening of 7-24-98 and the morning of 7-26-98. Nothing was revealed.

All of the transects surveyed in 1998 were positioned on the east end of the island for reasons of accessibility. However, information from the west side is of equal importance. In an attempt to broaden the scope of the survey a fourth transect was constructed in 1998 following the Huginnin Loop (HGIN).

In 1999 the Huginnin Loop transect will be run for the first time. Weekly checks of sites that may contain the mink frog will be conducted in order to better incorporate this species presence into the study. The frog logger will continue to be used in an attempt to isolate the breeding time of the mink frog as well as to locate any existing populations of the gray tree frog.

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**1998 FROG AND TOAD SURVEY  
ISLE ROYALE NATIONAL PARK, MICHIGAN**

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**SEPTEMBER, 1998**

## **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 a third permanent survey route was established to estimate the abundance of calling males by species so that a comparison could be made to the 1996 baseline data. In 1998 all three transects were used.

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 6 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 1999.

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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's 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 km<sup>2</sup> (210 mi<sup>2</sup>) 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:

1. **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.
2. **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.
3. **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.

4. **Marsh**--has 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%.
5. **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*).
6. **Pond**--open body of water that is less than 20 acres in size and does not dry up in the summer months. There is little emergent vegetation present.

## **METHODS**

Three standardized frog and toad survey routes were used in 1998. The surveys were conducted in early spring, late spring, and summer based upon temperature during these periods.

**Selection of study sites**--When creating a new transect the proposed route 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. 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 and were surveyed in 1998. 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). In 1998 a fourth transect was established. It follows the Huginnin trail on the west end of the island. It will be run for the first time in 1999.

**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. It should be noted that Isle Royale has characteristically lower temperatures than mainland sites in the spring and early summer. Therefore, occasional drops below the Michigan DNR's suggested temperature limits occur. It would be nearly impossible to complete this project within breeding dates if the limits were rigidly adhered to. The 1996, 1997, and 1998 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 index was used to get an 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 and a comparison between 1996 (Beeman et al. 1996), 1997 (Beeman et al. 1997), and 1998 data is made. The number of species per wetland type was also determined and compared to previous years. Other comparisons and statistical analysis will be made when future data is available.

**Table 1. Survey dates by transect and survey period for 1996, 1997, and 1998.**

|                               | 1996 | 1997 | 1998  |
|-------------------------------|------|------|-------|
| <b><u>EARLY TEMP 45+</u></b>  |      |      |       |
| TMLC                          | 5/23 | 5/22 | 5/18  |
| MTOJ                          | 5/20 | 5/16 | 5/23  |
| MBLS                          | *    | 5/21 | 5/23  |
| <b><u>LATE TEMP 55+</u></b>   |      |      |       |
| TMLC                          | 6/24 | 6/13 | 6/8   |
| MTOJ                          | 6/19 | 6/12 | 6/9   |
| MBLS                          | *    | 6/11 | 6/8   |
| <b><u>SUMMER TEMP 65+</u></b> |      |      |       |
| TMLC                          | 7/17 | 7/3  | 7/17  |
| MTOJ                          | 7/18 | 7/3  | 7/10  |
| MBLS                          | *    | 7/3  | 7/8&9 |

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

**Identification of new species**--If there is a sighting of an unusual anuran on Isle Royale the "Frog Logger" will be used to help determine if there is in fact a new species present. The "Frog Logger" is an 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).

## RESULTS

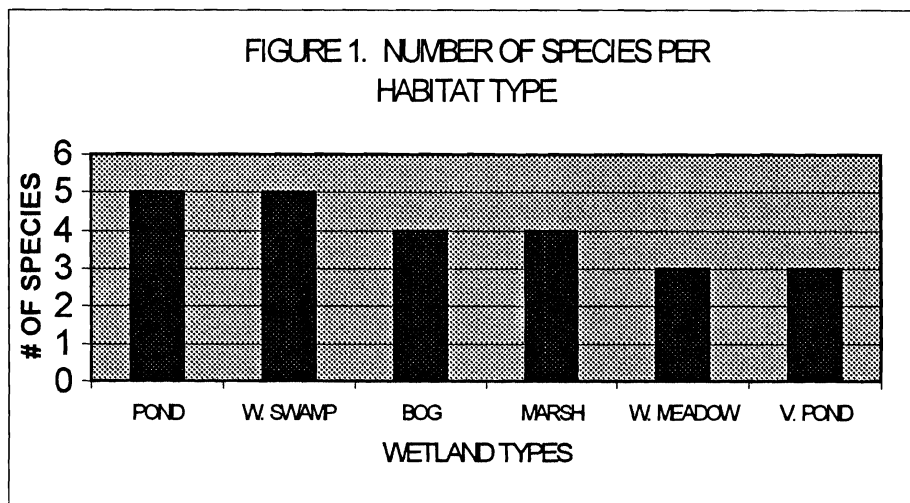
All of the six previously known anuran species (found on Isle Royale during the 1963-1964 study) were heard during the 1998 survey. This includes the mink frog which had been absent from the prior two surveys (1996, 1997) (Table 2.). Furthermore, it is possible that a seventh species may have a presence within Isle Royale National Park. The gray tree frog was reported by two members of the trail crew, Kenny Kipina and Dave Paavola, in the Island Mine vicinity. They saw and heard the frog repeatedly between the 11<sup>th</sup> and 14<sup>th</sup> of July, 1998. An attempt was made to locate this species using the "frog logger" between the evening of 7-24-98 and the morning of 7-26-98. Nothing was revealed.

The calling index mean where species were present ranged from 1 for mink frogs to 1.56 for spring peepers. The number of sites occupied by the different species varied with sampling period. During the first run the spring peeper occupied the greatest percent of sites (83%). The American toad dominated the second run, present at 50% of the points. The green frog and the mink frog were the only species present in the third run. The green frog was far more prevalent, occurring in 63% of the sites available (Table 2.).

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

|            |             | WOOD<br>FROG | CHORUS<br>FROG | SPRING<br>PEEPER | AMERICAN<br>TOAD | MINK<br>FROG | GREEN<br>FROG |
|------------|-------------|--------------|----------------|------------------|------------------|--------------|---------------|
| Early Run  | Mean        | 1            | 1              | 1.56             | 1.72             | -            | 1.07          |
|            | No of sites | 2            | 2              | 25               | 11               | 0            | 13            |
|            | % of Sites  | 6.67%        | 6.67%          | 83.33%           | 36.67%           | 0            | 43.33%        |
| Late Run   | Mean        | 1            | 1              | 1.14             | 2.2              | -            | 1.07          |
|            | No of sites | 1            | 2              | 7                | 15               | 0            | 13            |
|            | % of Sites  | 3.33%        | 6.67%          | 23.33%           | 50.00%           | 0            | 43.33%        |
| Summer Run | Mean        | -            | -              | -                | -                | 1            | 1.05          |
|            | No of sites | 0            | 0              | 0                | 0                | 2            | 19            |
|            | % of Sites  | 0            | 0              | 0                | 0                | 6.67%        | 63.33%        |
| 1998 mean  |             | 1            | 1              | 1.47             | 2                | 1            | 1.06          |

The survey transects were composed of six different wetland types. Species abundance by wetland type ranged from three to five species. The wooded swamp and pond had the most species with five anurans present. The vernal pond and wet meadow had the lowest abundance with 3 species. However, it should be noted that 1998 was an unusually dry year. Most of the vernal ponds were completely dry by the second run (Figure 1.).

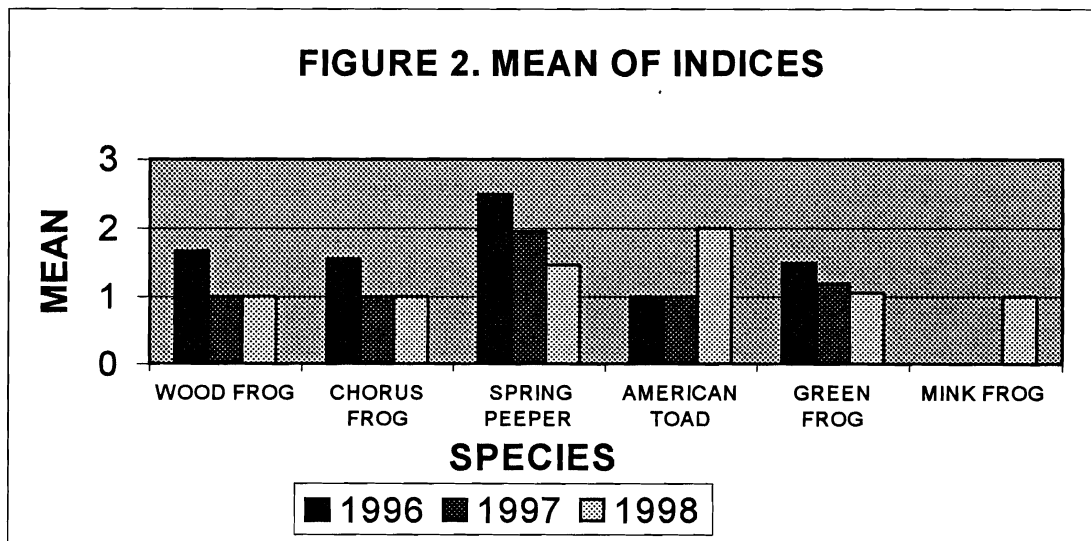


The spring peeper, American toad, and the green frog were unaffected by wetland type. They appeared in every habitat along the transect. The mink frog, wood frog, and the chorus frog appeared into two wetland types each (Table 3). Due to the elusive nature of Isle Royale mink frogs, it should be noted that the 2 survey points which record the species are not its typical open water habitat (Conant and Collins, 1991). These points (wooded swamp and bog) were adjacent to open water, which is where the calls of the mink frog were heard.

**Table 3. Species presence by habitat type.**

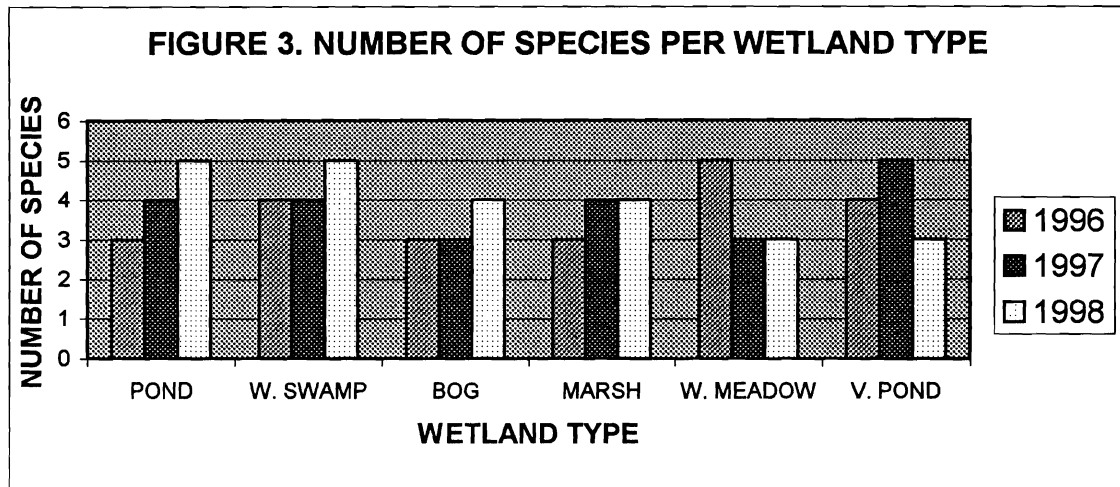
|              | NO.<br>of<br>Sites | Wood Frog | Chorus<br>Frog | Spring<br>Peeper | American<br>Toad | Mink<br>Frog | Green<br>Frog | No. of<br>Species |
|--------------|--------------------|-----------|----------------|------------------|------------------|--------------|---------------|-------------------|
| VERNAL POND  | 7                  |           |                | X                | X                |              | X             | 3                 |
| WOODED SWAMP | 12                 | X         |                | X                | X                | X            | X             | 5                 |
| BOG          | 1                  |           |                | X                | X                | X            | X             | 4                 |
| MARSH        | 4                  |           | X              | X                | X                |              | X             | 4                 |
| POND         | 4                  | X         | X              | X                | X                |              | X             | 5                 |
| WET MEADOW   | 2                  |           |                | X                | X                |              | X             | 3                 |

Four of the six species present on Isle Royale have decreased in their mean indices where present over the past three years. The two species that did not follow this trend were the American toad and the mink frog. In the 1998 study the mink frog was only heard at two sites. It is possible that the frog was present in previous years and that it's calling was not within the sampling periods (Figure 2.).

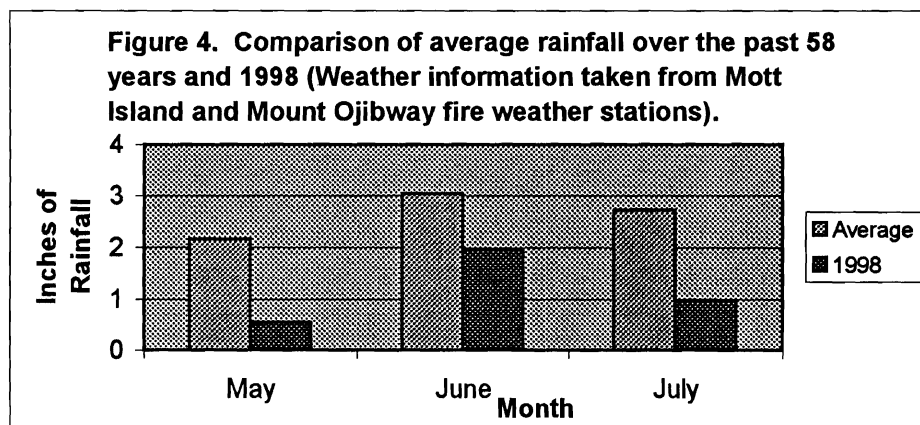


The pond, wooded swamp, bog, and marsh have all shown an increase in species abundance over the past three years. The vernal pond also experienced an increase in abundance from 1996 to

1997, but the number of species present declined in 1998. Again, this could be expected due to the dry conditions within this habitat type in 1998 (Figure 3.).



There are two factors that make trend analysis or conclusions tentative at this time. First, there are only three years of data available. This may not be enough sample years to reveal a pattern. Additionally, 1998 received considerably less rain than normal (Figure 4.). Due to the limited rainfall many of the vernal ponds were completely dry. The other habitats were also affected although not as severely.



## RECOMMENDATIONS

In the future, as more information becomes available, the mean calling index should be compared with previous years. The index's apparent decline now may not reveal a trend in the future. However, this index should continue to be monitored in case it does indicate a change in the anuran population.

In 1999 weekly checks of sites that could have mink frogs should be completed. Although the species was found in 1998, its occurrence was low, appearing in just 6.67% of the sites and only during the summer run. The mink frog's calling period may be so brief that the survey is missing it. Additionally, a further effort should be made to identify and record the gray tree frog. Although the species may not be present along the survey transect it will be important to note whether it has a breeding population on the island.

The "Frog Logger" that was purchased in 1996 should continue to be used in 1999. 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. This device may also make it possible to identify the gray tree frog or any other unknown species present.

It is suggested that the researchers in 1999 arrive at site 10 on the Moskey Basin and Lane Cove transects shortly before dusk. 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. This approach was used in 1998 and proved helpful. Because it is a loop, the Mt. Ojibway trail can be run the same way as in previous years, from site 1 to 10. The Huginnin trail will be run for the first time in 1999. It is a loop and can be run similarly to the Mt. Ojibway trail. However, because the transect is new, the surveyors should take the time to become familiar with all of the points before beginning the survey.

## **LITERATURE CITED**

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