Amphibian and Reptile Inventory at Little Bighorn Battlefield National Monument and Grant-Kohrs Ranch National Historic Site

2001-2002

Final Report

Submitted January 2003 by

David Pilliod, Blake Hossack, Stephen Corn, Holly Shepley, and Ryan Baum
US Geological Survey
Northern Rocky Mountain Science Center
Aldo Leopold Wilderness Research Institute
PO Box 8089
Missoula, MT 59807

Summary

The USGS Northern Rocky Mountain Science Center received National Park Service Natural Resources Challenge funding for 2001-2002 to document presence of herpetofauna at Little Bighorn Battlefield National Monument (LIBI) and the Grant-Kohrs Ranch National Historic Site (GRKO). The objectives of the study were to document 90% of the amphibian and reptile species present at LIBI and GRKO and update NPS databases (NRBib, NPSpecies, the Dataset Catalog, and the network database) to include amphibian and reptile species present in the two units. At LIBI, 22 areas were visually searched for amphibians and reptiles in April and June 2001 and June and July 2002. Through surveys and interviews with Park personnel, one amphibian and four reptile species were confirmed at LIBI: Tiger Salamander (*Ambystoma tigrinum*) Racer (*Coluber constrictor*), Gopher Snake (*Pituophis catenifer*) and Rattlesnake (*Crotalis viridis*). An unknown species of toad also occurs at the Park, probably Woodhouse's Toad (*Bufo woodhousii*). At GRKO, 12 wetlands were surveyed multiple times in April, May, and July 2001 and May, June, and July 2002. Columbia Spotted Frogs (*Rana luteiventris*) were the most common amphibian and were breeding at 42-67% of the sites. Boreal Toads (*Bufo boreas*) were rare, but breeding was observed at 1-2 sites. Surveys confirmed two reptiles at GRKO: Painted Turtle (*Chrysemys picta*) and Common Garter Snake (*Thamnophis sirtalis*). This work provides important baseline data for the Parks and also contributes to an ongoing national effort to determine the status and trends of amphibian populations on Department of Interior lands, the Amphibian Research and Monitoring Initiative (ARMI).

Background and Purpose

The Little Bighorn Battlefield National Monument (LIBI) and the Grant-Kohrs Ranch National Historic Site (GRKO), two small culturally significant NPS units in Montana, have limited information on occurrence of amphibians or reptiles. The USGS Northern Rocky Mountain Science Center received National Park Service Natural Resources Challenge funding for 2001-2002 to document presence of herpetofauna on these properties.

LIBI lies along the banks of the Little Bighorn River in a northern high plains environment. The monument is vegetated by northern mixed grass prairie and sagebrush shrub-steppe vegetation. Cottonwood and sedge riparian areas exist along the Little Bighorn River, but access to riparian habitats is curtailed by the monument fence (Michael Stops, Park Ranger, personal communication). A recent compilation of museum and literature records of Montana amphibians and reptiles (Maxell et al. 2003) shows that the herpetofauna of the Great Plains is well represented in Big Horn County, with several records from the vicinity of LIBI (Table 1.). All species with potential to occur at LIBI are represented by museum records or other observations in Big Horn County.

Table 1. Amphibians and Reptiles from Big Horn County, Montana. Asterisks denote records from the vicinity of Little Bighorn Battlefield National Monument (Maxell, 2003).

Amphibians:
Tiger Salamander (*Ambystoma tigrinum*)
Great Plains Toad (*Bufo cognatus*)*
Woodhouse's Toad (*Bufo woodhousii*)*
Boreal Chorus Frog (*Pseudacris maculata*)*
Plains Spadefoot (*Spea bombifrons* [= *Scaphiopus bombifrons*])*
Northern Leopard Frog (*Rana pipiens*)*
Reptiles:
Snapping Turtle (*Chelydra serpentina*)
Painted Turtle (*Chrysemys picta*)*
Spiny Softshell (*Trionyx spiniferus*)*
Short-horned Lizard (*Phyrnosoma hernadesi*)
Sagebrush Lizard (*Sceloporus graciosus*)
Racer (*Coluber constrictor*)*
Western Hognose (*Heterodon nasicus*)*
Milk Snake (*Lampropeltis triangulum*)
Gopher Snake (*Pituophis catenifer*)
Wandering Garter Snake (*Thamnophis elegans*)
Plains Garter Snake (*Thamnophis radix*)
Common Garter Snake (*Thamnophis sirtalis*)*
Prairie Rattlesnake (*Crotalus viridis*)*

GRKO lies along the Clark Fork River, just outside of Deer Lodge in west-central Montana. The ranch sits on 607 hectares of upland rangeland, 162 of which have been

converted to irrigated pasture for hay production. GRKO is west of the Continental Divide at higher elevation than LIBI (1370m vs. 965m). Consequently, it has a different and less diverse herpetofauna (Table 2). This section of the Clark Fork River has been heavily contaminated by mining activities and is part of the Clark Fork River Superfund site.

Table 2. Amphibians and Reptiles from southern Powell County and northern Deer Lodge County, Montana (Maxell, 2003). Asterisks denote records from the vicinity of Grant-Kohrs Ranch National Historic Site.

Amphibians:
Long-toed Salamander (*Ambystoma macrodactylum*)
Boreal Toad (*Bufo boreas*)
Northern Leopard Frog (*Rana pipiens*)
Columbia Spotted Frog (*Rana luteiventris*)*
Pacific Treefrog (*Pseudacris regilla* [= *Hyla regilla*])[1]
Reptiles:
Common Garter Snake (*Thamnophis sirtalis*)
Wandering Garter Snake (*Thamnophis elegans*)
Painted Turtle (*Chrysemys picta*)[1]
Rubber Boa (*Charina bottae*)[1]
Racer (*Coluber constrictor*)[1]
Gopher Snake (=Bull Snake) (*Pituophis catenifer*)[1]
Prairie Rattlesnake (*Crotalus viridis*)[1]

[1]Species recorded from adjacent counties with potential to occur at Grant-Kohrs NHS.

Objectives

1) Document 90% of the amphibian and reptile species present at LIBI and GRKO.
2) Update NPS databases (NRBib, NPSpecies, the Dataset Catalog, and the network database) to include amphibian and reptile species present in the two units.

Methods

Little Bighorn Battlefield National Monument

To inventory amphibians, all riparian habitats were searched twice in 2001 (17 April and 17 June) and on three occasions in 2002 (12 June, 2 July, 12 July). On each trip there was no standing water present, so surveys were limited to visual searches of terrestrial habitats in the riparian area southwest of the visitor center and in uplands elsewhere on the monument.

Reptiles occupy a wide range of habitats and are more difficult to inventory than amphibians. We visually searched for reptiles in appropriate habitats and under appropriate conditions (Appendix 1). Although this can be an effective method for documenting common species or species that are particularly active, complete reptile

inventories require more time- and effort-intensive methods, such as drift fences and funnel traps. However, we were unable to use drift fences and funnel traps in this study because they are highly visual and require ground disturbance, and therefore were not suitable due to the high number of visitors and the archaeological significance and sensitivity of the area. Therefore, the reptiles reported in this study should be considered a partial list of species present and not a 90% inventory.

Grant-Kohrs National Historic Site

Potential amphibian habitats were surveyed on four occasions in 2001 (19 April, 24 April, 16 May, and 01 July) and on four occasions (14 May, 20 June, 8 July, and 26 July) in 2002 using a variety of techniques, collectively termed visual encounter surveys. Individual techniques included area-constrained searches, pond surveys, and dip-netting for amphibian larvae (Heyer et al., 1994). VES methods are widely used for amphibians and are effective in most habitats. Surveys are designed to detect all life stages of amphibians; however, detection of evidence of breeding activity (presence of embryos or larvae) is emphasized. Data collected yields information on the presence of a species but does not establish absence, nor does it give reliable estimates of abundance. Most sites were surveyed 2-3 times. All sites were georeferenced with a GPS using horizontal coordinate information referenced to the North American Datum of 1983 (NAD 83).

We visually searched for reptiles in and around wetlands and thus semi-aquatic or aquatic species, such as garter snakes and turtles, were more likely to be observed than other species. As previously stated, alternate techniques such as drift fences and funnel traps were needed to thoroughly inventory for reptiles, but the presence of cattle and the archaeological significance of the area prevented the use these methods. In addition, county records indicated that only garter snakes occurred in the region and therefore visual searches near wetlands were appropriate. Given the constraints of this study, the reptiles reported should be considered a partial list and not a complete inventory.

Results and Discussion

Little Bighorn Battlefield National Monument

Amphibians:

No amphibians were found during surveys in 2001 or 2002. However, there was no standing water present during any survey. Some riverine and palustrine wetlands are available on adjacent private lands, but these areas were not searched. Ken Woody (Park Ranger) reported sighting Tiger Salamanders (*Ambystoma trigrinum*) at the visitor center and Custer Battlefield cemetery parking lots in the spring after rains. He also reported seeing to an unidentified species of toad (probably Woodhouse's Toad, *Bufo woodhousii*) near the backdoor of the visitor center theater. Park personnel have reported hearing choruses of frogs or toads from the visitor center after heavy rains. We suspect these choruses are Woodhouse's Toads or Chorus Frogs (*Pseudacris maculata*) and are likely coming from pools along the river or private land.

Based on two years of surveys, it appears that there is no breeding habitat for amphibians at LIBI and therefore the Monument does not provide sufficient habitat for viable amphibian populations. Although two species have been observed on the Monument, these are likely occurrences of transitory adults using uplands for foraging habitats. It is possible that Chorus Frogs, Spadefoots (*Spea bombifrons*), or Plains Toads (*Bufo cognatus*) will breed on the Monument if pools form in depressions in the uplands after heavy summer rains and we encourage staff to listen for breeding choruses and look for eggs and tadpoles after rain events. However, in June 2001, we visited the Monument several days after a rainstorm that delivered several centimeters of rain and no calling was reported and no surface water was found. The summer of 2001 was particularly wet, with above normal precipitation in June and July (Figure 1).

Reptiles:

Only one reptile species was confirmed by our surveys: Racer (*Coluber constrictor*). In 2001, we found two groups of hatched out snake eggs on the first visit, which we suspect were Racer eggs. These eggs appeared to have been depredated by squirrels. In 2002, a female Racer was found on 12 June at site 6, a grassland area next to a dry drainage near Deep Ravine (Figure 2A., Appendix 1). On 12 July 2002, a shed skin of a Racer was found at site 19, an area east of the Deep Ravine Trail. Monument personnel informed us of occasional sightings of Gopher (or Bull) Snakes (*Pituophis catenifer*) and Rattlesnakes (*Crotalis viridis*) in the summer and fall.

Through visual searches and personnel reports, we conclude that at least three reptile species occur on the Monument. Air temperatures in 2001 and 2002 were near normal or above normal during the survey period and thus reptiles should have been active and visible during visual searches (Figure 1). However, the relatively small size of the Monument and lack of habitat diversity may limit the diversity of reptiles on the site and most occurrences are likely transitory individuals. Although the potential species list for LIBI included many species (Table 1), we doubt that many of those species occur on the Monument. For example, the lack of sandy habitat probably prevents presence of the Western Hognose. Some species, such as Garter Snakes and maybe Milk Snakes, might reside in the riparian forest along the river, but this is a very small area of the Monument and these species would seldom move up on to the hill slopes. Turtles may occur in the Little Bighorn River, but this is outside of Monument property.

Recommendations:

To confirm the presence of 90% of the amphibian and reptile species present at LIBI, we recommend creating an annual "Wildlife Observation Record for Amphibian and Reptiles" and archiving this information (Appendix 3). Park personnel can easily be trained to identify species of amphibians and reptiles and their records can provide a considerable amount of information. After several years of records, a complete species list can then be compiled. Photographs can be taken and sent to our office for verification if species identity is unknown or uncertain. We would be happy to provide species identification training to permanent and seasonal staff at LIBI. Given the constraints of working in archaeologically sensitive areas, we feel this approach is preferable to placing drift fence arrays on the Monument.

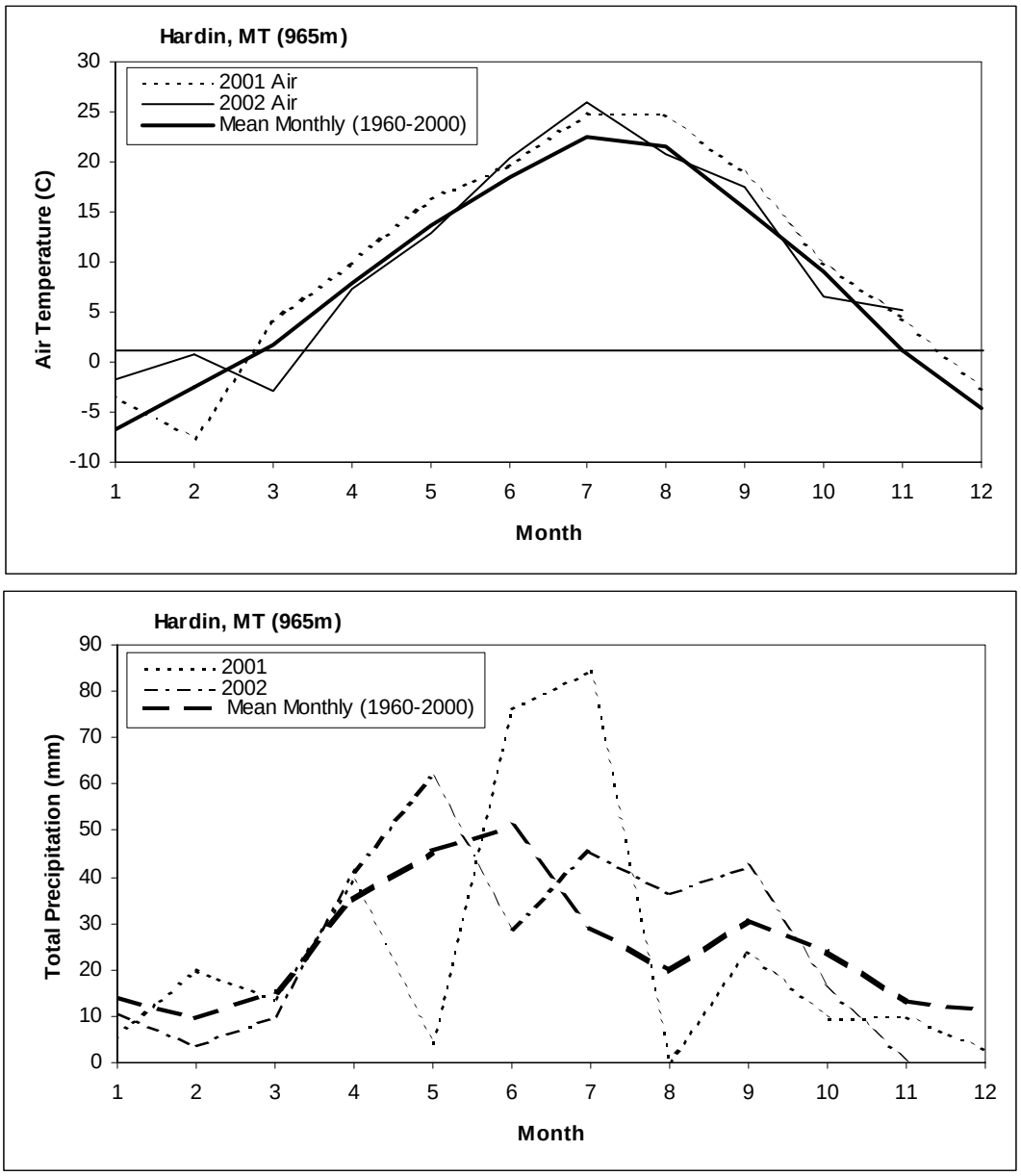

Figure 1. Air temperature and precipitation at Deer Lodge in 2001 and 2002 relative to mean monthly averages from 1960-2000.

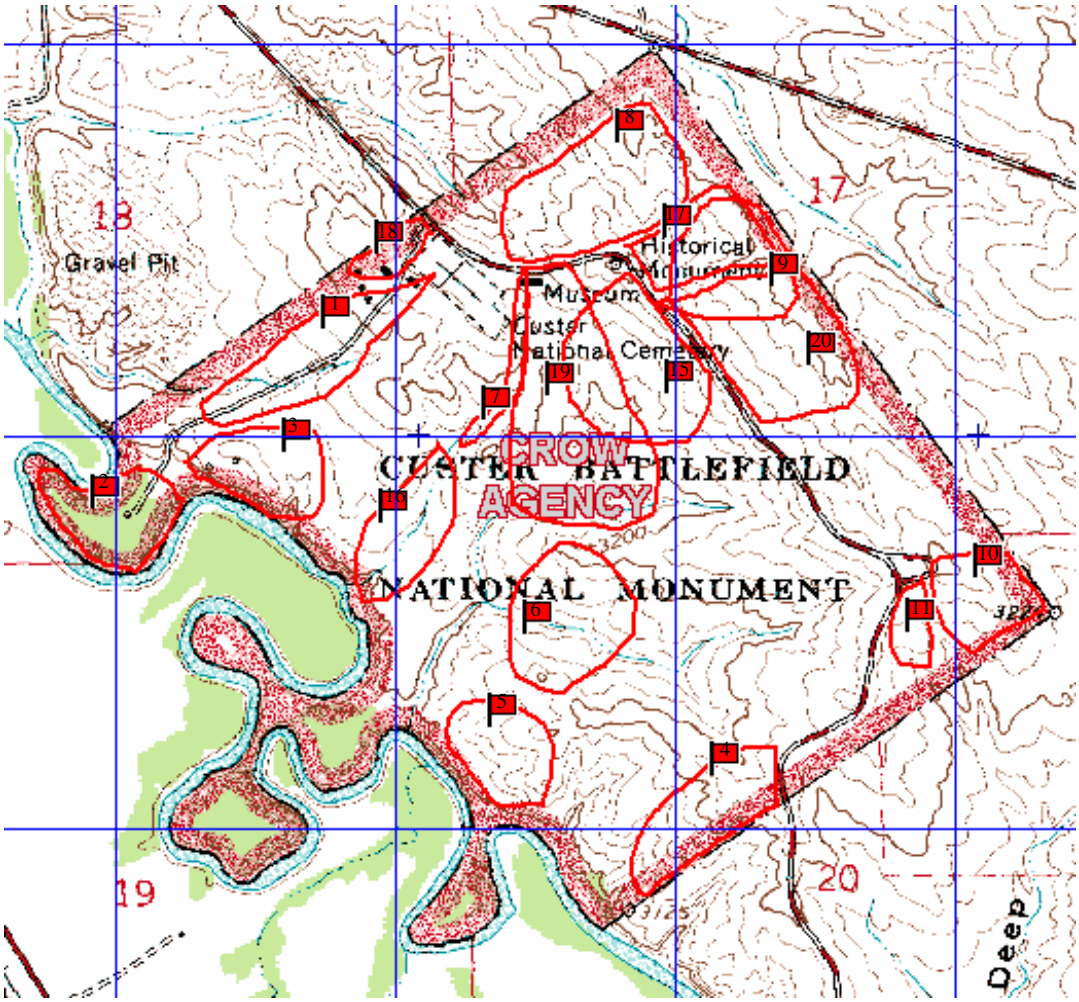

Figure 2A. Areas surveyed on main (northern) unit of Little Bighorn Battlefield National Monument, MT in 2001 and 2002.

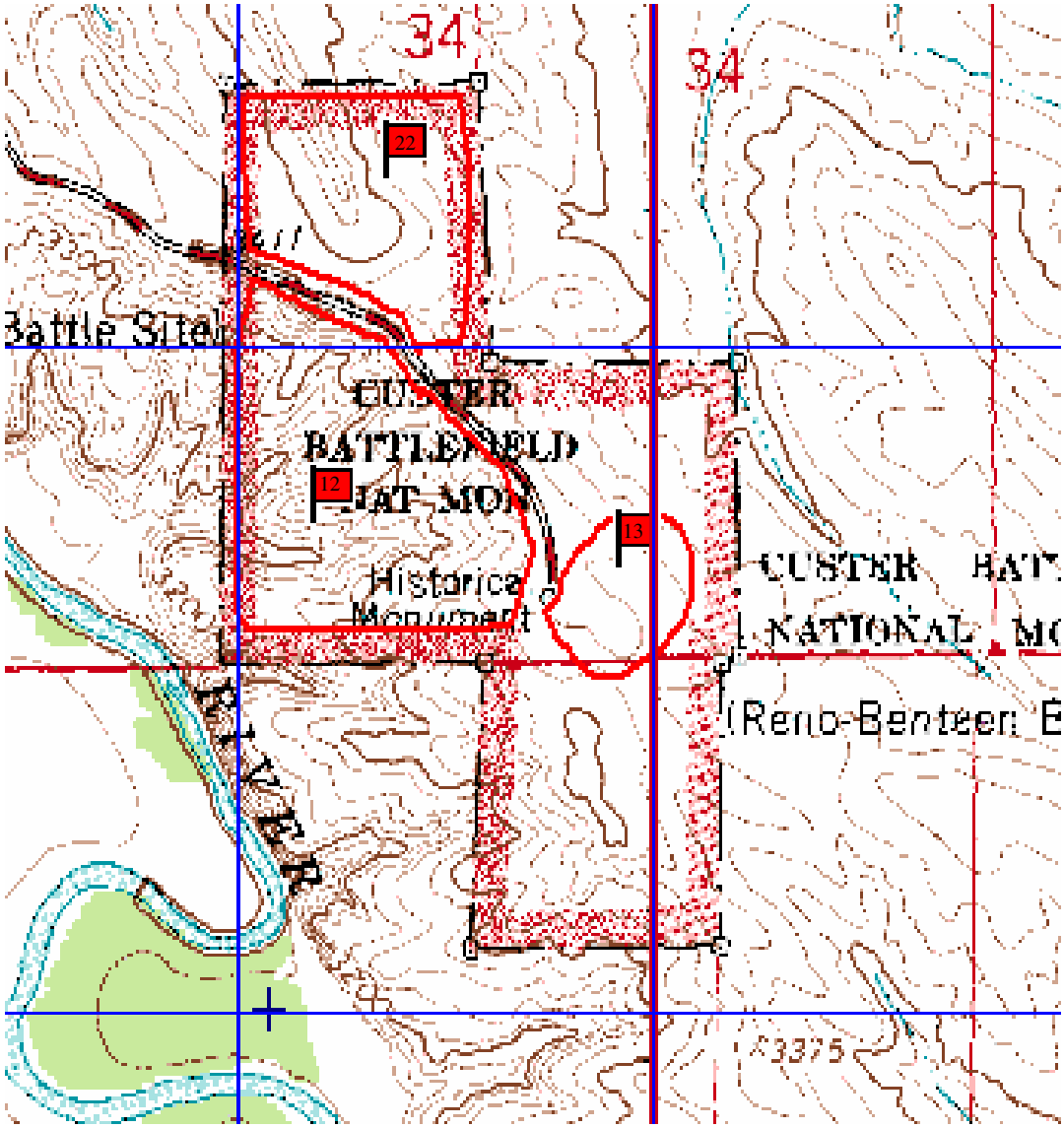

Figure 2B. Areas surveyed on southern unit of Little Bighorn Battlefield National Monument, MT in 2001 and 2002.

Grant-Kohrs National Historic Site

Amphibians:

In 2001 and again in 2002, we surveyed 12 riverine and palustrine wetlands along the Clark Fork River and surrounding floodplain (Figure 2). Most sites were surveyed 2-3 times each year (Table 3). In 2001 and 2002, two amphibian species were observed at GRKO: Columbia Spotted Frogs (*Rana luteiventris*) and Boreal Toads (*Bufo boreas*).

Table 3. Summary of surveys conducted and amphibians observed at Grant Kohrs National Historic Site, MT, 2001-2002.

Site Number	Site Location Datum NAD83 UTM Zone 12		Number of Visits		Columbia Spotted Frogs		Boreal Toads	
	UTM East	UTM North	2001	2002	2001	2002	2001	2002
1	366576	5142809	2	2	B	ND	ND	ND
2	366611	5142814	2	2	ND	P	ND	ND
3	366508	5142418	2	2	B	P	ND	ND
4	366476	5142092	2	2	B	ND	ND	ND
5	365729	5140839	3	3	ND	B	P	B
6	365665	5141319	3	3	B	P	B	B
7	365922	5140960	3	3	B	B	ND	ND
8	366003	5141043	2	3	B	B	ND	ND
9	366183	5141383	3	3	P	B	ND	P
10	366213	5141601	3	3	B	B	ND	P
11	366007	5140552	2	2	B	ND	ND	ND
12	366027	5141281	1	1	ND	ND	ND	ND
Total			28	30				

Table Notation: B = Breeding (eggs or tadpoles observed); P = Present (adults or juveniles present, but no eggs or tadpoles observed); ND = Not Detected (no amphibians observed).

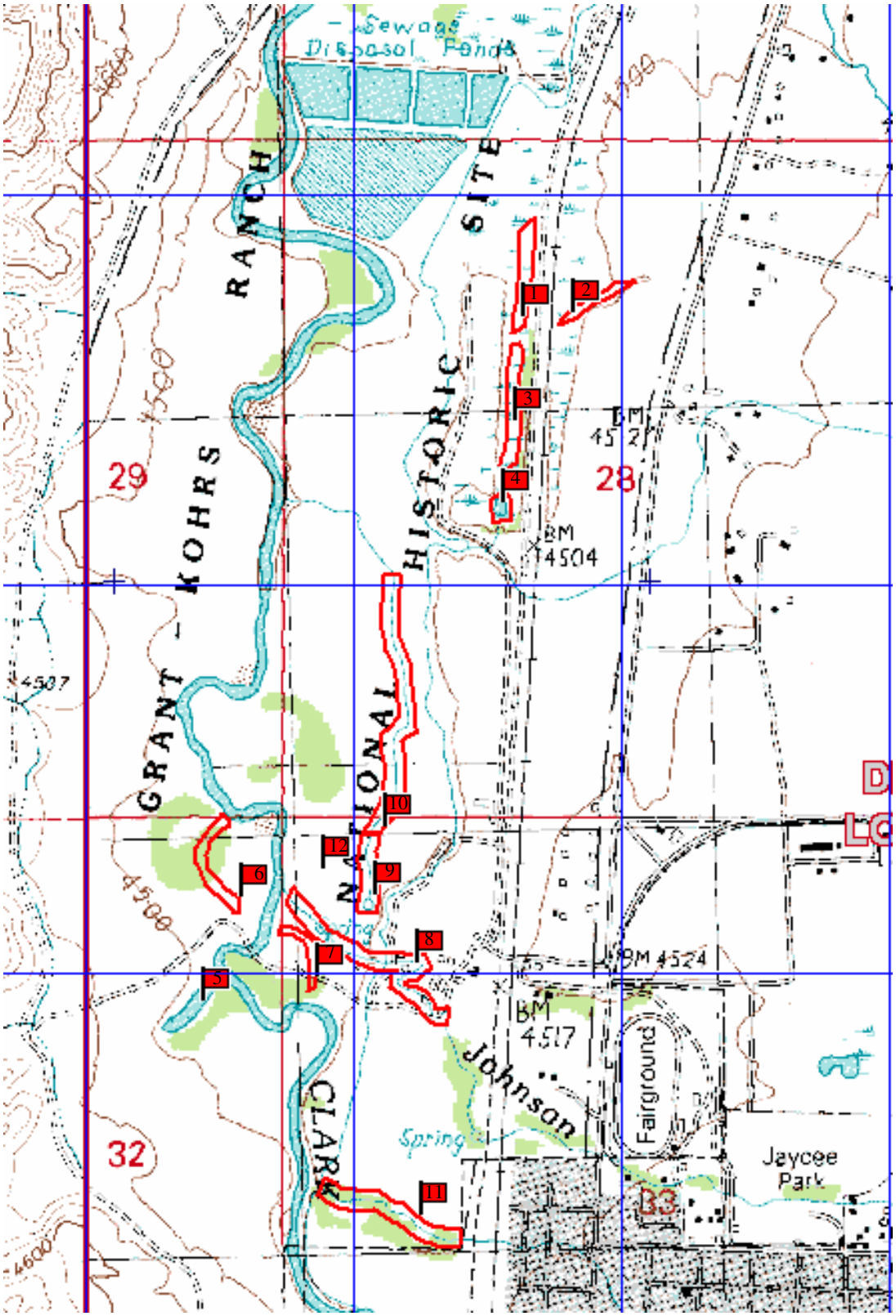

Figure 3. Map of wetland areas ("sites") surveyed on Grant Kohrs National Historic Site, MT in 2001 and 2002.

Columbia Spotted Frog (*Rana luteiventris*): This species was the most common amphibian encountered at GRKO. We found evidence of reproduction at 8 of 12 sites (67%) in 2001 and 5 of 12 sites (42%) in 2002. Spotted frogs bred in all types of wetland habitats, including deep, channelized oxbows (e.g., site 7), streams (e.g., site 9), and marshy ponds (e.g., site 4). Egg masses were deposited in areas with emergent vegetation or in thick mats of algae. Egg deposition time varies with spring temperatures (Figure 4). In 2001, we found several freshly laid egg masses and heard males calling on 19 April. In 2002, hatching egg masses were observed on 14 May and no tadpoles were observed at this time, indicating a later breeding season. The breeding period likely varies from year to year depending on winter snowpack and spring air temperatures at this relative high elevation site. The factors that influence breeding success are unknown. Preliminary evidence suggests that Columbia Spotted Frogs are fairly common at GRKO.

Boreal Toad (*Bufo boreas*): Of species potentially occurring at GRKO, there was high priority to verify the occurrence of Boreal Toads. This species has undergone drastic declines in the southern Rocky Mountains, and recent surveys in western Montana found it to be less common than expected. Boreal Toad adults were documented at 2 locations in 2000 (Clara Wheeler, personal communication), one site in 2001, and 2 sites in 2002. We found Boreal Toads breeding at 1 site in 2001 and 2 sites in 2002 (Table 3). Sites 5 and 6 are old oxbows of the Clark Fork River that are maintained by beaver dams. Site 5 is a very shallow oxbow that was often dry. Site 6 is a permanent oxbow with water depths of 1-2 m and fairly steep banks, except for the southern end where a shallow pool forms, where the tadpoles were observed. Boreal Toad tadpoles were not detected until the 01 July visit in 2001 and the 08 July visit in 2002, suggesting that breeding does not occur until late June when air temperatures peak. Some other Boreal Toad populations at similar elevation in western Montana breed in late May or early June.

Reptiles:

Two reptile species were found at GRKO in 2001 and no reptiles were observed in 2002. Painted Turtles (*Chrysemys picta*) were seen at 2 sites (site 6 and 7) in 2001. Sites 6 and 7 are old oxbows of the Clark Fork River that are maintained by beaver dams.

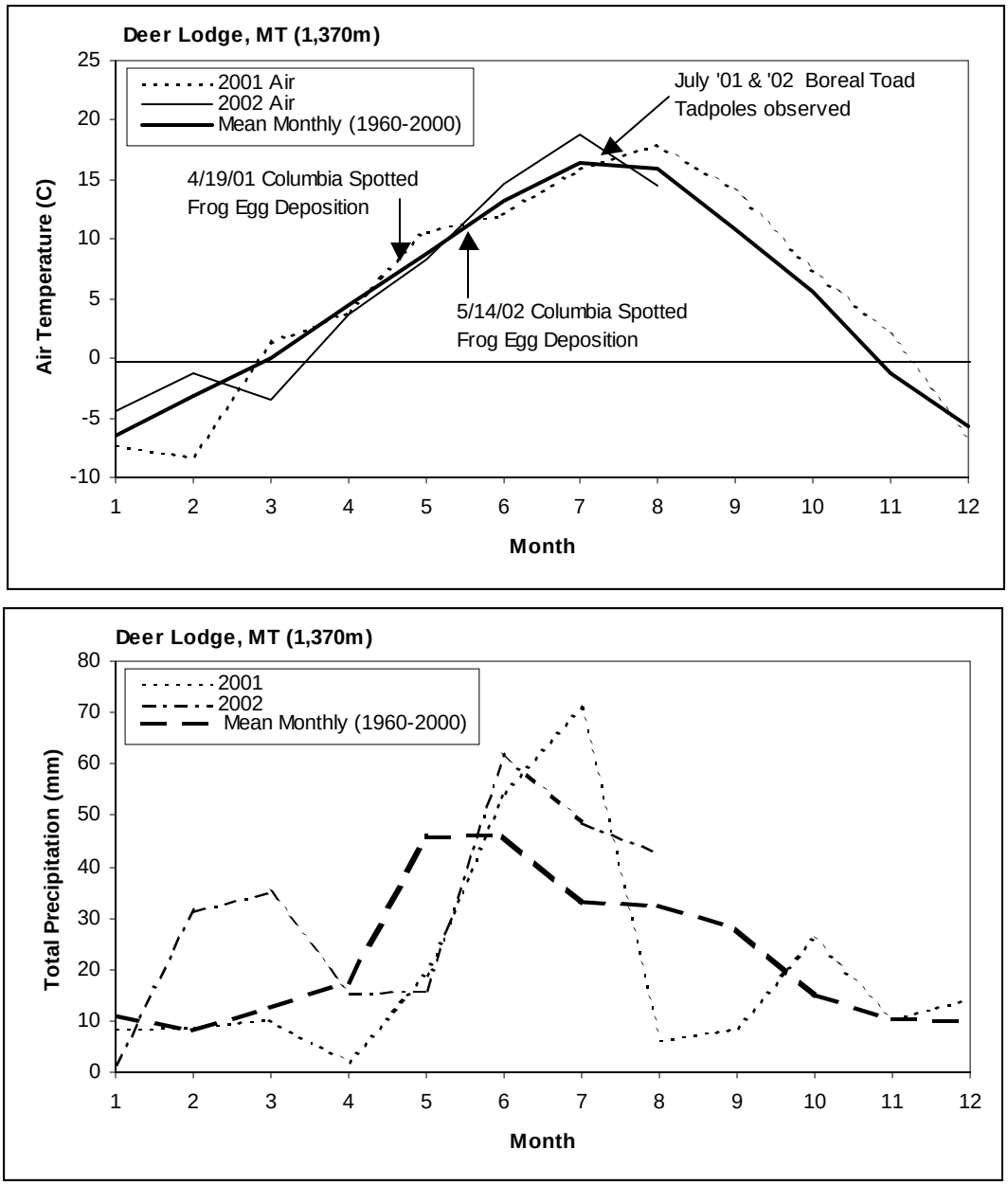

Figure 4. Air temperature and precipitation at Deer Lodge in 2001 and 2002 relative to mean monthly averages from 1960-2000.

These long channels (~250 m long and 3-10 m wide) are 1-2 m deep and hold water year round. Although no turtles were observed in 2002, a Painted Turtle was observed in 2000 (Clara Wheeler, personal communication) and we suspect that this species is resident to GRKO. A single Common Garter Snake (*Thamnophis sirtalis*) was observed at site 2 in 2001. Site 2 is a human-created irrigation ditch, measuring

approximately 250 m long and 7 m wide. Garter snakes often prey on amphibians, but this site appears to be infrequently used by frogs or toads (Table 3). However, throughout the summer, GRKO personnel report encountering garter snakes fairly frequently (Ben Bobowski, GRKO, personal communication).

From this study and communication with Park staff, only two reptile species are confirmed at GRKO. Both species represent new species records for the Historic Site and Painted Turtles are a new record for Deer Lodge County. Wandering Garter Snakes (*Thamnophis elegans*) may also occur at GRKO, but this species frequently does not co-occur with Common Garter Snakes. No Rattlesnakes (*Crotalus viridis*) or Bull Snakes (*Pituophis catenifer*) have been reported at GRKO and their occurrence is unlikely given that cattlemen are frequently aware of Rattlesnakes and species that mimic them. The high elevation of GRKO might limit the occurrence of species like Rattlesnakes and Bull Snakes, which are found lower in the Clark Fork drainage. Grant Kohrs Historic Ranch has suitable habitat for species like Racers (*Coluber constrictor*), but elevation may also limit this species. Rubber Boas (*Charina bottae*) are unlikely to occur in the open, highly managed pasturelands of GRKO. NPS databases (NRBib, NPSpecies, the Dataset Catalog, and the network database) will be updated to include location of all reptile and amphibian observations at GRKO.

Recommendations:

To confirm the presence of 90% of the amphibian and reptile species present at LIBI, we recommend creating an annual "Wildlife Observation Record for Amphibian and Reptiles" and archiving this information (Appendix 3). Park personnel can easily be trained to identify species of amphibians and reptiles and their records can provide a considerable amount of information. After several years of records, a complete species list can then be compiled. Photographs can be taken and sent to our office for verification if species identity is unknown or uncertain. We would be happy to provide species identification training to permanent and seasonal staff at GRKO.

Literature Cited

Heyer, W. R., Donnelly, M. A., McDiarmid, R. W., Hayek, L. C., and Foster, M. S. 1994. Measuring and Monitoring Biological Diversity: Standard Methods for Amphibians. Washington, D.C.: Smithsonian Institution Press. 364 pp.

Maxell, B. A., Werner, J. K., Hendricks, P., and Flath, D. L. 2003. Herpetology in Montana: A History, Status Summary, Checklists, Dichotomous Keys, Accounts for Native, Potentially Native, and Exotic Species, and Indexed Bibliography. Northwest Fauna No. 5. Olympia, WA: Society for Northwestern Vertebrate Biology. 138 pp.

Appendix 1. Field notes for Little Bighorn Battlefield National Monument surveys:

---

17 April 2001 10:00 – 17:00
Crew: Blake Hossack, Suki Christy, Greg Guscio

Met with Michael Stops. He says they often find frogs around visitor center after rains. By his description, I would guess they are Woodhouse's Toads, Great Plains Toads, or Plains Spadefoot.

Day was warm (65°F) and clear and snakes should have been basking. No recent rains. Looked around visitor center and found 2 areas with exposed/dug up snake eggs near visitor center. We collected a few for identification. Probably Racer eggs.

Crew searched riparian zone at end of service road by river for total of 3 hrs (1 hr each). No surface water, even in depressions by the river. Many ticks (*Dermacentor andersoni*). No amphibians observed.

Crew searched in and around garbage/salvage area, including uplands for >300 m radius around it, for 1.5 hrs (30 mins each). No reptiles observed.

Crew searched for 2.25 hrs (45 mins each) in uplands South of turn-around loop in main unit. No reptiles observed.

---

17 June 2001 10:00 – 16:00
Crew: David Pilliod and Suki Christy

Crew searched riparian zone at end of service road by river for total of 2 hrs (1 hr each). No surface water, even in depressions by the river. No amphibians observed. Hundreds of ticks in riparian vegetation clung to our pant legs.

Crew searched along bench cliff area just above floodplain for 1 hr (30 mins each). Habitat looked good (broken slabs of sandstone) for snakes. Conditions appropriate (warm day (70°F), clear, no breeze) for snakes to bask. No reptiles observed.

Crew searched in and around garbage/salvage area, including uplands for >300 m radius around it, for 1 hr (30 mins each). No reptiles observed.

Crew searched for 2 hrs (1 hr each) in uplands South of turn-around loop in main unit and also out along the walking trails in the smaller unit (past the private property). No reptiles observed.

Appendix 1 (cont) Field notes for Little Bighorn Battlefield National Monument surveys:

12 June 02
Crew: Ryan Baum

0900-1000 Meeting and tour with Michael Stops (Head Park Ranger)
1020-1050 VES1 – searched sagebrush grassland area near park employee housing west/southwest toward Little Bighorn R.
CC: 30%, Rad: clear, Wind: 3, T: 17.8C
No observations

1100-1130 VES2 – Searched woodland area next to Little Bighorn R.
CC: 30%, Rad: clear, Wind: 3, T: 17.8C
No observations

1130-1200 VES3 – flat grassland area at west end of Custer battlefield (east of service road)
CC: 30%, Rad: clear, Wind: 3, T: 17.8C
No observations

1250-1320 VES4 – grassland area at south/southeast end of Custer battlefield
CC: 80%, Rad: partial, Wind: 3, T: 19.6C
No observations

1330-1400 VES5 – southwest facing grassland area near south end of Custer battlefield
CC: 70%, Rad: clear, Wind: 3, T: 19.6C

1418-1428 VES6 –grassland area next to dry drainage near Deep Ravine
CC: 70%, Rad: partial, Wind: 3, T: 19.6C
COCO, female, 38.2 cm SVL (voucher photo taken)
UTM 13T 0310521 5048047 960m +/- 5m

1520-1550 VES7 – deep ravine trail from Visitor Center (received report of CRVI on trail around 1500)
CC: 60%, Rad: partial, Wind: 3, T: 19.8C
No observations

1555-1625 VES8 – grassland area at north end of Custer battlefield (north of Visitor Center)
CC: 60%, Rad: partial, Wind: 3, T: 19.8C
No observations

1630-1700 VES9 – northeast facing grassland area north/northeast of park road
CC: 60%, Rad: partial, Wind: 3, T: 19.8C
No observations

1705-1735 VES10 – northeast facing grassland area near Calhoun Hill turnout
CC: 60%, Rad: partial, Wind: 3, T: 19.6C
No observations

1745-1825 VES11 – south facing grassland area located on south side of Calhoun Hill turnout
CC: 60%, Rad: partial, Wind: 3, T: 19.5C No observations

Appendix 1 (cont) Field notes for Little Bighorn Battlefield National Monument surveys:

02 July 02
Crew: Ryan Baum

0930 Arrive at LIBI
0930-0955 Drive to Reno-Benteen battlefield
1010-1120 VES12 – area southwest of parking lot
CC: 0%, Rad: clear, Wind: 1, T: 27.8C
No observations

1130-1230 VES13 – area southeast and east of parking lot
CC: 0%, Rad: clear, Wind: 1, T: 27.8C
No observations

1235-1300 Drive back to Custer battlefield
1315-1515 VES14 – Deep Ravine trail from Visitor Center at Custer battlefield area
CC: 0%, Rad: clear, Wind: 1, T: 31.8C
No observations

1525-1625 VES15 – south facing grassland area located south/southeast of Last Stand Hill Monument
CC: 0%, Rad: clear, Wind: 1, T: 32C
No observations

1635-1735 VES16 – Deep Ravine area
CC: 0%, Rad: clear, Wind: 1, T: 31.8C
No observations

1740-1820 VES17 – northwest facing grassland area located northeast of Visitor Center
CC: 0%, Rad: clear, Wind: 1, T: 31.5C
No observations

---

12 July 02
Crew: Ryan Baum

1030 Arrive at LIBI
1055-1225 VES18 – south facing grassland area located south of Custer Battlefield cemetery
CC: 10%, Rad: clear, Wind: 1, T: 31.2C
No observations

1230-1330 VES19 – Deep Ravine trail and area east of trail
CC: 10%, Rad: clear, Wind: 1, T: 32.6C
COCO snake shed found
UTM 13T 0310899 5048550 994m +/-2m (NAD27 dataum)

1345-1545 VES20 – northeast facing grassland area north of Land Stand Hill Monument
CC: 20%, Rad: clear, Wind: 1, T: 27.8C
No observations

Appendix 1 (cont) Field notes for Little Bighorn Battlefield National Monument surveys:

1555-1615 Drive to Reno-Benteen battlefield
1620-1730 VES21 – area southwest of Reno-Benteen parking lot toward Little Bighorn R.

CC: 10%, Rad: clear, Wind: 1, T: 27.8C
No observations

1740-1840 VES22 – area north of Reno-Benteen parking lot
CC: 0%, Rad: clear, Wind: 1, T: 27.5C
No observations

1915 Talked to personnel at Visitor Center. Ken Woody (Park Ranger) reported sighting AMTI at parking lot next to Visitor Center and Custer Battlefield cemetery in the Spring after rains (couldn't remember exact date). Also reported seeing toads (no positive identification) near backdoor of the Visitor Center theatre. Park personnel also reported seeing PICA and CRVI throughout the Spring, Summer, and Fall months

---

Codes for Abbreviations:
CC: Cloud Cover (percentage)
Rad: Radiation (sunlight shining through clouds): clear, partial, or overcast
Wind: Wind speed: 0 – calm (0 avg. mph), 1 – light air (1-2 avg. mph), 2 – light breeze (4-8 avg. mph), 3 – gentle breeze (8-13 avg. mph), 4 – moderate breeze (14-18 avg. mph), 5 – fresh breeze (19-25 avg. mph), 5 – strong breeze (26-31 avg. mph)
T: Ambient Air Temperature (measured with Schultheis thermometer shaded at 1m)
VES#: Visual Encounter Survey. Sequential numbers indicate chronological order of visual searches and do not relate to a specific area. Areas searched are described in notes.
Species Abbreviations:
AMTI: *Ambystoma tigrinum* (Tiger Salamander)
COCO: *Coluber constrictor* (Racer)
PICA: *Pituophis catenifer* (Gopher Snake)
CRVI: *Crotalus viridis* (Prairie Rattlesnake)

Coordinate Information:
*All location data were collected in UTM zone 13, North American Datum 1927 (NAD27) with a Garmin eTrex Venture GPS unit at an accuracy of +/-10 meters.

Appendix 2. Field data for Grant Kohrs National Historic Site, 2001-2002:

Site Number	Date	Percent Site Surveyed	Wetland Type	Site Origin	Site Length	Site Width	Max Depth
1	4/19/2001	100	Pond	Human/Groundwater	400	10	<1 m
1	7/1/2001	100	Pond	Human/Groundwater	400	25	1-2 m
1	6/20/2002	100	Pond	Human/Groundwater	500	60	1-2 m
1	7/25/2002	100	Pond	Human/Groundwater	50	10	1-2 m
2	4/19/2001	100	Ditch/Irrigation Channel	Human/Groundwater	250	7	<1 m
2	7/1/2001	100	Ditch/Irrigation Channel	Human/Groundwater	300	7	1-2 m
2	6/20/2002	100	Ditch/Irrigation Channel	Human/Groundwater	200	7	1-2 m
2	7/25/2002	100	Ditch/Irrigation Channel	Human/Groundwater	50	10	1-2 m
3	4/24/2001	100	Marsh	Human/Groundwater	250	5	1-2 m
3	7/1/2001	100	Marsh	Human/Groundwater	250	25	1-2 m
3	7/25/2002	45	Marsh	Human/Groundwater	50	30	1-2 m
4	4/24/2001	100	Pond	Groundwater/Beaver	70	50	1-2 m
4	7/1/2001	100	Pond	Groundwater/Beaver	200	15	>2 m
4	6/20/2002	100	Pond	Groundwater/Beaver	70	55	1-2 m
4	7/25/2002	100	Pond	Groundwater/Beaver	22	19	1-2 m
5	4/24/2001	100	Oxbow	Groundwater/Beaver	250	25	1-2 m
5	5/16/2001	100	Oxbow	Groundwater/Beaver	150	20	<1 m
5	7/1/2001	100	Oxbow	Groundwater/Beaver	250	15	<1 m
5	5/14/2002	51-75	Oxbow	Groundwater/Beaver	100	1	<1 m
5	7/8/2002	76-99	Oxbow	Groundwater/Beaver	300	40	<1 m
5	7/26/2002	100	Oxbow	Groundwater/Beaver	50	15	1-2 m
6	4/25/2001	100	Oxbow	Groundwater/Beaver	250	8	1-2 m
6	5/16/2001	100	Oxbow	Groundwater/Beaver	250	8	>2 m
6	7/1/2001	100	Oxbow	Groundwater/Beaver	200	10	>2 m
6	5/14/2002	100	Oxbow	Groundwater/Beaver	150	6	1-2 m
6	7/8/2002	76-99	Oxbow	Groundwater/Beaver	400	20	1-2 m
6	7/26/2002	100	Oxbow	Groundwater/Beaver	60	10	1-2 m
7	4/25/2001	100	Oxbow/Irrigation Channel	Groundwater/Beaver	300	3	1-2 m
7	5/17/2001	100	Oxbow/Irrigation Channel	Groundwater/Beaver	300	10	>2 m
7	7/1/2001	100	Oxbow/Irrigation Channel	Groundwater/Beaver	100	3	1-2 m
7	5/14/2002	100	Oxbow/Irrigation Channel	Groundwater/Beaver	150	5	1-2 m
7	7/8/2002	100	Oxbow/Irrigation Channel	Groundwater/Beaver	250	10	1-2 m
7	7/26/2002	100	Oxbow/Irrigation Channel	Groundwater/Beaver	45	2	>2 m
8	4/25/2001	100	Johnson Creek	Groundwater/Beaver	250	8	<1 m
8	5/17/2001	100	Johnson Creek	Groundwater/Beaver	250	8	1-2 m
8	5/14/2002	100	Johnson Creek	Groundwater/Beaver	250	3	1-2 m
8	7/8/2002	76-99	Johnson Creek	Groundwater/Beaver	175	10	1-2 m
8	7/26/2002	n/a	Johnson Creek	Groundwater/Beaver	40	2	<1 m
9	4/25/2001	100	Stream with Cattails and Pools	Spring/Beaver	20	1	<1 m
9	5/17/2001	100	Stream with Cattails and Pools	Spring/Beaver	300	3	<1 m
9	7/1/2001	100	Stream with Cattails and Pools	Spring/Beaver	300	1	<1 m
9	5/14/2002	100	Stream with Cattails and Pools	Spring/Beaver	125	3	<1 m
9	7/8/2002	76-99	Stream with Cattails and Pools	Spring/Beaver	250	10	<1 m
9	7/25/2002	20	Stream with Cattails and Pools	Spring/Beaver	60	2.5	<1 m
10	4/25/2001	100	Stream with beaver ponds	Spring/Beaver	150	9	1-2 m
10	5/17/2001	100	Stream with beaver ponds	Spring/Beaver	150	10	1-2 m
10	7/1/2001	100	Stream with beaver ponds	Spring/Beaver	150	1	<1 m
10	5/14/2002	100	Stream with beaver ponds	Spring/Beaver	175	6	1-2 m
10	7/8/2002	100	Stream with beaver ponds	Spring/Beaver	200	30	1-2 m
10	7/25/2002	80	Stream with beaver ponds	Spring/Beaver	23.5	0.5	1-2 m
10	7/26/2002	100	Stream with beaver ponds	Spring/Beaver	35	2	1-2 m
11	5/16/2001	100	Cottonwood Creek and side pools	Groundwater/Beaver	200	15	1-2 m
11	7/1/2001	100	Cottonwood Creek and side pools	Groundwater/Beaver	80	2	1-2 m
11	5/14/2002	100	Cottonwood Creek and side pools	Groundwater/Beaver	50	10	<1 m
11	7/8/2002	100	Cottonwood Creek and side pools	Groundwater/Beaver	200	15	1-2 m
12	7/1/2001	100	Beaver Pond	Beaver	25	4	<1 m
12	7/8/2002	76-99	Beaver Pond	Beaver	30	10	1-2 m

Appendix 2 (cont.). Field data for Grant Kohrs National Historic Site, 2001-2002:

Site Number	Date	Percent Shallows	Percent Emergent Vegetation	Dominant Substrate	Water Temp (^{o}C)	pH	Cond (*Us*)	Fish Present?
1	4/19/2001	65			8	8.4	620	No
1	7/1/2001	40			19	7.9	640	No
1	6/20/2002	11-20			16	7.6	567	
1	7/25/2002	80		cobble	15.5	6.9	541	Yes
2	4/19/2001	100			4	8.4	510	No
2	7/1/2001	40			13	7.6	600	No
2	6/20/2002	11-20	11-20	silt/mud	15	7.0	484	No
2	7/25/2002	65	70	cobble	16	7.4	528	No
3	4/24/2001	85			9	7.4		No
3	7/1/2001	40			19	7.9	640	No
3	7/25/2002	85	95	mud/silt	13	7.1	598	No
4	4/24/2001	40			16	7.8		Yes
4	7/1/2001	60			9	7.6	520	Yes
4	6/20/2002	11-20	31-40	mud/silt	13	7.1	506	Yes
4	7/25/2002	35	80	mud/silt	16	7.3	449	Yes
5	4/24/2001	60			21	8.2	660	No
5	5/16/2001	100			11	8.6	700	No
5	7/1/2001	95			26	7.6	450	No
5	5/14/2002	91-100	1-10	mud/silt	7	8.0	605	No
5	7/8/2002	61-70	41-50	silt/mud	17	7.6	495	No
5	7/26/2002	60-70	25	sand/gravel	17	7.9	501	Yes
6	4/25/2001	60			9.5	8.1	690	No
6	5/16/2001	90			18	9.5	580	No
6	7/1/2001	90			15	8.0	580	No
6	5/14/2002	41-50	1-10	silt/mud	12	8.7	463	No
6	7/8/2002	31-40	11-20	silt/mud	22	6.9	552	No
6	7/26/2002	85	40	mud/silt	21.5	7.9	587	No
7	4/25/2001	10			10	8.9	410	No
7	5/17/2001	30			14	8.0	490	No
7	7/1/2001	20			28	8.0	410	Yes
7	5/14/2002	1-10	1-10	mud/silt	13	8.0	474	No
7	7/8/2002	71-80	11-20	mud/silt	22	7.1	332	Yes
7	7/26/2002	1-10	21-30	mud/silt	19	7.8	389	Yes
8	4/25/2001	40			6	8.8	460	No
8	5/17/2001	90			19	8.6	510	Yes
8	5/14/2002	41-50	21-30	mud/silt	17	8.4	473	Yes
8	7/8/2002	41-50	61-70	mud/silt	18	7.0	450	No
8	7/26/2002	100	40	mud/silt	17	7.9	386	No
9	4/25/2001	95			10	8.3	490	No
9	5/17/2001	100			9	8.1	650	No
9	7/1/2001	100			30	8.4	480	Yes
9	5/14/2002	91-100	91-100	leaves/grass	15	7.6	575	No
9	7/8/2002	71-80	81-90	silt/mud	21	7.0	376	No
9	7/25/2002	100	98	gravel/mud/silt	18.5	8.1	408	No
10	4/25/2001	60			11	8.6	450	No
10	5/17/2001	70			27	9.0	530	No
10	7/1/2001	100			30	8.4	480	Yes
10	5/14/2002	61-70	21-30	silt/mud	17	8.4	489	Yes
10	7/8/2002	21-30	31-40	silt/mud	18	7.0	436	No
10	7/25/2002	20	20	mud/silt	16	7.8	406	Yes
10	7/26/2002	85	70	mud/silt	12	7.7	414	No
11	5/16/2001	60			19	7.8	620	Yes
11	7/1/2001	80			15	8.3	340	Yes
11	5/14/2002	91-100	81-90	mud/silt	17	7.5	583	No
11	7/8/2002	71-80	11-20	silt/mud	19	7.1	356	No
12	7/1/2001	100			26	7.8	460	No
12	7/8/2002	91-100	91-100	silt/mud	17	6.9	652	No

Appendix 2 (cont.). Field data for Grant Kohrs National Historic Site, 2001-2002:

Site Number	Date	Columbia Spotted Frog Breeding	Columbia Spotted Frog Adults or Juveniles	Boreal Toad Breeding	Boreal Toad Adults or Juveniles	Common Garter Snake	Wandering Garter Snake	Painted Turtle
1	4/19/2001	Yes	Yes	No	No	No	No	No
1	7/1/2001	No	Yes	No	No	No	No	No
1	6/20/2002	No	No	No	No	No	No	No
1	7/25/2002	No	No	No	No	No	No	No
2	4/19/2001	No	No	No	No	No	No	No
2	7/1/2001	No	No	No	No	Yes	No	No
2	6/20/2002	No	Yes	No	No	No	No	No
2	7/25/2002	No	Yes	No	No	No	No	No
3	4/24/2001	Yes	No	No	No	No	No	No
3	7/1/2001	No	No	No	No	No	No	No
3	7/25/2002	No	Yes	No	No	No	No	No
4	4/24/2001	Yes	Yes	No	No	No	No	No
4	7/1/2001	No	No	No	No	No	No	No
4	6/20/2002	No	No	No	No	No	No	No
4	7/25/2002	No	No	No	No	No	No	No
5	4/24/2001	No	No	No	No	No	No	No
5	5/16/2001	No	No	No	No	No	No	No
5	7/1/2001	No	No	No	Yes	No	No	No
5	5/14/2002	No	No	No	No	No	No	No
5	7/8/2002	Yes	No	Yes	No	No	No	No
5	7/26/2002	No	No	No	No	No	No	No
6	4/25/2001	Yes	No	No	No	No	No	No
6	5/16/2001	No	No	No	No	No	No	No
6	7/1/2001	No	No	Yes	No	No	No	Yes
6	5/14/2002	No	No	No	No	No	No	No
6	7/8/2002	No	No	Yes	No	No	No	No
6	7/26/2002	No	Yes		No	No	No	No
7	4/25/2001	No	No	No	No	No	No	No
7	5/17/2001	Yes	Yes	No	No	No	No	Yes
7	7/1/2001	No	No	No	No	No	No	No
7	5/14/2002	Yes	Yes	No	No	No	No	No
7	7/8/2002	No	No	No	No	No	No	No
7	7/26/2002	No	No	No	No	No	No	No
8	4/25/2001	Yes	No	No	No	No	No	No
8	5/17/2001	Yes	Yes	No	No	No	No	No
8	5/14/2002	Yes	No	No	No	No	No	No
8	7/8/2002	No	No	No	No	No	No	No
8	7/26/2002	No	No	No	No	No	No	No
9	4/25/2001	No	Yes	No	No	No	No	No
9	5/17/2001	No	Yes	No	No	No	No	No
9	7/1/2001	No	Yes	No	No	No	No	No
9	5/14/2002	Yes	Yes	No	No	No	No	No
9	7/8/2002	No	No	No	No	No	No	No
9	7/25/2002	No	Yes	No	Yes	No	No	No
10	4/25/2001	Yes	Yes	No	No	No	No	No
10	5/17/2001	Yes	Yes	No	No	No	No	No
10	7/1/2001	No	Yes	No	No	No	No	No
10	5/14/2002	Yes	No	No	No	No	No	No
10	7/8/2002	No	No	No	Yes	No	No	No
10	7/25/2002	No	Yes	No	No	No	No	No
10	7/26/2002	No	No	No	No	No	No	No
11	5/16/2001	Yes	Yes	No	No	No	No	No
11	7/1/2001	No	No	No	No	No	No	No
11	5/14/2002	No	No	No	No	No	No	No
11	7/8/2002	No	No	No	No	No	No	No
12	7/1/2001	No	No	No	No	No	No	No
12	7/8/2002	No	No	No	No	No	No	No

Appendix 3. Example of Amphibian and Reptile Observation Report Form. Keep an ongoing list of species observations each year and archive at the Park with photos, maps, or other material.

Amphibian and Reptile Observation Record

Year:
Location:

Date	Species Observed (or describe)	Number Animals	Calling?	Location Description (Use common landmarks)	Photo	Your Name
			Y N		Y N	
			Y N		Y N	
			Y N		Y N	
			Y N		Y N	
			Y N		Y N	
			Y N		Y N	
			Y N		Y N	
			Y N		Y N	
			Y N		Y N	
			Y N		Y N	
			Y N		Y N	
			Y N		Y N	
			Y N		Y N	
			Y N		Y N	
			Y N		Y N	
			Y N		Y N	
			Y N		Y N	
			Y N		Y N	
			Y N		Y N	
			Y N		Y N	