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POPULATION OF NORTHERN LEOPARD FROGS (*RANA PIFIENS*) MIGRATING BETWEEN THE NEY FROG POND AND THE MINNESOTA RIVER VALLEY FOR SPRING BREEDING

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Abstract

The Northern Leopard Frogs (*Rana pipiens*) found at the Ney Nature Center (NNC) are particularly important to the NNC, as they are the initial population of frogs found deformed in 1995. As bio-indicators, frog populations can be used to assess the health of their surrounding environment. This study used standard herpetological field methods to gain a population estimate of Northern Leopard Frogs and the migration route used by these frogs as they moved up the bluffs of the Minnesota River Valley from their wintering site to the Ney Frog Pond for spring breeding. The results gathered provide the Ney Environmental Education Foundation (NEEF) an estimated population and route of migration, which allows them to put in place measures to continue to monitor and protect the eco-system of the Ney Nature Center and specifically the Northern Leopard Frogs found on-site. NEEF has committed to preserve, protect, and enhance the natural environment of the NNC.

Introduction

Pond breeding amphibian populations are ideal populations to study when gauging the health of an eco-system, because they depend on wetlands for breeding and surviving in the larvae stage, while spending adulthood on land (Birchfield & Deters,

2005). Amphibian characteristics include two-phase life cycles, thin permeable skin, eggs laid in water, internal source of heat comes from their environment, they are dependent on water and as adults they are carnivores (Karns, 1986). Amphibians are thus bio-indicators because their health reflects the health of the surrounding ecosystem in which they live (MacDonald, 2003).

The purpose of this study is to obtain an initial population estimate of Northern Leopard Frogs, (*Rana pipiens*), migrating from their site of hibernation in the Minnesota River Valley to the Ney Frog Pond, which the frogs use for breeding (Helgen, 2006; Straub, 2006).

Methods

Study organism

Rana pipiens, commonly known as Northern Leopard Frogs, are grassland frogs (Picture 1), found not only throughout Minnesota but as far west and east as the states of Washington and New York, as far north and south as the Hudson Bay and Arizona (Hoffman & Blouin, 2003). Minnesota Northern Leopard Frog populations have two unusual patterns that deviate from the norm of green or brown frogs with uneven lines of dark spots in rows of two or three flanked by obvious dorsolateral ridges, which are also found in Minnesota (Conant & Collins, 1998). Sexually mature frogs migrate to breeding ponds. The sexually immature frogs, those that were born the year before, do not migrate to a breeding pond but migrate directly to the grasslands for summer feeding. There they are joined by the adults after their breeding season has ended (Merrell, 1977). Between spring migration, summer movements and fall migration, Northern Leopard frogs will move distances greater than 3.5 miles (Merrell, 1977).

Predators of the Northern Leopard Frogs include mammals, fish, garter snakes, humans, birds, and turtles (Croshaw, 2005; Merrell, 1977).

Study Site

The Ney Family willed the Ney Nature Center to Le Sueur County as a wildlife preserve in 1990. The NNC is 446 acres, encompassing Minnesota River Bluffs, native prairie, restored prairie, ravines, wetlands, streams, ponds, woods, CRP, and two homesteads.

The Ney Nature Center's Northern Leopard Frogs are important, as they were the initial population of frogs found with deformities in 1995 (NELC, 2006). Studied by the Minnesota Pollution Control Agency until their funding for the project was cut in 2001, no conclusive factors were found to identify the cause of the deformities (MPCA, 2006). By 2001, the Northern Prairie Wildlife Research Center had received 835 verified cases of deformities in 54 species of frogs in 44 states and 4 Canadian provinces (Loeffler et al., 2001).

The NNC's Northern Leopard Frogs over-winter at a Minnesota River backwater lake (Picture 2) and breed at the Ney Frog Pond (Picture 3) (Helgen, 2006; Straub, 2006). The Northern Leopard Frogs are unable to over-winter at the Ney Frog Pond, as their need for oxygenated water would not be met (Merrell, 1977). In the spring these frogs migrate between their over-wintering site (Map 1, location A) and the Ney Frog Pond (Map 1, location B). This route moves the frogs across hazardous landscapes. Leaving the shores of their over-wintering site they cross a set of railroad tracks and Tyrone Township Road 2, and half way up the bluff MN Highway 19 is crossed. Frogs traverse

through woods, an open expanse of lawn, cropland, and grasslands to reach their breeding pond. In the end they will have moved up an estimated 200 foot Minnesota River Bluff.

Materials and Procedure

A drift fence was placed perpendicular to the identified migration route of the Northern Leopard Frogs (Karns, 1986). The drift fence consisted of plywood cut in half the long-way, laid lengthwise end-to-end (Picture 4) and staked with wood stakes. Pit traps were placed approximately every 32 feet along the fence. A pit trap was a five-gallon bucket sunk into the ground with the top rim at ground surface (Picture 5). A board was angled over each trap to protect the frogs from the sun and predators. Ground litter, (leaves and grass clippings) was placed at the bottom of each trap. Traps were checked daily. Frogs were identified, sexed, measured using snout-vent length method (Sjogren-Gulve, 1998a), photographed, and released to proceed on their way. Plastic or latex gloves were worn when handling the frogs. To protect the frog's skin, a wet paper towel was used when picking up the frogs. All specimens were released after data collection. Daily checking of traps began when frogs were observed on shore of overwintering site. Weather data was obtained from the National Oceanic and Atmospheric Administration (NOAA) National Weather Service Weather Forecast Office.

Results

On March 24th after sunset, Northern Leopard Frogs were observed on MN State Highway 19 and Tyrone Township 2. The weather was rainy. The first frogs were found in the pit traps on March 26th (Picture 6). Chart 1 relates the daily weather to the number of frogs caught. Chart 2 portrays individual frog data, sex, and snout-vent length.

In all a total of 32 amphibians were caught between March 26th and May 6th. All were Northern Leopard Frogs (Picture 6) except two: one Grey Tree Frog was caught on March 27th and one American toad was caught on March 28th. Of the Northern Leopard Frogs, 22 were identified as male, six female and two were unsexed.

Chart 1 Daily Data (* NOAA, 2007)

Date	# of Frogs	Temperature High (°F) *	Temperature Low (°F) *	Precipitation (inches) *
3/25	0	70	62	.10 rain
3/26	3	79	60	0
3/27	8	63	52	.03 rain
3/28	1	53	48	.33 rain
3/29	0	56	50	.04 rain
3/30	9	49	45	1.14 rain
3/31	3	47	44	1.21 rain
4/1	0	48	37	.14 rain
4/2	5	47	37	.03 rain
4/3	0	40	19	.02 rain
4/4	0	28	15	Trace rain
4/5	0	29	15	0
4/6	0	26	15	0
4/7	0	33	14	0
4/8	0	38	20	0
4/9	0	42	16	0
4/10	0	41	28	.5 snow
4/11	0	35	29	2.6 snow
4/12	0	43	28	.3 snow
4/13	0	51	30	Trace snow
4/14	0	56	26	T
4/15	0	61	32	0
4/16	0	76	37	0
4/17	0	63	45	0
4/18	0	64	38	0
4/19	0	63	39	0
4/20	0	72	46	Trace rain
4/21	1	82	57	0
4/22	0	74	51	.76 rain
4/23	0	68	47	.01 rain
4/24	1	64	49	0
4/25	0	59	46	0
4/26	0	60	43	0
4/27	0	76	39	0
4/28	0	78	53	0

4/29	0	81	56	0
4/30	0	70	51	.39 rain
5/1	0	66	46	0
5/2	0	66	44	0
5/3	0	69	48	0
5/4	0	60	52	.11 rain
5/5	0	66	55	.23 rain
5/6	1	66	52	.02 rain
5/7	0	70	56	.09 rain
5/8	0	72	51	.33 rain
5/9	0	79	50	0
5/10	0	86	53	0
5/11	0	72	52	0
5/12	0	69	49	Trace rain
5/13	0	91	55	Trace rain
5/14	0	88	64	Trace rain
5/15	0	63	44	Trace rain
5/16	0	58	43	0
5/17	0	70	37	0
5/18	0	83	53	.06 rain
5/19	0	83	37	0
5/20	0	61	40	.02 rain

Chart 2 Frog Data

	Date	Trap #	Sex	SVL (cm)	Additional Information
1	3/26	6	Female	8.9	
2	3/26	6	Male	5.8	
3	3/26	12	Female	5.8	
4	3/27	4	Male	7.5	
5	3/27	4	Female	6.5	
6	3/27	4	Male	7	
7	3/27	10	Male	7	
8	3/27	10	Male	7	
9	3/27	8	Male	3	Grey Tree Frogs
10	3/27	12	Male	8	
11	3/27	12	Male	7.5	
12	3/28	15	Male	No Data	American Toad
13	3/30	2	Male	6	
14	3/30	8	Male	6	
15	3/30	8	Male	5.5	
16	3/30	8	Male	7.5	Broken Leg
17	3/30	10	Male	7	
18	3/30	10	Male	6.5	
19	3/30	12	Male	5.5	
20	3/30	12	Male	7	

21	3/30	15	Female	8	
22	3/31	8	No Data	7	
23	3/31	4	No Data	7	
24	3/31	10	Male	7.5	
25	4/2	4	Male	6	
26	4/2	8	Male	6	
27	4/2	8	Male	7	
28	4/2	10	Male	6.5	
29	4/2	12	Male	6.5	
30	4/21	2	Female	10	Carrying Eggs
31	4/24	8	Female	7	
32	5/6	2	Male	5	

Discussion

Populations of Northern Leopard Frogs have been on the decline for years (Straub, 2006). Roads cause substantial mortality to migrating frogs (Sjogren-Gulve, 1998b). Loss of habitat has been a principal factor in population decline of Northern Leopard Frogs. Over-harvesting is not to be excluded as a factor (Hillis, 1988). The Ney Nature Center lists their number one purpose as “to preserve, protect, and enhance the natural habitats of the Minnesota River Valley wildlife (plants and animals)” (NELC, 2006). With this initial population count the Ney Nature Center can repeat this study to show trends of decline or growth. Future studies including breeding call surveys, egg clutch counts, search-and-seize surveys and range trapping can be used to enhance the results of this study.

With the unusual weather this spring, it is possible that the resulting count of frogs was skewed. Having a significant snow fall in April (Picture 7) could have killed migrating frogs in route. Knowing that the males migrate first and the females follow about a week after the males (Merrell, 1977), it is highly possible that a sizable female

population was migrating during the April snow. This would be unfortunate and highlights the need for future studies.

As the migration route studied is hazardous to the migrating frogs NNC can adopt conservation policies to minimize the impact of these hazards. For example, the expanse of lawn that the frogs migrate across is continuously mowed for use in NNC activities. Having documented this route with a migration time frame specific to this population of frogs enables the NNC to relocate activities and reduce mowing during migration periods. It is also thought that at some point in the future Minnesota State Highway 19, which the frogs cross during migration, may be rebuilt (Pollack, 2006). If rebuilt, this study documents the path of migration used by Ney Northern Leopard Frogs, enabling the NNC to work to ensure such construction be done with as little adverse consequences as possible to the *Rana pipiens* migrating population at the NNC.

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Picture 1 Northern Leopard Frog at the Ney Nature Center



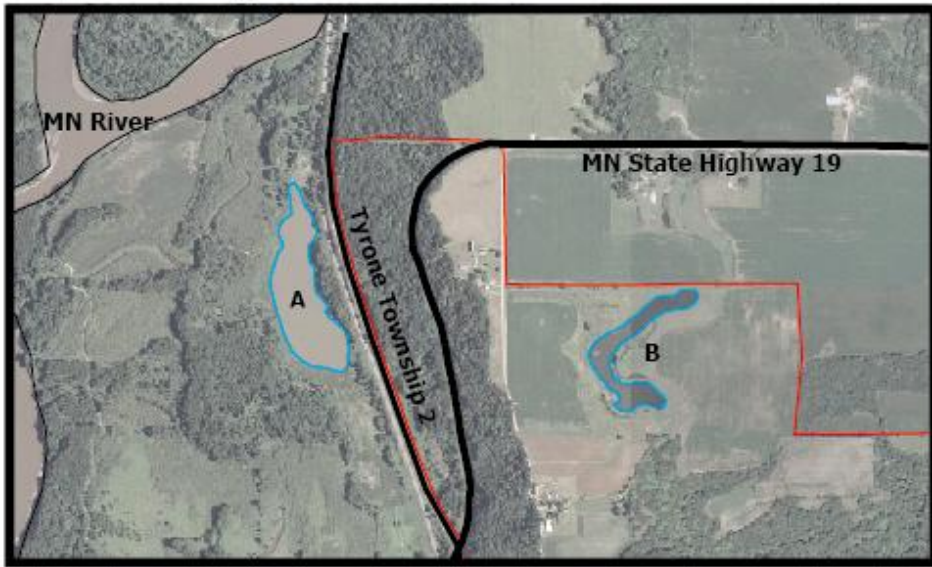
Picture 2 Over-wintering site of the NNC Northern Leopard Frogs




Picture 3 Ney Frog Pond



Map 1 Study Site



-  Ney Nature Center
 - A Winterring Site of Ney Northern Leopard Frogs
 - B Ney Frog Pond (Breeding Pond)
- Rebecca Madison Pollack 2007

Picture 4 Drift Fence



Picture 5 Pit Trap



Picture 6 Frog 1 and 3 caught March 26th



Picture 7 Snow on April 11th

