

Report to Florissant Fossil Beds National Monument

Inventory and Monitoring Project – Amphibians and Reptiles
In cooperation with DOI Amphibian Research and Monitoring Initiative

FINAL REPORT
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BACKGROUND

We surveyed Florissant Fossil Beds National Monument (FLFO) in 2001 and 2002 as part of the National Park Service's Inventory and Monitoring Program and in cooperation with the DOI Amphibian Research and Monitoring Initiative. The goal of this project was to document, with voucher specimens, 90% of the amphibian and reptile species occurring in FLFO. Florissant Fossil Beds National Monument is located 65 km west of Colorado Springs and covers approximately 6,000 acres of land in Teller County. Elevation ranges from 2,500 m to 2,750 m. The topography is open and park-like with mountain meadows and rolling hills of Ponderosa pine and spruce-fir forests. The dominant watercourse is Grape Creek, fed by a number of unnamed creeks. The only natural ponds in the monument are formed by beaver dams along Grape Creek in the northwest. There were 10 dams holding water during the spring and summer of 2001 and numerous other dams that were dry. Hammerson (1999) reported 3 amphibian species (tiger salamanders [*Ambystoma tigrinum*], chorus frogs [*Pseudacris triseriata*], and leopard frogs [*Rana pipiens*]) and 4 reptile species (prairie and plateau lizards = eastern fence lizard [*Sceloporus undulatus*], smooth green snake [*Liochlorophis vernalis*], western terrestrial garter snake [*Thamnophis elegans*], and western rattlesnake [*Crotalus viridis*]) as present in Teller County, but not necessarily at FLFO.

Methods

Our goal in 2001 was to provide a systematic, broad-scale survey of FLFO. In order to do that, a 500 m x 500 m grid was overlaid on the existing FLFO map. All or portions of 130 cells fell within FLFO and half of these cells were selected randomly. We

first searched all wetlands (ponds, marshes, streams, waterholes) at FLFO, regardless of what cell they were in. Second, we searched all cells in the selected 50%. Third, we searched additional cells as time allowed. Cells were located by GPS. Technicians located the northwest corner of each cell then proceeded to walk transects across the cell. Transects were approximately 25 m apart, and they were walked north to south. In 2002, our goal was to re-survey all sites in likely habitat that were surveyed in 2001. FLFO was visited twice (3-5 June and 1-3 July) in 2002. We re-surveyed 6 of the sites visited in 2001 (2-3 visits to each site) plus one additional site identified in 2002.

Visual encounter surveys (VES) (Heyer et al. 1994) were used throughout the study. We searched for all life stages of amphibians (egg, larvae and adult) and for adult reptiles. Two to four technicians walked through the grid cells on rough transects and examined all wet or moist areas closely. Dip nets were used to sample areas with limited visibility, and likely shallows with emergent vegetation were examined meticulously for eggs and larvae. Wetland areas, boulders, rocky outcrops, and downed woody debris received special attention. Dense forests received less attention, but likely habitat such as woodpiles or rocky debris was searched. Although we focused on habitat where we were likely to encounter amphibians or reptiles during the surveys, the entire cell was surveyed in 2001. In 2002, only wetland areas, ponds and likely basking spots for reptiles were surveyed. For all surveys, habitat characteristics were recorded. For each captured animal, mass was determined and snout-vent length (SVL) measured. Animals were released at the site of capture or kept as voucher specimens.

Call surveys (Bishop et al. 1997, Lepage et al. 1997, Corn et al. 2000) were performed at wetland locations at night between 2000 and 2200 hr (2 nights, n = 2,1

location(s) respectively in 2001; and 1 night, 5 locations in 2002). These surveys used auditory cues to determine the species present and relative abundance of the chorus. Time constraints limited the number of call surveys performed.

Voucher collection

Voucher specimens were collected as permanent documentation of species present at FLFO and as part of the Amphibian Research and Monitoring Initiative. Information collected on each voucher included; date and time of collection, location at capture (UTMs), weather conditions, species, snout-vent length (SVL), mass, sex, coloration, behavior, date of preservation, and collector's name. Euthanasia and preparation of voucher specimens followed standard protocol (Heyer et al. 1994 and National Wildlife Health Laboratory and ARMI standard operating procedures; see the following websites: http://www.nwhc.usgs.gov/research/amph_dc/sop_anesth.html, http://www.nwhc.usgs.gov/research/amph_dc/sop_restraint.html). Adult specimens are stored in 70% ETOH, and egg and larval specimens are stored in 10% formalin (Gotte and Reynolds 1997). Voucher specimens are housed at USGS-FORT, Fort Collins, CO until direction is received from the National Park Service on where the vouchers will be housed permanently.

Results

We spent 132 person hours surveying 83 cells or parts of cells that occurred within FLFO (total of 130 cells, Fig. 1) in 2001. Of the 83 cells (note that in the 2001 this number was 63 which was a typographical error) that were surveyed, we found amphibians and / or reptiles in 13 cells (43, 58, 68, 74, 79, 81, 82, 83, 88, 90, 113, 114, 118). Two species of amphibian (*P. triseriata* and *A. tigrinum*) and 2 species of reptile

(*S. undulatus* and *T. elegans*) were detected during surveys between 18 May and 11 June 2001. Descriptions of the cells and the animals encountered are detailed in the 2001 report (Muths, 2001, unpublished. Report to FLFO). *P. triseriata* were heard on all call surveys. Calling intensity was high in mid May (see Corn et al. 2000 for details), tapering off in June. Mid-day temperatures averaged 19-21°C during the surveys and there was one snowfall event on 21 May.

We focused on likely habitats in 2002 that were identified during the 2001 cell surveys and spent 20.2 person hours searching 9 sites. During the first visit, one amphibian species (*P. triseriata*) was heard calling, one amphibian species was seen surfacing on a pond (*A. tigrinum*) and one reptile species (*T. elegans*) was captured. Two garter snakes were kept as voucher specimens. Only one species (*T. elegans*) was detected during subsequent visits.

The following narratives describe the VES and call survey for each of the sites visited in 2002 (Table 1). For descriptions of areas surveyed in 2001 see 2001 report.

Grape Creek, Visit 1, 3 June.

Grape Creek feeds into Pond #3 and had slow running water with shallows and emergent vegetation on both sides. The pond was not more than one meter deep in surveyed areas. We searched along the creek from Pond #3 through cell 79 and into cell 67. During the survey it was slightly overcast and there was a light wind. We found 3 garter snakes, two of which were kept as voucher specimens.

Marsh #1, Visit 1, 4 June.

Marsh # 1 is the site of a pond recently eliminated by FLFO. The pond site was dry, but south of the pond was a creek bed containing a few centimeters of water. There was adequate emergent vegetation but probably not enough water for breeding amphibians. Marsh #1 is the site where *A. tigrinum* were collected last year (by D. Carlisle, FLFO)

when the restoration process was initiated. The weather during this survey was overcast with a light wind.

Dry Point, Visit 1, 4 June.

Dry point is a depression behind a man-made dam. This site was dry this year but it was visited because it appeared to be a pond on the FLFO map. The weather during this survey was overcast and calm. No amphibians or reptiles were seen or heard.

Pond #1, Visit 1, 4 June.

Pond #1 had appropriate habitat for amphibians on the north side. Shallows and emergent vegetation (mostly sedges) were present on the north shore. During the survey the sky was overcast and there was a light wind. No amphibians were seen.

Visit 2, 4 June – call survey. One chorus frog was heard.

Visit 3, 1 July. The water level was low and there was no emergent vegetation. During the survey it was partly cloudy and there was a light wind. Five wandering garter snakes (*T. elegans*) were detected (one preserved as a voucher specimen #18239).

Pond #2, Visit 1, 4 June.

The water level was very low. There was no emergent vegetation and no cover for breeding amphibians. Floating vegetation, covered with insect larvae was present over much of the pond surface. Tracks from raccoons and other small mammals were evident in the mud around the pond. No amphibians were detected. The weather was calm but raining during this survey.

Visit 2, 4 June – call survey. No amphibians were heard during the call survey that evening.

Visit 3, 1 July. The pond was thick with submergent vegetation. Dipnetting was unsuccessful, but it is possible that tiger salamanders are present in this pond. No amphibians or reptiles were heard or seen. The weather was overcast with a light wind.

Pond #3, Visit 1, 3 June.

This pond was drained recently by FLFO. Water from a reservoir above the pond had been drained by releasing high volumes of water into Grape Creek and through this area during two separate occasions. Suitable habitat for amphibians is present. Shallows and emergent vegetation surround the remnants of this pond. Chorus frogs were heard calling in the emergent vegetation in the early evening during the VES, but none were seen. The weather was partly cloudy and calm.

Visit 2, 4 June – call survey. Chorus frogs were heard.

Visit 3, 2 July. No amphibians were detected but 4 garter snakes were found. This pond had been drained almost entirely since the first visit. The weather during this survey was overcast with a moderate wind.

Pond #4, Visit 1, 4 June 2002.

Pond #4 included appropriate habitat for amphibians. The pond was about 30 x 55 meters with shallows and emergent vegetation available around the perimeter. Moss was the most abundant vegetation both in and around the pond. The weather was partly cloudy and calm. No amphibians or reptiles were present, but two garter snake sheds were found near the pond.

Visit 2, 4 June – call survey. No amphibians were heard calling during the call survey.

Visit 3, 2 July. The pond was nearly dry and there was little appropriate amphibian habitat. The north side of the pond was rocky and providing likely garter snake habitat. The weather during this survey was clear and calm. One shed garter snake skin and 8 garter snakes were found including 2 juveniles. One adult snake was preserved as a voucher specimen (Field #18240). No amphibians were detected.

Pond #5, Visit 1, 4 June 2002.

Shallows were present along the entire margin of Pond #5 (25 x 35 meters). Sedges were present around the margin, but only 3-5% were in the water. The pond was covered by a thick layer of floating aquatic vegetation making it impossible to see into the pond. The weather was partly cloudy and calm. We detected *A. tigrinum* surfacing but were unable to capture them.

Visit 2, 4 June – call survey. No amphibians were detected during call survey.

Visit 3, 2 July. The entire pond was covered with floating aquatic vegetation and no amphibians or reptiles were detected. The pond lacked emergent vegetation and shallows. The weather during this survey was slightly overcast with a moderate wind.

Pond #6, Visit 1, 5 June 2002.

This site was comprised of a series of beaver ponds with 20-30% emergent vegetation and flowing water. Willows and sedges were present, but most were not in the water. In most ponds, the bank (sedges and grasses) dropped off sharply to a silty substrate without cover. Habitat was appropriate in places for amphibians, but fish were present. We saw one *T. elegans*, but no amphibians. The weather during this survey was clear and calm. No call survey was conducted.

Visit 2, 2 July. No amphibians were detected. Eight garter snakes were seen, including 3 juveniles. The weather during this survey was clear and calm.

Pond #7 Visit 1, 2 July.

Pond #7 was identified during the first session in 2002 but not surveyed until the second session. This is a beaver pond with emergent vegetation (mainly grasses and willows) and shallows present on the north shore. Fish were seen in the pond. The weather was partly cloudy and calm. One garter snake was detected.

Visit 2, 3 July. No amphibians or reptiles were detected. Weather was partly cloudy and calm.

Surveys totaling 153.4 person hours (133.2 in 2001 and 20.2 in 2002) yielded 66% (2 of 3 species) of the amphibians and 50% (2 of 4 species) of reptiles predicted to be in Teller County by Hammerson (1999). We detected no new amphibian or reptile species after 26.3 and 6.7 person hours of searching (respectively) in 2001 and no new species in 2002 (Fig. 2a and b). These data suggest that we detected the species that were

present during our surveys. Chorus frogs and garter snakes were associated with wetlands although garter snakes were captured within 10 m of a road on 2 occasions.

Voucher collection:

One chorus frog and 6 tiger salamanders (2001) were captured and preserved. The salamanders were placed initially into alcohol rather than formalin. While this was appropriate for samples for some uses (e.g. genetic analyses), these specimens should have been preserved in formalin. They are now in formalin, but have degraded.

Although they are identifiable specimens, they do not meet typical museum specimen standards. Five garter snakes were captured and preserved but no *S. undulatus* were captured.

Discussion / Recommendations:

Florissant Fossil Beds National Monument is not particularly rich in herpetofauna and has limited areas appropriate for amphibian breeding. We spent 113 hours searching likely habitat for amphibian and reptiles and found 2 of 3 amphibians and 2 of 4 of the reptiles (57 % of the total herpetofauna) that are potentially resident in Teller County (Hammerson 1999). Although none were found during this survey, there is an undocumented sighting of a rattlesnake (*Crotalus viridis*) in the Monument in the last 10 years (FLFO personnel, pers. com.).

Tiger salamanders were observed in one location during our 2001 survey, the dammed pond in cell 43 (~125 m west of Teller 1 and Lower Twin Rock Road Junction). This dam was scheduled for removal by the Monument in 2001. However, salamanders were trapped at the temporary pond across from the Hornbeck homestead (475772E, 4308449N) (L. Livo, pers. com.). Salamanders were trapped (45 larvae in 70 trap hours)

at this pond on both 17 June and 14 August 2001 (L. Livo, pers. com.). In 2002 we observed salamanders only at Pond #5 (the pond across from the Hornbeck homestead). Leopard frogs (*R. pipiens*) have disappeared from parts of the State of Colorado perhaps due in part, to introductions of bullfrogs (Corn and Fogleman 1984, Hammerson 1999). However, leopard frogs may never have been present at FLFO.

The effort expended compared to new species found (Fig. 2) suggests that we located species that were present during our surveys, but other factors may play a role in the low numbers of species detected. Visual encounter survey methods are not ideal for more secretive species such as the smooth green snake; we had a snow storm in late May in 2001 that may have hindered our detectability; and drought played a considerable role in the availability of animals at FLFO during both years of the survey. The results from this survey were intended to provide baseline data for amphibian and reptile occurrence at FLFO; however, because of the above mentioned circumstances, these data should be used cautiously. A similar, thorough survey of FLFO should be conducted during 1 or more years with average rainfall to add to the data provided here. Surveys focused on appropriate habitat for reptiles during the hotter months later in the year or a more intensive pitfall trapping design around wetland areas might yield other species.

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Table 1: Results 2002. THEL = *Thamnophis elegans*, PSTR = *Pseudacris triseriata*, AMTI = *Ambystoma tigrinum*.

SITE	UTMs (NAD 27, zone 13)	VISIT #	DATE	SEARCH TIME (min)			TEMP C*		OBSERVATIONS		
				Start	End	Total	Air	Water	Species	Age class	# OF ANIMALS
Marsh #1	475904	1	4-Jun-02	1130	1218	96	--	--	none	--	--
	4305397										
Grape Creek	476112	1	3-Jun-02	1740	1843	126	--	--	THEL	Adult	3
	4307018										
Pond #1	477264	1	4-Jun-02	1620	1643	46	--	--	none	--	--
	4306784										
	2										
Pond #2	477581	1	4-Jun-02	1725	1816	51	--	--	none	--	--
	4305950										
	2										
Pond #3	476026	1	3-Jun-02	1655	1727	32	--	--	PSTR	Adult	aural
	4307006										
	2										
Pond #4	475264	1	4-Jun-02	1830	1849	19	--	--	none	--	--
	4308678										
	2										
Pond #5 (pond across from Hornbeck homestead)	475806	1	4-Jun-02	1900	1958	58	--	--	AMTI	Neotenes	20-30
	4308513										
	2										
Pond #6	474844	1	5-Jun-02	1020	1223	123	--	--	none	--	--
	4309125										
	2										
Pond #7	476863	1	2-Jul-02	1711	1724	26	22	20	THEL	Adult	1
	4308682										
	2										

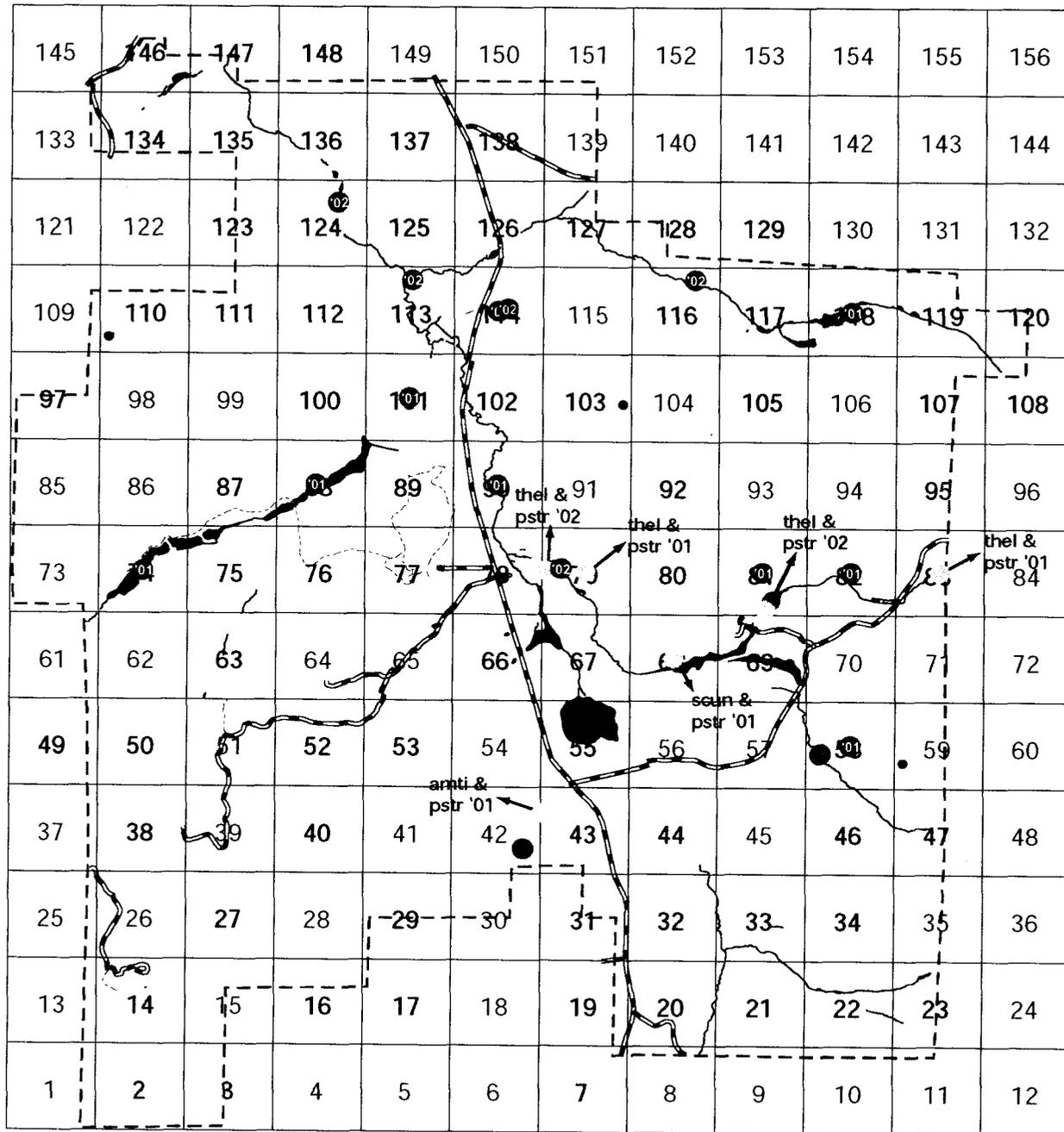
*Thermometer broke at beginning of first session, temperatures not recorded.

Table 2: Voucher specimens collected.

Species	Collection location (UTM, NAD27 ZONE 13)	Collection date	Snout-vent length (SVL)	Specimen number	Notes
<i>Pseudacris triseriata</i>	cell 79 476250E 4307000N	1- Jun - 01	25.1 mm	18161	Male
<i>Thamnophis elegans</i>	cell 83 478148E 4306980N	30-May-01	58 cm	18160	Apparent road kill with a 4-5 cm flattened area behind the head, female
<i>Ambystoma tigrinum</i> *	47389E 4307137N	1-Nov-01	--	18260, 18261, 18262, 18263, 18264, 18265	Sex unknown (n = 6)
<i>Thamnophis elegans</i>	cell 79 476112E 4307018N	3-Jun-02	27.5 cm	18162	Female
<i>Thamnophis elegans</i>	cell 79 476144E 4306950N	3-Jun-02	38.5 cm	18163	Male
<i>Thamnophis elegans</i>	477264E 4306784N	1-Jul-02	--	18239	Sex unknown
<i>Thamnophis elegans</i>	475264E 4308678N	2-Jul-02	--	18240	Sex unknown

* specimens not museum quality, see text.

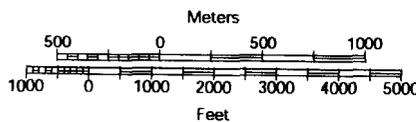
Figure 1: Florissant Fossil Beds National Monument. Map showing cells surveyed in 2001 (n = 83, cell numbers in black); sites surveyed in 2002; locations of amphibians and reptiles detected, years species found denoted in the colored dot.



- Monument Boundary
- Ponds and Marshes
- P. triseriata*
- No detections '02
- Paved Roads
Dirt Roads
Vehicle Tracks
- Streams and Marshes
- T. elegans*
- Multiple species
- Footpath
- Springs and Waterholes
- A. tigrinum*



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Universal Transverse Mercator
 Zone 13
 North American Datum of 1927

Figure 2: Species detected versus effort (survey time in person hours). Squares denote amphibians, diamonds denote reptiles.

