

**MINUTEMAN NATIONAL HISTORICAL PARK AMPHIBIAN AND
REPTILE INVENTORY AND MONITORING SURVEY**

under

National Park Service and Wildlife Conservation Society
Cooperative Agreement

DRAFT

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Summary

A cooperative agreement between the National Park Service and the Wildlife Conservation Society was created as an effort to document the current status, presence, absence, and distribution of amphibians and reptiles in 10 national parks in the northeast from spring 2000 through the fall 2002. As part of this inventory and monitoring project, Minuteman National Historic Site (MIMA) was surveyed from April through September 2001. In addition to documenting common species, this inventory was also interested in searching for threatened, endangered, or uncommon species, likely to appear in suitable habitats of the park.

The following is a preliminary draft summary of the results for the work performed at Minuteman in 2001.

Methods

Since several different species of amphibians and reptiles were encountered in many different types of habitats, a number of techniques were used to assess the status and presence of these species in the park. Habitat categories, described in Appendix 1, were assigned to each survey site. Sampling of MIMA was conducted on a monthly basis in April, May, June, August and September. Each monthly sampling period was 6 days in duration.

Amphibian Calling Counts

Calling counts (by "Wisconsin Frog and Toad Survey" method) were conducted at pond/wetland sites during the spring amphibian-breeding season. This method was used to record the presence and absence of species at specific pond/wetland sites and identify which pond/wetlands are being used by specific anuran species.

Calling counts were conducted with field observations. Field observation counts lasted 5 minutes and recorded species presence and call index of abundance. Amphibian calling counts were conducted in April, May, and June. Counts were conducted once a month starting half an hour after dusk.

Egg Mass Counts

Counts of amphibian egg masses were made once in April during the day. Surveyors walked around the perimeter of the wetlands identifying species, number of egg masses, developmental stage, % mortality, clear/cloudy egg masses, and number of spermatophore clusters (*A. maculatum*) if present. Entire bodies of water were surveyed as long as conditions allowed. Egg mass surveys can confirm not only the presence of a species at a site, but also provides evidence of breeding.

Time Constrained Searches

Time constrained searches (TCS) within woodland, field, stream, and pond habitats were conducted in most woodlands, streams, ponds, and fields in the park. Searchers moved deliberately through the habitat, searching under the best available cover. The amount of effort per habitat type was determined based on considerations of habitat area and difficulty of finding species likely to occur in each habitat. Additional searches were also done in habitats where less common species were more likely to be found.

Coverboards

Coverboards were used primarily to inventory snakes, a group for which there is little information. In April, corrugated sheet metal (2' x 4') and plywood coverboards (2' x 4' x 0.5") were placed on the ground on top of snow and existing vegetation. Eight arrays were placed in field habitats and 8 arrays were placed in woodlands. When possible, field arrays were placed along woodland edges. The number of arrays at each site was determined by the size of the site. Metal and wood coverboards were alternately placed approximately 5 meters apart in linear arrays of 8. Metal coverboards were placed at the beginning of each array so that all odd numbered coverboards were metal and all even numbered coverboards were wood. Coverboards were each checked once in April, May, June, and September and checked twice in August. Measurements of total length and snout-vent length were collected for each snake and sex was identified when possible. Amphibians under coverboards were also recorded but no measurements were taken.

Turtle Traps

Wire mesh "Crab" traps measuring 12"x12"x24"(wire mesh 0.5x1") were used primarily to sample shallow ponds and marshes for small aquatic/semi-aquatic turtles and funnel traps made of D-shaped metal hoop and nylon mesh (1") were used to sample deeper, more permanent ponds for aquatic turtles. Traps, baited with sardines, were set in each pond in May and June or as long as hydrology allowed, and were checked daily.

Data on carapace and plastron length and width, as well as total weight were recorded. Each turtle was assigned an individual notch code for identification in case of recapture and also for identification in future studies. Using a 3-sided file, a triangular notch was made on individual scutes, each representing a specific number (Figure 3).

Minnow Traps

One metal wire minnow trap and one mesh minnow trap were set in each body of water. Trapping was designed to capture developing frog and salamander larvae, as well as aquatic snakes.

Incidental Encounters

Incidental encounters were recorded on observation cards ("Green Cards") to augment data collected during formalized sampling. Any observations made by park staff and visitors were also recorded on Green Cards.

Results

A summary of the location and presence of amphibian and reptile species encountered during the surveys is described in Table 1.

Amphibian call counts were conducted between 24 March and 19 June. Species heard during surveys included spring peeper, green frog, bullfrog, wood frog, grey treefrog, and American toad (Table 2.)

Egg mass counts were conducted on 18 and 19 April at 13 sites. Spotted salamander egg masses were counted at 6 sites and wood frog egg masses were counted at 2 sites. Both spotted salamander and wood frog egg masses were found in Virginia and Cooks Ponds (Table 3).

Time constrained surveys were conducted at 23 sites in pond, field, and woodland habitats. Total search effort and number of species encountered is described in Table 4.

Coverboard checks at 16 sites yielded a total of 33 snakes. The majority of the snakes captured were found under metal coverboards (Tables 5,6,& 7).

Turtle trapping began on 16 April and the majority of trapping ended on 23 June. Millbrook Mouth was briefly trapped in August, resulting in the capture of a snapping turtle (Table 8). Only one spotted turtle was captured in the park, this was at Cranberry Bog. A summary of all turtles captured is described in Table 9.

Minnow trapping occurred at 12 sites, beginning on 24 March and continuing until 16 September 2001. Summary of minnow trapping is described in Table 10.

Incidental encounters recorded on green card survey forms are described in Table 11. A description of codes used for each species and common names is summarized in Table 12.

Table 1. Minuteman National Historic Park Species List, 2001.

Site Name	Species*																			# of spp.
	AMMA	AMSP	BUAM	CHPI	CHSE	CLGU	EUBI	HYVE	LATR	NOVI	PLCI	PSCR	RACA	RACL	RAPA	RAPI	RASY	RASP	THSI	
4-121 Pond			X									X		X						3
Burke House			X																	1
Concord River				X	X															2
Cook's Pond	X	X	X		X			X				X	X	X			X			9
Cranberry Bog	X				X	X		X				X		X				X		7
Elm Brook North							X													1
Elm Brook South							X											X		2
Fiske Hill Field 1									X										X	2
Fiske Hill Field 2																			X	1
Fiske's Field																				0
Folly Pond					X			X		X		X	X	X	X		X		X	9
Historic Field 1																			X	1
Historic Field 2																			X	1
Historic Field 3																				0
Historic Field 4																			X	1
Historic Fields			X					X								X	X			4
Irrigation Pond A				X								X	X	X			X	X	X	7
Millbrook Mouth			X		X										X	X	X	X		6
Millbrook North				X										X						2
Millbrook South														X						1
Millbrook Wayside												X		X						2
Millbrook West													X							1
Nelson House																			X	1
Nelson Pond			X	X	X			X				X	X	X	X	X				9
North of Meriam House																X				1

Site Name	Species*																			# of spp.
	AMMA	AMSP	BUAM	CHPI	CHSE	CLGU	EUBI	HYVE	LATR	NOVI	PLCI	PSCR	RACA	RACL	RAPA	RAPI	RASY	RASP	THSI	
Northbridge Field																X				1
Palumbo Ditches			X	X	X							X	X	X		X				7
Palumbo Field				X												X	X		X	4
Palumbo Pond				X	X							X	X	X				X		6
Pond O	X											X	X	X						4
Rt. 2A Pond	X							X			X	X	X	X			X	X		8
Virginia Pond	X		X								X	X		X			X	X		7
Visitor's Center Permanent Pond					X							X	X	X	X		X	X		7
Visitor's Center Vernal Pond												X								1
Whittemore Pond	X		X					X						X				X		5
Woodland 2			X								X						X			3
Woodland 3											X					X		X	X	4
Woodland 3A																			X	1
Woodland 3B																				0
Woodland 4											X						X		X	3
Woodland 6			X								X			X			X		X	5
Woodland 8											X								X	2
Woodland 11								X			X									2
Woodland 12			X								X									2
Number of Sites	6	1	12	7	9	1	2	8	1	1	9	14	10	17	4	8	12	10	14	
Relative Abundance	0.14	0.02	0.27	0.16	0.20	0.02	0.05	0.18	0.02	0.02	0.20	0.32	0.23	0.39	0.09	0.18	0.27	0.23	0.32	

*AMMA=spotted salamander; AMSP=*Ambystoma* spp.; BUAM=American toad; CHPI=painted turtle; CHSE=snapping turtle; CLGU=spotted turtle; EUBI=two-lined salamander; HYVE=gray treefrog; LATR=milksnake; NOVI=red-spotted newt; PLCI=red-backed salamander; PSCR=spring peeper; RACA=bullfrog; RAPA=pickerel frog; RAPI=leopard frog; RASY=woodfrog; RASP=*Rana* spp.; THSI=garter snake

RACL = *Rana clamitans*

Table 2. Species diversity and call index for 14-frog call count sites in Minuteman National Historic Site, 2001.

Location	Highest Call Index Recorded for Each Species						Total # of Species
	BUAM	HYVE	PSCR	RACA	RACL	RASY	
4-121 Pond	1	-	3	-	1	-	3
Cook's Pond	-	3	3	1	3	2	5
Cranberry Bog	-	3	3	-	2	-	3
Folly Pond	-	3	3	1	3	-	4
Irrigation Pond A	-	-	-	1	2	-	2
Nelson Pond	1	1	3	2	3	-	5
Palumbo Pond	-	-	1	-	1	-	2
Pond O	-	-	3	-	1	-	2
Rt. 2A Pond	-	2	3	1	1	1	5
VC Permanent Pond	-	-	2	1	1	-	3
VC Vernal Pond	-	-	1	-	-	-	1
Virginia Pond	-	-	2	-	-	1	2
Millbrook Wayside	-	-	3	-	3	-	2
Whittemore Pond	1	1	-	-	1	-	3
Number of Sites*	3	6	12	6	12	3	
Relative Abundance	7.1	14.3	28.6	14.3	28.6	7.1	

*Number of sites where each species was identified

Table 3. Summary of egg mass surveys in Minuteman National Historic Site, 2001.

Wetland Site	Date	Search Effort (person hrs)	Egg Masses	
			Spotted Salamander	Wood Frog
Cook's Pond	19-Apr	2.0	31	20
Cranberry Bog	19-Apr	1.2	1	-
Folly Pond	18-Apr	0.8	-	-
Irrigation Pond A	18-Apr	0.5	-	-
Nelson Pond	18-Apr	0.5	-	-
Palumbo Ditches	18-Apr	0.5	-	-
Palumbo Pond	18-Apr	0.3	-	-
Pond O	19-Apr	1.0	2	-
Rt. 2A Pond	19-Apr	1.3	22	-
VC Permanent Pond	18-Apr	0.3	-	-
VC Vernal Pond	18-Apr	0.2	-	-
Virginia Pond	19-Apr	1.2	13	96
Whittemore Pond	19-Apr	0.7	14	-
Total		10.5	83	116

Table 4. Summary of time constrained searches in Minuteman National Historic Park, 2001.

Location	Habitat	Search Effort (hrs)	# of Species
Cook's Pond	Permanent Pond	3.2	5
Cranberry Bog	Bog	2.5	3*
Fiske's Field	Field (grass)	2.9	0
Folly Pond	Permanent Pond	3.2	4
Historic Fields	Fields	10.2	3
Irrigation Pond A	Pond	2.3	3*
Nelson Pond	Farm Pond	2.0	3
North Bridge Field	Field/Floodplain	2.4	1
Palumbo Ditches	Farm Ditches	2.6	3
Palumbo Field	Agricultural Field	1.8	1
Palumbo Pond	Farm Pond	2.2	3*
Pond O	Permanent Pond	2.3	3
Rt. 2A Pond	Permanent Pond	2.7	7*
VC Permanent Pond	Permanent Pond	2.0	1
Virginia Pond	Temporary Pond	3.5	5
Whittemore Pond	Temporary Pond	3.8	3
Woodland 2	Mixed Forest	3.3	2
Woodland 3	Deciduous Forest	8.3	3*
Woodland 4	Deciduous Forest	4.2	3
Woodland 6	Deciduous Forest	5.0	6
Woodland 8	Mixed Forest	2.9	1
Woodland 11	Mixed Forest	3.3	2
Woodland 12	Deciduous Forest	2.3	2
Total		78.9	

*Does not include RASP observations

Table 5. Summary of coverboard surveys in Minuteman National Historic Site.

Sites	# of Snakes	# of Boards/ Site	Board Checks	# of Boards with Snakes	Snake Species*
Fiske Hill Field 1	6	8	48	2	LATR, THSI
Fiske Hill Field 2	2	8	48	2	THSI
Historic Field 1	11	8	56	5	THSI
Historic Field 2	7	8	40	3	THSI
Historic Field 3	0	8	46	0	-
Historic Field 4	2	8	48	1	THSI
Palumbo Field	2	8	48	2	THSI
Northbridge Field	0	8	32	0	-
Woodland 2	0	8	48	0	-
Woodland 3A	1	8	48	1	THSI
Woodland 3B	0	8	48	0	-
Woodland 4	0	8	48	0	-
Woodland 6	1	8	48	1	THSI
Woodland 8	1	8	48	1	THSI
Woodland 11	0	8	48	0	-
Woodland 12	0	8	48	0	-
Total	33	128	750	18	2

*LATR=eastern milksnake; THSI=eastern garter snake.

Table 6. Seasonal productivity of coverboard surveys in Minuteman National Historic Park, 2001.

Dates	Total Board Checks	# of Board Checks Producing Snakes	% of Board Checks Producing Snakes
April – July	380	15	3.9%
August – September	370	9	2.4%
Total	750	24	3.2%

Table 7. Summary of snake species found under wood and metal coverboards in Minuteman National Historic Park, 2001.

Species	# Snakes	# (%) Metal	# (%) Plywood
eastern garter snake	23	13 (57)	10 (43)
eastern milk snake	1	1 (100)	0 (0)
All Snakes	24	58%	42%

Table 8. Turtle trap locations, trap effort, and trap dates in Minuteman National Historic Site, 2001.

Site	Start Date	End Date	# of Trap Nights	# of New Turtles						# of Recaptured Turtles		
				Painted		Snapping		Spotted		Painted	Snapping	Spotted
				#	Ab*	#	Ab*	#	Ab*			
Cook's Pond	15-May	23-Jun	24	0	-	2	0.08	0	-	0	0	0
Cranberry Bog	15-May	23-Jun	24	0	-	2	0.08	1	0.04	0	0	0
Folly Pond	15-May	23-Jun	24	0	-	3	0.13	0	-	0	0	0
Irrigation Pond A	15-May	23-Jun	32	0	-	0	-	0	-	0	0	0
Millbrook Mouth	23-Aug	27-Aug	6	0	-	1	0.17	0	-	0	0	0
Palumbo Ditches	15-May	23-Jun	64	1	0.02	2	0.03	0	-	0	0	0
Palumbo Pond	16-Apr	23-Jun	25	8	0.32	4	0.16	0	-	2	1	0
Nelson Pond	15-May	23-Jun	24	2	0.08	1	0.04	0	-	0	0	0
Pond O	15-May	23-Jun	24	0	-	0	-	0	-	0	0	0
Rt. 2A Pond	15-May	23-Jun	24	0	-	0	-	0	-	0	0	0
VC Perm Pond	15-May	23-Jun	24	0	-	2	0.08	0	-	0	0	0
Virginia Pond	15-May	23-Jun	24	0	-	0	-	0	-	0	0	0
Whittemore Pond	15-May	23-Jun	24	0	-	0	-	0	-	0	0	0
Total			343	11	0.03	18	0.05	1	0.003	2	1	0

*Index of abundance (# individuals/# trap nights)

Table 9. Summary of measurements for turtles captured in Minuteman National Historic Site, 2001.

Site		Date	Sex	Notch Code	Carapace Length (mm)	Carapace Width (mm)	Plastron Length (mm)	Plastron Width (mm)	Weight (g)
CHPI	Nelson Pond	16-May	Female	R1,2	140	107	132	86	365
		19-May	-	R2,3	89	74	79	60	105
	Palumbo Ditches	16-May	Male	R3	124	90	114	71	235
	Palumbo Pond	17-Apr	Male	R1	135	92	115	75	295
		17-Apr	Female	R2	146	110	137	106	475
		17-May	-	R1,3	94	79	90	62	-
		18-May	Female	L9	161	127	156	100	578
		19-Jun	Female	R4	158	116	145	96	463
		19-Jun	Male	R1,4	137	97	124	75	281
		20-Jun	Female	R2,4	166	116	151	95	534
		22-Jun	Male	R8	125	93	112	73	235
CHSE	Cook's Pond	20-Jun	Female	R10 - L8	248	209	191	198	>2500
		20-Jun	Male	R8,10 - L8	188	144	132	134	>1000
	Cranberry Bog	19-Jun	Female	R9,11	173	133	124	123	>1000
		19-Jun	Male	R8,11	319	276	237	241	>2500
	Folly Pond	19-Jun	Female	R9 - L8	258	207	181	180	>2500
		19-Jun	Male	L8	340	274	243	244	>2500
		19-Jun	Male	R8 - L8	339	275	236	248	>2500
	Millbrook Mouth	24-Aug	Male	R10 - L10	419	353	307	332	>2500
	Millbrook Stream	20-Jun	Female	R9,10 - L8	312	242	231	218	>2500
	Nelson Pond	16-May	Female	R8	306	239	212	209	>2500
	Palumbo Ditches	19-May	-	R8,10	116	94	89	87	360
		20-May	Male	R11	284	229	189	203	>2500
	Palumbo Pond	16-May	Female	R9	394	332	271	298	>2500

Site		Date	Sex	Notch Code	Carapace Length (mm)	Carapace Width (mm)	Plastron Length (mm)	Plastron Width (mm)	Weight (g)
CHSE	Palumbo Pond	16-May	-	R8,9	220	182	156	162	2490
		20-Jun	Female	R8,9 - L8	366	294	252	275	>2500
		21-Jun	Male	R9,11 - L8	387	334	271	302	>2500
		21-Jun	Female	R8,9,10 - L8	299	244	215	217	>2500
	VC Permanent Pond	17-May	Female	R10	251	215	187	194	>2500
		19-Jun	Male	R9,10	242	188	158	182	>2500
CLGU	Cranberry Bog	21-Jun	Female	R1	116	84	104	62	222

Table 10. Minnow trap locations, trap effort, and trap dates.

Site	Start Date	End Date	# of trap nights	Species in Minnow Traps*																			
				AMMA		AMSP		BUAM		HYVE		NOVI		RACA		RACL		RAPA		RASY		RASP	
				A	L	A	L	A	L	A	L	A	L	A	L	A	L	A	L	A	L	A	L
Cook's Pond	24-Mar	17-Sep	54	5			2		1							1	93				21		
Cranberry Bog	15-Apr	28-Aug	40													3	246						
Folly Pond	15-Apr	17-Sep	46								1	1				1	221						
Irrigation Pond A	15-Apr	28-Aug	40														3						
Nelson Pond	15-Apr	28-Aug	40													6							
Palumbo Pond	15-Apr	28-Aug	40														15						
Palumbo Ditches	15-Apr	28-Aug	40													1	6						
Pond O	15-Apr	28-Aug	42												3	3	162						
Rt. 2A Pond	24-Mar	17-Sep	56								1				1		143						1
VC Permanent Pond	15-Apr	28-Aug	40															1					1
Virginia Pond	15-Apr	28-Aug	52														8			1	894		4
Whittemore Pond	24-Mar	17-Sep	55	1													1092						1
Totals			545	6	0	0	2	0	1	0	2	1	0	4	10	5	1989	1	0	1	915	0	7

*A=Adult; L=Larvae

Table 11. Green card incidental encounter summary, Minuteman National Historic Park, 2001.

Species	# Sites	ADL	VOC	Total Detections
Bullfrog	1	1	-	1
American Toad	5	8	1	9
Eastern Garter Snake	3	7	-	7
Green Frog	1	-	2	1
Leopard Frog	4	5	-	5
Painted Turtle	3	4	-	4
Pickerel Frog	3	4	-	4
Snapping Turtle	3	3	-	3
Wood Frog	5	7	-	7
Totals	16 sites	39	-	41

Table 12. Species code list.

Code	Common Name	Scientific Name
RACA	American Bullfrog	<i>Rana catesbiana</i> ✓
BUAM	American Toad	<i>Bufo americanus</i> ✓
HYVE	Gray Treefrog	<i>Hyla versicolor</i> ✓
RACL	Green Frog	<i>Rana clamitans</i> ✓
RAPI	Leopard Frog	<i>Rana pipiens</i> ✓
RAPA	Pickerel Frog	<i>Rana palustris</i> ✓
PSCR	Spring Peeper	<i>Pseudacris crucifer</i> ✓
RASY	Wood Frog	<i>Rana sylvatica</i> ✓
NOVI	Eastern Red-Spotted Newt	<i>Notophthalmus viridescens</i> ✓
AMMA	Yellow-Spotted Salamander	<i>Ambystoma maculatum</i> ✓
EUBI	Northern Two-Lined Salamander	<i>Eurycea bislineata</i> ✓
PLCI	Redbacked Salamander	<i>Plethodon cinereus</i> ✓
CHPI	Painted Turtle	<i>Chrysemys picta</i> ✓
CHSE	Snapping Turtle	<i>Chelydra serpentina</i> ✓
CLGU	Spotted Turtle	<i>Clemmys guttata</i> ✓
THSI	Garter Snake	<i>Thamnophis sirtalis</i> ✓
LATR	Milk Snake	<i>Lampropeltis triangulum</i> ✓

17

AMSP
RASP

Ambystoma spp.
Rana spp.

all species already in db
add ref to all species
do NOT add ref to NRE
Send to Bob for Review