

Frog and Toad Call Survey Results for Iowa, 2015 - 2018

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ABSTRACT Since 1991, volunteers across the state of Iowa have collected data on the frogs and toads in Iowa wetlands. Between the years of 2015-2018, call data was collected on 398-536 sites annually and 15 different frog and toad species identified. The four most common species recorded on the survey were Chorus frog (*Pseudacris maculata*), American toad (*Anaxyrus americanus*), Cricket Frog (*Acris blanchardi*) and Easter Gray Treefrog (*Hyla versicolor*). Trends indicate that overall species are stable in the number of wetlands they are found on though there is some suggestion that 2016 and 2017 saw early calling species struggle.

INTRODUCTION

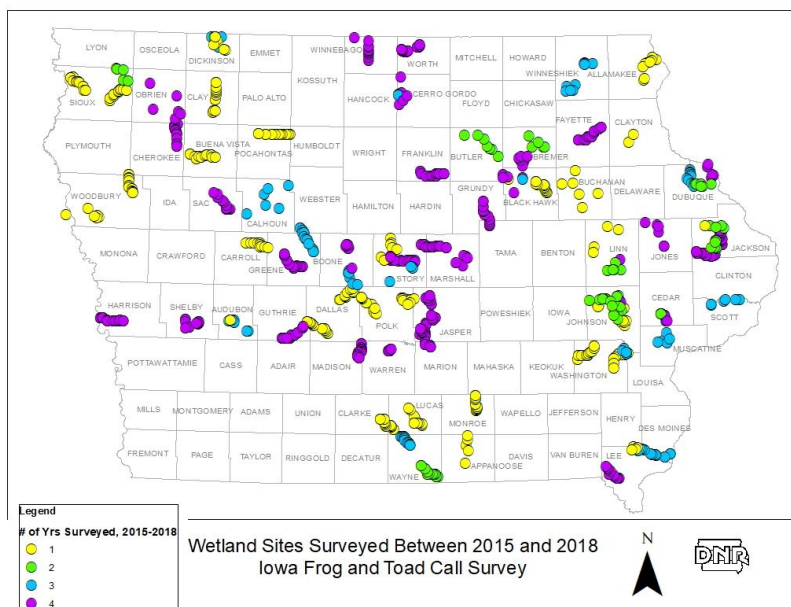
The first volunteer based frog and toad call survey in Iowa took place in 1984 but it did not become a permanent yearly event until 1991. Iowa was one of the earliest states to adopt this survey, which was developed in Wisconsin in response to the alarm in the conservation community regarding amphibian declines. These alarm bells have only grown louder over the past 23 years of the survey and this long-term dataset is more important than ever.

STUDY AREA

The frog and toad call survey is conducted on established routes statewide. An effort is made to have routes being surveyed evenly spread across the state, there are areas of the state that are under surveyed (Figure 1). The sites represent a mix of wetland types from roadside ditches to relatively pristine marshes to large areas of open water and riverine systems.

In 2015, a total of 80 routes were assigned. Sixty-six routes comprising 536 wetland sites were surveyed. In 2016, a total of 67 routes were assigned to volunteers, 51 of which were surveyed, totaling 398 sites. In 2017, 79 routes were assigned, 58 of which were surveyed, totaling 445 sites. Finally, in 2018, 68 routes were assigned, 54 of which were run for a total of 441 sites surveyed. Across all four years, a total of 691 sites were surveyed.

Figure 1. Wetland sites surveyed, and the number of years in which they were surveyed, between 2015 and 2018.



METHODS

The frog and toad call survey is run by volunteers at night on a route of sites that are repeatedly surveyed each year. Routes contain a collection of “wetland” sites and there are two different types of routes. Traditional survey routes are not random, having sites which were chosen by the volunteer surveyor, and follow no set driving route. They contain anywhere between 5-10 sites with the sites being at least 0.5 mile apart though there are a few exceptions to the 0.5 mile apart rule. The second type of route originated in 2010 when Iowa partnered with the U.S. Geological Survey to participate in the North American Amphibian Monitoring Program (NAAMP). The routes designed by NAAMP are randomly placed and 15 miles long. DNR personnel then drove each route outside of the frog and toad breeding season and chose exactly 10 stops that looked like they may provide anuran breeding habitat. Stops must be 0.5 miles apart. While the USGS discontinued their involvement with NAAMP in 2015, the Iowa DNR still collects and uses data from these routes.

To conduct the survey, volunteers are assigned to a route which they are responsible for until they retire from the survey. They are instructed to collect data on their route 3 times each year during 3 month-long survey windows, each with a minimum temperature requirement:

3 Run Windows	Minimum Temperature	Dates
Run 1	5.6° C (42° F)	Apr.1 -May 1
Run 2	10° C (50° F)	May 7 - June 7
Run 3	12.8° C (55° F)	June 13 - July 13

The structure of the survey with three survey windows is designed to capture data on all of the possible species using a wetland regardless of their timeline for breeding. To maximize the ability to detect all frogs the survey is run at night, starting at least 30 minutes post-sunset when the wind is calm and preferable after a rain event or even during a light rain event. Air temperature, sky condition, and wind are collected at the start and end of the survey. Days since rain is also recorded. At each wetland stop, the surveyor records the time, whether the site is wet or dry, whether the moon is visible, how many cars pass and if there are any noise interferences.

At each stop the volunteers stand and listen quietly for 5 minutes. They record all the species of frog and toad they hear calling during that time and estimate abundance using an index:

Relative Call Index Codes	
0-	No individuals heard.
1-	Individuals can be counted. There may be space between calls.
2-	Calls of individuals can be distinguished, but there is some overlapping.
3-	Full chorus of calls. Constant, continuous, and overlapping.

Since 2008, volunteers have been required to go through a training workshop if they don't have previous experience with the survey or with identifying frogs and toads by sound.

The data is recorded in an online database by the end of August each year. The data are then summarized to produce annual trends in species abundance by examining the percentage of surveyed wetlands each species is detected at and the average call index. The data also gives useful information about species distribution and their breeding chronology.

RESULTS

Environmental variables taken during the survey (air temperature, wind speed, sky conditions and days since rain) all indicate that surveys were done within recommended parameters. Weather variables were very similar across all four

years with the exception of days since rain which increased steadily from 1.69 to 3.54 between 2015 and 2018. It's unknown whether that is a function of precipitation patterns or surveyor choices. One notable weather anomaly, was the extremely cold April in 2018 which caused the coordinator to extend the window a few days to give volunteers an opportunity to get out during acceptable weather conditions. The average air temperature for the first survey window in 2018 was very similar to the three previous years (58° fahrenheit in 2018 versus 59° - 60° in previous years).

American toads, chorus frogs, cricket frogs and eastern gray treefrogs were the four most common species recorded on the survey. All of these species have a statewide distribution and can occur in many different types of wetland. The order of which is the most common does vary from year to year but Chorus frog and American toad are always the top two. The state endangered Crawfish frog and Wood Frog were not detected during any surveys.

The percentage wetlands measurement is not useful for the following species which have restricted ranges and which are relatively rare: Plains Spadefoot, Southern Leopard Frog, Fowler's Toad, Great Plains Toad and Woodhouse's Toad. Only a very few potential sites where these species may be found are surveyed so the data for them is misleading.

The most abundant species when found, based on the average call index was the cricket frog which had an average call index above 2 all years (Table 1a-d). The Chorus frog and spring peeper were not far behind. All three of these species are very small and tend to gather in large numbers and be very vocal so these higher abundance indices are expected.

Examining trends from 2015-2018 for each species suggests that there were no overall downward or upward trends (Figure 2 a-c). One pattern that is apparent is that all of the earlier calling species (chorus frog, spring peeper and all the leopard frogs) dipped in percentage of wetlands in 2016 and 2017. Species that usually call in the middle or late survey windows did not exhibit this pattern. The average percentage of change from year to year in the number of wetlands where present also suggests a fairly stable pattern for most species with ample data. The widespread species exhibiting the highest average change is the Spring Peeper at -3.59% between 2015 and 2018 (table 2).

Table 1a. 2015 Summary of data collected by volunteer monitors on Iowa's Frog and Toad Call Survey

Species	Total Sites Possible	Total Sites Detected	%Sites Detected	Sites Run 1	Sites Run 2	Sites Run 3	Total Visits Detected	Average Call Index
American Toad	536	327	61.0%	133	238	114	485	1.7
Bullfrog	536	119	22.2%	0	27	131	158	1.3
Chorus Frog	536	377	70.3%	368	205	84	657	2.1
Cope's Gray Treefrog	536	156	29.1%	14	142	111	267	1.5
Cricket Frog	536	239	44.6%	13	219	239	471	2.2
Eastern Gray Treefrog	536	260	48.5%	33	234	192	459	1.9
Fowler's Toad	37	0	0.0%	0	0	0	0	0
Great Plains Toad	40	3	7.5%	1	3	0	4	1.5
Green Frog	311	56	18.0%	2	23	48	73	1.4
Leopard Frog	536	13	2.4%	11	1	1	13	1.1
Northern Leopard Frog	536	116	21.6%	92	36	13	141	1.4
Pickeral Frog	103	3	2.9%	2	1	0	3	1.3
Plains Leopard	236	19	8.1%	8	11	5	24	1.3
Plains Spadefoot	40	0	0.0%	0	0	0	0	0
So. Leopard Frog	31	7	22.6%	4	5	1	10	1.2
Spring Peeper	344	107	31.1%	100	31	8	139	1.9
Woodhouse's Toad	61	6	9.8%	0	6	1	7	1.7

Table 1b. 2016 Summary of data collected by volunteer monitors on Iowa's Frog and Toad Call Survey

Species	Total Sites Possible	Total Sites Detected	%Sites Detected	Sites Run 1	Sites Run 2	Sites Run 3	Total Visits Detected	Average Call Index
American Toad	398	227	57.0%	141	129	58	328	1.9
Bullfrog	398	87	21.9%	1	30	75	106	1.2
Chorus Frog	398	204	51.3%	185	68	15	268	1.9
Cope's Gray Treefrog	398	98	24.6%	8	81	50	139	1.7
Cricket Frog	398	189	47.5%	0	139	137	276	2.2
Eastern Gray Treefrog	398	175	44.0%	22	125	113	260	1.9
Fowler's Toad	24	1	4.2%	1	0	0	1	2
Great Plains Toad	15	1	6.7%	0	1	0	1	3
Green Frog	266	42	15.8%	0	17	33	50	1.2
Leopard Frog	398	16	4.0%	13	2	2	17	1.1
Northern Leopard Frog	398	61	15.3%	52	16	5	73	1.5
Pickeral Frog	100	0	0.0%	0	0	0	0	0
Plains Leopard	140	9	6.4%	5	4	0	9	1.4
Plains Spadefoot	15	0	0.0%	0	0	0	0	0
So. Leopard Frog	20	2	10.0%	2	0	0	2	1
Spring Peeper	285	92	32.3%	85	26	5	116	1.9
Woodhouse's Toad	39	8	20.5%	3	5	3	11	1.4

Table 1c. 2017 Summary of data collected by volunteer monitors on Iowa's Frog and Toad Call Survey

Species	Total Sites Possible	Total Sites Detected	%Sites Detected	Sites Run 1	Sites Run 2	Sites Run 3	Total Visits Detected	Average Call Index
American Toad	445	225	50.6%	126	125	65	316	1.74
Bullfrog	445	112	25.2%	2	51	87	140	1.26
Chorus Frog	445	250	56.2%	232	69	15	316	2
Cope's Gray Treefrog	445	104	23.4%	10	77	38	125	1.6
Cricket Frog	445	227	51.0%	11	171	168	350	2.3
Eastern Gray Treefrog	445	172	38.7%	39	132	79	250	1.9
Fowler's Toad	31	0	0.0%	0	0	0	0	0
Great Plains Toad	10	0	0.0%	0	0	0	0	0
Green Frog	324	63	19.4%	2	31	47	80	1.3
Leopard Frog	445	27	6.1%	23	4	2	29	1.8
Northern Leopard Frog	445	54	12.1%	41	21	5	67	1.2
Pickeral Frog	103	0	0.0%	0	0	0	0	0
Plains Leopard	166	8	4.8%	7	2	0	9	2
Plains Spadefoot	10	0	0.0%	0	0	0	0	0
So. Leopard Frog	25	3	12.0%	3	1	1	5	2
Spring Peeper	343	77	22.4%	68	25	6	99	2
Woodhouse's Toad	32	6	18.8%	0	6	0	6	1.7

Table 1d. 2018 Summary of data collected by volunteer monitors on Iowa's Frog and Toad Call Survey

Species	Total Possible sites	Total Sites Detected	%Sites Detected	Sites Run 1	Sites Run 2	Sites Run 3	Total Visits Detected	Average Call Index
American Toad	411	246	59.9%	84	154	111	349	1.79
Bullfrog	411	114	27.7%	0	35	94	129	1.25
Chorus Frog	411	284	69.1%	240	97	62	399	2.1
Cope's Gray Treefrog	411	123	29.9%	5	92	86	183	1.63
Cricket Frog	411	206	50.1%	2	161	147	310	2.13
Eastern Gray Treefrog	411	178	43.3%	30	141	130	301	1.92
Fowler's Toad	15	1	6.7%	0	1	0	1	1
Great Plains Toad	16	8	50.0%	4	3	5	12	1.58
Green Frog	293	61	20.8%	0	20	54	74	1.69
Leopard Frog	411	27	6.6%	14	13	8	35	1
Northern Leopard Frog	411	98	23.8%	81	33	3	117	1.49
Pickeral Frog	85	2	2.4%	0	2	0	2	1
Plains Leopard	151	9	6.0%	4	4	2	10	1.4
Plains Spadefoot	16	4	25.0%	0	4	1	5	2.2
So. Leopard Frog	15	4	26.7%	4	0	0	4	1.5
Spring Peeper	305	62	20.3%	37	30	9	76	1.9
Woodhouse's Toad	38	12	31.6%	2	10	1	13	2

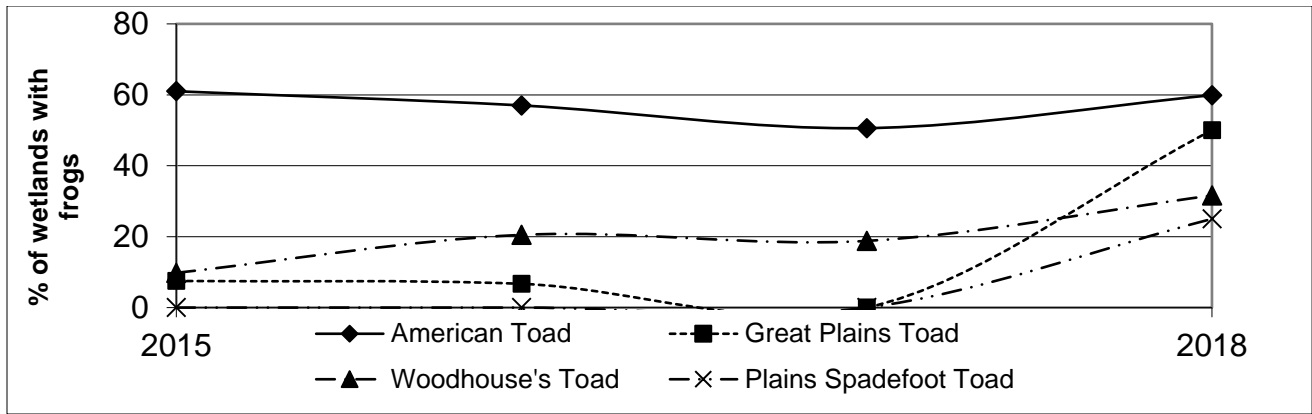


Figure 2a. Percentage of wetlands where Toad species were detected on Iowa's Frog and Toad Call Survey, 2015-2018.

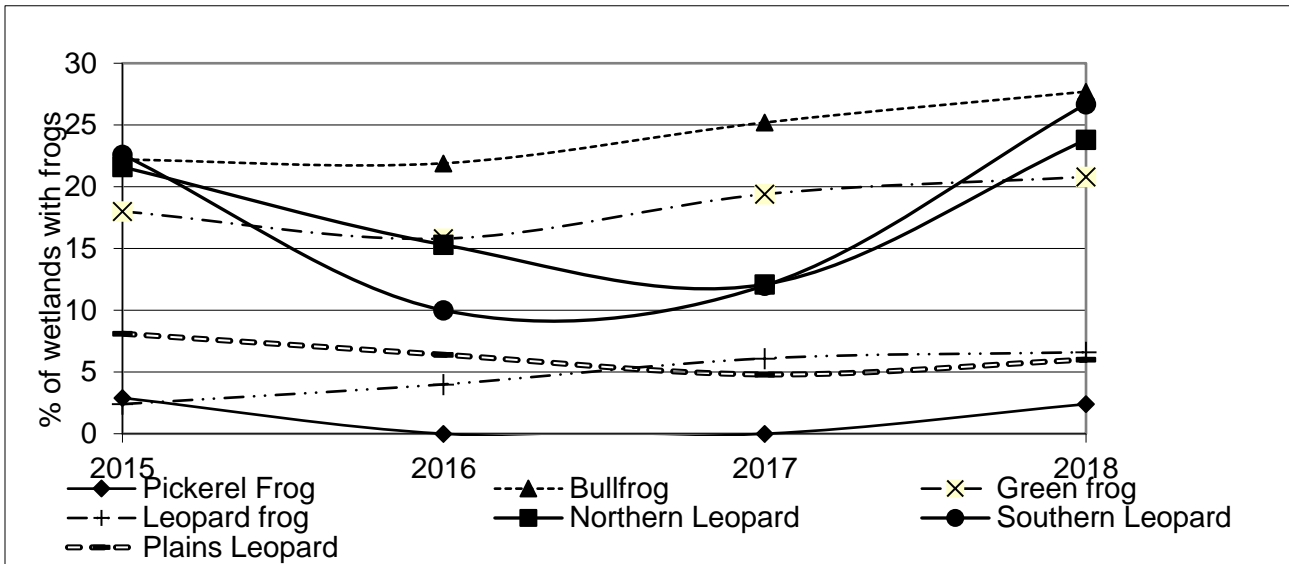


Figure 2b. Percentage of wetlands where True Frog species were detected on Iowa's Frog and Toad Call Survey, 2015-2018.

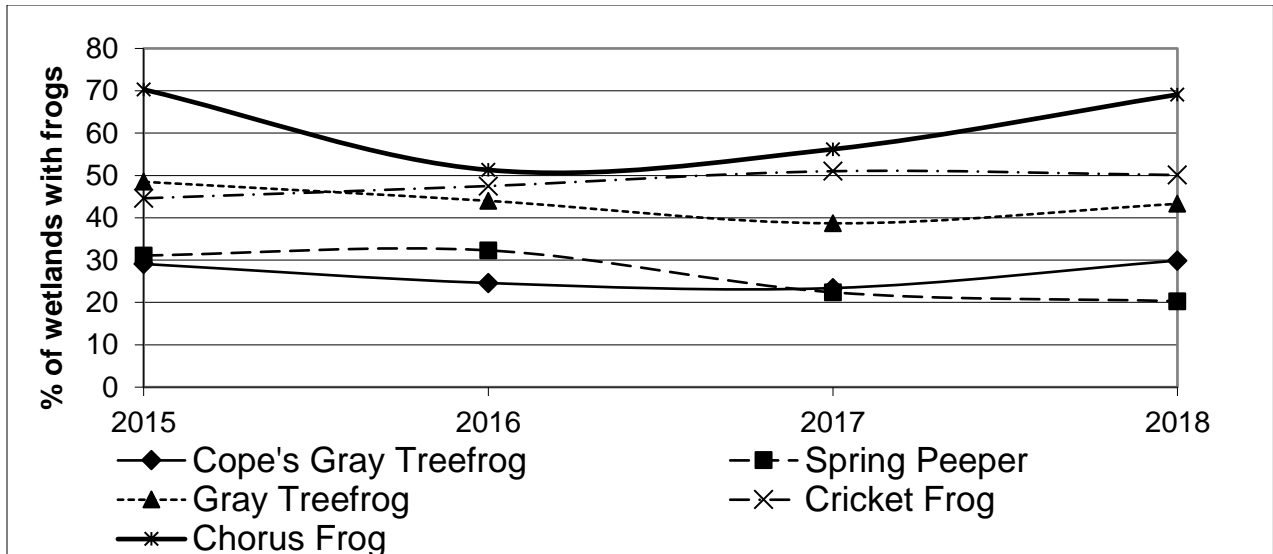
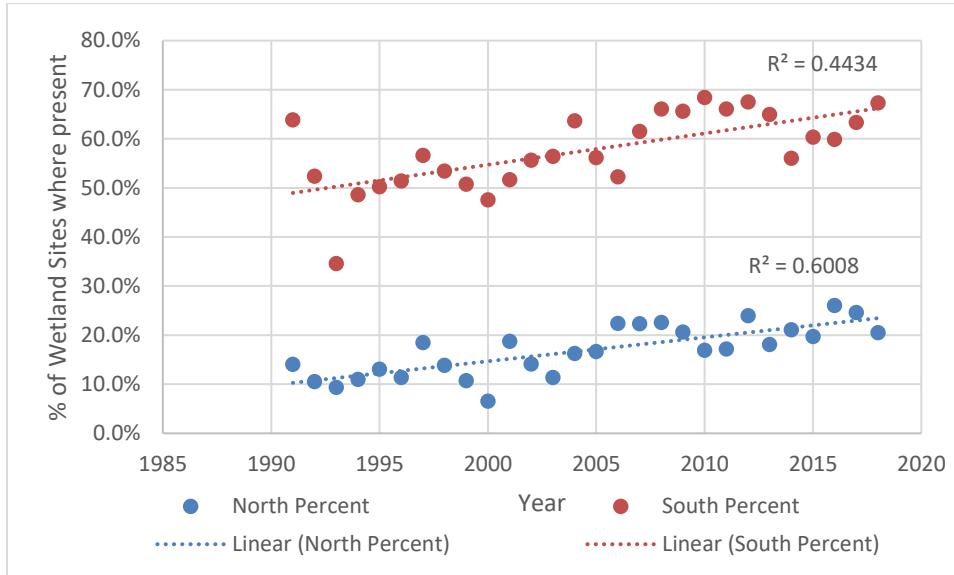


Figure 2c. Percentage of wetlands where Tree Frog species were detected on Iowa's Frog and Toad Call Survey, 2015-2018.

Blanchard’s cricket frog is listed as threatened or endangered in both Wisconsin and Minnesota to Iowa’s north, however the species continues to be common in Iowa. It is one of the top four most common species detected on the survey and when found it is usually abundant (tables 1a-d). Examining the data separately for the north versus the southern half of the state does reveal that cricket frogs are much less common in northern Iowa versus central and southern. However, trends indicate despite lower numbers in the north it has remained stable and even increased across time (figure 4).

Figure 4. The percentage of wetland sites with cricket frog present in the northern and southern halves of Iowa, 1991-2018.



DISCUSSION

In 2015, the USGS NAAMP survey was discontinued and in response the Iowa DNR chose to continue to monitor NAAMP routes but to integrate them without long-time “traditional” routes. The datasheet was modified to combine elements of both surveys and the data was ultimately combined in one database. This allows the data collected in 2015-2018 to be summarized as a whole and this report focuses on those years.

The most interesting result in this general look at the data is the fact that the earlier calling species all shared the same trend over the four years and they experienced a dip in the percentage of wetlands they were using in 2016 and 2017. There is not an obvious explanation for this. Precipitation as measured in Des Moines was higher in April of 2016 and 2017 versus 2015 and 2018 and this increased water on the landscape should impact these species favorably. Temperature in April of 2018 was extremely low but these species experienced a rise in the number of detections. Further investigation is needed.

The survey continues to provide useful information on frog and toad trends across the state. Future plans are to try and expand the number of volunteers and routes being run and a long-term analysis of the data is currently being undertaken. The long-term analysis is using data from 1991 through 2016 and will provide more detailed information on species colonization and extinction rates at sites and the factors that might be influencing these dynamics.

ACKNOWLEDGMENTS

This survey is one of the longer running surveys on amphibians in North America and certainly in Iowa. This accomplishment would not have been possible without an army of volunteers over the years, some of whom have been involved with the survey for a staggeringly long time! A huge thank you to all of the volunteers who have braved the night time country roads to further Iowa frog and toad conservation efforts.

LITERATURE CITED

Christianson, J.L. and R. M. Bailey. 1991. The Salamanders and Frogs of Iowa. Nongame Technical Series 2, Iowa Department of Natural Resources. 24pp.