



INVESTIGATOR'S ANNUAL REPORT

United States Department of the Interior
National Park Service

All or some of the information you provide may become available to the public.

OMB # (1024-0236)
Exp. Date (11/30/2010)
Form No. (10-226)

Reporting Year: 2008	Park: Saratoga NHP	Select the type of permit this report addresses: Scientific Study	
Name of principal investigator or responsible official: Lawrence Woolbright		Office Phone: 518-783-2451	
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Additional investigators or key field assistants (first name, last name, office phone, office email) No co-investigators			
Project Title (maximum 300 characters): The Amphibian Community at the Saratoga National Historical Park			
Park-assigned Study or Activity #: SARA-00002	Park-assigned Permit #: SARA-2008-SCI-0002	Permit Start Date: Apr 01, 2008	Permit Expiration Date: Dec 31, 2017
Scientific Study Starting Date: Apr 01, 2008		Estimated Scientific Study Ending Date: Dec 31, 2017	
For either a Scientific Study or a Science Education Activity, the status is: Continuing		For a Scientific Study that is completed, please check each of the following that applies: ☐ A final report has been provided to the park or will be provided to the park within the next two years ☐ Copies of field notes, data files, photos, or other study records, as agreed, have been provided to the park ☐ All collected and retained specimens have been cataloged into the NPS catalog system and NPS has processed loan agreements as needed	
Activity Type: Monitoring			
Subject/Discipline: Ecology (Aquatic, Marine, Terrestrial)			

Purpose of Scientific Study or Science Education Activity during the reporting year (maximum 4000 characters):

We propose to study the amphibian community of the Saratoga National Historical Park over a ten-year period of time. Key goals are to determine species present on the site, population densities, and spatial and temporal patterns of habitat use. These will be accomplished mainly through auditory surveys, visual surveys, and driving transects during spring breeding seasons. Data will provide a historical baseline for future evaluations of amphibian population trends, along with information relevant to amphibian conservation.

Findings and status of Scientific Study or accomplishments of Science Education Activity during the reporting year (maximum 4000 characters):

Primary objectives this year were: 1) to continue the long-term egg clutch counts for *Rana sylvatica* and *Ambystoma maculatum*, 2) to obtain additional radio-tracking data on woodfrogs dispersing from breeding sites, 3) to look more closely at the apparent migration of *Plethodon cinereus* across the tour road, as reported in prior years, and 4) to establish arrays of cover boards to begin density estimation for *Plethodon cinereus*. Our efforts included the participation of approximately 40 undergraduate students from Siena College. Progress on each objective follows.

1) Egg clutch counts were the highest since we began collecting data in 2002, probably reflecting a string of mild winters and good snow cover during the preceding season. We counted a total of 5438 egg clutches of the woodfrog, *Rana sylvatica*, compared to a previous high count of 4220. We counted a total of 596 egg clutches of the spotted salamander, *Ambystoma maculatum*, compared to a previous high of 374. Thus both of these populations appeared to be quite healthy. Subsequently, we experienced a severe dry spell from mid-April through the end of May this year that likely caused high mortality among these populations. Many of the breeding sites completely dried up before the larvae were able to metamorphose, and even some of the largest ponds experienced water levels low enough to cause severe crowding and competition among surviving larvae. We expect that this will result in lower population sizes and lower egg clutch counts in coming years.

2) Thirty adult woodfrogs, including both males and females, were equipped with radio-transmitters and released at their breeding sites between April 8 and 10, 2008. Twenty-eight of these were tracked successfully for an average of 39 days thereafter (range 10 to 101 days). These data underlined the effects of the extremely dry weather. Many frogs remained at the breeding sites for extended periods rather than dispersing long distances as we have seen in prior years. The average time between movements in 2008 was 18.8 days, compared to 2.4 to 5.1 days in prior years. This data set is the largest and best that we have collected since we started trying to track woodfrog movements. While it is good documentation of the frogs' behavior under extremely dry conditions, it probably does not add to our understanding of their normal dispersal behavior. We intend to repeat this experiment in 2009.

3) Siena senior, Lauren Fifield, studied the movement of the terrestrial salamander, *Plethodon cinereus*, across the tour road in the area identified as a possible migration corridor in prior years. As we have reported in the past, she found unidirectional movement of salamanders across the road in this location. Her results showed that migrating individuals included males, gravid and non-gravid females, and subadults. Unfortunately, her sample was limited to 16 individuals that crossed during those few wet nights in the early spring before the dry weather inhibited further amphibian movement. However, her results add to our growing data set on this question.

4) We placed 75 artificial cover boards at each of two locations in the park in order to begin monitoring population trends among terrestrial salamanders. One of these locations spans the tour road at the possible migratory location referenced above. We expect to start monitoring occupancy in spring 2009.

For Scientific Studies (not Science Education Activities), were any specimens collected and removed from the park but not destroyed during analysis?

No

Funding specifically used in this park this reporting year that was provided by NPS (enter dollar amount):
\$5378

Funding specifically used in this park this reporting year that was provided by all other sources (enter dollar amount):
\$0

List any other U.S. Government Agencies supporting this study or activity and the funding each provided this reporting year:

Paperwork Reduction Act Statement: A federal agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. Public reporting for this collection of information is estimated to average 1.625 hours per response, including the time for reviewing instructions, gathering and maintaining data, and completing and reviewing the forms. Direct comments regarding this burden estimate or any aspect of this form to Dr. John G. Dennis, Natural Resources (3127 MIB), National Park Service, 1849 C Street, N.W., Washington, DC 20240.

Annual Report for 2008 – SARA-2008-SCI-0002 – Siena College, L. Woolbright

Primary objectives this year were: 1) to continue the long-term egg clutch counts for *Rana sylvatica* and *Ambystoma maculatum*, 2) to obtain additional radio-tracking data on woodfrogs dispersing from breeding sites, 3) to look more closely at the apparent migration of *Plethodon cinereus* across the tour road, as reported in prior years, and 4) to establish arrays of cover boards to begin density estimation for *Plethodon cinereus*. Our efforts included the participation of approximately 40 undergraduate students from Siena College. Progress on each objective follows.

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Clutch Counts - <i>Rana sylvatica</i> - all years, all ponds								
Pond location	2001 Rs	2002 Rs	2003 Rs	2004 Rs	2005 Rs	2006 Rs	2007 Rs	2008 Rs
Way back behind 1 (E end of trough)	nf	nf	13	174	60	482	193	139
John's Pond 2 (off track past stop 1)	nf	nf	35	145	102	108	71	79
stop 1	119	393	383	640	724	618	66	965
service road	174	1	100	149	511	437	306	212
wheatfield	0	0	0	0	0	5	2	68
Beaver (old - top of hill nr Larry's)	2	7	0	0	0	1	3	0
Sean's 2 (right of road at culvert)	nf	nf	0	0	0	7	0	2
1st flag to left before stop 2	nf	nf	2	0	34	88	16	49
2nd flag to left before stop 2	nf	nf	5	19	17	37	2	27
stop 2 (all ponds combined)	0	0	12	162	89	271	52	165
bottom of hill on left before stop 4	nf	nf	13	6	0	22	18	33
stop 4 culvert	nf	nf	0	0	0	0	0	0
Sean's = bottom of hill past stop 4 on l	nf	4	0	0	0	0	0	0
Larry's = top of hill on left past stop 4	nf	23	16	47	32	23	38	92
Beaver pond below monument	nf	nf	16	0	0	2	3	0
stop 5	nf	160	91	160	217	253	112	311
pond south of road in curve below 1	nf	nf	0	0	6	18	19	34
roadside at John's Pond (all combined)	nf	0	6	55	118	80	67	225
John's Pond	nf	432	0	281	470	354	102	422
ditches on dirt track JP - FF	nf	nf	0	45	88	17	21	31
stop 8 fem field	129	419	317	1420	1114	839	277	895
stop 8 roadside	89	220	114	124	233	124	59	384
big pond on track thru Brit woods	incl below	incl below	246	133	61	94	20	73
vernal depressions in Brit woods - all	126	555	0	445	563	186	125	679
British camp north	67	?	65	119	102	56	100	334
British camp south	60	?	121	96	65	0	0	219
Total internal ponds	766	2214	1555	4220	4606	4122	1672	5438

Clutch Counts - <i>Ambystoma maculatum</i> - all years, all ponds								
Pond location	2001 Am	2002 Am	2003 Am	2004 Am	2005 Am	2006 Am	2007 Am	2008 Am
Way back behind 1 (E end of trough)	nf	nf	1	0	0		0	0
John's Pond 2 (off track past stop 1)	nf	nf	0	0	1		0	0
stop 1	2	0	9	0	47		1	10
service road	0	0	1	0	4		0	0
Beaver (old - top of hill nr Larry's)	12	3		6	5	sperm.	0	1
Sean's 2 (right of road at culvert)	nf	nf	0	0	0		0	0
1st flag to left before stop 2	nf	nf	1	3	1		0	0
2nd flag to left before stop 2	nf	nf	1	0	0		0	0
stop 2 (all ponds combined)	0	0	0	0	0		0	0
bottom of hill on left before stop 4	nf	nf	2	8	0		0	0
stop 4 culvert	nf	nf	0	0	0		0	0
Sean's = bottom of hill past stop 4 on	nf	0	0	0	0		0	0
Larry's = top of hill on left past stop 4	nf	6	2	0	0	4	10	1
Beaver pond below monument	nf	nf	4	9	0	3	3	0
stop 5	nf	0	4	0	9		12	0
pond south of road in curve below 1	nf	nf	0	0	0		0	0
roadside at John's Pond (all combined)	nf	0	3	0	0		0	5
John's Pond	nf	0	0	0	9		0	0
ditches on dirt track JP - FF	nf	nf	0	0	2		0	4
stop 8 fern field	4	156	161	136	62	8	20	451
stop 8 roadside	3	39	8	0	11		3	45
big pond on track thru Brit woods			15	0	3		4	5
vernal depressions in Brit woods - all	15	170	0	12	23		9	27
British camp north	6	?	0	1	3		1	30
British camp south	12	?	5	0	2		5	17
Total internal ponds	54	374	217	175	182	15	68	596

Pond location	N deg	N minutes	W deg	Wminutes	Other names (years used)
Way back behind 1 (E end of trough)	43	0.410	73	37.027	
John's Pond 2 (off track past stop 1)	43	0.283	73	38.992	
stop 1	43	0.368	73	38.875	
service road	43	0.274	73	38.844	
Wheatfield	43	0.015	73	38.976	
Beaver (old - top of hill nr Larry's)	42	59.834	73	38.928	
Sean's 2 (right of road at culvert)	42	59.682	73	38.785	
1st flag to left before stop 2	42	59.398	73	38.451	
2nd flag to left before stop 2	42	59.379	73	38.439	
stop 2 - a - birch pothole at NE	42	59.255	73	38.537	
stop 2 - b - main site inside woods to S	42	59.254	73	38.628	
stop 2 - c - edge of field on SW	42	59.247	73	38.710	
stop 2 - d - N middle at BA p/u	42	59.285	73	38.535	
bottom of hill on left before stop 4	42	59.545	73	38.477	
stop 4 culvert	42	59.721	73	38.654	
Sean's = bottom of hill past stop 4 on left	42	59.782	73	38.785	Stop 4 (03)
Larry's = top of hill on left past stop 4	42	59.821	73	38.843	Woolbright's(02); 4A(03)
Beaver pond below monument	42	59.884	73	38.530	
stop 5	43	0.108	73	38.811	
pond south of road in curve below 1	43	0.338	73	38.679	
roadside at John's Pond #1	43	0.302	73	37.549	
roadside at John's Pond #2	43	0.295	73	37.537	
roadside at John's Pond #3	43	0.286	73	37.528	
roadside at John's Pond #4	43	0.272	73	37.515	
John's Pond	43	0.319	73	37.519	
ditches on dirt track JP - FF VP#1	43	0.319	73	37.421	
ditches on dirt track JP - FF VP#2	43	0.319	73	37.409	
ditches on dirt track JP - FF VP#3	43	0.323	73	37.394	
stop 8 fem field - by JP track	43	0.306	73	37.425	
stop 8 fem field - back corner	43	0.263	73	37.359	
stop 8 fem field - front corner	43	0.213	73	37.390	
stop 8 fem field - across trail nr maple	43	0.263	73	37.432	
stop 8 roadside	43	0.122	73	37.445	
big pond on track thru Brit woods - site a	42	59.990	73	37.477	
vernal depressions in Brit woods - site b	42	59.976	73	37.430	
vernal depressions in Brit woods - site c	42	59.992	73	37.468	
brit woods - E side of 1st big complex - d	43	0.070	73	37.412	
brit woods - W side of 1st big complex - e	43	0.067	73	37.436	
brit woods - Jared's pond - f	43	0.039	73	37.445	
British camp north	42	59.857	73	36.996	Stop 8 West (01,02)
British camp south	42	59.857	73	36.996	Stop 8 East (01, 02)

Pond location	size	temp/	open/	on rd?	description
	S/M/L	perm	wooded	Y/N	
Way back behind 1 (E end of trough)	S	T	O	N	emergent grassy
John's Pond 2 (off track past stop 1)	S	T	W	N	forested
stop 1	L	P	W	Y	forested
service road	L	P	W	Y (dirt)	open water
wheatfield	S	T	O	Y	emergent grassy
Beaver (old - top of hill nr Larry's)	S	T	O	Y	stream at former beaver dam
Sean's 2 (right of road at culvert)	S	T	O	Y	emergent/gr at both sides of culvert
1st flag to left before stop 2	S	T	W	Y	red-twig dogwood
2nd flag to left before stop 2	S	T	W	Y	culvert back-up
stop 2 (all ponds combined)	many S	T	both	N	vernal pools/stream/potholes Q bicolor
bottom of hill on left before stop 4	S	T	O	Y	shrubby
stop 4 culvert	S	T	O	Y	emergent/gr at both sides of culvert
Sean's = bottom of hill past stop 4 on L	S	T	O	Y	culvert back-up when pipe clogged
Larry's = top of hill on left past stop 4	S	T	O	Y	emergent - cattails
Beaver pond below monument	S	T	O	N	stream at former beaver dam
stop 5	M	P	W	Y	emergent
pond south of road in curve below 1	S	P	W	Y	forested
roadside at John's Pond (all combined)	M	P	W	Y	ponds on L of tour road under pines
John's Pond	L	P	W	N	forested
ditches on dirt track JP - FF	many S	T	W	N	vernal pools /trailside ditches - treed
stop 8 fern field	L	T	O	N	emergent grass & shrub
stop 8 roadside	M	P	O	Y	open water
big pond on track thru Brit woods	M	T	W	N	forested vernal pool
vernal depressions in Brit woods - all	many S	T	W	N	forested vernal pool system
British camp north	M	P	W	N	forest/shrub deep depression
British camp south	M	P	W	N	forest/shrub deep depression

Legend for Radiotracking data forms 2004 – 2008
SARA-0002 and SARA-2008-SCI-0002
Siena College, Larry Woolbright

I am attaching copies of the summary radiotracking data collected for *Rana sylvatica* over the last four years. I still intend to pursue this project again in 2009, and I hope to be able to publish the multi-year data set when it is completed, but in the interest of redundancy, I wanted you to have copies in your files.

The format of the data sheets is the same for 2006, 2007, and 2008. From left to right, the information given is:

- 1) An ID # (either the frog or the transmitter code).
- 2) Name of the breeding site where the frog was captured and released (either John's Pond, Fern Field, or Roadside, all in the vicinity of Stop 8, and all as documented for the clutch count data set).
- 3) Sex of the frog, either m(ale) or f(emale).
- 4) Frog body size as snout-to-vent length in millimeters.
- 5) Date of release with transmitter attached. (For reference to what point in the season it was each year, my field notes indicate that breeding had concluded by 4/7/04, 4/2/06, 4/20/07, and 4/13/08.)
- 6) The next series of columns is alternating # days at location followed by the distance (in meters) of each movement. For example, a frog might have remained at its point of release for 2 days, then moved 18 m, then remained there for 4 days, then moved 150 m, etc.
- 7) The "sum distance" at the end of the above string is the total of the individual moves. This is not the same as the straight-line distance from the starting location of the frog to the ending location of the frog. Rather it is the total distance the frog must have moved to get from point A to point B to point C for the travel path it was observed to take.
- 8) The total number of days the frog was tracked, followed by the "sum distance" figure, above, divided by that number of days.
- 9) The number of times the frog is known to have changed locations, followed by the total days tracked divided by that number of moves to give the average number of days between moves.
- 10) The total distance (straight-line) between the location where the frog was released and the location where it was last observed. This was calculated by the Rhumb Line method located at <http://www.movable-type.co.uk/scripts/latlong.html>.

11) The total straight-line distance, above, divided by the total number of days the animal was followed.

12) The compass bearing, to the nearest whole degree, from the location of release to the last known location, as described in #10 above.

13) The “movement efficiency” of the animal, calculated as sum of movement distances (# 7 above) divided by total straight-line distance moved (# 10 above). For example, if a frog moved straight from his original to his final location, this ratio would be 1.0, whereas a value of 5.0 would indicate that the frog wandered back and forth moving a total of 5 times further than he would have needed just to get from start to finish locations.

The 2004 data set is very similar to the above, lacking only information on frog size. (All were at the Fern Field).

2008	#	days/ move	total dist	tot dist/ day	movement efficiency		
Frog #	moves		1st - last		sum dist/ tot dist	degr	bear
1	1	18.0	18.0	1.0	1.00		101
2	2	14.5	113.2	3.9	1.19		162
3	4	18.8	199.9	2.7	1.26		274
4	4	18.8	117.1	1.8	1.10		161
5	3	14.0	39.4	0.9	1.84		87
6	2	8.0	151.9	9.5	1.22		195
7	2	14.0	78.0	2.8	1.17		188
8							n/a
9	4	25.3	235.6	2.3	1.32		117
10	1	42.0	173.0	4.1	1.00		99
11	3	6.0					n/a
12	4	25.3	296.8	2.9	1.11		154
13	1	42.0	73.8	1.8	1.00		227
14	2	9.0	120.5	6.7	1.81		0
15	4	14.3	278.7	4.9	1.06		184
16							n/a
17							n/a
18	1	15.0	21.1	1.4	1.00		296
19	3	33.0	59.1	0.8	1.21		51
20	1	17.0	39.4	2.8	1.00		232
21	2	20.0	151.7	3.8	1.22		197
22	2	13.0	59.1	2.3	1.08		51
23	3	11.7	198.7	5.7	1.11		3
24	2	15.0	47.5	1.6	1.73		92
25	1	40.0	123.1	3.1	1.00		118
26	1	10.0	129.7	13.0	1.00		359
27	1	10.0	104.6	10.5	1.00		20
28	1	17.0	66.2	3.9	1.00		139
29	2	20.0	358.8	9.0	1.04		306
30	1	17.0	120.1	7.1	1.00		326
average	2.1	18.8	129.8	4.2	1.16		

2007	#	tot	dist/	degr	mvmt
tran#	moves	dist	day	bear	effic
37	4	37.2	2.5	340	2.0
33	4	39.1	2.3	5	3.3
39	5	39.5	2.3	20	1.2
40	3	29.9	1.8	93	2.6
41	4	22.3	0.3	114	5.2
42	3	1.4	0.1	270	25.0
31	6	162.4	5.8	77	1.2
32	6	15.5	0.3	241	2.7
33	5	253.0	14.1	19	0.4
34	5	73.7	2.6	38	1.7
35	5	5.7	0.3	288	4.6
47	2	5.4	0.3	90	1.3
43	2	8.9	1.8	294	1.3
36	4	30.4	1.5	336	1.6
43	2	70.3	6.4	225	1.0
44	2	125.9	7.4	115	1.0
45	2	10.2	0.6	111	5.4
46	2	195.3	11.5	267	1.0
Avere	3.7	62.6	3.5		3.5

[illegible]

2006 - Evan data summary													
Transmitter	sum dist	total days	sumd/ day	# moves	days/ move	total dist	1st-last	tot dist/ day	mvmt effic	Bearing Direction			
									sum d/ tot d				
107241	127.7	13	7.1	4	4.5	97.0		5.4	1.3	330			
107242	261.6	16	14.5	6	3.0	243.7		13.5	1.1	123			
107243	195.6	18	10.9	4	4.5	158.9		3.6	1.2	21			
107244	268.5	13	14.9	3	2.3	149.5		3.3	1.8	315			
107245	90.8	13	5.0	5	3.6	67.1		3.7	1.4	236			
107246	133.0	19	7.4	9	2.3	90.8		5.0	1.5	106			
107247	91.4	19	5.1	6	3.0	82.5		4.6	1.1	309			
107248	179.5	19	10.0	6	3.0	122.6		6.9	1.5	256			
107249	95.9	19	5.3	4	4.5	31.2		1.7	3.1	129			
107250	93.3	13	5.2	5	3.6	48.5		2.7	1.0	335			
107251	604.3	19	33.6	4	4.5	531.1		29.5	1.1	132			
107255	401.4	19	22.3	2	9.0	386.2		21.5	1.0	253			
107258	240.1	19	13.3	3	6.0	241.1		13.4	1.0	253			
107259	269.6	17	15.9	5	3.4	257.6		15.2	1.0	292			
107260	65.0	17	3.3	6	2.3	57.0		3.4	1.1	274			
107262	63.6	17	3.7	5	3.4	49.5		2.9	1.3	271			
107263	172.6	17	10.2	4	4.3	145.2		8.5	1.2	250			
107264	73.6	17	4.3	3	5.7	337.9		19.9	error	342			
107265	33.0	17	1.9	2	6.5	305.7		18.0	error	340			
90536	193.6	19	10.8	4	4.5	150.3		9.4	1.3	119			
90537	86.7	16	5.4	3	5.3	63.7		4.0	1.4	259			
90538	63.5	16	4.0	3	5.3	60.0		3.9	1.1	276			
averages	172.9	17.5	9.8	4.5	4.4	167.1		9.5	1.4				
st dev	133.1	0.7	7.4	1.7	1.8	130.9		7.4	0.5				

