

ANNUAL REPORT 2004

MONTANA PRAIRIE RIPARIAN NATIVE SPECIES STUDY



ROBERT G. BRAMBLETT

MELISSA A. JONES-WUELLNER

CHRISTOPHER S. GUY

ALEXANDER V. ZALE

MONTANA COOPERATIVE FISHERY RESEARCH UNIT

MONTANA STATE UNIVERSITY-BOZEMAN

BOZEMAN, MT 59717

Abstract.—Information on the distribution and abundance of fish, amphibians, reptiles, birds, and small mammals in and around Montana prairie streams is scarce. This information is important for resource managers to better understand and manage prairie species and their habitats. During the 2004 field season, we sampled fish, amphibians, reptiles, birds, and small mammals at 40 sites within prairie ecoregions in Montana. Five of these sites were sampled twice to allow an estimate of temporal variability in biological assemblages.

Introduction

An analysis of Montana Fish, Wildlife and Park's (MFWP) Montana River Information System database indicated that more than 18,000 miles of streams in the Montana database have not been surveyed. The overwhelming majority of these waters are small, warmwater prairie streams located in eastern Montana. Some of these streams may contain intact, diverse assemblages of native fishes. Similarly, data is scarce or non-existent for amphibians, reptiles, birds, and small mammals in the riparian and upland areas adjacent to these prairie streams. The purpose of this study is to gain a greater understanding of the vertebrate fauna that occurs in prairie streams and associated habitats by performing a survey of fish, amphibians, reptiles, birds, and mammals. This information will enable resource managers to better understand and manage prairie ecosystems.

Study Area and Methods

We sampled sites in the Northern Great Plains and Northern Glaciated Plains Ecoregions in the eastern two thirds of Montana, which include portions of the Missouri, Yellowstone, and Little Missouri river basins. A total of 40 sites were sampled for birds, reptiles, amphibians, and mammals (Table1). Two of the 40 sites were not sampled for fishes because the stream was too deep to wade safely.

The sampling effort consisted of two phases:

1. Phase 1 (Bird surveys)—Birds were surveyed from late May through June, during the season when males were actively singing on their territories.

2. Phase 2 (Fish, reptile, amphibian, and small mammal surveys)—These taxa were surveyed during June through September at the same sites sampled during Phase 1.

To assess temporal variability in species assemblages a subset of five sites were sampled four times. Five of the sites sampled early in Phase 1 were resampled towards the end of Phase 1 sampling. These same five sites were then sampled for the other taxa early and late in Phase 2 sampling. Quantification of within-site temporal variability will allow comparison to between-site variability to ascertain the extent to which differences among sites are caused by time of sampling.

Reptiles and amphibians.—Visual encounter surveys (VES) were used to determine the relative abundances of amphibians and reptiles (Heyer et al. 1994). Two 300-m VES transects were surveyed along the stream banks (2 banks x 300 m), and three 140-m transects were surveyed perpendicular to the stream along the mammal traplines. We recorded incidental observations of reptiles and amphibians during all other site activities, including vocalizations of frogs and toads heard while camping near sampling sites.

Fishes.—Fishes were surveyed at each site by seining a 300-m reach of stream. All fishes captured were identified to species, and lengths of at least 20 randomly selected individuals were recorded for each species. Up to ten voucher specimens for each species were preserved, and voucher specimens were examined in the laboratory to verify field identification of species. Specimens of *Phoxinus* sp. were identified as northern redbelly dace or northern redbelly dace x finescale dace hybrids by examining pharyngeal teeth in the laboratory. Specimens of *Hybognathus* sp. were tentatively identified in the field; species determinations were later confirmed by examining voucher specimens in the laboratory.

The temporal variability in fish assemblages was assessed by calculating a Sorenson's similarity index (SI) for samples taken at the five "temporal sites" that were sampled twice a year from 2002-2004. The SI represents the percent similarity in species occurrence between two samples, e.g., the number of species common to both samples is divided by the total number of species in both samples, and multiplied by 100. We calculated SI values for within-year samples

(comparing July to September within the same year) and between-year samples (comparing July to July of different years and September to September of different years).

Birds.—Three point-counts were conducted at each site using standard protocols (Ralph et al. 1995). One point-count was conducted at the center of the fish survey reach and the others were located 300 m straight-line-distance upstream and downstream from the center point within the riparian zone. Bird surveys were conducted between May 18 and July 1, 2004. Each point-count was conducted for 10 minutes, and all birds detected visually or aurally were recorded. General vegetation condition and structure were recorded at each point-count site. These measurements were modified from protocols established for forested areas (Hutto et al. 2001). Point-count protocols were consistent with state-wide bird monitoring protocols under development as part of the Montana Bird Conservation Plan to enable incorporation of our data into the state-wide database.

Mammals.—Three, 140-meter line transects, centered on each bird point-count site, and running perpendicular to the stream channel were established at each site. Paired snap-traps and Sherman live traps baited with peanut butter and oats were set along this transect, evenly spaced at every ten meters along each transect ($16 \text{ sets/transect} \times 2 \text{ traps/set} \times 3 \text{ transects} = 96 \text{ traps/site}$). Traps were set in the late afternoon or evening, and checked the following morning. Mammals captured were identified to species except for *Peromyscus* sp., which are difficult to distinguish in the field (Foresman 2001; John Carlson, Bureau of Land Management, personal communication), so the two Montana species (deer mouse and white-footed mouse) were grouped as *Peromyscus* sp.

Aquatic and riparian habitat.—We surveyed habitat in the same location where fish were sampled following the U. S. Environmental Protection Agency protocol for physical habitat characterization (Kaufmann and Robison 1998). Habitat variables measured included measures of channel dimensions, channel gradient, substrate size and type, habitat complexity and cover, riparian vegetation cover and structure, anthropogenic alterations, and channel-riparian interaction.

Water chemistry.—Water conductivity (micromhos/cm), dissolved oxygen (mg/L), pH, salinity (ppt), turbidity (NTU), water and air temperature (°C), and time of sample were recorded at each site.

Collaboration with Montana Fish, Wildlife, and Parks.—We conducted a fish identification workshop for MFWP field technicians at Montana State University (MSU) in April. Fish voucher specimen verification was conducted at MSU, working with MFWP technicians Ryan Lott, Toby Taylor, and Brad Tribby. We have assembled a master fish database that includes all prairie fish collection records from the Montana Cooperative Fishery Research Unit (MTCRFU) during 1999-2004 as well as all of FWP's prairie fish collection records from 2003 and 2004. This data base contains over 750 samples from Montana prairie streams. Bob Bramblett worked with FWP prairie stream survey personnel to ensure that records in the database are correct, and provided the database to FWP for their own analyses. Bob will summarize these data for a presentation at the 2005 annual meeting of the Montana Chapter American Fisheries Society.

Results

Fishes.—Fishes were present at 30 of the 38 sites (53%). A total of 21,372 individual fishes of 27 taxa were captured (Table 2). The majority of fish taxa and individuals captured were native to Montana. Twenty taxa and 19,878 individual fishes (95%) were native, and the remaining 7 species and 1,484 individual fishes were introduced species.

Fathead minnow (*Pimephales promelas*) were the most commonly occurring species; they were present at all 30 of 38 sites (79%) that had fish present. White sucker (*Catostomus commersoni*) and lake chub (*Couesius plumbeus*) were present at more than 50% of sites with fish. Brook stickleback (*Culaea inconstans*), longnose dace (*Rhinichthys cataractae*), plains minnow (*Hybognathus placitus*), black bullhead (*Ameiurus melas*), common carp (*Cyprinus carpio*), brassy minnow (*H. hankinsoni*), northern redbelly dace (*Phoxinus eos*), sand shiner (*Notropis ludibundus*), and flathead chub (*Platygobio gracilis*) were present at 10 to 50% of sites with fish. Plains killifish (*Fundulus zebrinus*), longnose sucker (*Catostomus catostomus*), northern redbelly dace x finescale dace hybrid (*P. eos* x *P. neogaeus*), western silvery minnow (*H.*

argyritis), channel catfish (*Ictalurus punctatus*), green sunfish (*Lepomis cyanellus*), mountain sucker, (*C. platyrhynchus*), pearl dace (*Margariscus margarita*), yellow perch (*Perca flavescens*), Iowa darter (*Etheostoma exile*), rainbow trout (*Oncorhynchus mykiss*), northern pike (*Esox lucius*), shorthead redhorse (*Moxostoma macrolepidotum*), stonecat (*Noturus flavus*), mountain whitefish (*Prosopium williamsoni*) were each present at fewer than 10% of sites with fish.

Fathead minnow were the most numerous, comprising 49% of the total catch. Lake chub, white sucker, and brook stickleback comprised 10%, 8%, and 6% of the catch, respectively. Plains minnow, northern redbelly dace, longnose dace, common carp, brassy minnow, green sunfish, mountain sucker, pearl dace, and black bullhead each comprised from 1 to 5% of the catch. Sand shiner, longnose sucker, flathead chub, plains killifish, northern pike, yellow perch, hybrid dace, mountain whitefish, channel catfish, western silvery minnow, Iowa darter, rainbow trout, shorthead redhorse, and stonecat comprised less than 1% of the catch. Fish collection records and latitude and longitude of sample locations will be forwarded to Steve Carson for incorporation into the MFISH database.

Temporal stability of species occurrences at temporal sites ranged from completely stable (SI = 100) to completely dissimilar (SI = 0; Figures 1-3). At three (Assiniboine, Crow and Thompson creeks) of five sites, fish assemblages averaged at least 77 % similar in comparisons within and between years, and ranged to as high as 100 % similar. These sites were characterized by having fairly reliable water levels during the three years we sampled them, even though these had no flow during sampling events, and had pools of water interrupted by dry channel reaches. Two sites (Dog Creek and Steves Fork) had lower similarity; their percent similarity averaged less than 76 %, and ranged to as low as 0 %. We observed more variability in water quantity over time at these sites. One of these sites, Dog Creek, varied from having flowing water and up to eight species present to virtually dry with no fish present.

Amphibians and reptiles.—A total of four amphibian species and eight reptile species were observed (Table 3). Northern leopard frog (*Rana pipiens*) was the most commonly occurring species; they were present at all 23 of 40 sites (58%). Painted turtle (*Chrysemys picta*) and

plains gartersnake (*Thamnophis radix*) were each present at 9 sites (22%). Woodhouse's toad (*Bufo woodhousii*) were present at six sites (15%), and boreal chorus frog (*Pseudacris maculata*) were present at five sites (12%). Eastern racer (*Coluber constrictor*), western rattlesnake (*Crotalus viridis*), gophersnake (*Pituophis catenifer*), snapping turtle (*Chelydra serpentina*), greater short-horned lizard (*Phrynosoma hernandesi*), terrestrial gartersnake (*Thamnophis elegans*) and tiger salamander (*Ambystoma tigrinum*) were each present at 3 or fewer sites ($\leq 8\%$). Northern leopard frogs were the most abundant species; a total of 988 were counted during surveys and we counted 517 individuals at a single site.

Birds.—A total of 2,517 individual birds of 101 species was observed during point-count surveys (Table 4). The most commonly observed species observed was western meadowlark (*Sturnella neglecta*), which was present at 95% of sites. The six next most common species, respectively, were brown-headed cowbird (*Molothrus ater*), red-winged blackbird (*Agelaius phoeniceus*), mourning dove (*Zenaida macroura*), killdeer (*Charadrius vociferus*), eastern kingbird (*Tyrannus tyrannus*), and lark bunting (*Calamospiza melanocorys*); each of these species was present at more than 50% of sites. We observed an additional 24 bird species through incidental observations in the vicinity of the sampling sites.

Mammals.—A total of 348 individual mammals of 8 taxa was captured (Table 5). The catch was dominated by *Peromyscus* sp.; 96% of the mammals captured were *Peromyscus* sp. The other species captured were house mouse (*Mus musculus*), long-tailed vole (*Microtus longicaudus*), meadow vole (*M. pennsylvanicus*), northern grasshopper mouse (*Onychomys leucogaster*) Ord's kangaroo rat (*Dipodomys ordii*), prairie vole (*M. ochrogaster*), thirteen-lined ground squirrel (*Spermophilus tridecemlineatus*).

Plans for 2005

During 2005 our prairie stream research will focus on the spatiotemporal dynamics of prairie stream fish assemblages. Our database, which includes over 750 samples from prairie streams during 1999-2004, provides a good foundation of information on the distribution of fish species in eastern Montana. However, we lack an understanding of how prairie fish assemblages vary

spatially within a stream system from mouth to headwaters as well as how these fish assemblages change temporally. The role of prairie streams in main river (e.g., the Yellowstone River) ecology is not known. For example, although we know that main river fishes are occasionally captured in lower reaches of prairie streams, the temporal and spatial extent that main river fishes occupy prairie streams is not known. Further, what proportion of fishes that occur in a stream over the course of a year is represented in a single summer sample at one location? To address this lack of information, and to provide a spatiotemporal context for our existing database, we will investigate the spatiotemporal dynamics of fish assemblages in a subset of streams. Graduate Research Assistant Jason Mullen will work with Bob Bramblett and Chris Guy on this project and we are now preparing a proposal outlining the study plan.

We will conduct a prairie fish identification workshop at MSU again in 2005, as well as continuing to assist MFWP field crews with database management and voucher specimen identification. We will finish developing habitat models for fish species in the prairie ecoregions of Montana, and assess the relative importance of site-level and landscape habitat features. We will have a final report for this analysis, in the form of a master's thesis by Melissa Jones-Wuellner in Fall 2005. By identifying the relationships between fish distribution and habitat characteristics, we hope to identify critical habitat for conservation of native fish species and assemblages.

References

- Foresman, K. R. 2001. The wild mammals of Montana. Special Publication number 12 of the American Society of Mammalogists. Lawrence, Kansas.
- Heyer, W. R., M. A. Donnelly, R. W. McDiarmid, L. C. Hayek, and M. S. Foster. 1994. Measuring and monitoring biological diversity: standard methods for amphibians. Smithsonian Institution Press, Washington, DC.
- Hutto, R. L., J. S. Young, and J. Hoffland. 2001. USDA Forest Service Northern Region landbird monitoring project: field methods.
<http://biology.dbs.umt.edu/landbird/methMan.htm>
- Kaufmann, P. R., and E. G. Robison. 1998. Physical habitat characterization. Pages 77-118 *in* J. M. Lazorchak, D. J. Klemm, and D. V. Peck, editors. Environmental monitoring and assessment program-surface waters: field operations and methods for measuring the ecological condition of wadeable streams. EPA/620/R-94/004F. U.S. Environmental Protection Agency, Washington, DC.
- Ralph, C. J., S. Droege, and J. R. Sauer. 1995. Managing and monitoring birds using point counts: standards and applications. Pages 161-168 *in* C. J. Ralph, J. R. Sauer, and S. Droege, editors. Monitoring bird populations by point counts. USDA Forest Service General Technical Report PSW-149. Pacific Southwest Research Station, Albany, CA.

Table 1. Locations of sites sampled during 2004.

Site	HUC name	HUC	Latitude	Longitude
Assiniboine Creek	Middle Milk	10050004	48.47377	107.90689
	Middle Milk	10050004	48.47377	107.90689
	Middle Milk	10050004	48.47377	107.90689
	Middle Milk	10050004	48.47377	107.90689
Big Porcupine Creek	Big Porcupine	10100002	46.70027	107.22292
Brazil Creek	Lower Milk	10050012	48.17144	106.98584
Calf Creek	Lower Musselshell	10040205	47.19313	107.92961
Canyon Creek	Upper Yellowstone-Lake Basin	10070004	45.72417	108.61305
Cherry Creek	Lower Yellowstone	10100004	46.91706	105.71146
Crooked Creek	Lower Musselshell	10040205	47.46049	108.02138
Crow Creek	Rock	10050015	48.79671	107.04169
	Rock	10050015	48.79671	107.04169
	Rock	10050015	48.79671	107.04169
	Rock	10050015	48.79671	107.04169
Deep Creek	Teton	10030205	47.76947	112.20570
Dog Creek	Bullwhacker-Dog	10040101	47.61533	109.40513
	Bullwhacker-Dog	10040101	47.61533	109.40513
	Bullwhacker-Dog	10040101	47.61533	109.40513
	Bullwhacker-Dog	10040101	47.61533	109.40513
Dry Fork Marias River	Marias	10030203	48.27402	111.81467
Eagle Creek	Bullwhacker-Dog	10040101	47.94434	109.86244
East Fork Battle Creek	Battle	10050008	48.93944	109.13684
East Pryor Creek	Pryor	10070008	45.41136	108.31290
East Redwater Creek	Redwater	10060002	47.72350	104.88794
Flat Creek	Judith	10040103	47.48546	109.70162
Little Dry Creek	Little Dry	10040106	46.98908	106.78506

Little Warm Creek	Beaver	10050014	48.05405	108.13941
Lodge Creek	Middle Milk	10050004	48.58088	109.18105
Lodge Grass Creek	Little Bighorn	10080016	45.11938	107.60682
McDonald Creek	Box Elder	10040204	46.99587	108.23323
O'Brian Coulee	Sage	10050006	48.67951	110.53995
Pole Creek	Upper Musselshell	10040201	46.45596	108.77314
Prairie Elk Creek	Prarie Elk-Wolf	10060001	47.96943	105.87891
Pryor Creek	Pryor	10070008	45.85675	108.28883
Rattlesnake Creek	Middle Musselshell	10040202	46.81504	107.70322
Rotten Grass Creek	Lower Bighorn	10080015	45.38559	107.65226
Sand Creek (Big Dry)	Big Dry	10040105	47.03011	107.21466
Sarpy Creek	Lower Yellowstone-Sunday	10100001	46.14383	107.11596
Sheep Creek	Lower Powder	10090209	46.28903	105.18478
Shonkin Creek	Upper Missouri-Dearborn	10030102	47.77955	110.64707
Snake Creek	Middle Milk	10050004	48.46364	109.09866
Steve's Fork	Big Dry	10040105	47.26929	107.19434
	Big Dry	10040105	47.26929	107.19434
	Big Dry	10040105	47.26929	107.19434
	Big Dry	10040105	47.26929	107.19434
Thompson Creek (Little Dry)	Little Dry	10040106	47.05629	106.41524
	Little Dry	10040106	47.05629	106.41524
	Little Dry	10040106	47.05629	106.41524
	Little Dry	10040106	47.05629	106.41524
Thompson Creek (Little Missouri)	Upper Little Missouri	10110201	45.03481	104.66104
Timber Creek	Fort Peck Reservoir	10040104	47.30773	106.16118

Trail Creek	Willow	10030204	48.72129	111.41132
Whitney Creek	O'fallon	10100005	46.67503	105.06558
Wolf Creek	Judith	10040103	47.48546	109.70162
Woody Island Coulee	Cottonwood	10050010	48.87202	108.15799

Table 2. Fishes captured during 2004.

Site	Date	Species	Number captured
Assiniboine Creek	7/12/2004	brook stickleback	20
		fathead minnow	12
		northern redbelly dace	2
		pearl dace	29
		white sucker	69
		Total	132
Assiniboine Creek	9/15/2004	brassy minnow	267
		brook stickleback	8
		fathead minnow	266
		hybrid dace	1
		northern redbelly dace	567
		pearl dace	130
		white sucker	136
		Total	1,375
Big Porcupine Creek	7/21/2004	fathead minnow	20
Brazil Creek	8/9/2004	fathead minnow	59
Calf Creek	8/6/2004	no fish	
Cherry Creek	8/13/2004	no fish	
Crooked Creek	8/7/2004	channel catfish	2
		common carp	732
		lake chub	81
		plains minnow	176
		western silvery minnow	1
		Total	992
Crow Creek	7/12/2004	fathead minnow	29
		lake chub	2
		white sucker	1
		Total	32
Crow Creek	9/16/2004	black bullhead	11
		brassy minnow	3
		fathead minnow	653
		lake chub	544
		plains minnow	32
		white sucker	93

		Total	1,336
Deep Creek	8/20/2004	brook stickleback	14
		fathead minnow	32
		lake chub	2
		white sucker	16
		Total	64
Dog Creek	7/13/2004	brook stickleback	1
		fathead minnow	9
		lake chub	40
		plains minnow	4
		white sucker	81
		Total	135
Dog Creek	9/17/2004	brassy minnow	53
		brook stickleback	33
		common carp	1
		fathead minnow	305
		lake chub	303
		longnose dace	1
		plains minnow	5
		white sucker	67
		Total	768
Dry Fork Marias	8/24/2004	brook stickleback	35
		fathead minnow	4
		flathead chub	3
		lake chub	66
		longnose dace	85
		white sucker	23
		Total	216
Eagle Creek	9/3/2004	brassy minnow	80
		fathead minnow	213
		lake chub	9
		longnose dace	107
		northern redbelly dace	250
		white sucker	446
		Total	1,105
East Fork Battle Creek	9/4/2004	black bullhead	20
		brook stickleback	5
		fathead minnow	218
		northern pike	7
		Total	250

East Pryor Creek	7/27/2004	fathead minnow	1
		lake chub	3
		longnose dace	48
		mountain sucker	348
		white sucker	151
		Total	551
East Redwater Creek	8/11/2004	no fish	
Flat Creek	8/20/2004	lake chub	10
		longnose dace	24
		northern redbelly dace	1
		rainbow trout	1
		white sucker	10
		Total	46
Little Dry Creek	9/8/2004	brassy minnow	98
		common carp	2
		fathead minnow	1,765
		lake chub	267
		plains killifish	5
		sand shiner	50
		white sucker	45
		yellow perch	4
		Total	2,236
Little Warm Creek	8/8/2004	no fish	
Lodge Grass Creek	7/25/2004	longnose dace	40
		longnose sucker	3
		mountain whitefish	3
		white sucker	3
		Total	49
McDonald Creek	8/5/2004	no fish	
O'Brian Coulee	8/25/2004	no fish	
Pole Creek	7/14/2004	no fish	
Prairie Elk Creek	8/10/2004	black bullhead	1
		common carp	3
		fathead minnow	88
		flathead chub	4
		lake chub	7

		longnose dace	106
		longnose sucker	8
		plains minnow	120
		sand shiner	22
		white sucker	42
		Total	401
Pryor Creek	7/28/2004	channel catfish	1
		fathead minnow	17
		longnose dace	322
		white sucker	72
		Total	412
Rattlesnake Creek	9/9/2004	fathead minnow	749
		lake chub	53
		plains minnow	26
		Total	828
Rotten Grass Creek	7/26/2004	fathead minnow	83
		lake chub	2
		longnose dace	11
		white sucker	11
		Total	107
Sand Creek	9/6/2004	common carp	52
		fathead minnow	660
		Total	712
Sarpy Creek	7/23/2004	black bullhead	14
		common carp	1
		fathead minnow	935
		green sunfish	408
		white sucker	10
		Total	1,368
Sheep Creek	8/12/2004	black bullhead	3
		fathead minnow	710
		flathead chub	2
		green sunfish	1
		lake chub	3
		longnose dace	58
		plains minnow	183
		white sucker	8
		Total	968
Shonkin Creek	8/21/2004	fathead minnow	632

		flathead chub	4
		lake chub	260
		longnose dace	166
		longnose sucker	12
		mountain sucker	7
		sand shiner	7
		shorthead redhorse	1
		stonecat	1
		western silvery minnow	2
		white sucker	110
		Total	1,202
Snake Creek	8/25/2004	brassy minnow	211
		brook stickleback	44
		fathead minnow	65
		hybrid dace	3
		Iowa darter	2
		northern redbelly dace	54
		white sucker	29
		Total	408
Steve's Fork	7/11/2004	brook stickleback	540
		fathead minnow	242
		Total	782
Steve's Fork	9/14/2004	brook stickleback	539
		fathead minnow	487
		plains killifish	1
		plains minnow	3
		Total	1,030
Thompson Creek (Little Dry)	7/10/2004	black bullhead	10
		brook stickleback	22
		fathead minnow	1,110
		lake chub	2
		plains minnow	320
		white sucker	4
		Total	1,468
Thompson Creek (Little Dry)	9/13/2004	black bullhead	93
		brook stickleback	20
		common carp	108
		fathead minnow	983
		lake chub	1
		plains minnow	189

		sand shiner	6
		white sucker	6
		Total	1,406
Thompson Creek (Little Missouri)	7/24/2004	fathead minnow	11
Timber Creek	9/7/2004	brook stickleback	1
		plains killifish	6
		Total	7
Trail Creek	8/23/2004	brook stickleback	20
		fathead minnow	3
		Total	23
Whitney Creek	7/29/2004	no fish	
Wolf Creek	7/15/2004	fathead minnow	10
		lake chub	486
		longnose dace	3
		northern redbelly dace	180
		white sucker	182
		Total	861
Woody Island Coulee	9/5/2004	brook stickleback	2
Grand total			21,372

Table 3. Amphibians and reptiles observed in 2004.

Site	Date	Survey or incidental	Species	Number observed
Assiniboine Creek	7/12/2004	Survey	northern leopard frog	3
		Incidental	painted turtle	
Assiniboine Creek	9/15/2004	Survey	northern leopard frog	39
			painted turtle	2
			plains gartersnake	1
Big Porcupine Creek	7/21/2004	Survey	boreal chorus frog	1
		Incidental	plains gartersnake	
Brazil Creek	8/9/2004	Survey	northern leopard frog	36
		Incidental	painted turtle	
			plains gartersnake	
Calf Creek	8/6/2004	Survey	None	
		Incidental	Woodhouse's toad	
Canyon Creek	9/10/2004	Survey	None	
Cherry Creek	8/12/2004	Survey	None	
Crooked Creek	8/7/2004	Survey	northern leopard frog	3
			Woodhouse's toad	1
Crow Creek	7/11/2004	Survey	None	
		Incidental	boreal chorus frog	
Crow Creek	9/16/2004	Survey	northern leopard frog	23
		Incidental	painted turtle	
Deep Creek	8/20/2004	Survey	None	
Dog Creek	7/13/2004	Survey	Woodhouse's toad	2
		Incidental	northern leopard frog	
			plains gartersnake	

Dog Creek	9/17/2004	Survey	northern leopard frog	10
		Incidental	western rattlesnake	
Dry Fork Marias	8/24/2004	Survey	northern leopard frog	2
		Incidental	eastern racer terrestrial gartersnake	
Eagle Creek	9/3/2004	Survey	northern leopard frog	10
		Incidental	western rattlesnake	
East Fork Battle Creek	9/4/2004	Survey	None	
East Pryor Creek	7/27/2004	Survey	boreal chorus frog	2
			northern leopard frog	1
		Incidental	western rattlesnake	
East Redwater Creek	8/11/2004	Survey	painted turtle	1
Flat Creek	8/19/2004	Survey	None	
Little Dry Creek	9/8/2004	Survey	northern leopard frog	536
			plains gartersnake	1
Little Warm Creek	8/8/2004	Survey	None	
		Incidental	northern leopard frog	
Lodge Creek	8/25/2004	Survey	northern leopard frog	1
Lodge Grass Creek	7/25/2004	Survey	northern leopard frog	1
		Incidental	plains gartersnake	
McDonald Creek	8/5/2004	Survey	None	
O'Brien Coulee	8/24/2004	Survey	None	
Pole Creek	7/15/2004	Survey	None	
Prairie Elk Creek	8/10/2004	Survey	northern leopard frog	24
			plains gartersnake	1

Pryor Creek	7/28/2004	Survey	painted turtle	1
Rattlesnake Creek	9/9/2004	Survey	None	
Rotten Grass Creek	7/26/2004	Survey	northern leopard frog	2
			painted turtle	1
		Incidental	northern leopard frog	
Sand Creek	9/6/2004	Survey	northern leopard frog	69
			painted turtle	2
		Incidental	greater short-horned lizard	
Sarpy Creek	7/23/2004	Survey	northern leopard frog	2
		Incidental	painted turtle snapping turtle	
Sheep Creek	8/13/2004	Survey	northern leopard frog	11
		Incidental	eastern racer painted turtle snapping turtle	
Shonkin Creek	8/21/2004	Survey	boreal chorus frog	1
			northern leopard frog	1
Snake Creek	8/25/2004	Survey	northern leopard frog	3
			Woodhouse's toad	1
		Incidental	northern leopard frog	
Steve's Fork	7/10/2004	Survey	gophersnake	1
		Incidental	Woodhouse's toad	
	9/14/2004	Survey	northern leopard frog	1
Thompson Creek	7/9/2004	Survey	northern leopard frog	13
			plains gartersnake	4
			Woodhouse's toad	1
		Incidental	northern leopard frog	

Thompson Creek	9/13/2004	Survey	northern leopard frog plains gartersnake	68 1
Thompson Creek (Little Missouri)	7/24/2004	Survey	eastern racer	1
		Incidental	northern leopard frog tiger salamander	3
Timber Creek	9/7/2004	Survey	None	
		Incidental	tiger salamander	
Trail Creek	8/22/2004	Survey	None	
Whitney Creek	7/29/2004	Survey	None	
Wolf Creek	7/15/2004	Survey	boreal chorus frog plains gartersnake	20 2
Woody Island Coulee	9/5/2004	Survey	None	
		Incidental	northern leopard frog	
		Grand total		910

Table 4. Birds observed during 2004.

Site	Date	Survey or incidental	Species	Number observed
Assiniboine Creek	5/20/2004	Survey	American wigeon	2
			brown-headed cowbird	7
			Canada goose	2
			cliff swallow	1
			common grackle	5
			common snipe	1
			killdeer	2
			long-billed curlew	1
			mallard	4
			marbled godwit	3
			mourning dove	7
			northern shoveler	1
			red-winged blackbird	10
			ring-necked pheasant	2
			western meadowlark	9
			willet	3
			Total	60
	6/30/2004	Incidental	American robin	
			American wigeon	
			blue-winged teal	
			brown thrasher	
			clay-colored sparrow	
			eastern kingbird	
			northern harrier	
			northern shoveler	
			unidentified gull	
		Survey	American robin	2
			barn swallow	1
			black-billed magpie	1
			Brewer's blackbird	1
			brown-headed cowbird	6
			cliff swallow	3
			common grackle	7
			eastern kingbird	3
			killdeer	45
			mourning dove	6
			red-winged blackbird	12
			ring-necked pheasant	2
			western meadowlark	6
			Total	95

		Incidental	blue-winged teal	
Big Porcupine Creek	6/14/2004	Survey	American wigeon	2
			brown-headed cowbird	2
			Bullock's oriole	4
			common grackle	4
			eastern kingbird	6
			European starling	2
			field sparrow	1
			house wren	2
			mourning dove	9
			northern harrier	1
			prairie falcon	1
			red-headed woodpecker	2
			red-winged blackbird	5
			unidentified blackbird	2
			upland sandpiper	2
			western kingbird	2
			western meadowlark	5
			western wood-pewee	1
			yellow warbler	3
			Total	56
		Incidental	American kestrel	
			common nighthawk	
			great horned owl	
			northern flicker	
Brazil Creek	6/27/2004	Survey	barn swallow	8
			brown-headed cowbird	9
			common nighthawk	1
			horned lark	2
			lark bunting	12
			mourning dove	4
			red-winged blackbird	6
			unidentified duck	1
			western meadowlark	2
			Total	45
Calf Creek	6/1/2004	Survey	American goldfinch	1
			American robin	8
			belted kingfisher	1
			black-headed grosbeak	1
			Brewer's blackbird	1
			brown thrasher	2
			brown-headed cowbird	1

			Canada goose	1
			European starling	1
			field sparrow	1
			house wren	3
			lazuli bunting	2
			least flycatcher	3
			mourning dove	6
			ring-necked pheasant	6
			spotted towhee	2
			western meadowlark	2
			western wood-peewee	2
			yellow warbler	6
			yellow-breasted chat	1
			Total	51
		Incidental	black-headed grosbeak	
			field sparrow	
			gray catbird	
			killdeer	
			lark sparrow	
			northern flicker	
			Swainson's thrush	
			western kingbird	
			western meadowlark	
Canyon Creek	6/17/2004	Survey	American robin	5
			bank swallow	1
			cedar waxwing	1
			common yellowthroat	1
			downy woodpecker	1
			European starling	7
			gray catbird	2
			least flycatcher	1
			mallard	2
			mourning dove	4
			red-winged blackbird	1
			western kingbird	1
			western meadowlark	1
			western wood-pewee	2
			willow flycatcher	1
			yellow warbler	5
			yellow-breasted chat	2
			Total	38
		Incidental	black-capped chickadee	
			lark sparrow	

			ring-necked pheasant	
Cherry Creek	6/12/2004	Survey	bank swallow	2
			Brewer's blackbird	1
			brown-headed cowbird	6
			eastern kingbird	3
			horned lark	7
			killdeer	1
			lark bunting	6
			lark sparrow	1
			mallard	2
			mourning dove	2
			unidentified blackbird	2
			vesper sparrow	1
			western meadowlark	4
			Total	38
Crooked Creek	6/3/2004	Survey	barn swallow	4
			Brewer's blackbird	3
			field sparrow	1
			killdeer	4
			lark sparrow	1
			mourning dove	6
			northern rough-winged swallow	1
			red-winged blackbird	4
			Say's phoebe	5
			unidentified blackbird	1
			vesper sparrow	2
			western meadowlark	10
			Total	42
		Incidental	lark sparrow	
Crow Creek	5/21/2004	Survey	Brewer's blackbird	4
			brown-headed cowbird	10
			eastern kingbird	1
			gadwall	6
			killdeer	1
			mallard	2
			marbled godwit	1
			mourning dove	2
			northern harrier	3
			northern pintail	1
			red-winged blackbird	3
			unidentified blackbird	1

		unidentified sparrow	9	
		western meadowlark	12	
		Total	56	
	Incidental	brown thrasher		
		chipping sparrow		
		horned lark		
		lesser scaup		
		loggerhead shrike		
		long-billed curlew		
		sharp-tailed grouse		
		Sprague's pipit		
		unidentified flycatcher		
		vesper sparrow		
		willet		
6/29/2004	Survey	American crow	1	
		black-billed magpie	1	
		brown-headed cowbird	15	
		eastern kingbird	3	
		horned lark	1	
		lark bunting	1	
		lark sparrow	1	
		mourning dove	2	
		northern pintail	1	
		red-winged blackbird	1	
		Sprague's pipit	1	
		western meadowlark	10	
		Total	38	
	Incidental	blue-winged teal		
		common nighthawk		
		killdeer		
		loggerhead shrike		
		McCown's longspur		
		northern harrier		
		unidentified duck		
Deep Creek	5/27/2004	Survey	American robin	5
		black-billed magpie	3	
		brown-headed cowbird	3	
		California gull	1	
		cliff swallow	17	
		European starling	4	
		gray catbird	1	
		killdeer	5	

			lark bunting	1
			mourning dove	1
			Swainson's thrush	2
			unidentified blackbird	1
			unidentified gull	1
			vesper sparrow	1
			western meadowlark	3
			yellow-rumped warbler	4
			Total	53
		Incidental	American dipper	
			common raven	
			eastern kingbird	
			lark sparrow	
Dog Creek	5/27/2004	Survey	American kestrel	5
			American robin	1
			black-billed magpie	4
			black-capped chickadee	1
			chipping sparrow	1
			European starling	1
			mallard	1
			mourning dove	4
			rock dove	7
			rock wren	4
			unidentified blackbird	1
			western meadowlark	7
			Total	37
		Incidental	American kestrel	
			American robin	
			black-billed magpie	
			chipping sparrow	
			golden eagle	
			lark sparrow	
			least flycatcher	
			pinon jay	
			red-breasted nuthatch	
			rock wren	
			spotted towhee	
			western meadowlark	
			white-throated swift	
	7/1/2004	Survey	American kestrel	1
			black-billed magpie	1
			black-headed grosbeak	1

			merlin	1
			mourning dove	2
			rock dove	3
			Say's phoebe	1
			western meadowlark	5
			white-breasted nuthatch	1
			yellow warbler	2
			Total	18
		Incidental	dark-eyed junco	
			golden eagle	
Dry Fork Marias River	5/29/2004	Survey	bank swallow	2
			black-billed magpie	1
			brown-headed cowbird	3
			eastern kingbird	2
			killdeer	3
			lark bunting	1
			lark sparrow	4
			mourning dove	4
			red-tailed hawk	2
			red-winged blackbird	4
			ring-necked pheasant	1
			Say's phoebe	1
			unidentified blackbird	1
			unidentified sparrow	1
			western meadowlark	7
			willet	1
			Total	38
		Incidental	American kestrel	
			American robin	
			mallard	
			marbled godwit	
			unidentified gull	
			vesper sparrow	
Eagle Creek	6/25/2004	Survey	American goldfinch	2
			American robin	1
			brown-headed cowbird	4
			cedar waxwing	3
			clay-colored sparrow	2
			eastern kingbird	3
			European starling	1
			field sparrow	1
			gray catbird	3

			killdeer	1
			lark bunting	2
			mourning dove	7
			red-winged blackbird	1
			western meadowlark	4
			yellow warbler	4
			Total	39
		Incidental	black-headed grosbeak	
			unidentified hawk	
East Fork Battle Creek	5/31/2004	Survey	American coot	1
			barn swallow	7
			brown-headed cowbird	7
			chipping sparrow	1
			cliff swallow	11
			eastern kingbird	1
			gadwall	2
			horned lark	1
			lark bunting	2
			mallard	5
			mourning dove	1
			northern harrier	1
			northern pintail	2
			red-winged blackbird	5
			Say's phoebe	1
			song sparrow	1
			unidentified blackbird	1
			unidentified gull	5
			western meadowlark	4
			Total	59
		Incidental	American robin	
			common merganser	
			gray catbird	
			greater sage grouse	
			killdeer	
			mallard	
			ring-billed gull	
			white-crowned sparrow	
			willet	
East Pryor Creek	6/16/2004	Survey	American goldfinch	4
			American robin	3
			black-billed magpie	2
			black-headed grosbeak	2

			Brewer's blackbird	2
			brown-headed cowbird	4
			Bullock's oriole	1
			cliff swallow	2
			eastern kingbird	2
			gray catbird	3
			house wren	2
			mourning dove	6
			red-winged blackbird	3
			Say's phoebe	1
			spotted towhee	3
			western meadowlark	1
			yellow warbler	6
			yellow-breasted chat	3
			Total	50
		Incidental	eastern kingbird	
			great horned owl	
			horned lark	
			northern harrier	
			ring-necked pheasant	
East Redwater Creek	6/26/2004	Survey	brown-headed cowbird	9
			common grackle	1
			eastern kingbird	4
			gadwall	1
			gray catbird	2
			killdeer	3
			lark sparrow	1
			long-billed curlew	1
			mallard	2
			mourning dove	5
			northern shoveler	1
			red-winged blackbird	10
			ring-necked pheasant	2
			upland sandpiper	1
			western kingbird	1
			western meadowlark	5
			Wilson's phalarope	1
			yellow warbler	2
			Total	52
		Incidental	American wigeon	
			blue-winged teal	
			brown thrasher	
			Canada goose	

			common nighthawk	
			horned lark	
Flat Creek	5/26/2004	Survey	American robin	2
			bank swallow	8
			brown-headed cowbird	11
			Canada goose	3
			common yellowthroat	2
			eastern kingbird	1
			killdeer	6
			lark bunting	2
			lark sparrow	2
			long-billed curlew	1
			mallard	7
			marbled godwit	1
			red-tailed hawk	1
			red-winged blackbird	8
			savannah sparrow	1
			unidentified blackbird	2
			upland sandpiper	1
			vesper sparrow	1
			western meadowlark	4
			Total	64
		Incidental		
			common raven	
			gadwall	
			willet	
			Wilson's phalarope	
Little Dry Creek	6/28/2004	Survey	brown-headed cowbird	2
			chestnut-collared longspur	3
			cliff swallow	3
			common grackle	1
			horned lark	13
			killdeer	4
			lark bunting	12
			lark sparrow	2
			mourning dove	1
			red-winged blackbird	5
			western meadowlark	2
			Total	48
		Incidental		
			Wilson's phalarope	
Little Warm Creek	5/21/2004	Survey	American wigeon	2

			blue-winged teal	1
			brown-headed cowbird	18
			Canada goose	5
			cliff swallow	2
			common grackle	1
			gadwall	1
			horned lark	2
			lark bunting	4
			mallard	3
			marbled godwit	4
			northern shoveler	4
			northern shrike	2
			red-winged blackbird	6
			ring-billed gull	1
			unidentified gull	7
			western meadowlark	5
			willet	1
			yellow-headed blackbird	1
			Total	70
		Incidental	American wigeon	
			long-billed curlew	
			northern harrier	
			savannah sparrow	
			Swainson's hawk	
Lodge Creek	5/30/2004	Survey	American goldfinch	3
			American robin	3
			barn swallow	5
			brown thrasher	2
			brown-headed cowbird	11
			California gull	1
			common grackle	3
			eastern kingbird	1
			European starling	6
			Franklin's gull	2
			house wren	2
			mallard	1
			mourning dove	3
			ring-necked pheasant	2
			savannah sparrow	1
			tree swallow	2
			unidentified swallow	2
			western meadowlark	4
			yellow warbler	4
			Total	58

		Incidental	barn swallow	
			clay-colored sparrow	
			common merganser	
			great blue heron	
			great horned owl	
			mallard	
Lodge Grass Creek	6/15/2004	Survey	American robin	1
			black-headed grosbeak	1
			Brewer's blackbird	1
			brown-headed cowbird	1
			cliff swallow	25
			common yellowthroat	1
			ferruginous hawk	1
			killdeer	1
			lark sparrow	1
			least flycatcher	1
			mourning dove	1
			northern flicker	1
			savannah sparrow	4
			song sparrow	3
			unidentified blackbird	1
			western wood-pewee	5
			Wilson's phalarope	1
			yellow warbler	5
			Total	55
		Incidental	American goldfinch	
			American redstart	
			barn swallow	
			eastern kingbird	
			hairy woodpecker	
			lark bunting	
			lazuli bunting	
			ring-necked pheasant	
			veery	
			yellow warbler	
			yellow-rumped warbler	
McDonald Creek	6/3/2004	Survey	American robin	3
			brown-headed cowbird	4
			Canada goose	17
			cliff swallow	1
			common grackle	1
			eastern kingbird	4

			European starling	23
			horned lark	2
			killdeer	3
			lark bunting	6
			lark sparrow	1
			mourning dove	5
			red-winged blackbird	8
			ring-necked pheasant	1
			tree swallow	4
			western kingbird	1
			western meadowlark	5
			western wood-peewee	1
			yellow warbler	9
			Total	99
		Incidental	Baird's sparrow	
			gray catbird	
			loggerhead shrike	
			Say's phoebe	
O'Brien Coulee	6/1/2004	Survey	bank swallow	2
			brown-headed cowbird	5
			horned lark	12
			house wren	1
			lark bunting	11
			red-tailed hawk	1
			vesper sparrow	2
			western kingbird	1
			western meadowlark	4
			Total	39
		Incidental	avocet	
			Canada goose	
			gray partridge	
			killdeer	
			lark sparrow	
			long-billed curlew	
			marbled godwit	
			northern harrier	
			ring-necked pheasant	
			Swainson's thrush	
Pole Creek	6/4/2004	Survey	bank swallow	3
			brown-headed cowbird	9
			horned lark	2
			killdeer	2

			lark bunting	11
			lark sparrow	2
			mourning dove	2
			western meadowlark	12
			Total	43
		Incidental	common nighthawk	
			eastern kingbird	
			greater sage grouse	
			upland sandpiper	
Prairie Elk Creek	6/26/2004	Survey	Brewer's blackbird	7
			brown-headed cowbird	3
			common grackle	6
			eastern kingbird	3
			field sparrow	1
			grasshopper sparrow	1
			killdeer	2
			lark bunting	1
			lark sparrow	1
			mallard	2
			mourning dove	3
			northern flicker	1
			red-winged blackbird	1
			ring-billed gull	1
			ring-necked pheasant	1
			upland sandpiper	2
			western kingbird	8
			western meadowlark	10
			Total	54
Pryor Creek	6/16/2004	Survey	American kestrel	1
			American robin	2
			black-billed magpie	1
			black-capped chickadee	1
			Brewer's blackbird	4
			common grackle	1
			common yellowthroat	3
			eastern kingbird	2
			European starling	1
			gray catbird	1
			hairy woodpecker	2
			house wren	2
			killdeer	1
			mourning dove	3
			red-winged blackbird	2

			ring-necked pheasant	3
			rock dove	3
			western meadowlark	1
			western wood-pewee	1
			yellow warbler	5
			yellow-breasted chat	3
			Total	43
		Incidental	American wigeon	
			brown thrasher	
			ceder waxwing	
			common nighthawk	
			ferruginous hawk	
			great blue heron	
			mallard	
			spotted towhee	
			upland sandpiper	
Rattlesnake Creek	6/2/2004	Survey	American goldfinch	2
			American wigeon	1
			brown-headed cowbird	6
			cliff swallow	30
			horned lark	1
			killdeer	2
			lark bunting	7
			mourning dove	2
			northern harrier	1
			red-winged blackbird	6
			vesper sparrow	2
			western meadowlark	6
			Total	66
		Incidental	loggerhead shrike	
			mallard	
Rotten Grass Creek	6/15/2004	Survey	American goldfinch	2
			American robin	1
			baltimore oriole	1
			Brewer's blackbird	1
			brown-headed cowbird	6
			Bullock's oriole	1
			cliff swallow	1
			common grackle	2
			common yellowthroat	1
			eastern kingbird	5
			gray catbird	4

			killdeer	1
			mourning dove	4
			northern harrier	2
			red-winged blackbird	4
			ring-necked pheasant	2
			unidentified blackbird	5
			western meadowlark	1
			yellow warbler	11
			Total	55
		Incidental	lazuli bunting	
Sand Creek	5/19/2004	Survey	American wigeon	13
			brown-headed cowbird	7
			Canada goose	9
			gadwall	6
			horned lark	6
			killdeer	1
			lark bunting	9
			mallard	2
			red-winged blackbird	4
			unidentified blackbird	1
			unidentified gull	1
			unidentified sparrow	1
			western meadowlark	17
			Total	77
		Incidental	common yellowthroat	
			mallard	
Sarpy Creek	6/14/2004	Survey	American robin	4
			black-billed magpie	4
			Brewer's blackbird	2
			brown-headed cowbird	2
			clay-colored sparrow	1
			eastern kingbird	4
			killdeer	2
			lark sparrow	6
			mallard	1
			mourning dove	3
			red-winged blackbird	5
			ring-necked pheasant	2
			western kingbird	5
			western meadowlark	2
			western wood-pewee	2
			yellow warbler	3

			Total	48
		Incidental	great blue heron tree swallow western kingbird	
Sheep Creek	6/13/2004	Survey	American goldfinch Brewer's blackbird brown-headed cowbird cliff swallow common grackle eastern kingbird field sparrow lark bunting lark sparrow mourning dove northern flicker red-winged blackbird tree swallow unidentified blackbird western kingbird western meadowlark Total	1 1 2 3 14 5 1 8 4 1 2 3 1 1 3 6 56
		Incidental	common nighthawk killdeer red-tailed hawk	
Shonkin Creek	5/28/2004	Survey	American goldfinch American kestrel American robin black-billed magpie brown thrasher brown-headed cowbird Canada goose clay-colored sparrow common yellowthroat gray catbird house wren mourning dove red-breasted nuthatch ring-necked pheasant rock dove spotted towhee western meadowlark	2 4 1 3 3 3 36 2 1 4 2 4 2 5 1 2 3

			yellow warbler	7
			yellow-breasted chat	4
			Total	90
		Incidental	chipping sparrow	
			least flycatcher	
Snake Creek	5/30/2004	Survey	blue-winged teal	7
			brown-headed cowbird	9
			clay-colored sparrow	1
			gadwall	4
			horned lark	4
			lark bunting	3
			mallard	5
			red-winged blackbird	6
			ring-billed gull	1
			western meadowlark	9
			Total	49
		Incidental	vesper sparrow	
Steves Fork	5/19/2004	Survey	brown-headed cowbird	8
			Canada goose	4
			gadwall	2
			horned lark	2
			killdeer	3
			lark bunting	20
			mallard	1
			northern harrier	1
			red-winged blackbird	4
			ring-billed gull	1
			Say's phoebe	1
			unidentified blackbird	1
			unidentified sparrow	1
			western meadowlark	4
			Total	53
		Incidental	barn swallow	
			cliff swallow	
			great blue heron	
			mallard	
			ring-necked pheasant	
			rock dove	
			Say's phoebe	
	6/28/2004	Survey	cliff swallow	27

			common grackle	2
			field sparrow	2
			horned lark	7
			killdeer	1
			lark bunting	11
			red-winged blackbird	2
			western meadowlark	2
			Total	54
Thompson Creek	5/18/2004	Survey	American wigeon	1
			Baird's sparrow	1
			brown-headed cowbird	8
			Canada goose	8
			horned lark	3
			lark bunting	15
			loggerhead shrike	1
			mallard	5
			red-winged blackbird	5
			savannah sparrow	1
			unidentified blackbird	7
			unidentified sparrow	1
			western meadowlark	7
			Total	63
		Incidental	Baird's sparrow	
			chestnut-collared longspur	
			ferruginous hawk	
			grasshopper sparrow	
			mallard	
			McCown's longspur	
			Say's phoebe	
			Sprague's pipit	
			western kingbird	
	6/28/2004	Survey	brown-headed cowbird	2
			eastern kingbird	2
			grasshopper sparrow	2
			horned lark	5
			killdeer	2
			lark bunting	13
			red-winged blackbird	7
			western meadowlark	6
			Total	39
		Incidental	common nighthawk	
			savannah sparrow	

Thompson Creek (Upper Little Missouri)	6/13/2004	Survey	American robin	4
			blue-winged teal	2
			Brewer's blackbird	2
			Brewer's sparrow	1
			brown thrasher	1
			brown-headed cowbird	5
			common grackle	8
			eastern kingbird	3
			European starling	2
			greater sage grouse	7
			killdeer	4
			long-billed curlew	1
			mourning dove	4
			northern flicker	5
			red-winged blackbird	2
			western kingbird	1
			western meadowlark	8
			yellow warbler	2
			Total	62
		Incidental	common nighthawk	
			eastern screech owl	
Timber Creek	5/20/2004	Survey	Baird's sparrow	3
			barn swallow	2
			brown-headed cowbird	3
			Canada goose	2
			chestnut-collared longspur	1
			eastern kingbird	1
			horned lark	6
			lark bunting	5
			northern shoveler	1
			red-winged blackbird	7
			savannah sparrow	1
			Sprague's pipit	2
			unidentified blackbird	1
			western meadowlark	5
			Wilson's phalarope	8
			Total	48
		Incidental	savannah sparrow	
			yellow-rumped warbler	
Trail Creek	5/29/2004	Survey	American crow	1
			American wigeon	1

			Brewer's blackbird	4
			brown-headed cowbird	7
			clay-colored sparrow	2
			cliff swallow	1
			eastern kingbird	2
			ferruginous hawk	1
			gadwall	2
			horned lark	7
			mallard	3
			northern harrier	1
			prairie falcon	1
			red-winged blackbird	1
			unidentified blackbird	3
			unidentified hawk	1
			vesper sparrow	3
			western meadowlark	6
			Total	47
		Incidental	American wigeon	
			Brewer's sparrow	
			northern harrier	
			northern shoveler	
Whitney Creek	6/12/2004	Survey	American kestrel	1
			American robin	1
			brown-headed cowbird	2
			common grackle	2
			eastern kingbird	4
			killdeer	1
			lark sparrow	1
			mourning dove	4
			northern flicker	5
			red-tailed hawk	1
			ring-necked pheasant	2
			western kingbird	1
			western meadowlark	13
			yellow warbler	5
			yellow-rumped warbler	1
			Total	44
		Incidental	common nighthawk	
			common poorwill	
			field sparrow	
			lark bunting	
			Say's phoebe	

Wolf Creek	6/2/2004	Survey	American crow	1
			American kestrel	1
			American robin	1
			brown-headed cowbird	1
			Bullock's oriole	3
			cliff swallow	125
			common grackle	9
			eastern kingbird	2
			European starling	1
			lark sparrow	1
			mountain bluebird	1
			Say's phoebe	1
			western meadowlark	3
			western wood-peewee	1
			yellow-breasted chat	2
			yellow-rumped warbler	2
			Total	155
		Incidental	black-billed magpie	
			eastern kingbird	
			mallard	
			mourning dove	
			red-winged blackbird	
			rock dove	
			song sparrow	
			yellow warbler	
Woody Island Coulee	5/31/2004	Survey	blue-winged teal	2
			brown-headed cowbird	4
			Canada goose	16
			gadwall	6
			horned lark	2
			killdeer	7
			lark bunting	2
			marbled godwit	2
			northern pintail	2
			northern shoveler	4
			redhead	1
			ring-billed gull	1
			sora	1
			western meadowlark	4
			willet	1
			Wilson's phalarope	10
			yellow-headed blackbird	8
			Total	73

Incidental	American avocet
	American coot
	black tern
	blue-winged teal
	cliff swallow
	gadwall
	green-winged teal
	horned lark
	lesser scaup
	northern shoveler
	pied-billed grebe
	ruddy duck

Grand total

2,517

Table 5. Mammals captured during 2004.

Site	Date set	Species	Number captured
Assiniboine Creek	7/12/2004	<i>Peromyscus</i> sp.	4
Assiniboine Creek	9/15/2004	<i>Peromyscus</i> sp.	7
Big Porcupine Creek	7/21/2004	<i>Peromyscus</i> sp.	11
Brazil Creek	8/9/2004	<i>Peromyscus</i> sp.	2
Calf Creek	8/6/2004	<i>Peromyscus</i> sp.	6
Canyon Creek	9/10/2004	long-tailed vole	1
		<i>Peromyscus</i> sp.	13
Cherry Creek	8/12/2004	<i>Peromyscus</i> sp.	3
Crooked Creek	8/7/2004	<i>Peromyscus</i> sp.	14
Crow Creek	7/11/2004	none	
Crow Creek	9/16/2004	<i>Peromyscus</i> sp.	3
Deep Creek	8/20/2004	<i>Peromyscus</i> sp.	16
Dog Creek	7/13/2004	<i>Peromyscus</i> sp.	2
Dog Creek	9/17/2004	<i>Peromyscus</i> sp.	15
Dry Fork Marias River	8/23/2004	<i>Peromyscus</i> sp.	7
Eagle Creek	9/3/2004	<i>Peromyscus</i> sp.	3
		prairie vole	1
East Fork Battle Creek	9/4/2004	<i>Peromyscus</i> sp.	6
East Pryor Creek	7/27/2004	<i>Peromyscus</i> sp.	7
East Redwater Creek	8/11/2004	meadow vole	1
		<i>Peromyscus</i> sp.	4
		thirteen-lined ground squirrel	1
Flat Creek	8/19/2004	<i>Peromyscus</i> sp.	1

Little Dry Creek	9/8/2004	Ord's kangaroo rat <i>Peromyscus</i> sp.	2 1
Little Warm Creek	8/8/2004	<i>Peromyscus</i> sp.	3
Lodge Creek	8/25/2004	<i>Peromyscus</i> sp.	4
Lodge Grass Creek	7/25/2004	house mouse meadow vole <i>Peromyscus</i> sp.	1 1 10
McDonald Creek	8/5/2004	<i>Peromyscus</i> sp.	15
O'Brien Coulee	8/24/2004	<i>Peromyscus</i> sp.	13
Pole Creek	7/14/2004	northern grasshopper mouse <i>Peromyscus</i> sp.	2 8
Prairie Elk Creek	8/10/2004	Ord's kangaroo rat <i>Peromyscus</i> sp.	1 5
Pryor Creek	7/28/2004	house mouse <i>Peromyscus</i> sp.	1 2
Rattlesnake Creek	9/9/2004	<i>Peromyscus</i> sp.	35
Rotten Grass Creek	7/26/2004	<i>Peromyscus</i> sp.	11
Sand Creek	9/6/2004	<i>Peromyscus</i> sp.	8
Sarpy Creek	7/23/2004	<i>Peromyscus</i> sp.	1
Sheep Creek	8/13/2004	<i>Peromyscus</i> sp.	16
Shokin Creek	8/21/2004	<i>Peromyscus</i> sp.	5
Snake Creek	8/26/2004	none	
Steve's Fork	7/10/2004	meadow vole <i>Peromyscus</i> sp. prairie vole	1 2 1
Steve's Fork	9/14/2004	<i>Peromyscus</i> sp.	3
Thompson Creek	7/9/2004	<i>Peromyscus</i> sp.	3

Thompson Creek	9/13/2004	none	
Thompson Creek (Little Missouri)	7/24/2004	meadow vole	1
		<i>Peromyscus</i> sp.	33
Timber Creek	9/7/2004	<i>Peromyscus</i> sp.	5
Trail Creek	8/22/2004	<i>Peromyscus</i> sp.	10
Whitney Creek	7/29/2004	<i>Peromyscus</i> sp.	1
Wolf Creek	7/15/2004	<i>Peromyscus</i> sp.	6
Woody Island Coulee	9/5/2004	<i>Peromyscus</i> sp.	9
Grand total			348

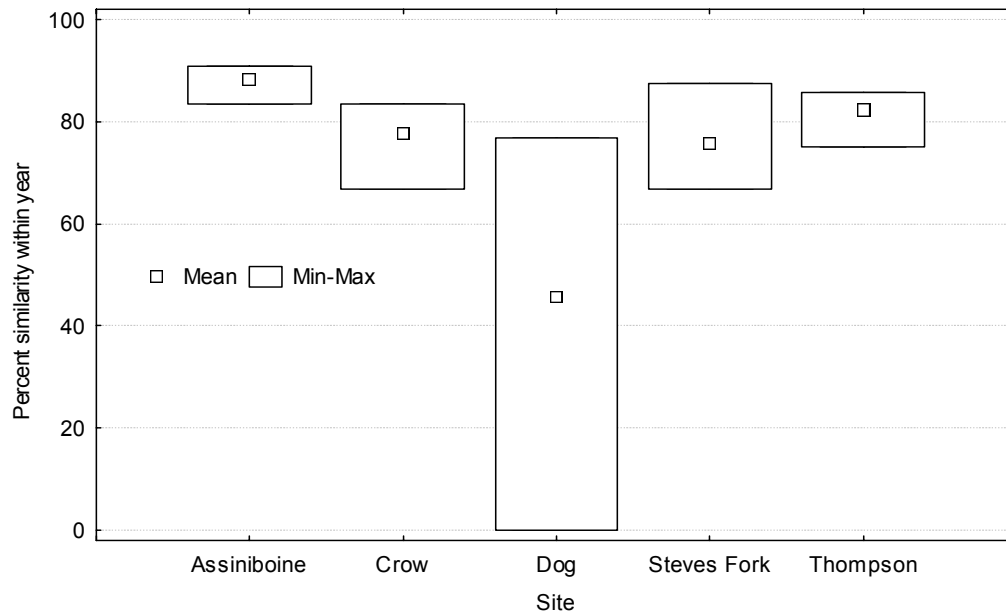


Figure 1. Sorenson's similarity index (SI) vales for fish species occurrence at five sites; SI was calculated by comparing samples collected during July and September within each of three years (2002-2004).

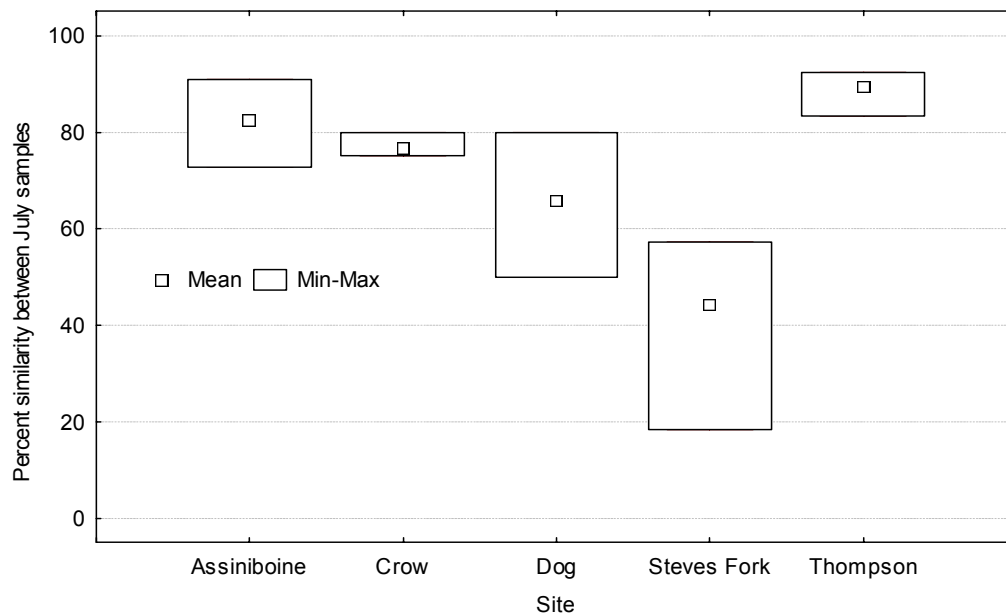


Figure 2. Sorenson's similarity index (SI) vales for fish species occurrence at five sites; SI was calculated by comparing samples collected during July in each of three years (2002-2004).

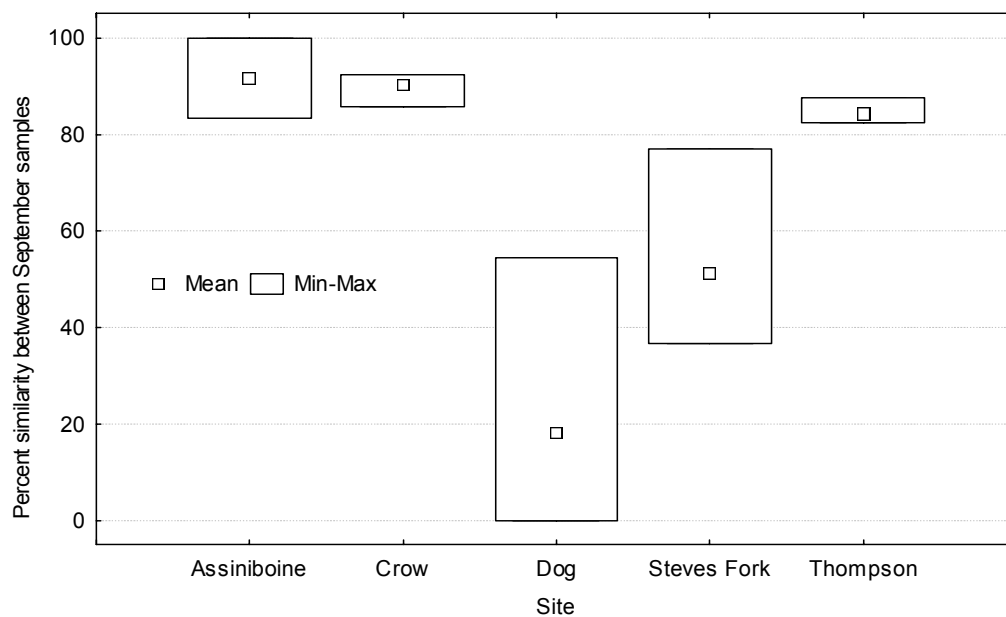


Figure 3. Sorenson's similarity index (SI) vales for fish species occurrence at five sites; SI was calculated by comparing samples collected during September in each of three years (2002-2004).