ANURAN CALL SURVEY OF THE WOONASQUATUCKET RIVER IN THE VICINITY OF THE CENTREDALE MANOR SUPERFUND SITE NORTH PROVIDENCE, RHODE ISLAND

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Introduction

At the request of the U.S. Environmental Protection Agency (EPA), staff from the New England Field Office of the U.S. Fish and Wildlife Service (FWS) conducted a survey of calling anuran amphibians (frogs and toads) on the Woonasquatucket River in the vicinity of the Centredale Manor Superfund Site in the spring of 2001. The purpose of the survey was to determine if there was a notable difference in species and numbers of anuran amphibians between areas containing dioxin and reference areas. The study site consisted of four contiguous impounded areas on the Woonasquatucket River in North Providence, Rhode Island, one of which, the Allendale Impoundment, is defined as a Superfund Site. The purpose of the survey was to determine if there was a notable difference in species and numbers between areas impacted by dioxin and reference areas. However, in the spring of 2001, the Allendale Dam breached, causing the impoundment to greatly de-water. The dam was rebuilt in the spring of 2002. EPA requested that the anuran call survey be repeated given the change in habitat at the Allendale Impoundment.

Methods

Identification of Monitoring Stations:

In 2001, monitoring stations were chosen by EPA and FWS. Anuran call monitoring station locations were chosen upstream of the contamination, within the area of contamination, downstream of the contamination, and one location on a tributary stream. The specific locations of the monitoring stations were chosen based on the apparent availability of anuran habitat (surface water, aquatic vegetation, and lack of water current), and the ability to survey as large an area as possible.

Nine monitoring stations were chosen. Three were upstream of the contamination (Rangely Court, Chamberlain Road, and Adams Road); two were in the Allendale Impoundment which is the most contaminated area (Stevens Street and Wiscasset Avenue); two were in the next lower impoundment, Lymansville Impoundment (Warren Street and Oak Street); one was in the next lower impoundment, the Manton Impoundment (Brennan Oil); and one was on an impounded area of Assapumpsett Brook, which drains into the Lymansville Impoundment (Assapumpsett Pond). Maps with rough locations of the monitoring stations are provided in Figures 1 and 2 at the end of the report. However, the Rangely Court monitoring station did not work well in 2001; very few anurans were heard at the site possibly because the water current in the area was too strong to provide good anuran habitat. Therefore, we searched for a site to replace Rangely Court. Therefore, we selected Georgiaville Pond, the next impoundment north. Most of this impoundment is open water with little emergent vegetation. The only accessible location that looked appropriate was at the north end of the pond. This location is shown in Figure 1.

Call Counts:

The anuran call count protocol was based on the protocol used in the North American Amphibian Monitoring Program (NAAMP). NAAMP protocols were fashioned after the long-running Wisconsin Frog and Toad Survey (Mossman *et al.* 1998). The protocol establishes four separate

monitoring periods to account for anuran species that call at different times during the spring mating season. For Rhode Island the monitoring periods are: "floating" (depending on when wood frogs begin to call); April 10 to April 25; May 10 to May 31; and June 15 to June 31 (Dr. Peter Paton, University of Rhode Island, NAAMP coordinator for the State of Rhode Island, pers. comm.). The first monitoring period is for wood frogs (*Rana sylvatica*), spring peepers (*Pseudacris crucifer*), and possibly American toads (*Bufo americanus*). The second is for spring peepers, American toads, northern leopard frogs (*Rana pipiens*), and pickerel frogs (*Rana palustris*). The third is for northern leopard frogs, pickerel frogs, green frogs (*Rana clamitans*), gray treefrogs (*Hyla versicolor*), Fowler's toads (*Bufo woodhousei fowleri*), and spadefoot toads (*Scaphiopus holbrooki holbrooki*). The fourth is for bullfrogs (*Rana catesbeiana*), green frogs, gray treefrogs, Fowler's toads, and eastern spadefoot toads. However, each calling period is temperature-dependent and, therefore, may vary from year to year. The first monitoring period requires a minimum air temperature of 42°F; the second requires a minimum air temperature of 50°F; the third requires a minimum air temperature of 50°F; and the fourth requires a minimum air temperature of 55°F. The other requirements for monitoring include little wind and no rain significant enough to impair the ability to hear calling anurans at a distance. Observations are expected to take place between one-half hour after sunset and 2:00 am.

Observations were recorded for a five-minute period. Because the intent of the NAAMP survey is to record population trends over time, the protocol does not require that individual anuran calls be counted but rather that a Call Index Value (CIV) be recorded. A CIV of 1 is recorded when calls can be counted and do not overlap. A CIV of 2 is recorded when calls can be distinguished and some overlap. A CIV of 3 is recorded when there is a full chorus, which means that calls are continuous and overlapping. Additional data recorded includes: start time and end time, temperatures at start and end time, sky conditions, wind conditions, and whether there was any noise during the listening period that would hamper the ability to hear the anurans. Data were recorded on data sheets developed for NAAMP surveys conducted on national wildlife refuges.

The surveys followed the NAAMP protocol with a few modifications. First, we attempted to conduct surveys on two nights within each monitoring period understanding that anuran activity varies from night to night even when conditions appear optimal. Also, in addition to recording the CIV we attempted to estimate the number of individuals calling, which we recorded in parentheses after the CIV numbers.

Monitoring was conducted by two individuals. At the end of the listening period at each station, the two listeners compared observations. At some monitoring stations the two listeners intentionally stood some distance apart to maximize the area of coverage. At the end of the listening period, the listeners conferred and came to agreement on the locations of calling individuals and, thus, developed the best estimate of the number of calling individuals at a monitoring station. If there was a question about the lack of activity at a site, particularly the first site monitored in the evening, the site was remonitored at the end of the evening.

Results

In 2002, surveys were conducted on five nights: April 8, May 6, May 23, June 13, and July 2. The end of March was exceptionally warm, therefore, wood frogs started calling early and may have finished before this survey started. However, wood frogs use vernal pools exclusively and since little of this habitat is present in the study area we were not concerned about this omittance. Most of the month of April was exceptionally cold and rainy, therefore, it was difficult to coordinate nights with exceptable weather conditions. These cold conditions may have postponed some of the mating activity, so although only one survey was conducted in April, all of the species expected were heard during the other survey periods. The last survey on July 2 was conducted a few days beyond the recommended monitoring window. However, this proved to be the most productive night of all the surveys indicating that no data was missed by conducting the last survey a little later than the suggested protocol.

Below are descriptions of the monitoring stations and the results for each station. Results for 2001 are summarized in Table 1 and results for 2002 are summarized in Table 2. Copies of the field data sheets are provided at the end of the report.

Georgiaville Pond- This is the most upstream station and is considered a reference site. This site has a field and forest edge and aquatic vegetation in the pond. Unfortunately, Interstate 295 is nearby and created enough noise to make hearing frogs difficult at times. During the first survey a reasonable chorus of spring peepers was heard, and a small number of spring peepers was heard during the second and third surveys. During the fourth and fifth surveys, one bullfrog was heard each time, and the call seemed to come from about the same location each time suggesting that it was the same frog.

Chamberlain Road or Green Property - This is considered a reference site. Grassed yard extends to the edge of the river on the east side. On the west side of the river a water treatment plant creates a loud hum. There is a complex of aquatic vegetation on both sides of the river. Observations were conducted from the lawn on the east side of the river. In 2001, up to four pickerel frogs and four green frogs were heard in this location, as well as up to two bullfrogs and two spring peepers. Similarly, in 2002, up to four pickerel frogs and four green frogs were heard, as well as two bullfrogs, two spring peepers, and one American toad.

Adams Road - This site is also a reference site just downstream of the Green Property. Grassed yard extends to the eastern shore of the river. The opposite shore is vegetated with trees but houses are not far from the trees and shore. There are patches of emergent vegetation throughout the area. In 2001, anurans were relatively abundant including up to three spring peepers, four pickerel frogs, two American toads, eight green frogs, and three bullfrogs. The results for 2002 were similar except no American toads were heard. In 2002, up to two spring peepers were heard, four pickerel frogs, five green frogs, and four bullfrogs.

Table 1. Anuran species heard (Call Index Value[1] with number of individuals in parentheses)during a call survey on the Woonasquatucket River in North Providence, Rhode

Island in the spring of 2001. The call survey was conducted as part of an assessment of the Centredale Manor Superfund Site. Values given are the maximum of four surveys.

Site	Species Heard (Call Index Value and Number of Individuals ( ))							
	Spring Peeper	Wood Frog	Pickerel Frog	American Toad	Fowler's Toad	Green Frog	Bullfrog	Gray Treefrog
Rangely Court	0	0	1(1)	0	0	1(1)	1(1)	0
Chamberlain Road	1( )	1(2)	1(5)	0	0	1(6)	1(1)	0
Adams Road	1(3)	0	1(4)	1(2)	0	2(8)	1(3)	0
Stevens Street	0	0	0	0	0	0	0	0
Wiscasset Avenue	0	0	0	0	2(4)	0	0	0
Warren Street	2( )	0	2(8)	1(2)	1(3)	2(6)	1(2)	0
Oak Street	0	0	2(5)	1(2)	0	1(6)	1(3)	1(1)
Brennan Oil	0	0	1(3)	0	0	1(2)	1(2)	0
Assapumpsett Pond	3( )	0	1(1)	2(4)	0	2(7)	1(2)	0

[1] Call Index Value: 1=Calls can be counted, no overlapping; 2=Calls can be distinguished, some overlapping; 3=Full chorus, calls continuous and overlapping.

Table 2. Anuran species heard (Call Index Value[1] with number of individuals in parentheses)during a call survey on the Woonasquatucket River in North Providence, Rhode Island in the spring of 2002. The call survey was conducted as part of an

assessment of the Centredale Manor Superfund Site. Values given are the maximum of five surveys.

Site	Species Heard (Call Index Value and Number of Individuals ( ))					
	Spring Peeper	Pickerel Frog	American Toad	Fowler's Toad	Green Frog	Bullfrog
Georgiaville Pond	2(7)	0	0	0	0	1(1)
Chamberlain Road	1(2)	1(4)	1(1)	0	1(4)	1(2)
Adams Road	1(2)	1(4)	0	0	1(5)	1(4)
Stevens Street	1(2)	1(1)	0	0	1(4)	0
Wiscasset Avenue	0	0	1(1)	1(2)	1(2)	1(1)
Warren Street	1(1)	2(7)	0	1(1)	1(5)	1(1)
Oak Street	0	2(6)	0	0	1(3)	1(1)
Brennan Oil	0	1(3)	0	0	1(2)	1(2)
Assapumpsett Pond	3( )	1(1)	0	0	2(10)	1(1)

[1] Call Index Value: 1=Calls can be counted, no overlapping; 2=Calls can be distinguished, some overlapping; 3=Full chorus, calls continuous and overlapping.

Stevens Street - This monitoring location is at the upper end of the Allendale Impoundment, which is the most contaminated of the impoundments. In 2001, because of the breached dam, this area was mostly forested/scrub-shrub wetland with the main river channel flowing along the west bank and small streams braiding throughout the rest of the area. In 2001, no frogs were heard in this area during any of the survey dates. In 2002, this area was completely flooded and one pickerel frog, two spring peepers, and up to four

green frogs were heard.

Wiscasset Ave. - This monitoring station is located about in the middle of the Allendale Impoundment on the east shore. The east shore has a narrow buffer of trees and then houses and yards. The west shore is mostly parking lots and industry. Monitoring of this location took place from a large ledge which allowed for hearing over a large area, from the dam up to near the Stevens Street monitoring station. In 2001, there was little water in the impoundment for the first two surveys, but it was about one-third full for the subsequent two surveys. No anurans were heard during the first two surveys. Fowler's toads were heard (four and three individuals, respectively) during the third and fourth surveys. In 2002, the impoundment was full. No anurans were heard during the first and fourth surveys, but two green frogs were heard during the second survey and one American toad was heard after the five minute listening period had ended. During the third survey one American toad was heard again as well as two green frogs. During the fifth survey, one green frog, one bullfrog, and two Fowler's toads were heard.

Warren Street - This monitoring station is located toward the upper end of the Lymansville Impoundment. Contamination in this impoundment is approximately an order of magnitude less than in the Allendale Impoundment (EPA pers. comm.). In 2001, this site had the highest abundance and diversity of frogs of all the monitoring locations. A moderate chorus of spring peepers was heard, as well as up to eight pickerel frogs, two American toads, three Fowler's toads, six green frogs, and two bullfrogs. In 2002, the abundance of anurans appeared to be lower, with only one individual spring peeper heard, up to seven pickerel frogs, one Fowler's toad, five green frogs, one bullfrog, and no American toads.

Oak Street - Monitoring from this location was conducted from a yard that extends into the Lymansville Impoundment, providing listening over a relatively large area. Trees, lawns, and houses edge the shoreline. The water has patches of emergent vegetation. In 2001, up to five pickerel frogs were heard, two American toads, six green frogs, three bullfrogs, and one gray treefrog. In 2002, the abundance and diversity was a little lower with up to six pickerel frogs, three green frogs, and one bullfrog heard.

Brennan Oil - This is the only monitoring location in the Manton Impoundment because the impoundment is relatively small. The monitoring location was sited in about the only area with emergent vegetation. Listening occurred from a parking lot on the east bank. A factory on the west bank produces a loud hum. There is a lot of pavement around the river in this area. In 2001, up to three pickerel frogs, two green frogs, and two bullfrogs were heard. The results for 2002 were identical to 2001.

Pond on Assapumpsett Brook - Assapumpsett Brook is a small tributary to the Woonasquatucket River that empties into the Lymansville Impoundment. This is a reference site and the only site that is not located on the Woonasquatucket River. The pond is a small impounded area of the brook that is mostly surrounded by houses, except at the west end where there is a relatively large area of forest and scrub-shrub wetland. The monitoring location is at the end of Bowen Street overlooking the scrub-shrub wetland. The pond is a distance down a sloped yard from the monitoring location, but we did not have permission from the landowner to use the yard. In

2001, this site had a full chorus of spring peepers as well as one pickerel frog, four American toads, two green frogs, and two bullfrogs. In 2002, we again heard a full chorus of spring peepers, one pickerel frog, up to ten green frogs, and one bullfrog. It is likely that the low number of pickerel frogs heard is due to the fact that this species' call is a low snore that is difficult to hear at a distance. Therefore, there were probably more pickerel frogs present than were detected.

Discussion

In the 2001 report, we discussed some of the challenges faced in monitoring. In 2001, it was cold and rainy in May making it difficult to coordinate a suitable night for monitoring. In 2002, the cold rains came in April, again making it difficult to find suitable nights for sampling. However, we seemed to collect data on the species we would expect in the area, with the exception of the gray treefrog and wood frog. These two species were heard in limited numbers, one and two, respectively, in 2001 suggesting that habitat is limited for them in the study area. Ambient noise was a problem in both years. The study area is a suburban/ industrial area with noise from cars, sirens, airplanes, helicopters, barking dogs, and factories. Due to scheduling difficulties, the last survey was conducted a little later than the protocol recommends. However, it proved to be the most productive of the sampling nights, therefore, it appears that we did not miss important call data as a result.

The station-specific sampling results for 2001 and 2002 were relatively similar. One difference between the two years is that we replaced the northern most station, Rangely Park, with a station farther north, Georgiaville Pond. However, the Georgiaville Pond site proved to be about as productive as Rangely Park. We believe that the anuran productivity at Rangely Park may have been low because there was too much water current at the site to make it attractive to anurans. We do not have an explanation for the relatively low productivity at Georgiaville Pond.

There were some changes in species observed at some of the sites between the two years. For example, American toads were heard at Adams Road in 2002 but not in 2001, and green frogs were heard at Oak Street and Brennan Oil in 2002 but not in 2001. There were also some differences in the numbers of individuals of a species heard at a site between the two years. For example, we heard a moderate chorus of spring peepers at Warren Street in 2001 and only one individual spring peeper in 2002. However, some variation in numbers and species is to be expected between years.

The most substantial difference in observations between the two years, was that in 2001, only Fowler's toads, three total, were heard in the Allendale Impoundment. In 2002, two spring peepers, one pickerel frog, four green frogs, one American toad, and two Fowler's toads were heard in the Allendale Impoundment. Although the calling activity in 2002 may not have been impressive, it was dramatically greater than in 2001. This suggests that frogs were missing from the Allendale Impoundment in 2001 because of lack of water. It appears that anurans began to colonize the site once water/habitat was provided.

Although there is some discussion of amphibian population fluctuations, movements, dispersal, and colonization in the literature, these aspects of amphibian natural history are difficult to study and are, thus, not well understood. However, Pechmann *et al.* (1991) reported that changes or differences in hydrology, such as drought or differing pond hydroperiods, accounted for changes or differences in breeding population sizes of four amphibian species in South Carolina. Dodd and Charest (1988) reported that differences in activity patterns between years were likely due to differences in temperatures, rainfall amounts, and hydroperiods. This information, in concert with simple logic, leads us to conclude that the timing of the presence/absence of water in the Allendale Impoundment would be critical to the presence/absence of a breeding anuran population.

Since the Allendale Impoundment was relatively dry during autumn 2001 and winter 2002, it is unlikely that anurans hibernated there. Anurans inhabiting the impoundment in spring 2002 were probably migrants from upstream and downstream, and, therefore, had reduced exposure to contaminants in sediments of the Allendale Impoundment. Since this study made no attempt to determine whether reproduction was successful, and since anurans are relatively mobile, it may be difficult to determine whether the Allendale Impoundment is toxic to frogs without evaluating endpoints in addition to the number of calling males.

Summary and Conclusions

The species and abundances of calling frogs heard were relatively similar between the two years. The major difference noted is that in 2001 only a small number of Fowler's toads were heard in the Allendale Impoundment, while in 2002, four species of anurans, in small numbers, were heard in the Allendale Impoundment.. This suggests that by rebuilding the dam and allowing the impoundment to fill with water, a small number of breeding males were able to recolonize the site. However, since these animals did not likely hibernate at the site, they cannot serve as an indicator of the toxicity of the sediments to hibernating adults. Therefore, EPA may want to evaluate additional endpoints than just presence/absence of calling males to determine whether the Allendale Impoundment is a hospitable environment for reproducing anurans.

Literature Cited

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Mossman, M., L.M. Hartman, R. Hay, J.R. Sauer, and B.J. Dhuey. 1998. Monitoring long-term trends in Wisconsin frog and toad populations. Pages 169-198 in M.J. Lanoo (ed). Status and conservation of midwestern amphibians. University of Iowa Press. 507 pp.

Pechmann, J.H.K., D.E. Scott, R.D. Semlitsch, J.P. Caldwell, L.J. Vitt, and J.W. Gibbons. 1991. Declining amphibian populations: the problem of separating human impacts from natural fluctuations. Science 253:892-895.

Figure 1. The four northerly monitoring stations for the anuran call survey conducted on the Woonasquatucket River in the vicinity of the Centredale Manor Superfund Site, North Providence, Rhode Island. The Rangely Court station was used in 2001 and the Georgiaville Pond station was used in 2002. The other stations were used in both years.

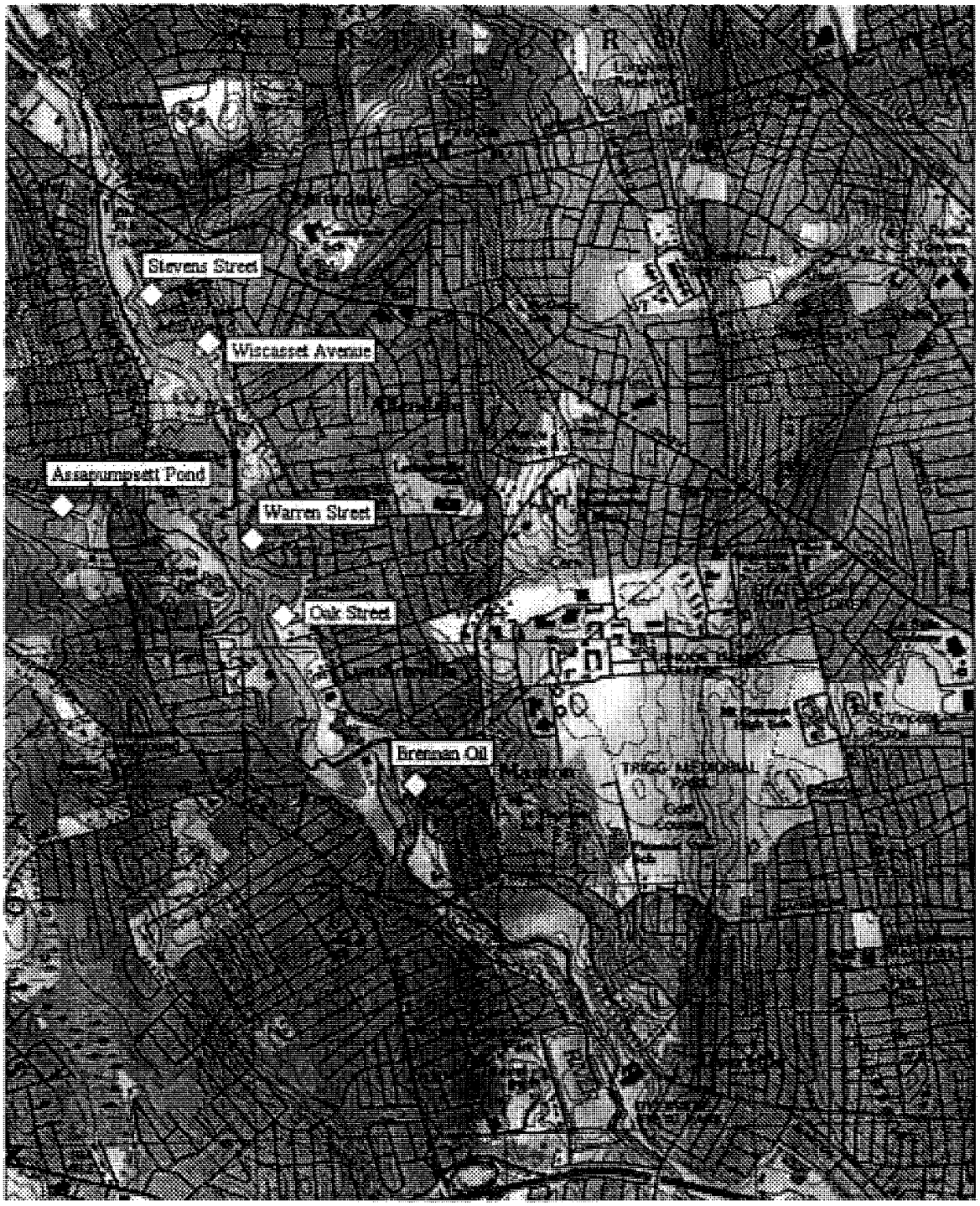

Figure 2. The six southerly monitoring stations used for the anuran call survey on the Woonasquatucket River in the vicinity of the Centredale Manor Superfund Site, North Providence, Rhode Island. All six stations were used in both 2001 and 2002.

FWS Anuran Call Count Survey

L. Eaton-Poole

Observer: K. Munney (USFWS) Route: Centredale Manor Survey Date: 4/8/02 Run Number: 1

Survey Data

	Time	Temp (°F)	Wind Scale	Sky Code
Start	8:00 pm	46°	1	2
Finish	10:20 pm	43°	1	2

Point Data

Georgiaville Chamberlain Adams Stevens Louisquisset

	1		2		3		4		5	
Start Time	8:00 pm		8:20		8:35		8:50		9:05	
Air Temperature (°F)										
Sky Code	2		2		2		2		2	
Was noise a factor? (✓ = yes)	Highway		Water flowing							
Did you take a timeout? (✓ = yes)	N		N		N		N		N	
Species Heard:	3 min.	5 min.	3 min.	5 min.	3 min.	5 min.	3 min.	5 min.	3 min.	5 min.
Spring peeper		*1(6)								
Pickerel frog				1(3)		1(1)		1(1)		
	*									

Comments: * New site - replaces Rargely Court Park

1(6) = 1 = Call Index Value (6) = estimated number individuals

Call Index Value: 1 = Calls can be counted, no overlapping. 2 = Calls can be distinguished, some overlapping. 3 = Full chorus, calls continuous and overlapping.

Sky Code: 0 = Clear / few clouds. 1 = Partly cloudy / variable. 2 = Cloudy (broken) or overcast. 4 = Fog / Smoke
5 = Drizzle / light rain 7 = Snow *8 = Showers *(do not conduct survey)*

Wind Scale: 0 = Smoke rises vertically.
1 = Light air movement, smoke drifts.
2 = Wind felt on face, leaves rustle.
3 = Gentle breeze, leaves and small twigs in motion.
*4 = Small branches move, raises dust and loose paper.
*5 = Small trees in leaf begin to sway, crested wavelets.
*6 = Large branches in motion.
* *Unacceptable wind strengths for survey.*

Revised Feb. 2001

FWS Anuran Call Count Survey

Continuation Sheet 2

Route: Centredale Manor

Survey Date: 4/8/05

Point Data

Warren Oak Brennan Assapumpp

	6		7		8		9		10	
Start Time	9:20		9:45		10:00		10:15			
Air Temperature (°F)										
Sky Code	2		2		2		2			
Was noise a factor? (✓ = yes)	Airplane for short period		Factory noise							
Did you take a timeout? (✓ = yes)	N		N		N		N			
Species Heard:	**3 min.**	**5 min.**	**3 min.**	**5 min.**	**3 min.**	**5 min.**	**3 min.**	**5 min.**	**3 min.**	**5 min.**
Spring Peeper								3(C)		
Pickerel frog		1(4)		1(4)		1(1)				
	1									

Comments:

Call Index Value: 1 = Calls can be counted, no overlapping. 2 = Calls can be distinguished, some overlapping. 3 = Full chorus, calls continuous and overlapping.

Sky Code: 0 = Clear / few clouds. 1 = Partly cloudy / variable. 2 = Cloudy (broken) or overcast. 4 = Fog / Smoke
5 = Drizzle / light rain 7 = Snow *8 = Showers *(do not conduct survey)*

Wind Scale: 0 = Smoke rises vertically. *4 = Small branches move, raises dust and loose paper.
1 = Light air movement, smoke drifts. *5 = Small trees in leaf begin to sway, crested wavelets.
2 = Wind felt on face, leaves rustle. *6 = Large branches in motion.
3 = Gentle breeze, leaves and small twigs in motion. * *Unacceptable wind strengths for survey.*

FWS Anuran Call Count Survey

FWS Anuran Call Count Survey

Observer: L. Eaton-Poole / K. Munney [redacted] Route: Centredale Manor Survey Date: 5/6/02 Run Number: 2

Survey Data

	Time	Temp (°F)	Wind Scale	Sky Code
Start	8:28 pm	60°	3	2
Finish	10:20 pm	54°	3	2

Point Data

Georgiaville Chamberlain Adams Stevens Wiscasset

	1		2		3		4		5	
Start Time	8:28		8:52		9:03		9:15		9:30	
Air Temperature (°F)	60°		59°							
Sky Code	2									
Was noise a factor? (✓ = yes)	Highway		Sewage treatment plant noise		Car noise					
Did you take a timeout? (✓ = yes)										
Species Heard:	**3 min.**	**5 min.**	**3 min.**	**5 min.**	**3 min.**	**5 min.**	**3 min.**	**5 min.**	**3 min.**	**5 min.**
Spring peeper		2(7)		1(2)		1(2)		1(1)		
Am. toad				1(1)						*
Pickerel frog				1(4)		1(4)		1(1)		
Green frog				1(1)				1(4)		1(2)
	*									

Comments: * 1 American toad called after survey finished

Call Index Value: 1 = Calls can be counted, no overlapping. 2 = Calls can be distinguished, some overlapping. 3 = Full chorus, calls continuous and overlapping.

Sky Code: 0 = Clear / few clouds. 1 = Partly cloudy / variable. 2 = Cloudy (broken) or overcast. 4 = Fog / Smoke
5 = Drizzle / light rain 7 = Snow *8 = Showers *(do not conduct survey)*

Wind Scale: 0 = Smoke rises vertically.
1 = Light air movement, smoke drifts.
2 = Wind felt on face, leaves rustle.
3 = Gentle breeze, leaves and small twigs in motion.
*4 = Small branches move, raises dust and loose paper.
*5 = Small trees in leaf begin to sway, crested wavelets.
*6 = Large branches in motion.
* *Unacceptable wind strengths for survey.*

Revised Feb. 2001

FWS Anuran Call Count Survey

Continuation Sheet 2

Route: Centredale Manor

Survey Date: 5/6/02

Point Data

Warren Oak Brennan Assapump

	6		7		8		9		10	
Start Time	9:44		9:50		10:03		10:15			
Air Temperature (°F)							54°			
Sky Code										
Was noise a factor? (✓ = yes)					Factory noise					
Did you take a timeout? (✓ = yes)										
Species Heard:	**3 min.**	**5 min.**	**3 min.**	**5 min.**	**3 min.**	**5 min.**	**3 min.**	**5 min.**	**3 min.**	**5 min.**
Spring Peeper		1(1)						1(3)		
Pickerel Frog		2(7)		2(6)		1(3)		1(1)		
	1									

Comments:

Call Index Value: 1 = Calls can be counted, no overlapping. 2 = Calls can be distinguished, some overlapping. 3 = Full chorus, calls continuous and overlapping.

Sky Code: 0 = Clear / few clouds. 1 = Partly cloudy / variable. 2 = Cloudy (broken) or overcast. 4 = Fog / Smoke
5 = Drizzle / light rain 7 = Snow *8 = Showers *(do not conduct survey)*

Wind Scale: 0 = Smoke rises vertically. *4 = Small branches move, raises dust and loose paper.
1 = Light air movement, smoke drifts. *5 = Small trees in leaf begin to sway, crested wavelets.
2 = Wind felt on face, leaves rustle. *6 = Large branches in motion.
3 = Gentle breeze, leaves and small twigs in motion. * *Unacceptable wind strengths for survey.*

FWS Anuran Call Count Survey

FWS Anuran Call Count Survey

Observer: L. Eaton-Poole, K. Munney (USFWS) Refuge Route: Centredale Manor Survey Date: 5/23/02 Run Number: 3

Survey Data

	Time	Temp (°F)	Wind Scale	Sky Code
Start	9:00	60°	1	0
Finish	11:00	51°	1	0

Point Data

Georgiaville Chamberlain Adams Stevens Wiscasset

	1		2		3		4		5	
Start Time	10:55		9:03		9:15		9:26		9:40	
Air Temperature (°F)	51°									
Sky Code	0									
Was noise a factor? (✓ = yes)	Highway									
Did you take a timeout? (✓ = yes)	N									
Species Heard:	**3 min.**	**5 min.**	**3 min.**	**5 min.**	**3 min.**	**5 min.**	**3 min.**	**5 min.**	**3 min.**	**5 min.**
Green frog				1(3)				1(4)		1(2)
Pickerel frog				1(1)		1(1)				
Spring peeper		*1()				1(1)				
Am. toad										1(1)
	*									

Comments: * Had difficulty hearing over traffic noise so did not estimate number calling.

Call Index Value: 1 = Calls can be counted, no overlapping. 2 = Calls can be distinguished, some overlapping. 3 = Full chorus, calls continuous and overlapping.

Sky Code: 0 = Clear / few clouds. 1 = Partly cloudy / variable. 2 = Cloudy (broken) or overcast. 4 = Fog / Smoke
5 = Drizzle / light rain 7 = Snow *8 = Showers *(do not conduct survey)*

Wind Scale: 0 = Smoke rises vertically. *4 = Small branches move, raises dust and loose paper.
1 = Light air movement, smoke drifts. *5 = Small trees in leaf begin to sway, crested wavelets.
2 = Wind felt on face, leaves rustle. *6 = Large branches in motion.
3 = Gentle breeze, leaves and small twigs in motion. * *Unacceptable wind strengths for survey.*

Revised Feb. 2001

FWS Anuran Call Count Survey

Continuation Sheet 2

~~Refuge~~ Route: Centredale Manor

Survey Date: 5/23/c

Point Data

Warren Oak Brennan Assapum

	6		7		8		9		~~10~~	
Start Time	9:52		10:05		10:15		10:30			
Air Temperature (°F)							51°			
Sky Code										
Was noise a factor? (✓ = yes)	dogs barking									
Did you take a timeout? (✓ = yes)										
Species Heard:	**3 min.**	**5 min.**	**3 min.**	**5 min.**	**3 min.**	**5 min.**	**3 min.**	**5 min.**	**3 min.**	**5 min.**
Pickerel frog		1(4)		1(4)		1(2)				
Green frog		1(1)						1(1)		
	1									

Comments:

Call Index Value: 1 = Calls can be counted, no overlapping. 2 = Calls can be distinguished, some overlapping. 3 = Full chorus, calls continuous and overlapping.

Sky Code: 0 = Clear / few clouds. 1 = Partly cloudy / variable. 2 = Cloudy (broken) or overcast. 4 = Fog / Smoke
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Wind Scale: 0 = Smoke rises vertically. *4 = Small branches move, raises dust and loose paper.
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3 = Gentle breeze, leaves and small twigs in motion. * *Unacceptable wind strengths for survey.*

FWS Anuran Call Count Survey

FWS Anuran Call Count Survey

Observer: Laura Eaton-Poole / Greg Mannesto (USFWS) Route: Centredale Manor Survey Date: 6/13/02 Run Number: 4

Survey Data

	Time	Temp (°F)	Wind Scale	Sky Code
Start	9:10 pm	57°	1	2
Finish	11:10	55°	1	2

Point Data

Georgiaville Chamberlain Adams Stevens Wiscasset

	1		2		3		4		5	
Start Time	9:10		9:25		11:05		9:45		10:05	
Air Temperature (°F)	57°									
Sky Code	2									
Was noise a factor? (✓ = yes)	Highway									
Did you take a timeout? (✓ = yes)										
Species Heard:	3 min.	5 min.	3 min.	5 min.	3 min.	5 min.	3 min.	5 min.	3 min.	5 min.
Bullfrog		1(1)		1(2)		1(2)				⊘
Green frog				1(4)		1(4)		1(3)		
	*									

Comments: Surprisingly inactive night

Call Index Value: 1 = Calls can be counted, no overlapping. 2 = Calls can be distinguished, some overlapping. 3 = Full chorus, calls continuous and overlapping.

Sky Code: 0 = Clear / few clouds. 1 = Partly cloudy / variable. 2 = Cloudy (broken) or overcast. 4 = Fog / Smoke
5 = Drizzle / light rain 7 = Snow *8 = Showers *(do not conduct survey)*

Wind Scale: 0 = Smoke rises vertically.
1 = Light air movement, smoke drifts.
2 = Wind felt on face, leaves rustle.
3 = Gentle breeze, leaves and small twigs in motion.
*4 = Small branches move, raises dust and loose paper.
*5 = Small trees in leaf begin to sway, crested wavelets.
*6 = Large branches in motion.
* *Unacceptable wind strengths for survey.*

Revised Feb. 2001

FWS Anuran Call Count Survey

Continuation Sheet 2

~~Refuge~~ Route: Centredale Manor

Survey Date: 6/13/02

Point Data

	Warren 6		Oak 7		Brennan 8		Assapump 9		10	
Start Time	10:20		10:30		10:40		10:50			
Air Temperature (°F)										
Sky Code										
Was noise a factor? (✓ = yes)							dogs barking			
Did you take a timeout? (✓ = yes)										
Species Heard:	**3 min.**	**5 min.**	**3 min.**	**5 min.**	**3 min.**	**5 min.**	**3 min.**	**5 min.**	**3 min.**	**5 min.**
Green frog		1(4)		1(1)				1(2)		
Bullfrog				1(1)		1(1)				

Comments:

Call Index Value: 1 = Calls can be counted, no overlapping. 2 = Calls can be distinguished, some overlapping. 3 = Full chorus, calls continuous and overlapping.

Sky Code: 0 = Clear / few clouds. 1 = Partly cloudy / variable. 2 = Cloudy (broken) or overcast. 4 = Fog / Smoke
5 = Drizzle / light rain 7 = Snow *8 = Showers *(do not conduct survey)*

Wind Scale: 0 = Smoke rises vertically. *4 = Small branches move, raises dust and loose paper.
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FWS Anuran Call Count Survey

Laura Eaton-Poole (USFWS)

Observer: Jennifer Adleman (CEPA contractor) Route: Centredale Manor Survey Date: 7/2/02 Run Number: 5

Survey Data

	Time	Temp (°F)	Wind Scale	Sky Code
Start	9:15 pm	85°	0	0
Finish	11:20 pm	80°	0	0

Point Data

Georgiaville Chamberlain Adams Stevens Wiscasset

	1		2		3		4		5	
Start Time	9:15		9:35		9:45		10:00		10:15	
Air Temperature (°F)	85°									
Sky Code	0									
Was noise a factor? (✓ = yes)	Highway Fire crackers		N		N		N		N	
Did you take a timeout? (✓ = yes)	N		N		N		N		N	
Species Heard:	**3 min.**	**5 min.**	**3 min.**	**5 min.**	**3 min.**	**5 min.**	**3 min.**	**5 min.**	**3 min.**	**5 min.**
Bullfrog		1(1)		1(2)		1(4)				1(1)
Green Frog				1(4)		1(5)		1(4)		1(1)
Fowler's Toad										1(2)
	*									

Comments: 1 ( ) # outside brackets is CIV or Call Index Value
inside brackets is estimated number of individuals.

Call Index Value: 1 = Calls can be counted, no overlapping. 2 = Calls can be distinguished, some overlapping. 3 = Full chorus, calls continuous and overlapping.

Sky Code: 0 = Clear / few clouds. 1 = Partly cloudy / variable. 2 = Cloudy (broken) or overcast. 4 = Fog / Smoke
5 = Drizzle / light rain 7 = Snow *8 = Showers *(do not conduct survey)*

Wind Scale: 0 = Smoke rises vertically.
1 = Light air movement, smoke drifts.
2 = Wind felt on face, leaves rustle.
3 = Gentle breeze, leaves and small twigs in motion.
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*5 = Small trees in leaf begin to sway, crested wavelets.
*6 = Large branches in motion.
* *Unacceptable wind strengths for survey.*

Revised Feb. 2001

FWS Anuran Call Count Survey

Continuation Sheet 2

Route: Centredale Manor

Survey Date: 7/2/0c

Point Data

	Warren 6		Oak 7		Brennan 8		Assapump 9		10	
Start Time	10:40		10:50		11:00		11:15			
Air Temperature (°F)							80°			
Sky Code							0			
Was noise a factor? (✓ = yes)	Factory buzz						N			
Did you take a timeout? (✓ = yes)										
Species Heard:	**3 min.**	**5 min.**	**3 min.**	**5 min.**	**3 min.**	**5 min.**	**3 min.**	**5 min.**	**3 min.**	**5 min.**
Bullfrog		1(1)		1(1)		1(2)		1(1)		
Green frog		1(5)		1(3)		1(2)		*2(?)		
Fowler's toad		1(1)								

Comments: * Quite a number of green frogs calling but where we listen from is too far from the pond to discern the locations of that many frogs. There may have been 10 individuals.

Call Index Value: 1 = Calls can be counted, no overlapping. 2 = Calls can be distinguished, some overlapping. 3 = Full chorus, calls continuous and overlapping.

Sky Code: 0 = Clear / few clouds. 1 = Partly cloudy / variable. 2 = Cloudy (broken) or overcast. 4 = Fog / Smoke 5 = Drizzle / light rain 7 = Snow *8 = Showers *(do not conduct survey)*

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FWS Anuran Call Count Survey