Illinois Department of Natural Resources
Wildlife Preservation Fund Grant #07-002W
Population Genetic Structure of the Mudpuppy, *Necturus m. maculosus*

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Project Objective:

Different populations of the mudpuppy, *Necturus m. maculosus*, will be compared to find if these populations are genetically distinct. If there is genetic distinction, conservation plans for this species may be more important than previously thought.

Project Description:

Multiple populations of the mudpuppy were sampled from Illinois to assess genetic variation of this secretive species that has not been thoroughly studied throughout its distribution in the United States. (Other areas that samples were collected from include parts of Ohio and Michigan.)

Introduction:

Amphibians are known to be decreasing locally and worldwide due to various environmental and human-induced problems. While the mudpuppy, *Necturus maculosus maculosus*, is thought to be generally abundant in eastern North America, recent Ohio records

are scarce. In Ohio *Necturus* is generally uncommon (although disputed otherwise by different authors). However, due to its' fully aquatic life history it may be locally abundant in and around Lake Erie. The same applies to other states throughout its range. Threats to *Necturus* include lampricide application, increased sedimentation and pollution of waterways, and negative human interactions. The primary goal of this project is to evaluate levels of genetic diversity within and among geographically distinct populations of *Necturus*. Populations from the Lake Erie, the Ohio River basin, the Lake Michigan area, and the Mississippi River may represent demographically and genetically independent units of conservation concern. Blood samples have been collected from twenty-three individuals from the Detroit River (Lake Erie Basin) and the Ohio River Basin. We have successfully performed DNA extractions and standardized the PCR technique for the amplification of the mtDNA control region, a hyper-variable region of the mitochondrial genome that has proven to be useful for intraspecific comparisons. Analyses of Molecular Variance (AMOVA) and phylogenetic analyses of DNA sequences will be performed to identify potential populations of conservation concern.

Materials and Methods:

Trapping was the only method I used to collect samples personally. Gee-minnow traps with two-inch openings were set on the river or lake bottom with processed bait. Traps were checked every 12 to 24 hours before being pulled. While there are many methods that can be used to capture mudpuppies, this is one of the more humane methods (compared to hooked lines or electroshocking). Samples were also obtained from fellow researchers, including Bill Flanagan of the National Amphibian Conservation Center at the Detroit Zoo and Dr. Richard King of Northern Illinois University and his students.

Results:

Gee-minnow traps proved not to be a highly effective method to trap mudpuppies. This may be due to limited time constraints or inactivity of the population. While this method did yield some results, those results were certainly not impressive. If there was more known about this species natural history and use of habitat, collecting for this species in certain areas could become easier and more time efficient. However, with the secretive nature of this species results may not vary significantly. To assess genetics of a population one should have a minimum of ten individual samples from a population. This was not the result at Wolf Lake. Refer to original data for more detailed information.

Discussion:

The mudpuppy was found to occur at Wolf Lake in northeastern Illinois and not found in the Mississippi River at the Upper Mississippi National Wildlife and Fish Refuge. These were the only two areas sampled in Illinois. This coincides with previous data from the Illinois Natural History Survey that is available on their website, www. inhs.uiuc.edu/cbd/herpdist/species/ne_maculos.html.

Summary:

Lab results are still being compiled. Therefore, it is not yet known whether these populations are important to conserve for genetic purposes. With the very small sample size from Wolf Lake it cannot be known with confidence that this is a genetically distinct population. More studies should be performed in the future to determine this.

Wildlife Affected:

No other species were directly affected by this project. However, there is a potential for other species to be affected in the future. In areas where lampricide is applied, the mudpuppy populations are affected significantly. For example, the Cleveland Museum of Natural History collected over 100 mudpuppies after a lampricide application, which was higher than the expected population (personal communication, Tim Matson). If Illinois waterways become inhabited by exotic lampreys, mudpuppies and freshwater mussel could be affected significantly. Since lampricide applications occur at approximately four to five year intervals, this kills off the aforementioned species at important life stages. Furthermore, it may be difficult for these species to bounce back after such applications due in part to their relatively small home range.

Total Project Expenditure:

The two expenditures for this project were gasoline and hotel accommodations. The only mileage allowed to be reimbursed was for the Wolf Lake portion of the project. As mileage was only noted a receipt of fuel would not be sufficient, therefore I only list the mileage used.

Gas Mileage: October 2006: 71 miles
November 2006: 120 miles
Total Mileage: 191 mile * $0.34 = $64.94

Necturus m. maculosus Trapping Rachel K. Bradfield
Upper Mississippi National Wildlife and Fish Refuge Necturus Data, Illinios, USA; 10.5.07-10.6.07
Traps: gee minnow traps with enlarged openings
Bait: chicken liver
WGS84

Local	Trap #	Waypoint	Easting	Northing	Set Trap (10.5.06)	Checked Trap (10.6.06)	Pulled Trap (10.6.06)	Notes
South	1	115	719927	4676762	14:00	8:25	13:20	
	2	115	719927	4676762	14:00	8:25	13:20	
	3	115	719927	4676762	14:00	8:25	13:20	
Boat Launch	1	113	719240	4677494	10:00	8:38	13:35	2 traps lost
	2	113	719240	4677494	10:00	8:38	13:35	
	3	113	719240	4677494	10:00	8:38	13:35	
South North	1	114	717169	4680614	10:40	8:55	13:50	
	2	114	717169	4680614	10:40	8:55	13:50	
	3	114	717169	4680614	10:40	8:55	13:50	
North	1	116	717315	4680399	10:50	9:10	14:00	
	2	116	717315	4680399	10:50	9:10	14:00	
	3	116	717315	4680399	10:50	9:10	14:00	

Results: No Necturus found

Necturus m. maculosus Trapping Rachel K. Bradfield State Permit Number: A06.4086
Wolf Lake/William W. Powers Preserve, Illinois, USA; 10.14-10.15.2006
Traps: gee-minnow traps with enlarged openings
Bait: tuna
NAD27 Central

Local	Trap Num./Waypoint	Easting	Northing	Time Set	Time Checked	Time Pulled	Capture	Notes
North	125	455427	4613084	14:30	9:20	10:45	No	trap stolen
	126	455425	4613031	14:30	9:20	10:45	No	trap stolen
Middle	122	455265	4612651	14:30	9:28	10:35	No	
	127	455269	4612643	14:30	9:30	10:35	No	
	128	455262	4612637	14:30	9:32	10:35	No	
	129	455266	4612634	14:30	9:33	10:35	No	
South	119	455303	4611923	14:30	9:39	10:35	IL01	
	130	455291	4611884	14:30	10:40	10:35	No	trap lost
	131	455284	4611874	14:30	10:42	10:35	No	

Results: IL01, Adult, Deposited at Bowling Green State University, Department of Biological Sciences

This work was made possible by IL Wildlife Preservation Fund Grant #07-002W.

Necturus m. maculosus Trapping Rachel K. Bradfield
Wolf Lake, Illinois, USA; 11.22.06-11.24.06
Traps: gee-minnow traps with enlarged openings
Bait: tuna Checked daily
WGS84, metric, CDI: 0.25 State Permit Number: A06.4086

Trap #	Local	Easting	Northing	Set Date	End Date
1	1	455294	4612079	11.22.06	11.24.06
2	1	455294	4612079	11.22.06	11.24.06
3	2	455297	4612089	11.22.06	11.24.06
4	3	455312	4612130	11.22.06	11.24.06
5	4	455310	4612147	11.22.06	11.24.06
6	5	455303	4612176	11.22.06	11.24.06
7	6	455295	4612206	11.22.06	11.24.06
8	6	455295	4612206	11.22.06	11.24.06
9	7	455212	4612197	11.22.06	11.24.06
10	7	455212	4612197	11.22.06	11.24.06
11	8	455160	4612426	11.23.06	11.24.06
12	8	455160	4612426	11.23.06	11.24.06
13	8	455160	4612426	11.23.06	11.24.06

Results: No Necturus found.

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