

Frog and Toad Call Survey Results for Iowa, 2023

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ABSTRACT Since 1991, volunteers across the state of Iowa have collected data on the frogs and toads in Iowa wetlands. In 2023, call data was collected at 851 sites and 16 different frog and toad species were identified. The four most common species recorded on the survey were Chorus frog (*Pseudacris maculata*), Cricket Frog (*Acris blanchardi*), American toad (*Anaxyrus americanus*), and Eastern Gray Treefrog (*Hyla versicolor*). As more years of data are included, some species have started to show moderate to strong trends including green frog (+), cricket frog (+), Eastern gray treefrog (-) and cricket frog (-). Further analysis is needed to determine whether these are true trends or are biased by some variables not currently included in the analysis.

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 by the Wisconsin DNR in response to the alarm regarding amphibian declines. These alarm bells have only grown louder over the past 30+ years of the survey and this long-term dataset is more important than ever.

The survey has evolved over the years. Training workshops were offered for the first time in the early 2000s and these became a requirement in 2008. Up until 2007, monitors listened for 10 minutes per site, per survey but that was shortened to 5 minutes starting in 2008. Analysis has indicated that while this change may have impacted the detection for a couple of species, this change made the survey easier to perform for the volunteers and did not have a significant impact on the overall data. The three leopard frog species in Iowa were not identified by species in the survey until 2009. Finally, in 2010, Iowa started participating in the USGS' North American Amphibian Monitoring Program (NAAMP) which added 84 randomly placed routes needing survey. In 2015, USGS discontinued NAAMP but Iowa has absorbed these routes into our traditional survey and database.

STUDY AREA

The frog and toad call surveys are conducted on routes statewide. An effort is made to have the surveyed routes evenly spread across the state, though western and southern Iowa could use additional survey effort (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 2023, a total of 159 routes were assigned to volunteer monitors. Of those assigned, 135 routes covering 851 wetland sites were surveyed. This represents the highest number of routes conducted in the survey's history surpassing a record high in 2022. One element that has contributed to this increased participation is a greater opportunity for interested volunteers to attend a training. Since 2021, the DNR has started offering live trainings online via zoom in addition to the 2-3 in person trainings held in different locations each year.

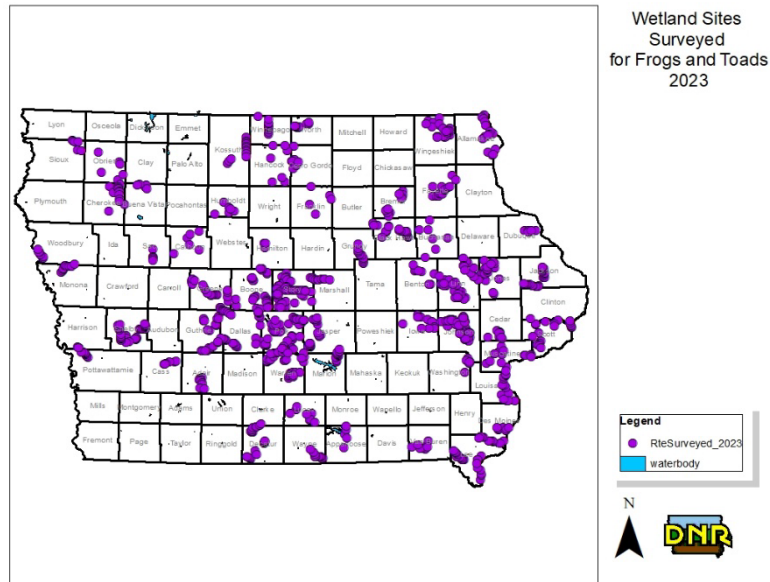


Figure 1. Wetland sites surveyed in 2023

METHODS

The frog and toad call surveys are conducted by volunteers at night on routes that are repeatedly surveyed each year. Routes contain a collection of 5-10 “wetland” sites and there are two different types of routes. Traditional survey routes are not random, having sites which were chosen by a volunteer surveyor, and they 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 distance rule. The second type of route are the randomly placed NAAMP routes added in 2010. The NAAMP routes have a set 15-mile route to drive, along which are 10 survey stops all that are at least 0.5 miles apart.

To conduct the survey, volunteers are assigned to a route which they are annually responsible for until they retire from the survey. They are instructed to collect data on their route three times each year during 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 anuran 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 preferably after a rain, 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 of each species using the following 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 naïve trends in species occurrence by examining the percentage of surveyed wetlands where each species is detected 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. Surveys were done on average within 3.72 days of a rain event which was the longest interval recorded since 2015. The previous 8-year average was 2.49 days since rain. This interval since rain was particularly high during the second survey window (May 7-June 7), but also was high during the first survey window and was closer to average for survey window 3. The average temperatures recorded during the survey were all in line with previous years and for all survey windows were well above the minimum temperature requirement.

Chorus frogs, cricket frogs, American toads, and eastern gray treefrogs were the four most common species recorded on the survey. All of these species have a statewide distribution and can use many different types of wetlands for breeding, with the exception, perhaps, of the gray treefrog. One notable trend among these very common species is that American toads and eastern gray treefrogs appear to have notable declining trends over the last 10 years. Cricket frogs on the other hand appear to be increasing. (Figure 2). Until recently, the NAAMP and traditional datasets could not be combined, limiting trends to the period from 2015 onward. Work has been done to combine these datasets all the way back to the initiation year for NAAMP in 2010. This made this ten-year trend analysis possible. These trends need to be investigated further to assess whether they are the result of bias or not. For example, there is a high concentration of volunteers and routes in urban areas so might these trends be reflecting something that is happening in urban environments and not across the board.

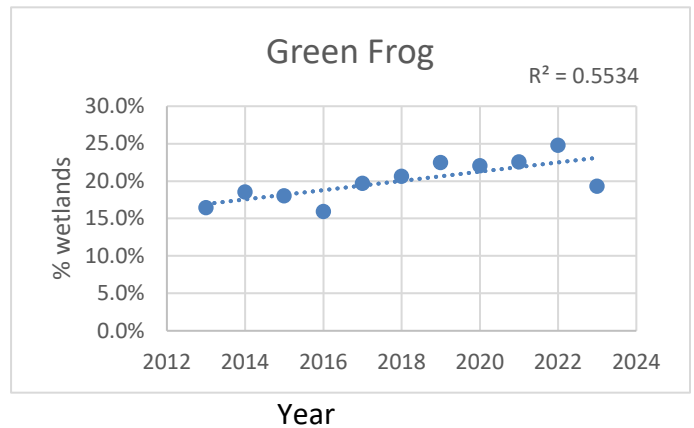
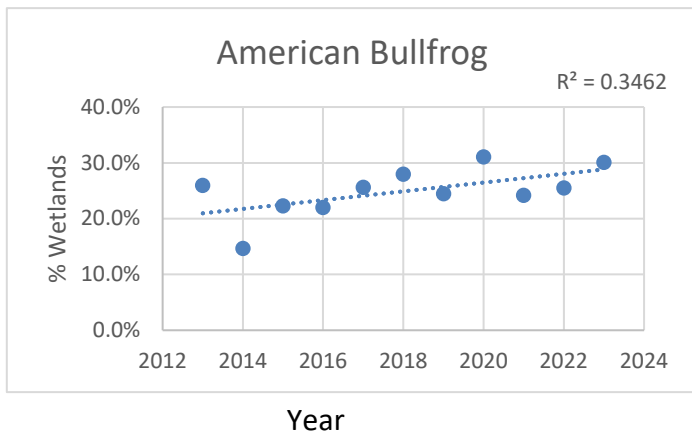
For those species for which we have enough data, the one additional species with the strongest trend over the last 10 years besides the eastern gray treefrog, American toad and cricket frog is the green frog which has an increasing trend (Figure 2). The bullfrog has a very slight positive trend. Most other species show a very weak or flat trend (Figure 2).

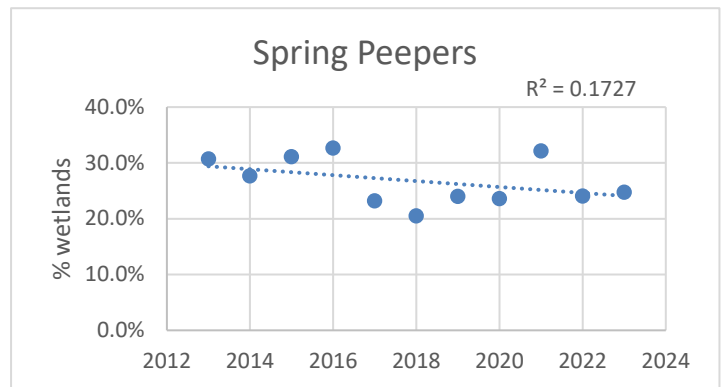
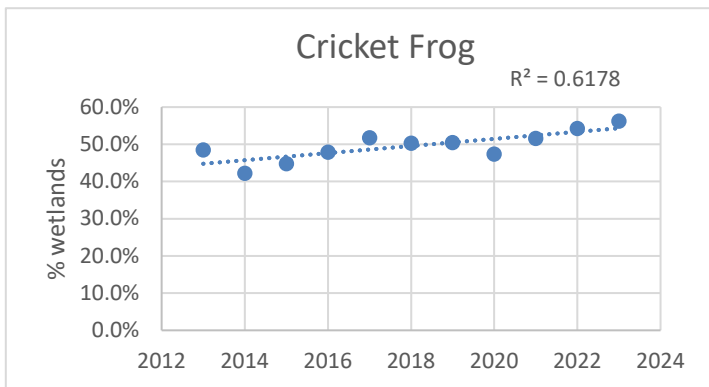
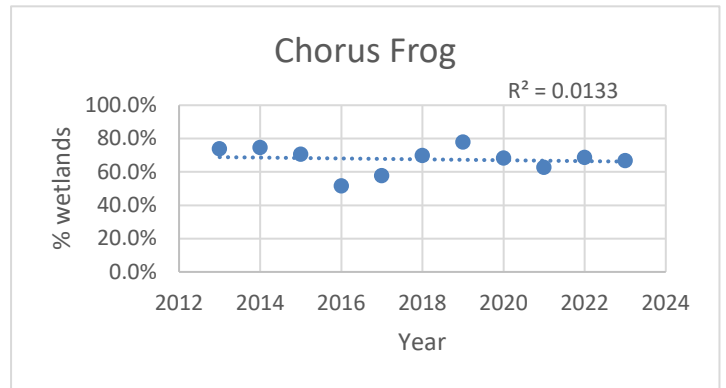
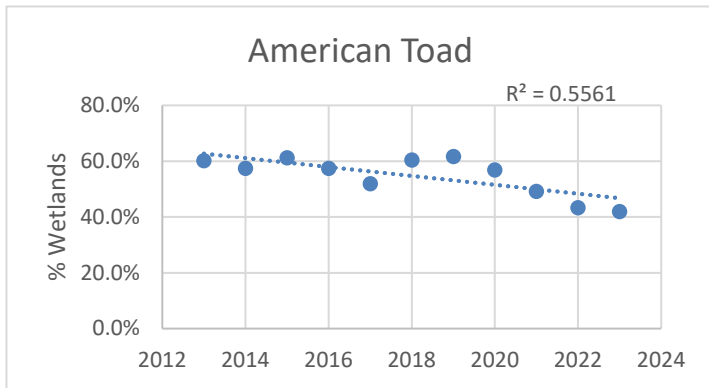
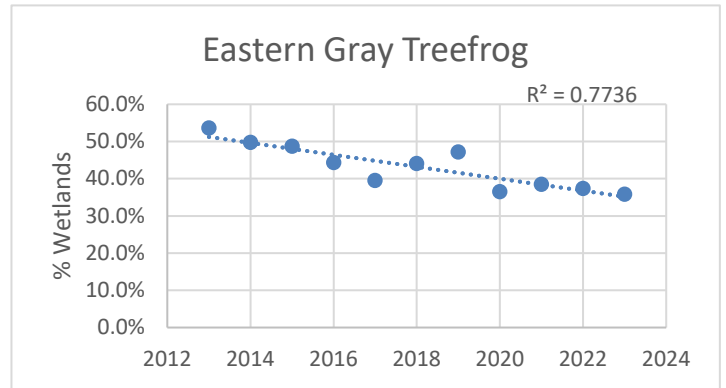
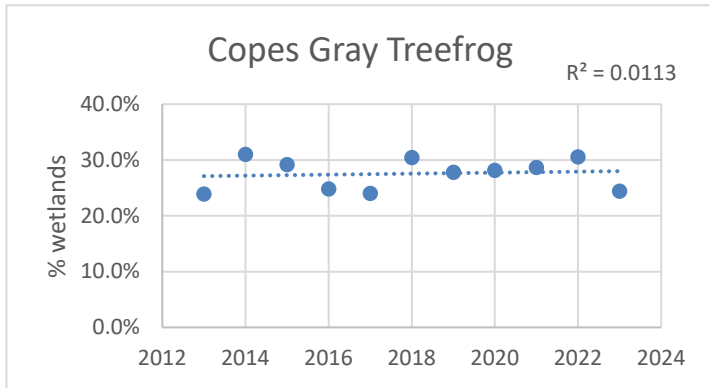
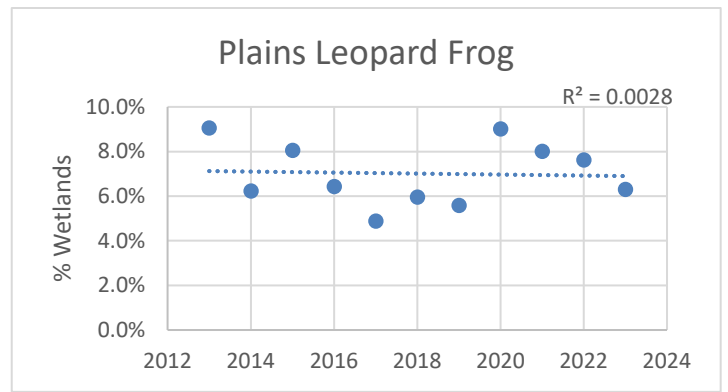
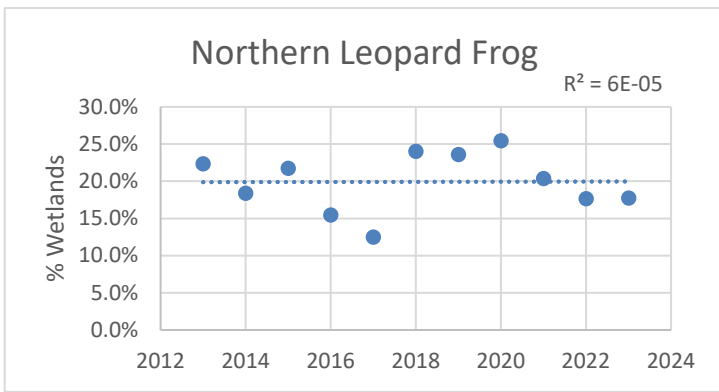
There were only two species not detected on the survey in 2023; the state endangered, likely extirpated Crawfish frog, and the Wood frog, which is possible in the state but has never been detected.

The most abundant species when found, based on the average call index, was the cricket frog or great plains toad both of which had an average call index of 2.29 (Table 1). The overall average abundance index for all species combined this year was significantly lower than in 2022 but was right around the 10-year average.

Table 1. 2023 Summary of data collected by volunteer monitors on Iowa’s Frog and Toad Call Survey

Species	Total Sites Detected	Total Possible sites	%Sites Detected	Sites Run 1	Sites Run 2	Sites Run 3	Total Visits Detected	Average Call Index
Chorus Frog	569	851	66.9%	526	212	52	790	1.97
Cricket Frog	478	851	56.2%	14	353	371	738	2.29
American Toad	357	851	42.0%	69	263	2	334	1.68
Eastern Gray Treefrog	305	851	35.8%	19	233	187	439	1.95
Bullfrog	256	851	30.1%	2	81	236	319	1.26
Spring Peeper	166	671	24.7%	155	50	3	208	1.89
So. Leopard Frog	19	73	26.0%	17	2	0	19	1.11
Cope's Gray Treefrog	208	851	24.4%	9	150	107	266	1.65
Green Frog	117	606	19.3%	0	49	98	147	1.26
Great Plains Toad	6	32	18.8%	0	3	4	7	2.29
Fowler's Toad	9	73	12.3%	1	6	6	13	1.77
Northern Leopard Frog	151	851	17.7%	120	32	8	160	1.34
Unknown Gray Treefrog	117	851	13.7%	8	82	63	153	1.93
Plains Spadefoot	2	32	6.3%	0	0	2	2	1
Plains Leopard	24	381	6.3%	11	6	7	24	1.63
Leopard Frog	33	851	3.9%	24	10	1	35	1.23
Pickeral Frog	8	229	3.5%	4	4	0	8	1.13
Woodhouse's Toad	2	171	1.2%	0	1	1	2	2
Crawfish Frog	0	0	0.0%	0	0	0	0	0
Wood Frog	NA	NA	NA	NA	NA	NA	NA	NA





YEAR

YEAR

Figure 2. Charts showing the trends from 2013 to 2023 for frog and toad species detected regularly in 2023.

DISCUSSION

The 2023 anuran breeding season was characterized by drought. According to the Department of Agriculture and Land Stewardship average precipitation overall this year was between 2.35" (Northwest) and 11.99"(East Central) less than the 30 year average, with the statewide average being 9.13" less. At the same time, 2023 has been the hottest year on record at the global scale. In Iowa, April May and June all had higher than average temperatures paired with lower than average rainfall. July was cooler than average but still had lower than average rainfall. These trends were exhibited in the survey by the average days since rain, which was the highest number in recent years (Run 1 = 3.82 days, Run 2 = 4.59 days and Run 3 = 2.75 days).

Statewide the drought did not affect frog and toad numbers noticeably. Most species were slightly down or similar to 2022 numbers and the average call index was lower than in 2022 meaning that where they occurred, individuals were less abundant. However, 2022 appeared to have a particularly high average call index and this year's was in line with the previous years' combined average.

The species that had the biggest drops between 2022 and 2023 were Cope's Gray Treefrog, plain's leopard frog and green frog. According to the Drought Monitor (<https://droughtmonitor.unl.edu>), there are roughly 28 counties in Iowa with 80% + of their area in the extreme drought category. Most of these counties are in eastern and southeastern Iowa, which may explain the dip in number for green frogs and plains leopard frogs, both of which have restricted ranges that fall in these areas.

Looking at longer trends, we can now examine data from 2013 through 2023. 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 with our long established "traditional" routes. Integrating the two datasets has taken some time but we are slowly able to work with more years of combined data

Four species are demonstrating the strongest trends in this longer time frame; green frog and cricket frog which have increased and eastern gray treefrog and American toad which have decreased. This analysis doesn't really examine the reason for these trends but a more thorough analysis of 30 years of these survey data may clarify whether this is a more recent phenomenon and what might be driving it. The next step, to test how true these trends are, is to examine the data with some variables that might have an effect (like urban sites vs. rural) and see if anything in the trajectory changes. We also intend to continue to expand the number of years that can be included in the trends.

One of our recent goals for the survey was to recruit more surveyors in the areas of the state where distribution limited species occur. The survey made some steps forward with this goal by increasing the number of routes being done in Southeastern Iowa. This increased survey effort resulted in all known extant species being detected on the survey which is a rare occurrence! Often missed are the Fowler's Toad and Pickerel frog which are both only found in southeastern or far eastern Iowa respectively. We will continue to work to fill in gaps, particularly in western Iowa.

Iowa DNR staff have also been working on a long-term analysis of the first 30 years of data collected by this survey. This analysis will hopefully provide insight into what variables might be influencing Iowa's frogs and toads and will also highlight where the survey could be enhanced to collect the most useful data for amphibian management.

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. We had 128 monitors participate this year, 35 of which were new volunteers. Thank you

and WELCOME! Among that 128 are also many monitors who have been participating for over 10 years and at least 10 people that have collected data for over 20! A huge thank you to all of the volunteers who have braved the night time country roads to further Iowa's 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.