

Assessment of Frog and Toad Populations in the Manitoba Model Forest Year I: May to July 2008



Linda Lees¹, Devin Martinson², and Dr. Brian Kotak³

1 Manitoba Model Forest

2 Science Horizons Intern, Manitoba Model Forest

3 Miette Environmental Consulting Inc.

September, 2008

Abstract

Amphibians are good indicators of environmental quality, being highly sensitive to contaminants and other external stressors (humans). Surveys were undertaken in 2008 for nine species of amphibians, American toad (*Bufo americanus*), Boreal Chorus Frog (*Pseudacris maculata*), Cope's Tree Frog (*Hyla chrysoscelis*), Gray Treefrog (*Hyla versicolor*), Green Frog (*Rana clamitans*), Mink Frog (*Rana septentrionalis*), Northern Leopard Frog (*Rana pipiens*), Spring Peeper (*Pseudacris crucifer*), and the Wood Frog (*Rana sylvatica*) in the Nopiming Provincial Park area. Particular emphasis was placed on locating Mink and Green frogs due to their special status (rarity) in Manitoba. Wood and Boreal Chorus Frogs were observed most, and Mink and Green Frogs and American Toads not found at all. A large number of the observations were of single or few individuals (65) vocalizing at one time while few observations were made with some overlapping calls (26), or full choruses (19). Temperature variation and survey efforts had the most impact on what species were observed. The spring of 2008 was cold, causing breeding times to be delayed and it is possible that surveys did not coincide with peak breeding times for some species.

Introduction

There are nine native species of frogs and toads in the Model Forest area of south eastern Manitoba. These species are the American toad (*Bufo americanus*), Boreal Chorus Frog (*Pseudacris maculata*), Cope's Tree Frog (*Hyla chrysoscelis*), Gray Treefrog (*Hyla versicolor*), Green Frog (*Rana clamitans*), Mink Frog (*Rana septentrionalis*), Northern Leopard Frog (*Rana pipiens*), Spring Peeper (*Pseudacris crucifer*), and the Wood Frog (*Rana sylvatica*). Each species varies in abundance, with most species being common. The Conservation Data Center classifies a species abundance and distribution on a scale from 1 to 5 at a Global (G), National (N) and Subnational (S) level. On the Subnational level, S1 signifies that the species is critically endangered throughout its range in a certain area and is at high risk of extinction. S2 denotes that the species is endangered in a particular area of its range. An S3 species is vulnerable to extinction in a certain area, an S4 species is apparently secure in its range and an S5 species is widespread and common, not being at risk of extirpation. The Green Frog has an S2 rank in Manitoba and the Mink has a rank of S3. The Northern Leopard Frog has an S4 rank, however, it is the only amphibian species considered a Special Concern species under the Species at Risk Act, due to a drop in population numbers throughout the last four decades. Thus there is long term concern for three species.

The Manitoba Model Forest encompasses 1.05 million hectares of boreal forest, extending eastward from Lake Winnipeg to the Manitoba/Ontario border and from Pinawa in the south to just north of the community of Manigotagan. It is located in the Canadian Shield and contains many rocky outcrops. The primary trees of the Model Forest are Jack Pine, Black Spruce, White Birch, Trembling Aspen, Balsam Fir and White Spruce. The habitat varies greatly from area to area, with many changes in elevation affecting soils and moisture levels. This creates many pools and ponds for frogs and toads to live in.

The purpose of this study was to generally assess the abundance of each species present in the Manitoba Model Forest area, and in particular, to locate areas where the Mink and Green Frogs were breeding. Surveys included areas that were historically known to have Mink and Green frogs. There has been no recent or extensive studies done in this part of the province, therefore, the data collected from our surveys will provide important baseline information, so that results can be compared over time. The results were also entered into the Nature Watch's Frog Watch internet database. Frog Watch combines results from areas throughout Canada to gain a better understanding of amphibian health on a national level. Frog populations are known to be highly variable and several studies have shown that in some years, little to no breeding occurs, while the next year may have high breeding populations (Gibbes et al., 2005). One year cannot provide enough data to make proper conclusions.

Methods

Frog surveys were carried out from May 7 to July 24, 2008. Sampling sites included Peterson creek, Bird River, Springer Lake, Beresford Lake, Davidson Lake, Bird Lake, Highways 314 and 315 in Nopiming Provincial Park, trails extending from these highways, as well as camping and cottage areas, all being near or on , some form of water body such as ditches, lakes, rivers, creeks, streams, marshes or temporary ponds. The general areas surveyed in the Manitoba Model forest are shown in Figure 1. Survey areas were located in the Canadian Boreal Shield. All lakes surveyed were shield lakes, being deeper than prairie lakes, and having rocky shores that dropped off sharply. Springer Lake was an exception, with most of the west side of the lake being shallow and marsh like. The portion of Peterson creek surveyed was shallow and had a marsh-like area bordering its length. It also contained rocky rapid areas in three different locations. Trails surveyed were in upland areas, consisting of Jack Pine, Black Spruce, and Trembling Aspen.

Frog species were identified by both observing individuals and through vocalizations. Checking for frog vocalizations was done by listening at predetermined intervals; along transects each interval was marked

as a waypoint with a GPS. Listening involved stopping for a minimum of three minutes in order to give frogs time to start calling again, in case they had been startled. Species were identified by call, and abundance was rated using the following scale: 1)No species present, 2)Frogs visually observed but no calls heard, 3)Few calls heard, but individual calls clear with no overlap, 4)Individuals can be counted, but some calls overlapping, and 5)Individuals cannot be distinguished in the chorus of calls. Weather, temperature, time of day and any other site specific notes were recorded for each point surveyed.

Roadside surveys included sites along Highways 314 and 315 in Nopiming Provincial Park, and cottage roads along Davidson Lake, Beresford Lake, Booster Lake and Flanders Lake. Roadside surveys were done by parking, shutting off the vehicle and listening for calls for a minimum of three minutes every 250 metres along cottage roads, and every kilometre along Highways 314 and 315. Select trails that extended from Highways 314 and 315, included decommissioned logging roads, ATV trails, trapping trails and walking trails, and were surveyed on foot. See appendix for specific trail locations. Frog calls were recorded every 250 metres or when water was present nearby or along the trails. Frog surveys conducted along roads and trails were generally done from 10:00 AM to 3:00 PM.

Listening for frog calls in lakes was done by canoe. Lake surveys were performed in the evening, before or at dusk, or in the morning before eight am. Listening was continuous during canoeing, along with brief three minute intervals of no paddling to check for calls. Each lake was surveyed by following the perimeter, and points were marked only when frog vocalizations were observed. Lakes surveyed by canoe included Tulabi, Beresford, Davidson, and Springer.

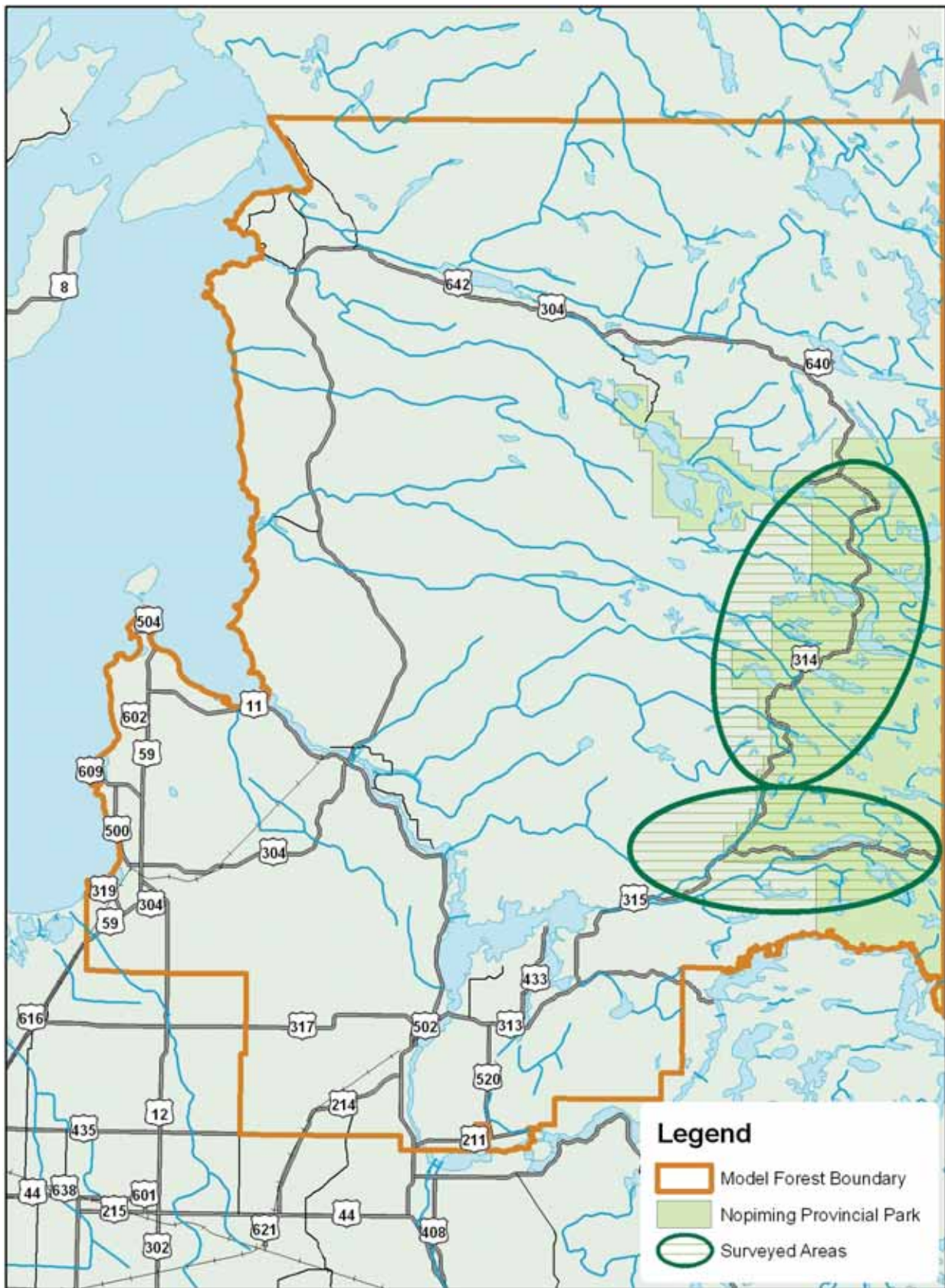


Figure 1: Map of the Manitoba Model Forest. Areas inside the ellipses were surveyed for amphibians.

Results and Discussion





Surveys for this study were not undertaken on a consistent basis during the spring and early summer. Survey dates included May 7, 13, 14, 15, 21, 23, 27, June 6, and July 21, 22 and 24. The number of survey days were not sufficient to obtain an accurate representation of the start and end dates for vocalizations and breeding times. Thus we could under or over estimate population densities. Table 1 summarizes basic information for these species and Table 2 provides pictures of each.





Table 1: Breeding information and call of surveyed amphibian species.

Species	Breeding Start	Breeding End	Breeding Habitat	Call	Other Notes
American Toad	March	July	Ditches, shallow ponds, wetlands	Monotonous trill , lasting up to 30 seconds	Mainly nocturnal. Thick skin red to brown, warty, 11 cm long. Live in fields, gardens, forests
Boreal Chorus Frog	May	Mid-July	Fishless ponds and ditches, splash pools, marshes, shallow lakes, swamps	Finger running down a comb	Skin brown and smooth, black stripe through eye and down body. 4 cm long. Live in forested areas around ponds and ditches.
Cope's Tree Frog	When evening temp >15°C	Early July	Wooded areas near temporary and permanent water	Low pitched trill, slightly longer than gray tree frog call	Suction cups on toes. Hide and live in trees and shrubs. Brown to green in color with dark blotches on back. <6 cm long
Gray Tree Frog	When evening temp >15°C	Early July	Wooded areas near temporary and permanent water	High pitched short trill	Suction cups on toes. Hide and live in trees and shrubs. Brown to green in color with dark blotches on back. <6 cm long
Green Frog	Late Spring (Late May)	Midsummer, as late as August	Lake shores, slow moving streams, shallow permanent water	A Twang, like a loose banjo string	Green to brown. Webbed toes. Mainly aquatic, lives in areas surrounding permanent water bodies. 10 cm long. S2
Mink Frog	Late Spring (Late May)	Late summer (Late August)	Permanent water	Series of sounds similar to a hammer hitting a nail	Musky odour. Olive to brown in color, webbed feet. Almost entirely aquatic. 7 cm long. S3

Northern Leopard Frog	Mid Spring (march), peaks in April	Late Spring (June)	Permanent ponds without fish	Low pitched snore, followed by a series of grunts	Brown to green with light edged dark spots. Up to 10 cm long. Known to stray far from water outside breeding season. S4. Species of Special Concern on the Species at Risk Act.
Spring Peeper	Early Spring	June	Anywhere there is water, prefer temporary ponds	Chorus of high pitched peeps	Brown with black X across back. May be heard calling in fall, but no breeding occurs at this time. 3cm long. Can climb trees but prefer ground near pools.
Wood Frog	March, often when ice is still present	May (Beginning to end depending on temp)	Woodland pools, ditches	Series of duck like quacks	Tan or brown in color, black stripe from tip of nose to behind tympanum. 8 cm long. Lives in moist woodlands.

Table 2: Surveyed species pictures.

American Toad		Green Frog	
Boreal Chorus Frog		Mink Frog	

Cope's Tree Frog and Gray Tree Frog		Northern Leopard Frog	
Spring Peeper		Wood Frog	

These species have evolved to blend in to their environment and are highly sensitive to movement, making them hard to locate visually. Call surveys are a more effective way to locate breeding grounds and approximate population density. During breeding times, male frogs vocalize to attract females. Listening to calls allows species to be identified and density to be approximated. A species heard consistently and in high numbers over several years would likely indicate a stable breeding population in that area.

Frogs and toads require a certain amount of water and temperatures above freezing to breed, therefore spring weather has a great effect on when vocalizations begin. The spring of 2008 was cooler than usual, as shown by Figures 2 through 7, causing frog breeding to begin later compared to other, warmer years. May and June had less precipitation than usual, while July had more rain than normal. This affected both the start and end dates for breeding choruses of all species. For example the Wood Frog historically breeds until early May. However, in 2008, they were observed calling as late as May 21. Temperature and precipitation had a great effect on observations. Few frogs were heard calling on days that received a high amount of precipitation, or had strong winds. Only a few Spring Peepers and one Gray Treefrog were heard on June 6, which received 21.1mm of precipitation. Most vocalizations were heard once temperatures reached over 8°C. However, frogs generally did not call when the temperature was hottest during the mid day. Therefore, the time of day surveys were done affected what vocalizations were heard. Most surveys on foot were done during the day approximately from 10am to 3pm, while frogs and toads call the most at dusk and throughout the night until dawn.

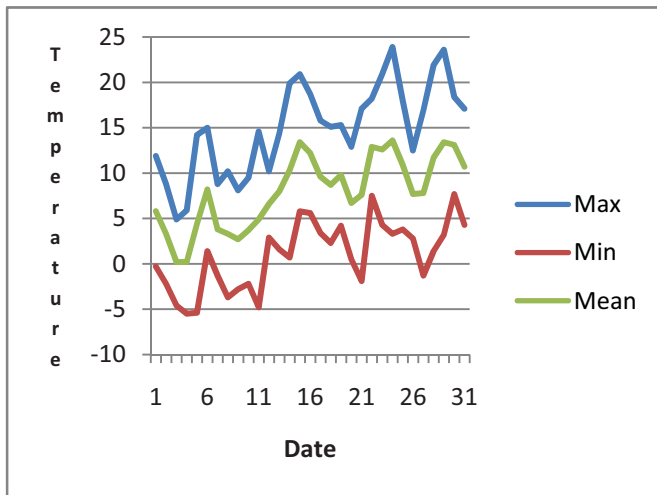


Figure 2: Daily temperatures for the month of May, 2008.

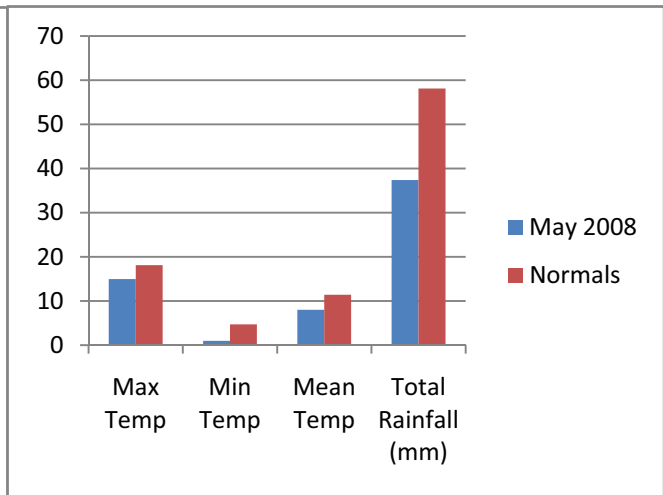


Figure 3: Average temperatures and total for May 2008, compared to normals from 1971-2000.

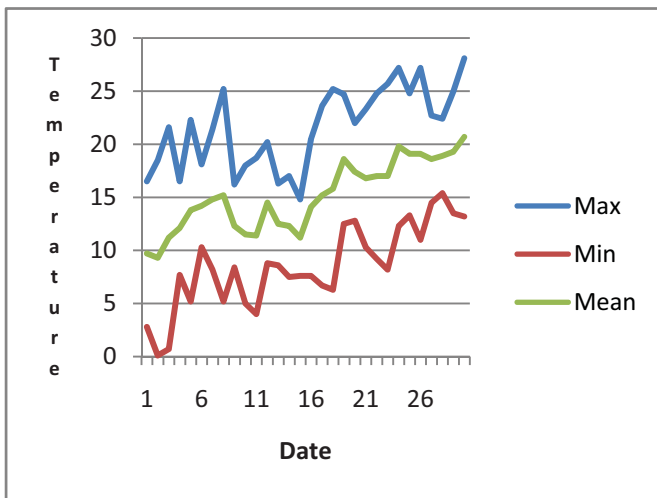


Figure 4: Daily temperatures for the month of June, 2008.

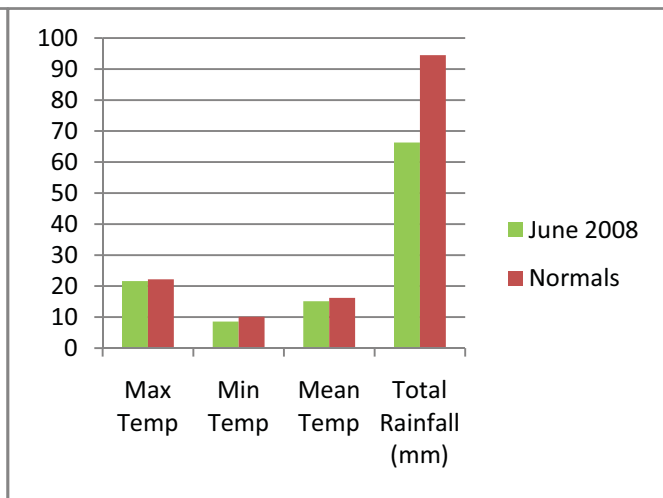


Figure 5: Average temperatures and total rainfall for June, 2008, compared to normals from 1971-2000.

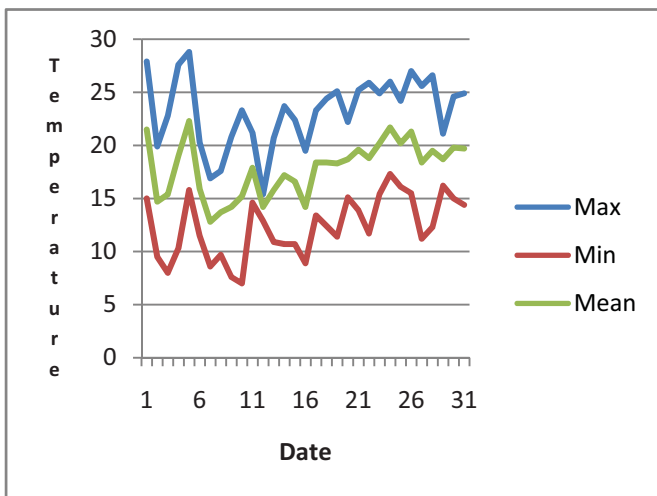


Figure 6: Daily temperatures for the month of July, 2008.

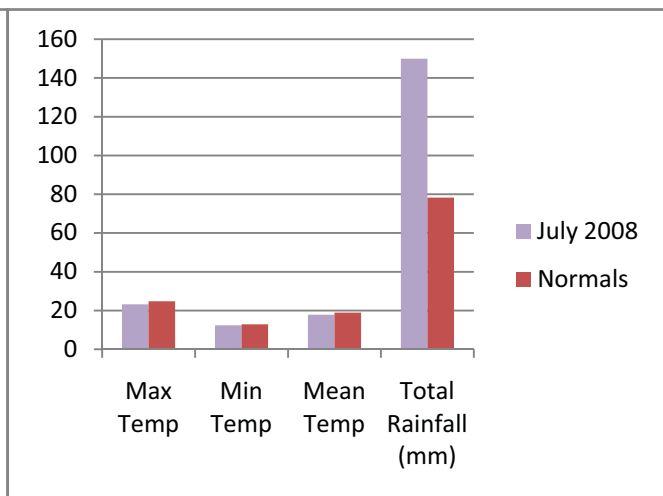


Figure 7: Average temperatures and total rainfall for July, 2008, compared to normals from 1971-2000.

Table 3: First observed vocalization and last observed vocalization. Note *1: a single call was heard on July 22 during canoe surveys. Note *2: A single call was heard July 23 during canoe surveys

Species	First Call Observed	Last Call Observed
Wood Frog	May 13	May 23
Boreal Chorus Frog	May 13	May 27*1
Northern Leopard Frog	May 13	May 23*2
Spring Peeper	May 23	June 6
Gray Treefrog	June 6	July 21

To gain an understanding of when each species starts and finishes breeding, surveys need to be completed continuously. Table 3 summarizes the first and last observed vocalization times for all species during the surveys in 2008. Thus, the surveys did not cover the full time frame required.

No American Toads were observed vocalizing during surveys. They are mainly nocturnal amphibians and since surveys were done during the day throughout their typical breeding season, it is plausible that their calls were not heard simply due to surveying at the wrong time. American Toads are known to be widespread in their distribution and are not a species of concern.

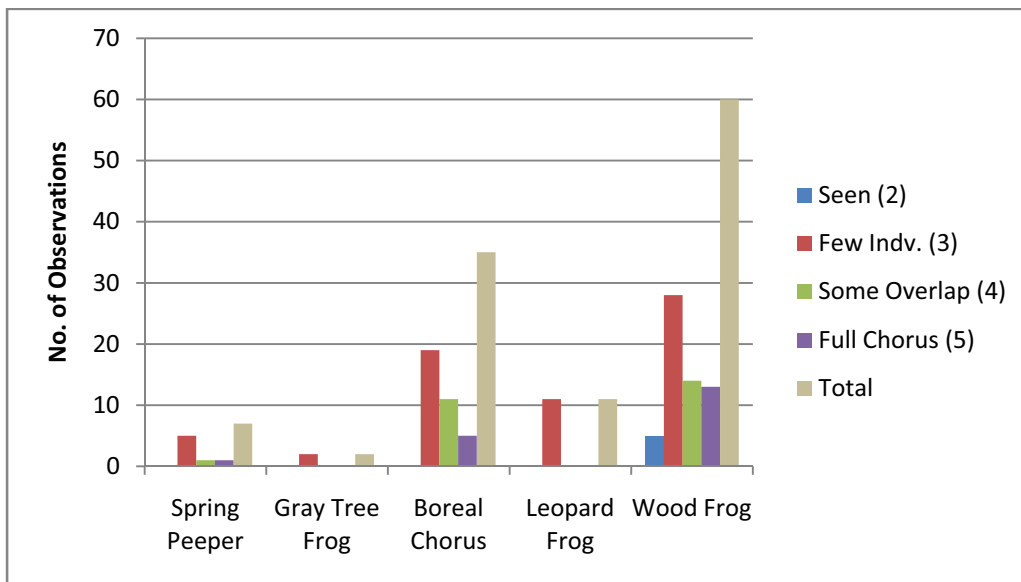


Figure 8: Total number of calls observed for each species for each abundance scale, 2 to 5 (1 not shown).

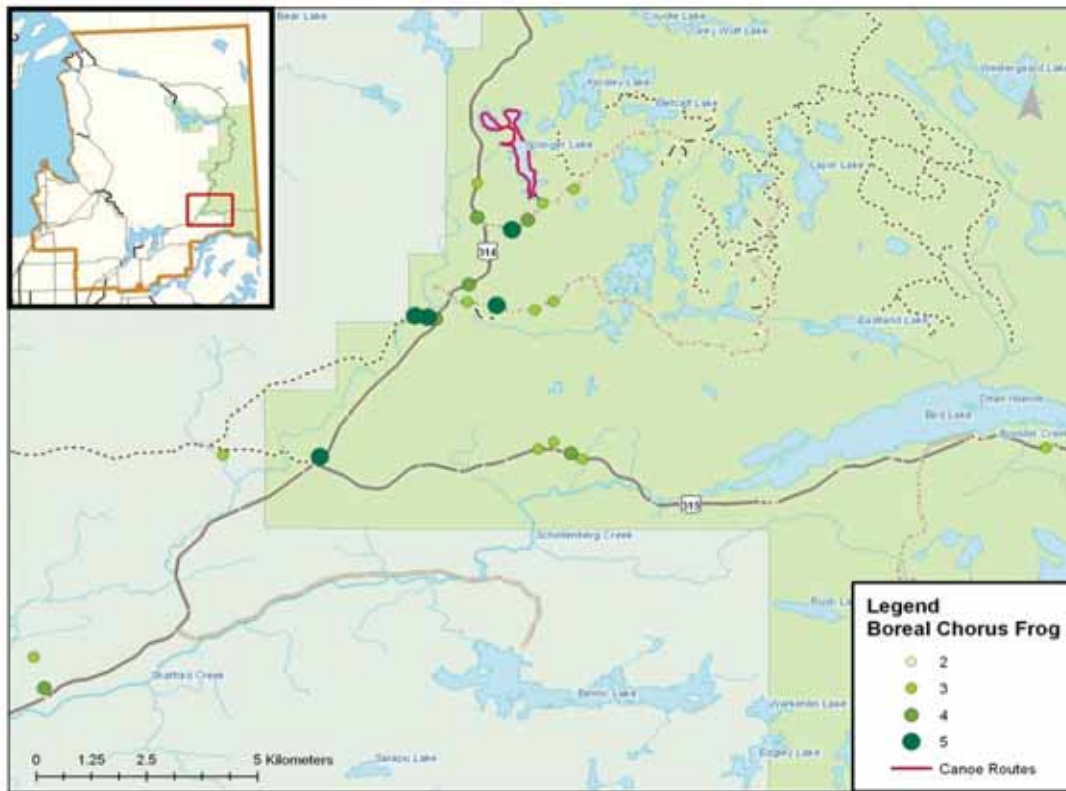


Figure 9A: Observed call locations and their intensity for the Boreal Chorus Frog north of the Translucence Rd.



Figure 9B: Observed call locations and their intensity for the Boreal Chorus Frog south of the Translucence Rd.

Boreal Chorus Frogs were observed calling first on May 13, the first day of surveying on foot, and last heard calling on May 27. They were observed calling during the morning and afternoon when air temperatures were between 6.8 and 22.6°C. These frogs were heard vocalizing in a wide range of areas, especially in ditches and ponds. They were most often rated a 3 on the vocalization scale (19 times) as shown in Figure 8. Calls rated as a 4 on the abundance scale were heard eleven times, and calls rated as a 5 on the abundance scale were observed five times during the survey period. Figure 9 shows the observed locations and intensity vocalization scale recorded during survey efforts.

No Cope's Tree frogs were heard vocalizing. These frogs are not considered to be threatened and not of special concern in Manitoba. It was difficult to accurately distinguish this frog's call from that of the Gray tree frog. For this reason it is possible that Cope's tree frogs may have been confused at times with the Gray Tree Frog.

The Gray Tree Frog was first observed calling on June 6 and was heard again on Davidson Lake during the July 21 survey, shown on Figures 10A and B. Gray Tree Frogs were also observed several times on non survey days in the Model Forest area. It was most often heard calling from brush or trees just back from lakes, streams and rivers. They were heard in the morning and at dusk when the temperature was above 10 °C and calls were rated both times as a 3 on the abundance scale.



Figure 10A: Observed call locations and their intensity for the Gray Treefrog North of the Translucence Rd.



Figure 10B: Observed call locations and their intensity for the Gray Treefrog on Davidson Lake.

The Green Frog was not heard vocalizing at any time. It was reportedly heard calling in previous years at Springer Lake, Beresford Lake, and Davidson Lake and along Peterson Creek and Rabbit River. Canoe surveys included Springer, Beresford and Davidson Lakes as well as Peterson Creek. Peterson creek was surveyed on May 7, which would be much too early for the Green frog to be heard, as it was a cold spring. Beresford was surveyed on June 6; Davidson Lake during the evening of July 21; Tulabi Lake on the morning of the July 22; and Springer Lake was canoed during the evening of July 24. No vocalizations were heard in any of these areas. The Green Frog is considered to be at the northern edge of its distribution in the model forest area. It was also a cold late spring and so these factors may contribute to our results. It is, however, considered vulnerable to extirpation in Manitoba, so more surveys need to be done to help discover if this frog still occurs in these areas.

The Mink Frog is also a species of frog considered to be vulnerable in Manitoba. It was not heard calling during any surveys. The Mink frog has been observed vocalizing in previous years in Springer Lake, Tulabi Lake and in Peterson Creek. These three areas were all surveyed, however Peterson Creek was surveyed too early in the year. The Mink Frog is considered vulnerable and its range is restricted to small areas. It is possible that these areas were not covered in our surveys. Again, due to the late spring, breeding times for the Mink frog may have been later than usual, possibly causing surveys to not be done at the right time.

The Northern Leopard Frog was first heard on May 14 and throughout that month during the day, when air temperatures were 14 to 25.5 °C. All vocalizations were rated a 3 on the abundance scale and are shown on Figures 11A, B, and C. One Leopard Frog was heard vocalizing on July 22 at dusk on Tulabi Lake, which is not during this species normal breeding times according reference data. Leopard Frogs were always heard calling from water that was not in danger of drying up, including rivers, creeks and water dammed by beavers. They were observed vocalizing 11 times during the survey period. Northern Leopard Frogs are considered uncommon and more data needs to be collected to determine their true distribution.

The Spring Peeper was first heard on May 23 and was last observed calling on June 6. Temperatures during vocalizations ranged between 10 and 19°C. Spring Peepers were also heard calling during early June when surveys were not taking place. On five of the seven occasions calls were recorded, they were marked as a 3 on the abundance scale (Figure 12). One occasion was marked as a 4, and one occasion was a 5. Spring Peepers' calls often seemed to be coming from shallow marshy areas or slightly back from the water of pools and ponds.



Figure 11A: Observed call locations and their intensity for the Northern Leopard frog near the Translucence Rd.

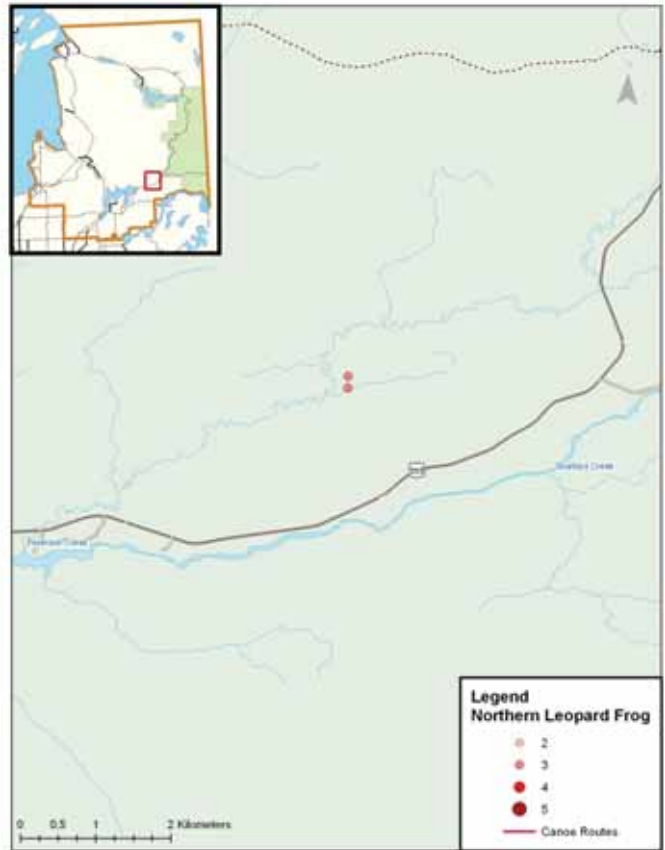


Figure 11B: Observed call locations and their intensity for the Northern Leopard Frog on Peterson Creek.



Figure 11C: Observed call locations and their intensity for the Northern Leopard Frog east of Bird Lake.



Figure 12: Observed call locations and their intensity for the Spring Peepers north of Black Lake.

Wood Frogs were heard calling on the first walking survey (May 13) and were heard calling last on May 21. There were five occasions where wood frogs were seen but not heard: May 15, 21, 23, 27 and June 6. Wood Frogs were rated twenty-eight times as a 3 on the abundance scale, a 4 fourteen times and a 5 thirteen times, summarized in Figure 8 and 13A and B. Air temperatures ranged from 6.6 to 25.5°C when vocalizations were heard. Wood Frogs were heard calling from ditches, ponds, slow moving streams and other areas where there were temporary stands of water. It was noted that the Wood Frog was one of the earliest frogs to call and also stopped calling the earliest, as it was never heard calling after May 21 agreeing with other data collected on this species.

Of the five species of frogs that were observed during surveys, Wood Frogs were heard the most (heard 55 times and observed 5 times). Boreal Chorus Frogs were heard on 35 separate occasions, Northern Leopard Frogs heard on eleven occasions, Spring Peepers heard on 7 and Gray tree frogs were observed vocalizing on 2 occasions. Most calls during the surveys were rated as a 3 on the abundance scale indicating most survey points had only a few males calling at once. Less than 20 of the areas surveyed were rated as a 5, and 26 locations were rated as a 4 (Figure 14).



Figure 13A: Observed call locations and their intensity for the Wood Frog south of the Translucence Rd.



Figure 13B: Observed call locations and their intensity for the Wood Frog north of Rabbit River.

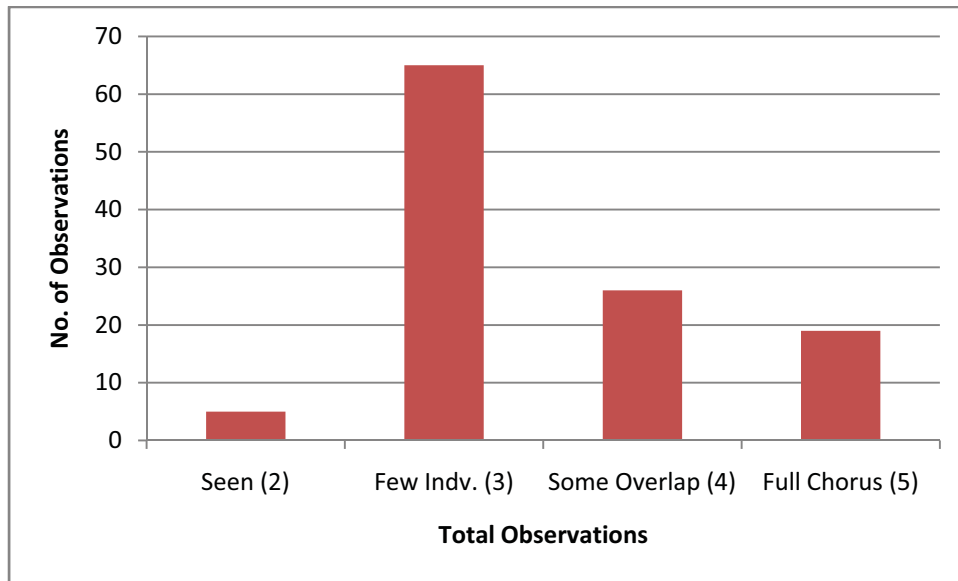


Figure 14: Total number of observations for each abundance rating; includes all species.

Boreal Chorus and Wood Frogs were found to be the most abundant species, being heard vocalizing more than the other species. This may be due to lack of surveying during times when other species may have been calling. Wood Frogs and Boreal Chorus Frogs were also the most widespread of all species in the sampling area, being found in several different locations. Figures 9 to 13 shows the approximate density of amphibian populations based on surveyed locations and call abundance ratings. This data can be compared with surveys in subsequent years to help assess population trends and specific areas consistently used by each species.

Based on our results, we would recommend that surveys be conducted over multiple years through the breeding season. Areas that are known to historically have Mink and Green Frogs should be resurveyed, as the surveys in 2008 were not likely conducted at the correct times to detect these species. In addition, areas that were shown to have high population densities should be repeatedly resurveyed throughout the spring so that beginning and end breeding times for a specific species can be more accurately determined. By making these efforts, the stability of species populations in these areas can be assessed accurately in future years.

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Figure 17: Surveyed areas near the Translucence Rd. and Black Lake.



Figure 18: Surveyed areas on and near Springer Lake and Highway 315.



Figure 19: Surveyed areas near Peterson Creek and near the junction of Highway 314 and 315.

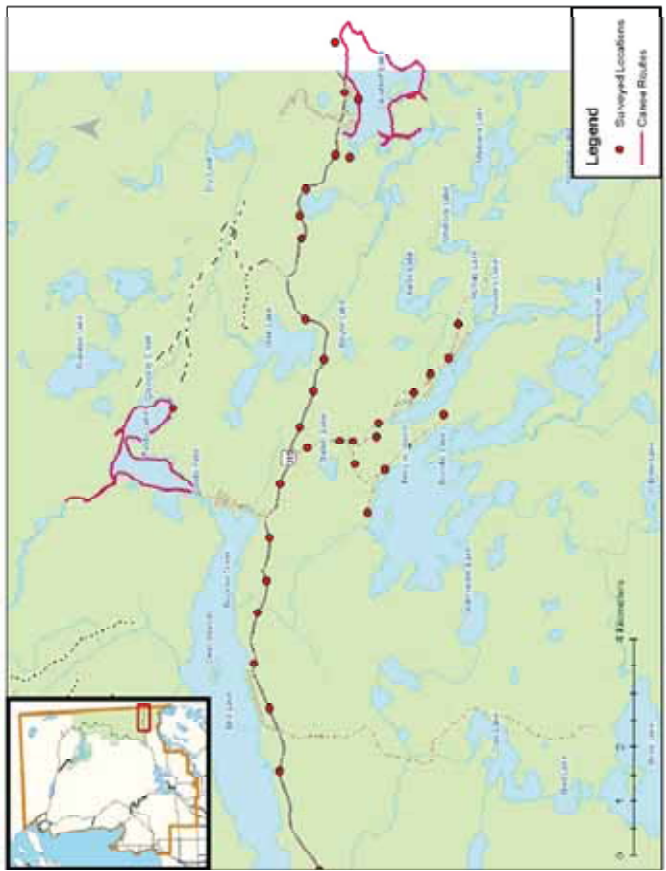


Figure 20: Surveyed areas on Tulabi and Davidson Lakes, and near Booster and Bird Lakes.