

WISCONSIN ENDANGERED RESOURCES REPORT 16

WISCONSIN'S FROG AND TOAD SURVEY, 1984

by Michael J. Mossman and Ruth L. Hine

SUMMARY

Cooperators surveyed 63 routes in 38 Wisconsin counties and adjoining parts of Iowa and Minnesota. Wood frogs, chorus frogs, green frogs and American toads were found throughout most of the state. Spring peepers were common, but absent from urban areas. Cope's and Eastern gray tree frogs were less common. Bullfrogs were common in the lower Mississippi River bottoms and in scattered locations throughout the state. The leopard frog, a "watch" species, was common but irregular in distribution. Pickerel frogs were again most common in the driftless area. Mink frogs were heard at 16 sites in northern Wisconsin.

The dramatic decline of the endangered cricket frog during the past two decades continues without any understanding of its causes. It was reported (but not documented) at 4 sites in the southern half of the state, but several reports were verified outside of the survey routes.

Frequently repeated visits to certain sites documented daily and seasonal variations in call index values associated with changes in air temperature. Differences in call index values between 2 sites were associated with water temperature differences. These data suggest the need for longterm monitoring to account for such variation and so provide accurate information on species abundance and distribution.

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April 1985

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INTRODUCTION

The Wisconsin frog and toad survey was begun in 1981 to collect distributional information and monitor long-term population trends for the state's 12 native anuran species. During the first 3 years of the survey, many auditory monitoring routes were established throughout the state, and methods, data forms, and routes were modified. By 1984 the methods and nearly all permanent survey routes had been established. Mossman and Hine (1984) described the development of the survey and summarized results of the first 3 years. This report summarizes the 1984 survey.

METHODS

Sixty-three survey routes were run by volunteers and natural resource agency personnel in 1984 (Figure 1, Table 1). Two of these routes were just beyond the Wisconsin border along the Mississippi River. Each route consists of 10 listening points subjectively located near wetland sites, usually on roadsides. Each route was run 3 times during the year, once during each of the periods 15-30 April, 20 May-5 June, and 1-15 July. At each site the observers listened for a 5-10 minute period recording one of the following "call index" values for each species heard:

- 1 = individuals can be counted; there is space between calls.
- 2 = calls of individuals are distinguishable but some calls overlap.
- 3 = full chorus; calls are constant, continuous, and overlapping.

Observers were asked to document the occurrence of the endangered cricket frog (*Acris crepitans*) or other species found outside their currently-recognized range. See Mossman and Hine (1984) for a more complete description of methods. Twelve of the 63 routes were not run strictly according to these methods (Table 1), but were run fewer than 3 times, with fewer than 10 sites on each run, or far outside the suggested survey periods.

In an expanded effort, three observers collected data on the phenology of anuran calls at frequently-visited wetland sites near their homes: Ronald Eckstein made 41 visits to a seasonal, 0.1-ha sedge/leatherleaf (*Chaemedaphne calyculata*) bog in Oneida County between 9 April and 29 May; Karen Voss made 13 visits to a 4-ha, partially wooded pond and marsh in Eau Claire County between 12 April and 15 July; Carol Rudy made 14 visits to a wooded swamp in Calumet County during 25 April - 15 June, and 22 visits to a grass-sedge-cattail (*Typha* sp.) marsh during 25 April - 3 August. During each evening visit observers listened for 5-10 minutes and recorded call index values, air and (Voss and Rudy only) water temperatures.

Frog survey cooperators and other observers were also sent "miscellaneous observation" forms for recording call index values and sightings of anurans from sites other than the permanent survey routes.

During 23-25 July, Mossman, Connie Mueller, and Eric Epstein surveyed 17 known or potential cricket frog sites in Grant, Iowa, and Lafayette counties, documenting all calls on tape, using a parabolic microphone. During 13-17 June, Mossman canoed the Lower Wisconsin River from Lone Rock (Sauk County) to Bridgeport (Crawford County), broadcasting tape recordings of cricket frog songs at several sites and listening for cricket frogs and other species throughout the trip.

RESULTS AND DISCUSSION

The Survey

Of the 63 routes surveyed in 1984 (Table 1), 62 are considered permanent while the remaining route (number 532) contained only 9 sites and will hopefully become permanent in 1985 with the addition of another site. New volunteers are still being recruited and 4-6 new routes will probably be added to this list in 1985. Of the 1984 routes, 49 were run according to the survey requirements, i.e., all 10 sites were surveyed 3 times each, during the suggested time periods. Although information from the remaining routes is limited it is still useful for certain species when the survey is run during those suggested time periods that cover the particular species' breeding season. Incomplete annual surveys also limit the monitoring function of the survey program. Recruiting one or more competent, alternate observers for each route will help ensure that each survey is run thoroughly each year, regardless of unforeseen absence, illness, bad weather, or other situations that often prevent a primary cooperator from completing each survey.

Survey results from 1984 are summarized in Table 2. This table gives a rough indication of the relative abundance of each species statewide and in different regions of the state. Its value in this regard is limited by 3 factors:

1. Each route was chosen to represent the variety of wetlands within an area but the choice was subjective.
2. Not all areas of the state were covered equally.
3. Some species are more detectable than others, e.g., they are louder or call more frequently.

The following discussion of the survey results bears these limitations in mind.

As in 1983, wood frogs (Rana sylvatica) were found throughout most of the state, most frequently in northern Wisconsin and least often in the most urbanized and least wooded areas. The timing of the year's first survey is critical to the monitoring of this species because of its brief calling

period. A few observers have commented that if they were to wait until water temperatures reached 50° before conducting their first survey, as suggested in the survey suggestions, they would miss the peak of wood frog activity.

Of those routes that were run during both the first and second survey periods, all but 3 (94%) produced chorus frogs (Pseudacris triseriata) (Table 2). These 3 routes were in Bayfield, Iron and Trempealeau counties. Chorus frogs were common in urban areas in both 1983 and 1984.

As in 1983, spring peepers (Hyla crucifer) were absent or rare from most urban areas and some other areas such as Horicon Marsh. Although the species is considered threatened in Iowa (Table 3) it remains common in non-urban areas throughout most of Wisconsin. It was the most frequently recorded of all species, being found at 78% of those sites visited during the first 2 survey periods (Table 2).

The leopard frog (Rana pipiens) is on Wisconsin's "Watch" list. It was fairly common but somewhat irregular in its occurrence in 1984. Pickerel frogs (R. palustris) were recorded from routes in 9 Wisconsin counties, most frequently in the driftless area.

As in 1983, American toads (Bufo americanus) were widespread. Their scarcity or absence from scattered routes may simply reflect their relatively short, intense calling period. Future monitoring and phenological observations will help interpret these results.

Both species of gray treefrogs were recorded frequently, although the eastern (Hyla versicolor) is apparently more common than Cope's (H. chrysoscelis). The former was recorded at 56% of sites and 81% of routes while Cope's was recorded at 29% of sites and 68% of routes (Table 2). However, in Waukesha, Walworth, Dane, Columbia and Douglas counties Cope's gray treefrog was found more frequently than the eastern species. Data from both 1983 and 1984 show that in Vogt's (1981) range maps, the blank areas for Cope's gray treefrog (in northcentral Wisconsin) and eastern gray treefrog (in southeastern Wisconsin) represent areas of low densities for the respective species, rather than actual absences.

The endangered cricket frog was reported from a total of 4 sites on as many routes in the southern half of the state, although no records were verified by tape-recordings, photos or specimens. However, several other records were verified from sites not on the standard survey routes. Dick Nikolai counted over 220 cricket frogs in two adjacent Iowa County farm ponds, and secured photographs. Karl and Dorothy Legler reported cricket frog calls from 3 sites in Grant County. Mossman, Mueller, and Epstein later tape-recorded calls at all 3 sites and at an additional Grant County site. Leglers and Mossman et al. failed to find the species at a site in Lafayette County where the Leglers had heard calls in 1983. Mossman also tape-recorded cricket frog calls at two sites in Governor Dodge State Park, Iowa County. Undocumented occurrences were reported from 4 additional sites in the state.

This species was once common throughout much of southern and central Wisconsin, but it has nearly disappeared from the state during the past 2 decades. Cricket frogs were formerly abundant along the Lower Wisconsin River (Vogt 1981, George Knudsen pers. comm.), but Mossman heard none on his June canoe survey. Maarit Threlfall supplied a 1972 tape-recording of cricket frogs at Cherokee Marsh, where the species no longer occurs. Other observers reported specific sites from which they know the species to have been extirpated in recent years. Population problems have also been suspected in neighboring states (Table 3). Although the population decline has been striking, its causes are unknown. There is an immediate need for more work on the statewide distribution of the cricket frog and the causes of its decline.

Mink frogs (*Rana septentrionalis*) were recorded at 3% of survey sites statewide. It was reported from 14 sites in northern Wisconsin and from 2 sites south of its known range, in Outagamie County. These records and a 1983 record from adjacent Waupaca County have not been verified.

The green frog (*R. clamitans*) was the most widespread of all species. It was found on 98% of those routes visited during the last 2 survey periods.

Although observers in various parts of the state continue to be concerned with declines in local bullfrog (*R. catesbiana*) populations, this "watch" species remains common in the Mississippi River bottoms of southwestern Wisconsin and adjacent Iowa and Minnesota. It was recorded on 28 of the 30 sites sampled along this stretch of river, but was absent farther upstream at Trempealeau National Wildlife Refuge. Other populations were scattered throughout the state. Several additional local populations of this species were reported in 1984 but more distributional information is needed.

Song Phenology

Observers who have made repeated nighttime visits to a particular wetland site realize that the call index value for a particular species can vary markedly from day to day or even within the period of a single evening. Figure 2 illustrates this variability for 3 early-season species at a bog in Oneida county. One of the daily factors affecting call index is air temperature, as indicated by the cessation of calling by all species during the late April cold spell.

The broader pattern of song phenology for individual species may also vary between wetlands due to differences in water temperature, which in turn may be affected by such factors as geography, water depth, presence of springs, or wetland size. Figure 3 illustrates the earlier calling period of green frogs and eastern gray treefrogs in a warm Eau Claire wetland, in comparison to a cooler wetland in Calumet County. Daily air temperatures were similar at both sites.

Daily and seasonal patterns of calling can also vary from year to year within the same wetland, as a result of annual weather differences. Because of daily, annual, and between-site variation in the call index, the monitoring program requires repeated annual surveys to provide an "average" index for particular sites and routes so that meaningful, long-term comparisons can be made. To help determine the number of replicates needed and the reliability of our survey data, further quantitative observations are needed on all 3 types of variability.

CONCLUSIONS

The 1984 survey provided important information on the status and distribution of frog and toad species in Wisconsin, in particular regarding the relative distribution of eastern and Cope's gray treefrogs, the location of bullfrog concentrations, and the rarity of the endangered cricket frog. Final confirmation of rare or "extralimital" occurrences awaits documentation of individual site records.

The number of permanent routes conducted under standard procedure has steadily increased since the program's inception in 1981 and the addition of new routes in 1985 should bring the total number to at least 65. However, there is still a need to establish routes in poorly sampled sections of the state, notably the northeast and central-northwest counties, and in sites outside the Mississippi River floodplain in the southwest. The use of non-standard procedures by some cooperators remains a problem -- especially the omission of one or more of the 3 survey runs. Because it is sometimes difficult for a single cooperator to conduct all 3 surveys in a given year, we again stress the need for cooperators to recruit alternate observers to cover their routes when necessary.

Phenological data collected in 1984 helped document the variability of calling frequency for certain species within particular wetlands, and suggested the effects of date and of air and water temperatures on calling frequency. More phenological data are needed from a variety of wetland sites throughout the state to quantify daily, annual, and between-site variation in the call index and thus help interpret standard survey data.

Cooperators collected substantial additional information on the poorly known distribution of cricket frogs in Wisconsin. Although several records remain undocumented, areas have been identified for intensive surveys in 1985.

ACKNOWLEDGEMENTS

This survey is based on the efforts and expertise of volunteers throughout Wisconsin, many of whom collected additional information besides running the standard survey routes. In addition to the cooperators listed in Table 1, the following people contributed data during the past year: Peter Bigelow, Gary Dunsmoor, Eric Epstein, Jim Evrard, Harold Lindberg, Jeff Reidi, Clark Schultz.

We extend our thanks to Ray Anderson and the University of Wisconsin-Stevens Point for providing the cassette tape of Wisconsin frog and toad calls, and to Mark Martin and the Madison Audubon Society for making these tapes available to cooperators at cost. We are forever grateful to Dr. Charlene Gieck for summarizing various data.

The Wisconsin Frog and Toad Survey is made possible by contributions to the Endangered Resources Fund.

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Table 1. Wisconsin frog and toad survey routes, 1984.

Route Number	Route Name	Primary Observer	1984				First Year of Permanent Route
			Number of Sites Surveyed*				
021	Ashland - Marengo	John and Ellie Thomason	10	10	10	10	1984
041	Bayfield - Northwest	Fred Strand	10	10	10	10	1981
042	Bayfield - Grandview	Steve and Rory Sorenson	10	10	10	10	1983
043	Bayfield - Mason	Nancy Weber and Carl Westlund	10	10	10	10	1984
051	Brown - Green Bay	Randy Korb	10	10	10	10	1984
071	Burnett - Crex Meadows	Jim Hoefler	10	10	10	10	1981
081	Calumet - Brown	Dick Nikolai	10	10	10	10	1982
082	Calumet - Brothertown	Carol Rudy	10	10	10	10	1984
111	Columbia - Arlington	Mark and Sue Martin	10	10	10	10	1982
112	Columbia - Otsego	Summer Matteson, Jim T. Harris	10	10	10	10	1983
113	Columbia - Courtland	Gerald Barfelt	10	10	10	10	1984
131	Dane - Arboretum	David Sample, Ann McLain, Brandy French	10	10	10	10	1984
132	Dane - Stoughton	Gary Birch	10	10	2	2	1983
133	Dane - Cherokee	Lu Severson, Marrit Threlfall	10	10	10	10	1983
134	Dane - Middleton	Louise Eberhart, Jobelle Shands	10	10	10	10	1983
135	Dane - Martinsville	Nancy Heiden, Sylvia Marek, Mary Mullen	(10)	10	10	10	1983
138	Dane - Mazomanie	Michael Mossman	10	10	10	10	1984
141	Dodge - Horicon West	Larry Vine	10	10	--	--	1981
142	Dodge - Horicon East	Bill Wheeler	10	10	10	10	1981
151	Door - Sturgeon Bay	J.J. Goodwin	10	10	10	10	1983
161	Douglas - Gordon	Kevin Morgan	10	10	10	10	1983
181	Eau Claire - Washington	Terry Balding	10	10	10	10	1983

Table 1 (continued)

Route Number	Route Name	Primary Observer	1984		First Year of Permanent Route
			Number of Sites	Surveyed*	
182	Eau Claire - Seymour	Michael Well	10	10	1983
183	Eau Claire - Brunswick	Karen Voss	10	10	1984
211	Forest - Laona	Gary Zimmer	10	10	1984
221	Grant - Mississippi	John Lyons, Connie Mueller	--	--	1984
231	Green - Rock	Steve Apfelbaum	10	(7)	1985?
251	Iowa - Arena	Robert Ellarson	(10)	10	1983
261	Iron - Mercer	John Olson	10	10	1984
262	Iron - Montreal	Carol and Charlie Zinsmaster	10	10	1982
281	Jefferson - Lake Mills	Karen Etter Hale, Jim Hale	10	10	1983
291	Juneau - Lyndon	Stephan Carlson, Barb Dennis	10	10	1983
292	Juneau - Camp Williams	Michael Ebersold	10	10	1984
301	Kenosha - Bong	Cathy Chybowsky, Vern Wolf, Bob Momper	10	10	1984
351	Lincoln - Tomahawk	Nancy Weber	10	10	1984
391	Marquette - Newton	Tom and Barb Peinar	10	10	1984
392	Marquette - Montello	Daryl Christensen	10	10	1984
421	Monroe - Tomah	Kim and Vicki Mallo	10	10	1983
441	Onelda - Rhineland	Ron Eckstein	10	--	1984
442	Onelda - McNaughton	Ron Eckstein	10	--	1984
443	Onelda - Hazelhurst	Woody Hagge	10	10	1984
451	Outagamie - Ellington	Arlene Laird	10	10	1983
531	Richland - Rockbridge	Barb Duerksen, Robert Hirschy	8	10	1984

Table 1 (continued)

Route Number	Route Name	Primary Observer	1984		First Year of Permanent Route
			Number of Sites Surveyed*	Number of Sites Surveyed*	
532	Richland - Willow Creek	Nancy Nichols, L. Grubb	9	(9)	1985?
561	St. Croix - Stanton	Bruce Bacon	10	10	1983
571	Sauk - South	Karl and Dorothy Legler	10	10	1981
572	Sauk - Merrimac	Ken Lange	10	10	1981
573	Sauk - Fairfield	Lisa Hartman	10	10	1984
574	Sauk - Otter Creek	Michael Mossman, Lisa Hartman	10	10	1984
601	Sheboygan - Fond du Lac	Roger Rief	10	10	1983
611	Taylor - Stetsonville	Norma and Mike Riegert	10	10	1984
621	Trempealeau - NWR	Robert Drieslein, Tom Hunter	10	10	1984
641	Vilas - Boulder Junction	Ron Eckstein	--	--	1984
651	Walworth - East Troy	Robert Pulliam	10	10	1984
652	Walworth - Whitewater	Galen Smith, Charles North, Daniel Sable	10	10	1982
671	Washington - Hartford	Judy Haseleu, Bill Holmes	10	10	1983
681	Waukesha - Ottawa	John Bleiefeldt, Margaret Amberg	10	10	1982
691	Waupaca - New London	James S. Anderson	--	10	1982
701	Waushara - Richford	John Shillinglaw	10	(9)	1984
712	Winnebago - Outagamie	Dave Evenson, Eleanor & Howard Brenneke	10	10	1983
721	Wood - Babcock	John Kubisiak	10	10	1981
801	Altafamee (Iowa) - Miss. River	Margaret Anderson	10	10	1982
901	Houston (Minn.) - Miss. River	Margaret Anderson	--	10	1982

*Parentheses indicate route was run too far outside of suggested survey period.

Table 2. Summary of 1984 Wisconsin Frog and Toad Survey results by route: number of sites at which each species was recorded.

Route Number	County	Wood Frog	Chorus Frog	Spring Peeper	Leopard Frog	Pickered Frog	American Toad	E. Gray Treefrog	Cope's Treefrog	Cricket Frog	Mink Frog	Green Frog	Bullfrog	Total No. of Species
021	Ashland	8	5	10	--	--	1	5	--	--	--	5	--	6
041	Bayfield	5	--	10	3	--	5	5	--	--	3	3	--	7
042	Bayfield	7	3	10	1	2	3	8	6	--	--	6	--	9
043	Bayfield	10	3	10	2	--	--	3	1	--	--	7	--	7
051	Brown	--	1	7	8	--	5	7	--	--	--	1	2	7
071	Burnett	8	6	10	7	--	7	10	6	--	--	4	--	8
081	Calumet	10	9	2	6	--	10	6	--	1**	--	4	--	8
082	Calumet	6	2	3	5	--	9	8	2	--	--	5	--	8
111	Columbia	5	8	10	6	--	4	10	5	--	--	8	--	8
112	Columbia	1	10	10	7	--	4	8	10	--	--	10	--	8
113	Columbia	--	7	10	5	--	9	--	10	--	--	7	--	6
131	Dane	--	7	--	4	--	7	--	1	--	--	4	--	5
132	Dane	--	9	2	3	--	6	(11)*	(7)	(--)	(--)	(4)	(--)	7
133	Dane	--	10	--	7	--	1	--	3	--	--	5	--	5
134	Dane	--	5	2	4	--	5	--	2	--	--	1	--	6
135	Dane	(--)	(3)	(8)	(2)	(--)	8	2	5	--	--	7	--	7
138	Dane	3	6	10	8	1	--	--	1	--	--	7	2	8
141	Dodge	--	9	--	3	--	1	(1)	(--)	(--)	(--)	(--)	(--)	4
142	Dodge	2	5	--	5	--	7	--	--	--	--	6	--	5
151	Door	8	9	9	--	--	7	6	--	--	--	--	--	5
161	Douglas	2	8	10	8	--	8	8	9	--	4	8	3	10
181	Eau Claire	9	6	10	7	2	3	2	4	--	--	10	--	9
182	Eau Claire	9	3	8	8	--	8	7	--	--	--	6	1	8
183	Eau Claire	10	8	10	6	--	2	8	7	--	--	10	--	8
211	Forest	7	5	10	1	--	7	9	1	--	--	8	--	8
221	Grant	(--)	(--)	(--)	(--)	(--)	(2)	(8)	(--)	(1**)	(--)	(6)	(8)	5

Table 2 (continued)

Route Number	County	Wood Frog	Chorus Frog	Spring Peeper	Leopard Frog	Pickered Frog	American Toad	E. Gray Treefrog	Cope's Treefrog	Cricket Frog	Mink Frog	Green Frog	Bullfrog	Total No. of Species
231	Green	1	(2)	(4)	(--)	(--)	(7)	(1)	(--)	(--)	(--)	(--)	(--)	5
251	Iowa	(--)	(6)	10	(4)	(5)	7	(7)	(5)	(--)	(--)	(6)	(--)	8
261	Iron	10	4	10	7	--	6	7	2	-	5	7	6	10
262	Iron	10	--	10	2	--	1	--	--	--	--	3	--	5
281	Jefferson	1	8	7	5	--	9	7	3	--	--	8	--	8
291	Juneau	3	9	10	2	--	10	9	2	--	--	8	--	8
292	Juneau	6	10	10	4	--	--	10	10	--	--	6	--	7
301	Kenosha	--	10	--	2	--	--	--	--	--	--	9	--	3
351	Lincoln	7	8	10	4	--	3	5	1	--	--	6	3	9
391	Marquette	9	5	9	7	--	8	10	1	1**	--	9	--	9
392	Marquette	5	9	10	1	2	6	7	7	--	--	9	--	9
421	Monroe	--	9	10	5	--	9	9	7	--	--	8	--	7
441	Oneida	8	(1)	(9)	(4)	(--)	(2)	(--)	(--)	(--)	(--)	(--)	(--)	5
442	Oneida	9	(--)	(9)	(2)	(--)	(3)	(--)	(--)	(--)	(--)	(--)	(--)	4
443	Oneida	9	7	10	1	--	4	8	--	--	1	9	5	9
451	Outagamie	6	8	6	6	--	9	4	1	--	2	5	1	10
531	Richland	(--)	(8)	10	(4)	(2)	8	9	3	--	--	9	--	8
532	Richland	(9)	(9)	(1)	(--)	(--)	(7)	(4)	(--)	(--)	(--)	(5)	(--)	6
561	St. Croix	5	6	10	2	--	7	9	--	--	--	2	--	7
571	Sauk	6	1	10	6	2	8	10	--	--	--	9	--	8
572	Sauk	1	4	6	4	--	8	3	1	--	--	6	--	8
573	Sauk	5	9	9	3	1	3	8	3	--	--	4	1	9
574	Sauk	8	7	10	--	1	5	5	3	--	--	5	--	8
601	Sheboygan	4	6	8	4	--	--	6	1	--	--	9	--	7
611	Taylor	6	2	8	4	--	8	7	1	--	--	7	--	8
621	Trempealeau	6	--	10	--	--	7	10	--	--	--	9	--	5

Table 2 (continued)

Route Number	County	Wood Frog	Chorus Frog	Spring Peeper	Leopard Frog	Pickrel Frog	American Toad	E. Gray Treefrog	Cope's Treefrog	Cricket Frog	Mink Frog	Green Frog	Bull-frog	Total No. of Species
641	Vilas	(--)	(--)	(--)	(--)	(--)	(--)	(--)	(--)	(--)	(1)	(5)	(4)	3
651	Walworth	--	5	7	--	--	5	2	4	--	--	10	--	6
652	Walworth	--	6	8	5	--	2	--	8	--	--	10	2	7
671	Washington	3	8	6	2	--	7	7	7	--	--	6	1	9
681	Maukesha	--	10	10	5	1	5	1	6	--	--	10	--	8
691	Waupaca	(--)	(--)	(1)	(--)	(--)	10	6	--	--	--	10	--	4
701	Waushara	5	10	10	(9)	(--)	(1)	(1)	(8)	(--)	(--)	(9)	(--)	8
712	Winnebago	6	8	5	3	--	6	--	--	--	--	4	1	7
721	Wood	8	1	10	4	9	6	10	9	1**	--	9	--	10
801	Allamakee, IA	--	6	10	8	3	10	8	--	--	--	10	10	8
901	Houston, MN	(--)	(--)	(3)	(--)	(--)	10	9	--	--	--	10	10	5
SUMMARY***														
Number of standard survey routes		55	52	54	52	52	57	53	53	53	53	53	53	53
Number of routes of occurrence		42	49	49	47	11	52	43	36	3	5	52	14	14
Number of site of occurrence		257	320	422	214	26	321	298	153	3	15	358	48	48
% of routes with species		76%	94%	91%	90%	21%	91%	81%	68%	6%	9%	98%	26%	26%
% of sites with species		47%	62%	78%	41%	5%	56%	56%	29%	1%	3%	68%	9%	9%

* Data in parentheses invalid because fewer than 10 sites were surveyed or because route was not run during suggested time period.

** Cricket frog records not verified.

*** Does not include data in parentheses

Table 3. Midwestern state-listed frog and toad species of special status.

Species	Illinois ¹	Indiana ²	Iowa ³	Michigan ⁴	Minnesota ⁵	Missouri ⁶	Ohio ⁷	Wisconsin
Wood frog (<u>Rana sylvatica</u>)						R		
Chorus frog (<u>Pseudacris triseriata</u>)		SC	UC					
Strecker's chorus frog (<u>Pseudacris streckeri</u>)	T							
Illinois chorus frog (<u>Pseudacris streckeri illinoensis</u>)		UC						
Spring peeper (<u>Hyla crucifer</u>)			T					
Northern leopard frog (<u>Rana pipiens</u>)		SC						W
Pickereel frog (<u>Rana palustris</u>)			UC		SC			
Gray treefrog (<u>Hyla versicolor</u>)			UC					
Cricket frog (<u>Acris crepitans blanchardi</u>)			UC		SC			E
Bullfrog (<u>Rana catesbeiana</u>)					SC			W
Plains spadefoot toad (<u>Scaphiopus bombifrons</u>)			T					

Key: E = Endangered, R = Rare, SC = Special Concern, T = Threatened, UC = Under Consideration for Listing, W = Watch.
Sources: 1 Illinois Department of Conservation and U.S. Fish and Wildlife Service, 1981.
2 Indiana Department of Natural Resources, 1984.
3 Howe 1982
4 Michigan Department of Natural Resources 1983.
5 Minnesota Department of Natural Resources 1984.
6 Missouri Department of Conservation 1982.
7 Ohio Department of Natural Resources 1983.

