

Frog and Toad Calling Survey of the Carleton College Cowling Arboretum

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Introduction:

A survey was initiated to determine the status of frog and toad populations in the Carleton College Arboretum. The floodplain forests and Kettle Hole Marsh in the Lower Arb coupled with Lyman Lakes and Spring Creek in the Upper Arb provide a range of habitats suitable for frogs and toads. The Arb is a refuge of restored prairie and forest in an area where farmland is the dominant ecosystem. The Arb's watersheds will be in better health than those surrounded by farmland, and should be one of several sites along the Cannon River Watershed that host significant frog populations. While a list of observed frog and toad species in the Arb exists, this list makes no attempt to assess the size or status of Arb populations. This survey will track Arb frog and toad populations over time so that we can make informed management decisions where frog and toad habitat is concerned.

Table 1: List of frog and toad species observed in the Arb to date.

Bullfrog (<i>Rana catesbeiana</i>)
Green Frog (<i>Rana clamitans</i>)
Leopard Frog (<i>Rana pipiens</i>)
Wood Frog (<i>Rana sylvatica</i>)
Copes' Gray Treefrog (<i>Hyla chrysoscelis</i>)
Gray Treefrog (<i>Hyla versicolor</i>)
Chorus Frog (<i>Pseudacris triseriata</i>)
American Toad (<i>Bufo americanus</i>)

Methods:

Methods followed those established by the Minnesota Department of Natural Resources (MDNR), except that not all sites were located a minimum of .5 miles apart and most sites were more than 200 meters from a road. For this reason, our route would not be utilized by the MDNR as part of their state-wide survey, and our data were not submitted to the MDNR. Ten locations throughout the Arb were selected as survey points (**Table 3, Figure 2, Figure 3**). The survey was conducted three times during the main vocalization period to provide data on as many species as possible: April 11th, May 23rd, and July 6th (**Table 2**). Wind speed and sky conditions were recorded at the beginning of the survey. The surveys took place on nights without rain and when wind speed was less than 12 miles per hour, and generally occurred on weekday evenings because of increased noise on weekends.

At each location, the air temperature and water temperature (if possible) were recorded. The number of cars passing, other distracting noises, and visibility of the moon were also recorded.

Table 2: Approximate calling times for species that are known to occur or could hypothetically occur in the Arboretum (Minnesota Department of Natural Resources).

Family	Species	March	April	May	June	July
True Frogs - Ranidae	Bullfrog (<i>Rana catesbeiana</i>)				X	X
	Green Frog (<i>Rana clamitans</i>)				X	X
	Leopard Frog (<i>Rana pipiens</i>)		X X			
	Pickerel Frog (<i>Rana palustris</i>)			X X		
	Wood Frog (<i>Rana sylvatica</i>)	X	X			
Tree Frogs - Hylidae	Copes' Gray Treefrog (<i>Hyla chrysoscelis</i>)			X	X	
	Gray Treefrog (<i>Hyla versicolor</i>)			X	X	
	Spring Peeper (<i>Pseudacris crucifer</i>)		X	X		
	Chorus Frog (<i>Pseudacris triseriata</i>)	X	X			
Toads - Bufonidae	American Toad (<i>Bufo americanus</i>)			X	X	

Table 3: Description of listening locations in the Arb.

Location	Description	Upper Arb	Lower Arb
1	Southern end of upper Arb along Spring Creek.	X	
2	Near Cole Wetland along Spring Creek.	X	
3	Lower Lyman Lake near council ring.	X	
4	Retention Pond		X
5	Above Turtle Pond and floodplain forest near Cannon River		X
6	Above Oxbow Pond		X
7	Unnamed floodplain pond		X
8	Cannon River and back channel near Iron Bridge		X
9	Kettle Hole Marsh		X
10	Near Olin Farm (Mark McKone's) House		X

Results:

(See **Table 4**)

Discussion:

The Frog and Toad Survey recorded large increases in frog and toad numbers and diversity since 2009. This can be attributed to higher temperatures and more suitable hydrological conditions. The 2009 drought rendered floodplain ponds nearly uninhabitable for lack of water. The area of

suitable habitat in Kettle Hole Marsh in 2009 was greatly reduced in size. This year, floodplain ponds had suitable amounts of water, and depressions in low-lying areas remained filled with water through the end of the last count.

Wood frog and chorus frog populations showed the least change. The drought of 2009 was not as pronounced during the early part of the season as it was later on in June and July. Still, chorus frogs inhabited new floodplain pond habitat that was likely too dry during 2009, occurring at two new locations. Wood frogs were the only species that showed decline since last year, occurring at the same number of stops, but with abundance dropping at stop 6. The leopard frog, which was observed visually throughout the Arb last year outside of the count, but not recorded during the count, was recorded at two locations this year.

The gray treefrog and Cope's gray treefrog showed the most noticeable increases in population. Last year these species were scarce and absent, respectively. Gray treefrog was recorded at only one site with abundance recorded as '2'. This year, the gray treefrog may have been the most numerous species in the Arb, occurring at maximum abundance ('3') at three locations. In both floodplain pond locations (stops 6 and 7), the call of the gray treefrog was deafening. The Cope's gray treefrog was recorded at three locations, though numbers were small compared to the gray treefrog. The American toad did not occur at Lyman Lakes this year, as last year, but occurred in higher or equal abundance at all other locations.

Unfortunately, bullfrogs moved into two new locations this year, with multiple individuals recorded at two floodplain forest sites. This could be due to more hospitable conditions or to spring flooding, which could have facilitated the dispersal of individuals from upstream locations. The Green Frog, never seen or heard last year, was recorded at stop 7 this year, though it is clear the Arb population is quite small. Gray treefrog and Cope's gray treefrog were also recorded during July, but numbers were much reduced.

The results of the statewide survey show trends only for the spring peeper, gray treefrog, and bullfrog. The spring peeper and gray treefrog have been declining since 1998, with a big drop occurring in 2003. The bullfrog has been increasing since 1998. With the release of the 2010 data next year, it will be apparent whether trends in our data reflect statewide trends.

Conclusion:

The continuation of the frog and toad survey in subsequent years will be necessary to determine the status of Arb populations. Continued awareness of hydrological conditions should inform our choice of when to do the surveys within the parameters of the MDNR. The improvement in numbers seen since last year indicates that the Arb frog and toad population responds quickly to hydrological changes. Rice county, and southeastern Minnesota in general, experienced reduced rainfall and a lower than average water table from 2006 to 2009. In 2010, there was higher than average rainfall and the water table rose over two feet compared to 2009. Our findings this year eliminate the concern that populations may have sustained irreparable damage from the drought of the last four years (**Table 5, Figure 1**). Populations could still show a long-term downward trend, but many more years of data will be needed to make any conclusions about long term changes.

Since last fall, a new wetland site was created in a location near the survey route that may have been home to as many as three species of frogs during the survey period. It would be good to incorporate this location into the survey route, either as a new stop, or by replacing the current stop 10, which is the only lower Arb stop that hasn't produced any data. Observations during each survey detected calls in the distance from stop 10. It was later realized that the probable source of at least some of these detections could have been the wetland in the parking area to the east of the Arb office. This experience also brought recognition that detections outside of the prescribed wetland for any location should note the direction of the detection rather than speculation on the location of the detected animal. This will allow us to make more informed judgments at a later time.

Table 5: Depth to groundwater at Prairie Island, Goodhue County, MN during July of 2006 to 2010. Prairie Island is the nearest location where this data is recorded. (Source: USGS)

Month/Year	Depth to Groundwater (feet)
July 2006	No data available
July 2007	15.362
July 2008	14.267
July 2009	15.462
July 2010	13.457

There remain two hypothetical species, the spring peeper, and the pickerel frog, that have not been detected. Greater coverage of pickerel frog calling time was achieved this year by counting during late May instead of early June. However, the pickerel frog would be just beyond the end of its range here, and there may not be proper habitat for it in the Arb. The spring peeper has occurred in Rice County, and most of Rice County is within its expected range (MDNR). Maximum calling activity is expected to fall in the second half of April or the first half of May, an inconvenient time that falls between Arb surveys. Spring peepers prefer mature forest habitat. As floodplain forests in the lower Arb continue to mature, spring peepers may come to the Arb. If this species should be reported in the Arb in future years, particularly outside of the survey, it is recommended that survey times be adjusted or a fourth date is added in late April or early May to better accommodate the calling time of the spring peeper. As this occurs, we may see a decline in Cope's gray treefrog populations in the floodplain forest because this species prefers more open or grassland-forest edge habitat.

References:

Minnesota Department of Natural Resources, *Minnesota Frog and Toad Calling Survey*. http://www.dnr.state.mn.us/volunteering/frogtoad_survey/index.html.

Hedberg Maps, 2003, *Map of the Carleton College Cowling Arboretum*.

United States Geological Survey, *USGS Surface Water Data*. <http://waterdata.usgs.gov>

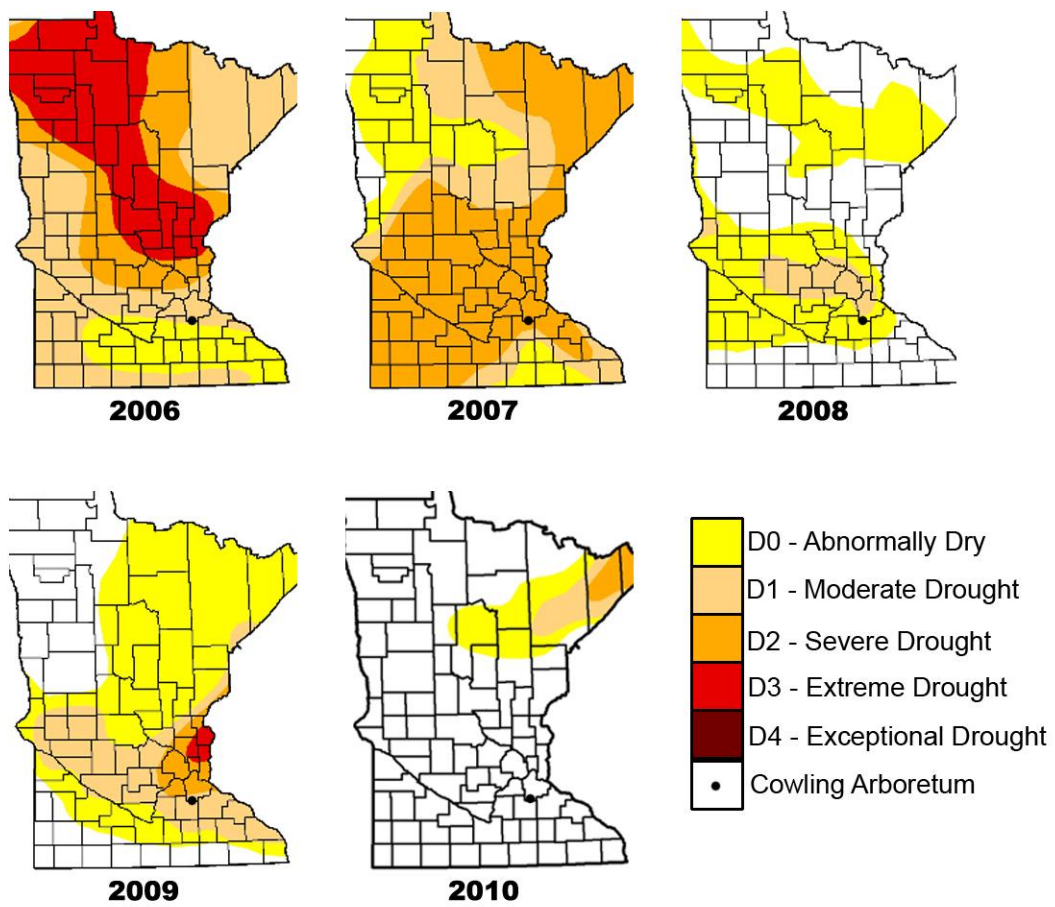


Figure 1: Drought data from 2006-2010. The dot represents the approximate location of the Cowling Arboretum. Source: National Drought Monitor



Figure 1 Frog and toad survey listening locations 1-4, 10 in the Upper Arb and southern Lower Arb.

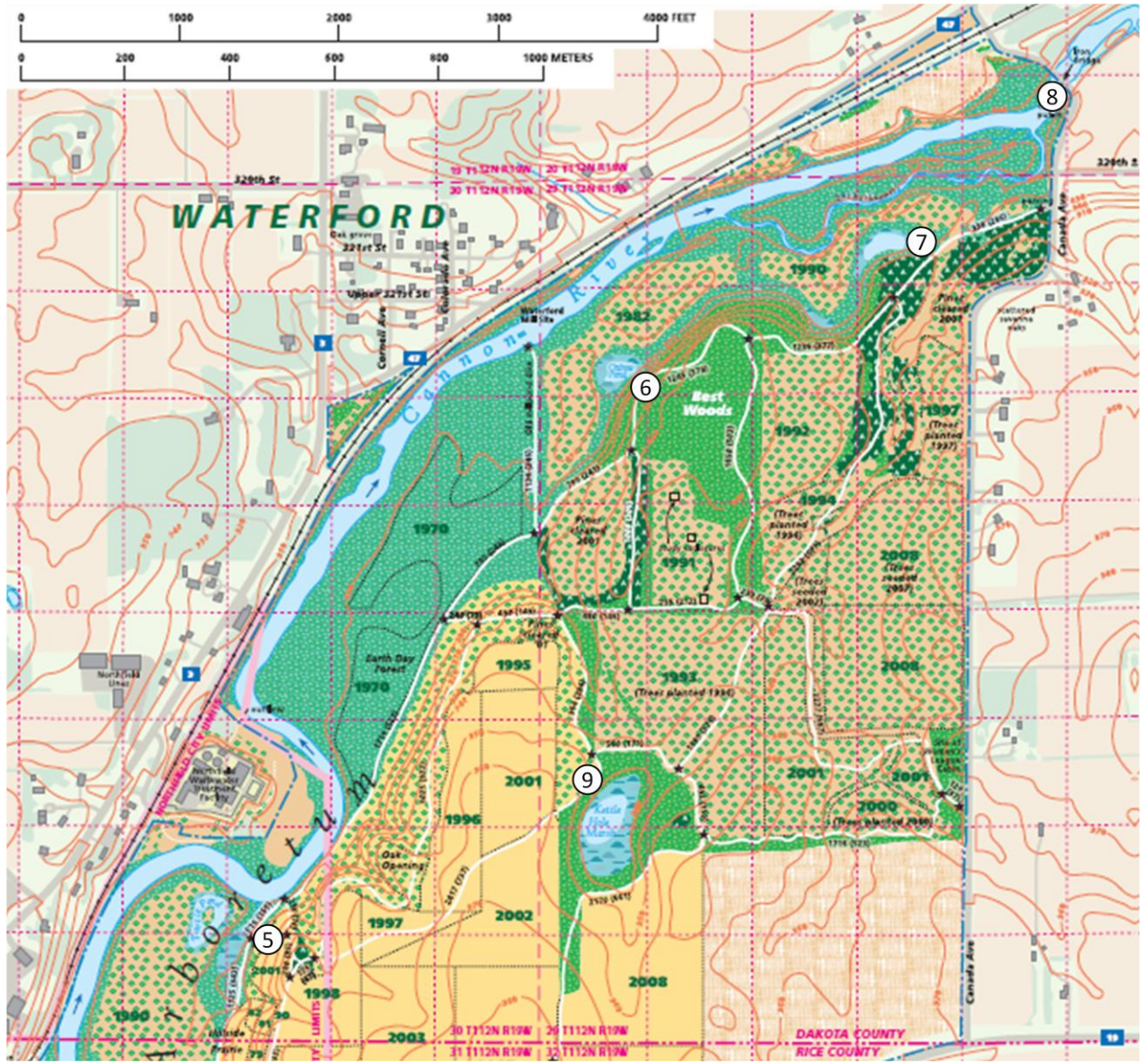


Figure 2 Frog and toad survey listening locations 5-9 in the northern Lower Arb.