Montana Fish, Wildlife & Parks

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Abstract

A survey of 143 sites comprised of 136 streams in Montana Fish Wildlife and Parks region 4 was conducted as part of a Montana prairie stream inventory. Sampling began on May 16, 2006 and concluded on October 10, 2006. This was the first time that the majority of these streams had been sampled for the presence of fish. Most sites were randomly selected based on stream length, 4th Code Hydrologic Unit (HUC), and lack of prior sampling, while a few were selected based on Montana Fish Wildlife and Parks fishery staff's interest and need for updated data to meet managements needs. One hundred-thirteen survey sites were located on private lands and 30 were on public lands (16-state, 12-Bureau of Land Management, 1- United States Department of Agriculture National Forest, and 1-United States Fish and Wildlife Service). Seventy-seven (54%) of the sites had water present and 66 (46%) of the sites were dry. Of the wetted sites, five (7%) held continuous standing water, 17 (22%) had interrupted standing pools, and 55 (71%) were flowing. Seines were used to sample a 300m reach on wetted streams when possible. Backpack electrofishing units were used to sample streams where seining conditions were less than optimal (i.e. highly vegetated areas and rocky substrates). Fifty-six (73%) of the wetted sites had fish present. A total of 17,669 fish were collected consisting of 21 species (12 native, 9 introduced) and seven families. Fathead minnow (*Pimephales promelas*) were the most abundant (*n* = 5,087 – 29%) of fish captured and had the highest distribution (44 sites – 79%). Eastern brook trout (Salvelinus fontinalis) were the most abundant of non-native species observed (*n* = 316, 2%), while spottail shiners (*Notropis hudsonius*) had the highest distribution (7 sites, 13%). Indian Creek and Castner Coulee had the greatest fish diversity with 10 species observed at each. Northern redbelly dace x finescale dace (*Phoxinus eos* x *P. neogaeus*) hybrids were observed at 13 (23%) of the sites sampled. Analysis of water quality ranges in which fish were observed showed a temperature range of 4.2-28.7˚C, a pH range of 7.37-10.12, a conductivity range of 290-4,080µS, a turbidity range of 6.9-147 NTU, and a dissolved oxygen range of 17-140.8% concentration and 1.51-16.24 mg/L. Eleven species of reptiles and amphibians comprised of six families were observed while at or in transit to survey sites. Northern leopard frogs (*Rana pipiens*) had the highest distribution (10 sites) and abundance (*n* = 480) of amphibians encountered. Western rattlesnakes (*Crotalus viridis*) had the highest abundance (*n* = 14) and distribution (14 sites) of reptiles observed. In addition to performing prairie stream surveys, larval fish sampling, electrofishing, and netting surveys were conducted on the lower Musselshell River. Larval fish sampling occurred weekly from April 18, 2006 to July 6, 2006 on the lower Musselshell River at river mile 74.2 (Mosby) and 25.4 (Harris Ranch). Electrofishing surveys were performed on April 20, 2006 and May 3, 2006 from river mile 84.5 to 75.2 (9.3 miles), and drift and trap netting occurred on May 1 and 3, and June 19, 2006 at river mile 25.4, 74.2, 74.3, and 75.5. Results of the lower Musselshell River sampling will be presented in a future report.

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INTRODUCTION

A survey of 143 sites comprised of 136 Region 4 streams (Figure 1 and Appendix A) was conducted between May 16 and October 10, 2006. This survey was performed as part of a Montana prairie stream inventory to document the occurrence and distribution of fish, amphibian, and reptile species in the prairie streams of Regions 4, 5, 6, and 7. This was the first time that the majority of streams had been sampled for fish. Water quality assessments were conducted at most survey sites. Observations of reptiles and amphibians at survey sites or while in transit were also documented.

METHODS

Site Location and Sampling –

Steve Carson, Programmer/Analyst for Montana Fish Wildlife and Parks (MFWP), performed random survey site generation. Random sites were selected based on stream length, 4th Code Hydrologic Unit (HUC), and lack of previous sampling. A latitude and longitude coordinate in decimal degree units was associated with each random survey site. Appendix B outlines complete random site generation procedures. A primary and alternate site was generated for each survey stream. Sites were prioritized based upon total stream length with emphasis on sampling streams greater than 10 miles in length. If access was denied at the primary site an attempt was made at the alternate location. If neither site could be accessed, then the nearest public land or area where landowner permission was granted was sampled. If a site was dry, an attempt was made to locate a wetted portion of stream within a one-mile radius of both the primary and alternate sites as described in Dr. Bob Bramblett's protocol (Appendix C). MFWP fishery staff selected additional survey sites based on prior sampling, interest in updated results, and management needs. Individual survey sites were located using a Garmin *e*Trex VISTA global positioning system (GPS) unit in conjunction with Bureau of Land Management (BLM) maps, and topographic maps (DeLorme 2001). Once accessible sites were located, layouts of a 300-meter sample reach were performed using methods described by Bramblett (Appendix C), in addition to sampling the most wetted portion. Sites were classified as dry, interrupted standing pools, continuous standing water, or water flowing. GPS decimal degree coordinates and photographs were taken at each sample site.

Fish Survey –

Sites were sampled using seines, dip nets, or a backpack electrofishing unit. Seines used included: 6' x 20', 4' x 15', 6' x 30' with a 6' x 6' x 6' bag, and 4' x 12' with a 4' x 4' x 4' bag. Mesh size and type on all seines was ¼" heavy delta, except for the 4' x 12' bag seine which was 3/16" mesh. Seine size and use of block nets was determined by stream morphology. A two-person crew executed seine hauls by applying Bramblett's protocols (Appendix C). Captured fish were sorted into buckets of like species. Bramblett's protocol (Appendix C) was used in processing captured fish. Fish were anesthetized using tricaine methyl sulfonate (MS-222) and identified. Help in field identification of fish was accomplished using Holton and Johnson (2003) and a looking glass. If numbers allowed, total lengths in millimeters (mm) were recorded on at least 20 of each species,

and typically a minimum of five individuals were preserved in a 10% Formalin solution for proper identification confirmation at a later date. If possible, minimums of 20 specimens were vouchered from the genus *Hybognathus.* Up to 60 specimens of *Phoxinus* spp. per observation site were retained with emphasis on vouchering larger fish (> 60mm) for identification of hybrids. Fish data was recorded on "Rite in the Rain" data sheets (Appendix D). Fish that were not measured or preserved were counted and released. Identification validation of vouchered specimens was done at a later date, and if errors occurred, number totals were adjusted by extrapolation on a percentage basis. Northern redbelly dace X finescale dace (*Phoxinus eos* x *P. neogaeus*) hybrids were identified through pharyngeal teeth counts and observing the structure of the intestine.

Amphibian and Reptile Survey –

All amphibian and reptile sightings at survey sites or while in transit were recorded. Reichel and Flath (1995) and Werner et al. (2004) were used for species identification. Date, species, number of adults or larvae observed, location description including county, and GPS coordinates were documented.

Water Quality Survey –

Water turbidity data was taken using a LaMotte 2020 Turbidimeter and reported as nephelometric turbidity units (NTU). Water temperature (° C), conductivity (µS), and pH data was collected using a waterproof Oakton Portable pH/CON 10 Meter. Conductivity measurements were compensated to 25° C. Dissolved oxygen content was measured using a YSI 55 Dissolved Oxygen meter.

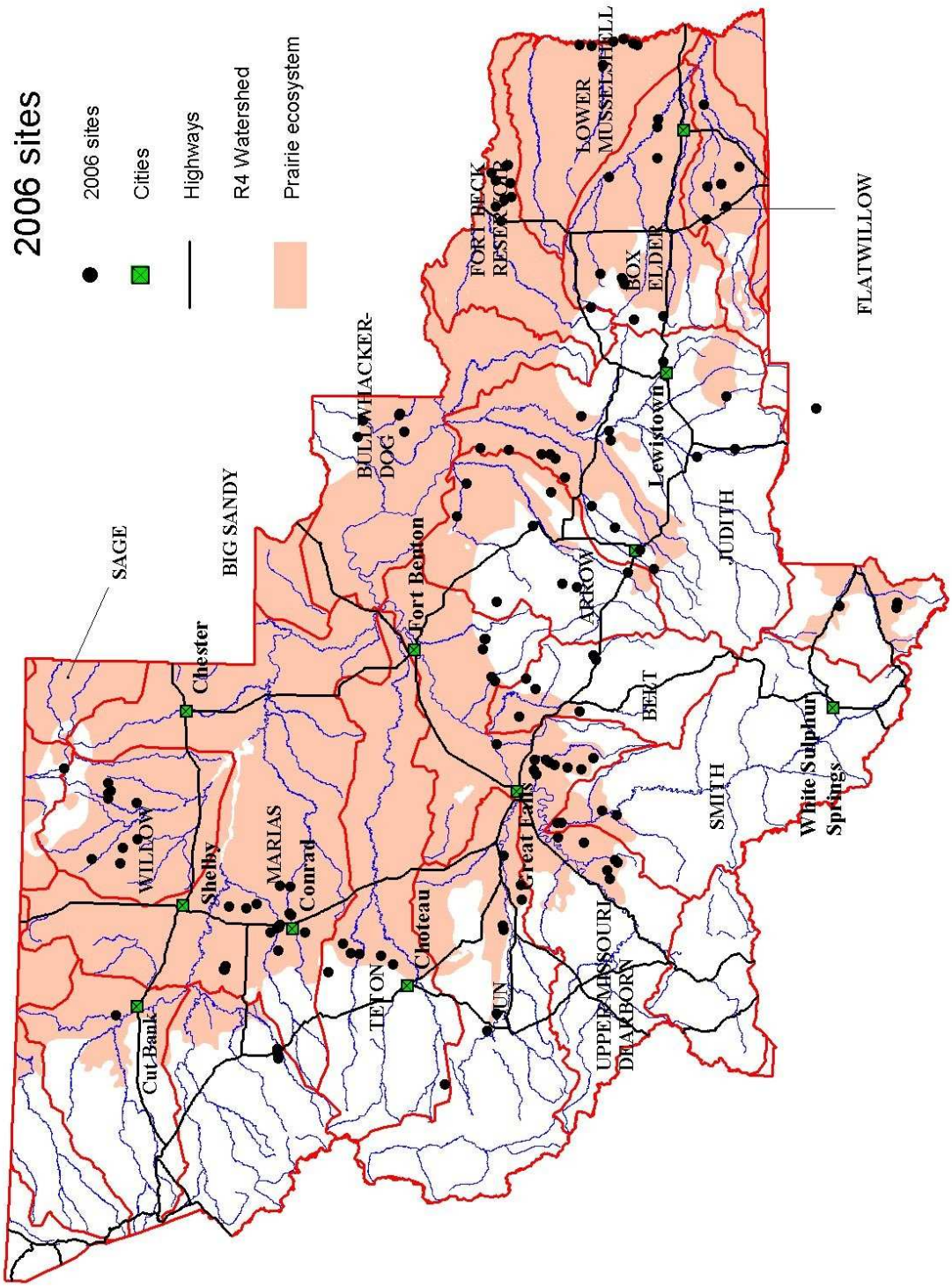

Figure 1. Sites sampled during Region 4 prairie stream surveys, May – October 2006.

RESULTS

Site Surveys -
One hundred and forty-three sites comprised of 136 Region 4 streams were sampled. One hundred and thirty sites were randomly selected, and MFWP fisheries staff selected the remaining 13. One hundred and thirteen survey sites were located on private lands and 30 were on public lands (16-state, 12-BLM, 1-USDA National Forest, and 1-USFWS). Seventy-seven (54%) of the sites had water present and 66 (46%) of the sites were dry (Figure 2). Of the wetted sites five (7%) had continuous standing water, 55 (71%) had flowing water, and 17 (22%) had interrupted standing pools (Figure 2). Fish were observed at 56 (73%) of the wetted sites sampled. All streams in three HUCS were dry (Figure 3).

Fish Surveys -
A total of 17,669 fish were collected from 56 survey sites, consisting of 21 species (12 native, 9 introduced) and seven families (Table 1). Fathead minnows (*Pimephales promelas*) were the most abundant (*n* = 5,087 – 29%) fish captured and had the highest distribution (44 sites – 79%) as seen in Table 1. Eastern brook trout (*Salvelinus fontinalis*) were the most abundant of non-native species observed (*n* = 316, 2%), while spottail shiners (*Notropis hudsonius*) had the highest distribution (7 sites, 13%) (Table 1). Indian Creek and Castner Coulee had the greatest fish diversity with 10 species observed at each (Table 2 & Figure 4). Golden shiners (*Notemigonus crysoleucas*) were observed at Castner Coulee (Table2), which was the first time that they have been captured while performing region 4 prairie stream surveys. Northern redbelly dace x finescale dace hybrids were observed at 13 sites within 6 HUCS (Upper Missouri-Dearborn, Sun, Two Medicine, Teton, Judith, and Box Elder), which has increased their documented range in Montana. Percent fish species composition observed by site can be seen in Appendix E.

Amphibian and Reptile Surveys -
Eleven species of reptiles and amphibians comprised of six families were observed while at or in transit to survey sites (Table 3 & Appendix F). Northern leopard frogs (*Rana pipiens*) had the highest distribution (10 sites) and abundance (*n* = 480) of amphibians encountered. Western rattlesnakes (*Crotalus viridis*) had the highest abundance (*n* = 14) and distribution (14 sites) of reptiles observed (Table 3). Herpetofauna observed at prairie stream sample sites is presented in Table 4.

Water Quality Surveys -
Analysis of water quality ranges in which fish were observed showed a temperature range of 4.2-28.7˚C, a pH range of 7.37-10.12, a conductivity range of 290-4,080µS, a turbidity range of 6.9-147 NTU, and a dissolved oxygen range of 17-140.8% concentration (Table 5). Measured water temperature ranged from 4.2°C to 30.9°C, with a mean of 16.6°C. Measured pH ranged from 7.15 to 10.12, with a mean of 8.22. Measured water conductivities ranged from 290µS to 8,100µS, with a mean of 1,382µS. Measured turbidity ranged from 6.9 NTU to >1,100 NTU, with a mean of 23.7 NTU. Dissolved oxygen concentrations ranged from 17 to 185%, with a mean of 82.7% and 1.51 to 16.24 mg/L with a mean of 8.05 mg/L (Table 6).

Major Observations by HUC

10030102 – Upper Missouri-Dearborn River

Twenty-one sites were sampled, including: Allen Creek, Antelope Coulee, Big Sag, Big Sag Creek, Blaine Creek, Box Elder Creek, Brown Coulee, Castner Coulee, Cherry Coulee, Dutchman Coulee, Geyser Creek, Giffen Coulee, Goon Coulee, Huff Creek, Indian Coulee, Keaster Creek, Mining Coulee, Number Five Coulee, Sand Coulee, Sand Coulee Creek, and Walker Coulee. Six sites had flowing water, two had interrupted standing pools, one had continuous standing water, and 12 sites were dry (Table 6, Figure 3). Castner Coulee had ten fish species present (Figure 4) and tied with Indian Creek (Judith HUC) for the highest fish species richness of MFWP Region 4 streams sampled in 2006. Golden shiners were observed at Castner Coulee (Table 2), which was the first time that they have been captured while performing region 4 prairie stream surveys. Northern redbelly dace X finescale dace hybrids were observed at both Castner Coulee and Keaster Creek. The hybrid dace are a Montana native species of special concern (Holton and Johnson 2003).

A significant fish passage barrier was identified on Box Elder Creek. Sampling occurred both above and below the 5-meter waterfall located 135 m upstream from its mouth with the Missouri River. Longnose dace (*Rhinichthys cataractae*) and mottled sculpin (*Cottus bairdi*) were the only fish species observed above the barrier while eight fish species were observed between the confluence and waterfall (Table 2, Figure 4).

Four species of fish were observed at Blaine Creek, three species of fish were observed at Huff Creek and eight species of fish were observed at Keaster Creek (Table 2).

Five paedomorphic tiger salamander (*Ambystoma tigrinum*) larvae of were observed at Cherry Coulee and an eastern racer (*Coluber constrictor*), two gopher snakes (*Pituophis catenifer*), one terrestrial garter snake (*Thamnophis elegans*), and three western rattlesnakes were observed while in transit within this HUC (Table 4, Appendix F).

10030103 – Smith River

Four sites sampled were Cannonball Coulee, Clark Creek, Lord Coulee, and Murphy Coulee. Two sites had water flowing, while the remaining two were dry (Table 6, Figure 3). Cannonball Coulee had fathead minnows present while Clark Creek only produced longnose dace and white suckers (*Catostomus commersoni*) (Table 2).

One gopher snake and two western rattlesnakes were observed while in transit within this HUC (Appendix F).

10030104 – Sun River

Seven sites were sampled, including: Adobe Creek, Big Coulee, Blackfoot Coulee, Clemons Coulee, Cutting Shed Coulee, and Fourmile Creek. Five sites had flowing

water and two sites were dry (Table 6, Figure 3). Flows at lower Adobe Creek, Big Coulee, Blackfoot Coulee, and Cutting Shed Coulee appeared to be augmented with irrigation wastewater.

Lower Adobe Creek had nine fish species present, Big Coulee had seven fish species present, Blackfoot Coulee had nine fish species present, and Cutting Shed Coulee had three fish species present (Table 2, Figure 4). Northern redbelly dace X finescale dace were observed at both lower Adobe Creek and Blackfoot Coulee.

10030105 – Belt Creek

Six sites were sampled, including: Big Willow Creek, Neil Creek, North Willow Creek, Red Coulee, and Williams Creek. Five sites had flowing water and one site was dry (Table 6, Figure 3). Big Willow Creek had six fish species present, North Willow Creek had one fish species present, and Williams Creek had eight fish species present (Table 2, Figure 4).

Six tiger salamander larvae were observed at Red Coulee and one terrestrial garter snake was witnessed at Williams Creek (Table 4). One eastern racer and one western rattlesnake were observed while in transit within this HUC (Appendix F).

10030201 – Two Medicine River

Repeat sampling of Sheep Creek and an oxbow pond (initially sampled in 2005) were the only sites to be sampled in this HUC during MFWP Region 4 2006 prairie stream surveys. Sheep Creek was flowing at both sites sampled and the oxbow pond contained continuous standing water (Table 6). The repeat sampling of Sheep Creek was performed amid expectation of documenting the presence of northern redbelly dace X finescale dace hybrids, but none were observed. Only four fish species were observed in Sheep Creek in 2006, whereas eight species of fish were observed in 2005 (Tabor 2005). Sampling on the oxbow pond produced results similar to 2005, with northern redbelly dace X finescale dace hybrids and fathead minnows being present (Tabor 2005). Northern leopard frogs were observed at Sheep Creek in both 2005 and 2006.

10030202 – Cut Bank Creek

Big Rock Coulee was the single stream sampled in this drainage in 2006. Big Rock Coulee was flowing. Sampling was performed to confirm presence of fish both below and above an existing dilapidated weir. The landowner currently is requesting permits and grants to rebuild the weir and reestablish a wetland upon this property. Though it seems the existing weir would create a fish passage barrier, seven species of fish were observed below the weir and six species of fish were captured above it (Table 2, Figure 4). Fish species present both above and below the weir included: brassy minnows (*Hybognathus hankinsoni*), brook stickleback (*Culaea inconstans*), fathead minnows, lake chubs (*Couesius plumbeus*), longnose dace, and white suckers. Longnose suckers

(*Catostomus catostomus*) were only observed below the existing weir, but further sampling may be needed to substantiate their presence in upstream reaches.

10030203 – Marias River

Seventeen sites were sampled, including: Big Flat Coulee, Bullhead Creek, Dry Fork Marias River, an unnamed tributary to the Dry Fork Marias River, Favot Coulee, Little Flat Coulee, Oliver Coulee, Pearson Coulee, Pondera Coulee, Railroad Coulee, Ringwald Coulee, School Section Coulee, Spring Creek, Swift Coulee, and Winginaw Coulee. Eleven sites had flowing water, three had interrupted standing pools, and three were dry (Table 6, Figure 3).

Two sites each were sampled on the Dry Fork of the Marias River and an unnamed tributary to the Dry Fork of the Marias River. Sampling was performed to assist the Montana Department of Environmental Quality (MTDEQ) in stream reclassification and permitting. Seven species of fish were observed at both sites on the Dry Fork of the Marias River. Three fish species were identified at the upper site on the unnamed tributary and only brook stickleback were observed at the lower site of the unnamed tributary (Table 2).

Big Flat Coulee had six species of fish; Bullhead Creek had nine species of fish present; Ringwald Coulee had six species of fish present; Winginaw Coulee had eight species of fish present; and, sampling at Little Flat Coulee, School Section Coulee and Spring Creek only produced brook stickleback (Table 2, Figure 4).

Pondera Coulee had five species of fish present, including brook stickleback, fathead minnows, lake chubs, spottail shiners and white suckers (Table 2). Prior sampling at Pondera Coulee was conducted by Tabor (2004) where the eight fish species observed included brassy minnows, brook stickleback, common carp (*Cyprinus carpio*), fathead minnows, longnose suckers, white suckers, and yellow perch (*Perca flavescens*). Differences in species observations among years may well be attributed to seasonal and longitudinal sampling site discrepancies.

One common garter snake (*Thamnophis sirtalis*), eight northern leopard frogs, one plains garter snake (*Thamnophis radix*), and one terrestrial garter snake were observed while in transit within this HUC (Appendix F).

10030204 – Willow Creek

Nine sites were observed, including: Alkali Coulee, Black Coulee, Cavitt Coulee, Elmer Coulee, Fernell Coulee, Johannson Coulee, Price Coulee, Steep Coulee, and Taylor Coulee. All sites sampled were dry (Table 6, Figure 3). No fish or herpetofauna were observed within this HUC in 2006.

10030205 – Teton River

Seven sites were sampled, including: Blindhorse Creek, Brady Canal, Farmers Coulee, Gamble Coulee, Kropp Coulee, Maucki Coulee, and Spring Coulee. Four sites had flowing water and three contained interrupted standing pools of water (Table 6, Figure 3).

Blindhorse Creek had eight species of fish present including northern redbelly dace X finescale dace hybrids (Table 2, Figure 4). A terrestrial and two common garter snakes were also observed at this site (Table 4).

Brady Canal had four fish species present; Farmers Coulee had two fish species present; Gamble Coulee had six fish species present; and Spring Coulee had seven fish species present (Table 2, Figure 4). Northern redbelly dace X finescale dace hybrids were observed at both Gamble Coulee and Spring Coulee.

A boreal chorus frog (*Pseudacris maculata*) was captured at Farmers Coulee and two tiger salamanders were observed at Maucki Coulee (Table 4). A plains garter snake, a terrestrial garter snake and three tiger salamanders were observed while in transit within this HUC (Appendix F).

10040101 – Bullwhacker-Dog Creeks

Five sites were sampled, including: Birch Creek, Kings Coulee, Little Birch Creek, and Sand Creek. Two sites had water flowing, one site had interrupted standing pools of water and two sites were dry (Table 6, Figure 3).

Birch Creek was sampled at two locations. The upper Birch Creek site (region 6) had six species of fish present (Table 2, Figure 4). The lower sample site, near its confluence with Sand Creek appeared to be ephemeral runoff. Fish were absent in both Sand Creek and Birch Creek in this area and turbidity measurements exceeded 1,100 NTU (Table 6).

One eastern racer and one western rattlesnake were observed while in transit within this HUC (Appendix F).

10040102 – Arrow Creek

Eight sites were sampled, including: Braun Creek, Cowboy Creek, Davis Creek, Flat Creek, Lepleys Creek, Possum Run Creek, Sun Creek, and Tom Dale Coulee. Two sites had flowing water, one site had interrupted standing pools of water and five sites were dry (Table 6, Figure 3).

Three species of fish (2-*Cyprinidae* and 1-*Catostomidae*) were captured while sampling Davis Creek, though numerous eastern brook trout were observed (but not sampled) several miles upstream at a culvert crossing the county road. Four species of fish were observed in Possum Run Coulee (Table 2, Figure 4).

One western rattlesnake was observed while in transit within this HUC (Appendix F).

10040103 – Judith River

Seventeen sites were sampled, including: Boyd Creek, Buffalo Creek, Campbell Coulee, Coal Mine Coulee, Coyote Creek, Falls Coulee, Hamilton Coulee, Indian Creek, Mossey Coulee, Mutton Coulee, Rock Creek, Ross Fork Creek, Scotchman Coulee, Skull Creek, and Smith Creek. Seven sites had flowing water, four sites had interrupted standing pools of water and six sites were dry (Table 6, Figure 3).

Boyd Creek had 2 fish species present; Buffalo Creek had eight fish species present; Coyote Creek had five fish species present; Hamilton Coulee had three fish species present; Rock Creek had three fish species present; Ross Fork Creek had eight fish species present; and, Smith Creek had two fish species present (Table 2, Figure 4). Indian Creek had ten fish species present (Figure 4) and tied with Castner Coulee (Upper Missouri-Dearborn HUC) for the highest fish species richness of MFWP Region 4 streams sampled in 2006 (Figure4). Northern redbelly dace X finescale dace hybrids were collected at Buffalo Creek, Coyote Creek, Hamilton Coulee, and Ross Fork Creek. A two-pass electrofishing depletion estimate was performed on Rock Creek where brook trout, rainbow trout (*Oncorhynchus mykiss*), and mottled sculpin were observed (Table 2) and the results will be presented in Tews et al (in preparation).

Three northern leopard frogs were observed at Buffalo Creek, 13 at Hamilton Coulee, 16 at Indian Creek, and greater than 150 at Mutton Coulee. Fifteen tiger salamanders were observed at Mutton Coulee, and one common garter snake and one terrestrial garter snake were witnessed at Rock Creek (Table 4). A boreal chorus frog, two eastern racers, a northern leopard frog, a plains garter snake, two terrestrial garter snakes, and two western rattlesnakes were observed while in transit within this HUC (Appendix F).

10040104 – Fort Peck Reservoir

Ten sites were sampled, including: Badland Creek, Downer Coulee, Fritzner Coulee, Haines Coulee, King Coulee, Musselman Coulee, Phillips Coulee, Roach Gulch, Sandstrom Coulee, and Tomty Coulee. All ten sites sampled were dry (Table 6, Figure 3). No fish or herpetofauna were observed within this HUC in 2006.

10040201 – Upper Musselshell River

Three sites were sampled, including: Cooper Creek, Hereim Creek, and Muddy Creek. All three sites sampled had water flowing (Table 6, Figure 3). Muddy Creek was the only stream in this HUC sampled where fish were found. Though sparse, five eastern brook trout and 12 mottled sculpin were collected here (Table 2). No reptiles or amphibians were observed within this HUC.

10040202 – Middle Musselshell River

Galloway Creek was the only site to be sampled in this HUC in 2006. It was barely flowing (Table 6, Figure 3) and no ichthyofauna or herpetofauna were observed.

10040203 – Flatwillow Creek

Six sites were sampled, including: Bender Creek, Butler Coulee, the Petrolia Reservoir overflow canal to Flatwillow Creek, Kinnick Coulee, North Fork Yellow Water Creek, and Pike Creek. One site had flowing water, three had interrupted standing pools of water and two sites were dry (Table 6, Figure 3).

The Petrolia Reservoir overflow canal to Flatwillow Creek was sampled directly below Petrolia Reservoir. Fathead minnows were captured in seine hauls whereas larger fish were observed in the pool directly below the spillway but avoided capture. These were likely walleye (*Zander vitreum*) due to their shape and the lack of forage fish in the sampled section.

Sampling in Pike Creek produced results similar to Frank and Tews (2004), where fathead minnows were the only fish species observed here (Table 2). Four boreal chorus frogs and 273 northern leopard frogs were observed while seining Pike Creek (Table 4).

One common garter snake and one gopher snake where observed while in transit within this HUC (Appendix F).

10040204 – Box Elder Creek

Ten sites were sampled, including: Akins Coulee, Christ Creek, Dry Creek, Edwards Creek, Feldt Coulee, Log Gulch, Lone Tree Gulch, Maiden Creek, Parr Creek, and South Fork Bear Creek. Two sites had flowing water, three sites had continuous standing water and five sites were dry (Table 6, Figure 3).

Fathead minnows were observed at Akins Coulee. Akins Coulee was impounded immediately upstream from its confluence with Box Elder Creek. No outlet was observed and the streambed below the barrier appeared to have lacked connectivity with Box Elder Creek for several years.

Northern redbelly dace, fathead minnows and northern redbelly dace X finescale dace hybrids were captured at Log Gulch, which is impounded and flows perennially (conversation with landowner). Discharge water flows from the outlet and is dispensed through flood irrigation. No subsequent channel exists and the stream appears to lack connectivity to Little Box Elder. This site should possibly be considered a candidate for future fisheries and habitat restoration based upon the presence of a species of concern.

Two species of fish were collected at South Fork Bear Creek (Table 2).

One tiger salamander was observed at Akins Coulee, four northern leopard frogs were observed at Log Gulch, and two and five boreal chorus frogs were observed respectively at Maiden Creek and South Fork Bear Creek (Table 4). Four gopher snakes were observed while in transit within this HUC (Appendix F.)

10040205 – Lower Musselshell River

Seven sites were sampled, including: Biggett Coulee, Camelbratten Coulee, Deep Coulee, Dovetail Creek, Gibbs Coulee, Haley Coulee, and Raundal Coulee. All sites sampled were dry (Table 6, Figure 3).

Three eastern racers, one great plains toad, one western hog-nose snake and one western rattlesnake were observed while in transit within this HUC (Appendix F).

10050002 – Upper Milk River

Breed Creek was the only stream sampled in this HUC in 2006. Breed Creek had flowing water present and was sampled at the 4-H Campground. The fish species observed consisted of eastern brook trout, lake chubs, longnose dace, mountain suckers (*Moxostoma macrolepidotum*), and white suckers. Sampling efforts in 2003 at river mile 14.6 produced brassy minnows, fathead minnows, Iowa darters (*Etheostoma exile*), lake chubs, longnose dace, mountain suckers, and white suckers (Frank and Tews 2004). Divergence amid species observed between years can be attributed to longitudinal sample site variation.

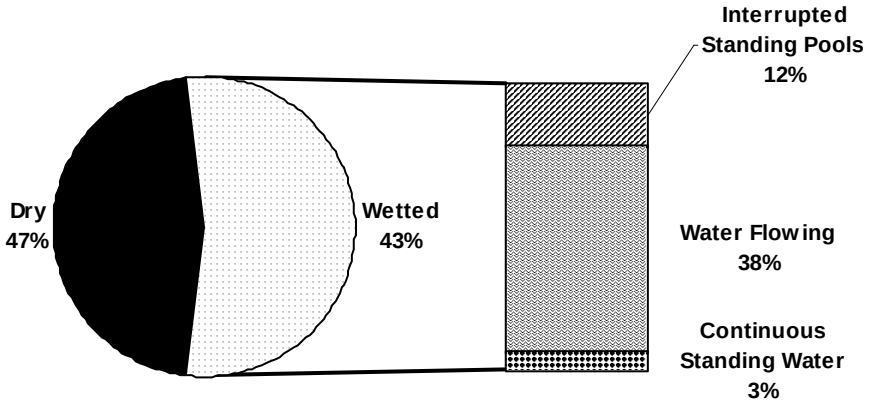

Figure 2. Percent water types observed in Region 4 prairie stream surveys, May - October 2006.

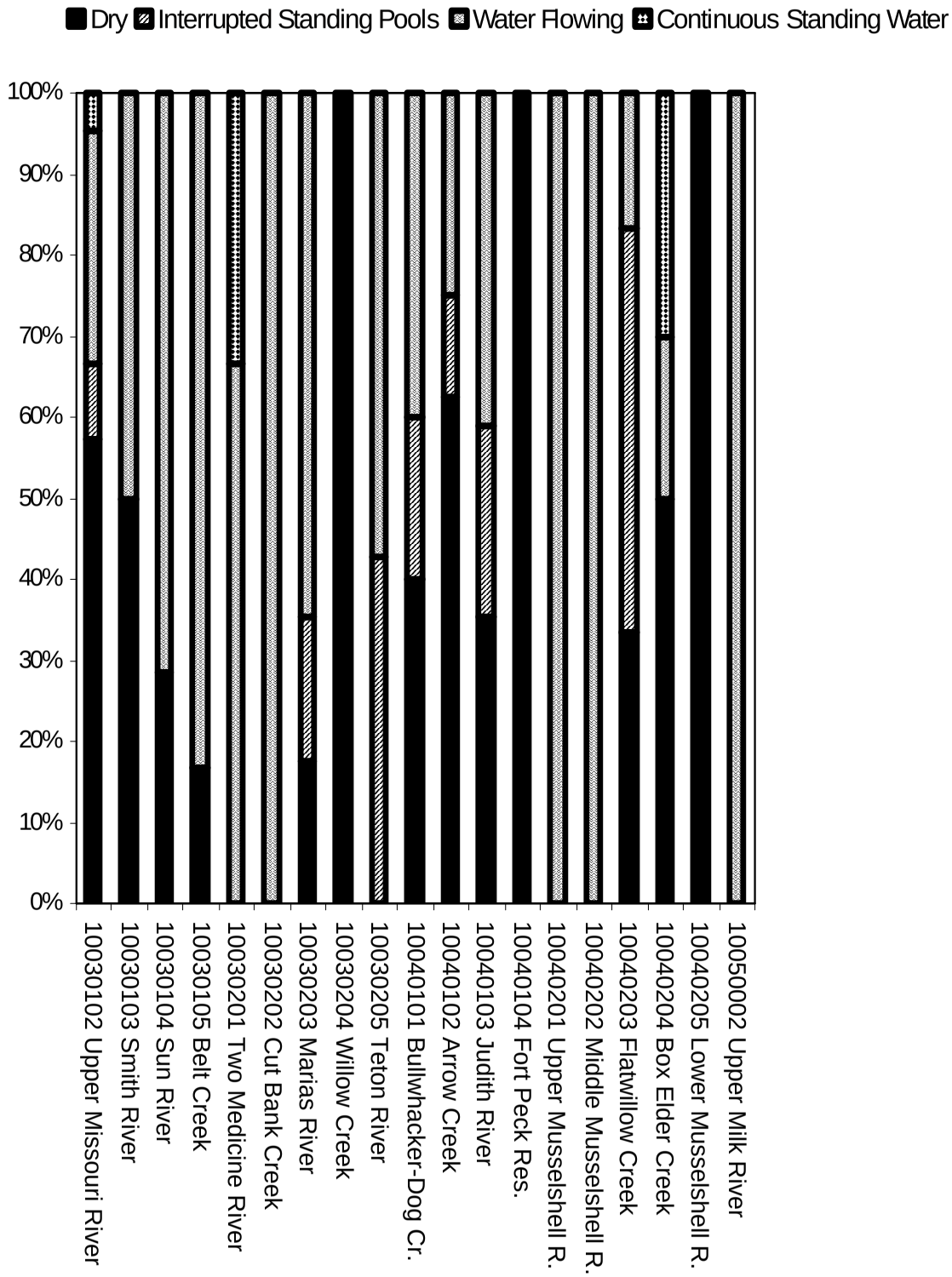

Figure 3. Water types observed by HUC during Region 4 prairie stream surveys, May - October 2006.

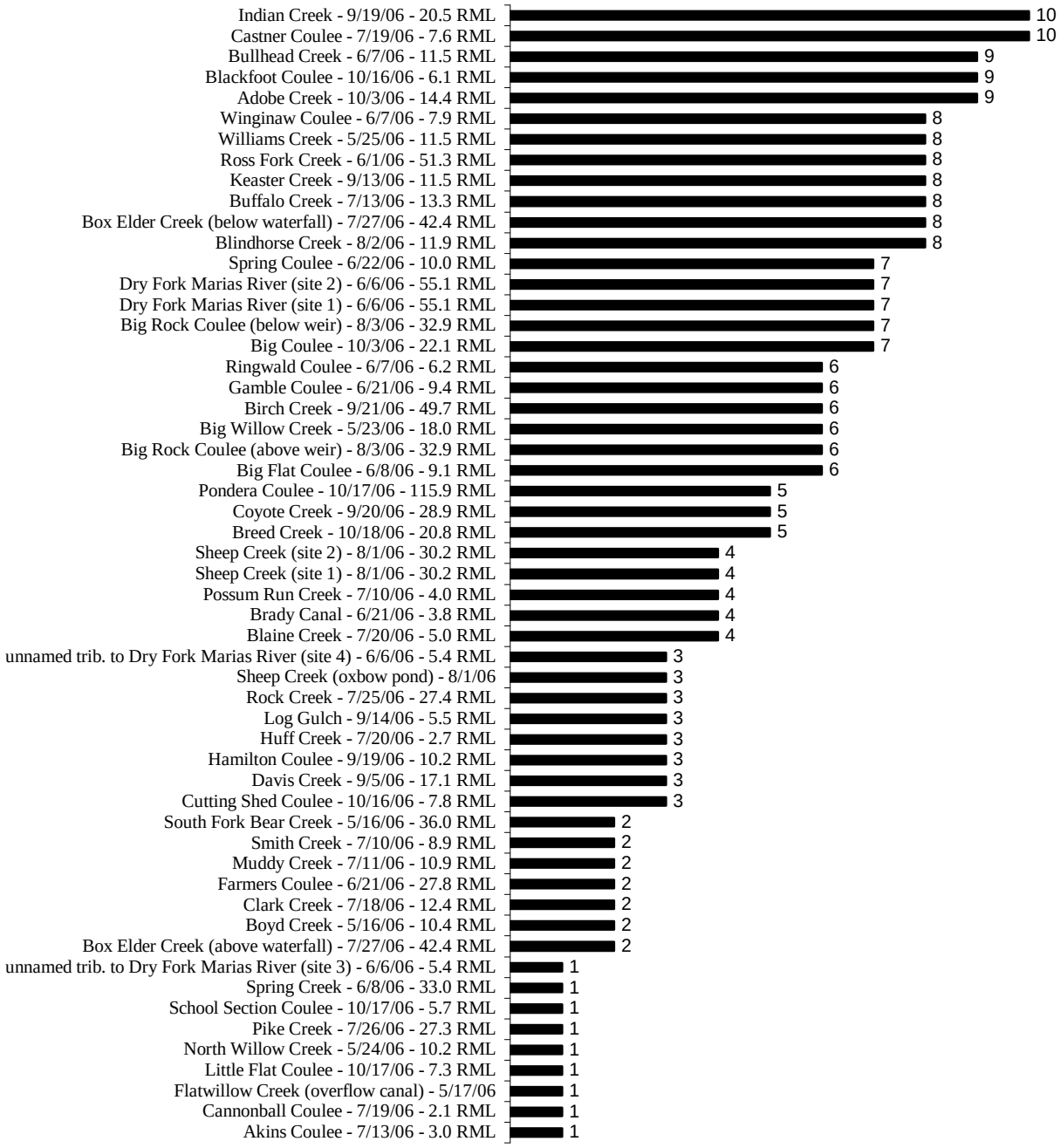

Figure 4. Number of fish species observed at Region 4 prairie stream sites, May – October 2006.

DISCUSSION AND RECOMMENDATIONS

A two-person crew performed the fieldwork in 2006. Two people proved to be sufficient for sampling the majority of the prairie streams. The 4' x 12' bag seine was the most useful and efficient means for sampling fish since it spanned most prairie stream widths and water depths. Additionally, the bag facilitated efficient fish capture during hauls. A battery operated Smith-Root backpack electrofishing unit was useful for sampling streams where water velocity, substrate size, vegetation and debris would hinder efficient seining.

This was the first time that surveys had been completed on the majority of these prairie streams. Therefore, limited information is available for site comparisons. Roughly 40% of all prairie streams and 73% of wetted streams sampled in 2006 supported fish populations. Only 43% of streams sampled were wetted. However, due to the ephemeral and intermittent nature of prairie streams the majority of streams sampled may well demonstrate characteristics of being dry, interrupted standing pools, continuous standing water, or be flowing at some point throughout a given year. In addition, the location of a single random sampling site on a prairie stream cannot sufficiently reflect its longitudinal or seasonal presence of water or fauna. Repeated sampling at the original survey sites or index areas in addition to longitudinal and seasonal surveys is recommended to more thoroughly evaluate and detect changes in the fish community over time.

Although at least 22 species of nonnative fish have been introduced into Region 4 waters, most prairie streams surveyed in 2006 were dominated by native species. Overall less than 3% of the 17,669 fish captured are introduced, and 86% of these individuals were non-native trout species. As a result of 2006 surveys, the formerly documented ranges of native species including brassy minnows, brook stickleback and northern redbelly dace X finescale dace hybrids were extended further westward in Region 4.

Because proper identification of the hybrid dace is time consuming and requires precision in extracting pharyngeal arches, accurate identification in the field is problematic. Effort was made during the 2006 surveys to voucher up to 60 of the largest *Phoxinus spp*. individuals from each site for examination in the laboratory at a later date where proper hybrid identification could be performed through pharyngeal teeth counts. In addition, attempts were made to voucher some of the largest *Phoxinus spp*. captured at a site. Not only were the larger fish easier to dissect, but also the hybrid dace are typically females in a family were female biased sexual size dimorphism exists. Thus, by retaining the larger specimens there seemed to be an increased likelihood of confirming the presence of hybrids in populations where *Phoxinus spp*. occur. Prior to the 2006 stream surveys there had been approximately 10 documented and verified waters containing northern redbelly dace X finescale dace hybrids in Region 4. Following 2006 surveys, northern redbelly dace X finescale hybrids were identified at an additional 12 sites in 5 HUCs and therefore have now been observed in 10 of the 21 HUCs within the region. Professional judgment would suggest high probability exists that the range of hybrid dace would fall within the majority of remaining HUCs because of past or present stream connectivity. Additional efforts should ensue to more thoroughly examine the distribution of *Phoxinus*

eos X *P. neogaeus* hybrids in Region 4 and Montana in addition to creating an updated status review. State ranking currently defines hybrid dace as a S3 species, which are potentially at risk because of limited and potentially declining numbers, extent and/or habitat, even though it may be abundant in some areas. Further inventory and review may define them as being a S4 species, which are defined as being uncommon but not rare (although it may be rare in parts of its range), and usually widespread. In addition, S4 species are apparently not vulnerable in most of its range, but there is possible cause for long-term concern.

Future efforts should include a biological evaluation and comprehensive inventory of 4th order prairie streams in Region 4, including water quality, seasonal and spatial distribution of prairie fishes. Though many 1st and 2nd order prairie streams have been sampled in recent years (Appendix G), many have been dry and/or fishless in the wake of several drought years. Professional judgment suggests that the 3rd and 4th order systems are important to harbor founding populations of native and aquatic species that potentially recolonize in the smaller tributaries during wet years.

Table 1. Fish species captured during Region 4 prairie stream surveys, May – October 2006.

Family	Species	Native or Introduced	Number Observed	Percent of Total Observed[1]	Number of Sites Where Observed	Percent of Sites Where Observed[1]
Sucker	**Catostomidae**					
white sucker	*Catostomus commersoni*	Native	2,514	14%	31	55%
mountain sucker	*Catostomus platyrhynchus*	Native	131	1%	5	9%
longnose sucker	*Catostomus catostomus*	Native	77	0%	9	16%
Minnow	**Cyprinidae**					
fathead minnow	*Pimephales promelas*	Native	5,087	29%	44	79%
lake chub	*Couesius plumbeus*	Native	2,837	16%	29	52%
northern redbelly dace	*Phoxinus eos*	Native	2,306	13%	19	34%
longnose dace	*Rhinichthys cataractae*	Native	2,041	12%	31	55%
brassy minnow	*Hybognathus hankinsoni*	Native	583	3%	19	34%
northern redbelly dace x finescale dace	*Phoxinus eos x P. neogaeus*	Native	455	3%	13	23%
spottail shiner	*Notropis hudsonius*	Introduced	27	0%	7	13%
common carp	*Cyprinus carpio*	Introduced	8	0%	3	5%
golden shiner	*Notemigonus crysoleucas*	Introduced	2	0%	1	2%
Trout	**Salmonidae**					
eastern brook trout	*Salvelinus fontinalis*	Introduced	316	2%	3	5%
rainbow trout	*Oncorhynchus mykiss*	Introduced	72	0%	5	9%
brown trout	*Salmo trutta*	Introduced	26	0%	4	7%
mountain whitefish	*Prosopium williamsoni*	Native	2	0%	2	4%
Stickleback	**Gasterosteidae**					
brook stickleback	*Culaea inconstans*	Native	1,056	6%	21	38%
Sunfish	**Centrarchidae**					
pumpkinseed	*Lepomis gibbosus*	Introduced	16	0%	1	2%
green sunfish	*Lepomis cyanellus*	Introduced	13	0%	1	2%
Perch	**Percidae**					
yellow perch	*Perca flavescens*	Introduced	2	0%	1	2%
Sculpin	**Cottidae**					
mottled sculpin	*Cottus bairdi*	Native	98	1%	7	13%
		Total	17,669			

[1] to nearest 1%

Table 2. Statistics of fish captured by HUC and site during Region 4 prairie stream surveys, May – October 2006.

HUC (Drainage)	Site Name / Date	Species	N	Total Length (mm) Min	Max	Mean
10030102 Upper Missouri-Dearborn	Blaine Creek 7/20/06	fathead minnow	314	41	65	53.8
		lake chub	434	58	136	92
		longnose dace	593	51	97	74.2
		white sucker	93	36	175	90.9
10030102 Upper Missouri-Dearborn	Box Elder Creek (above waterfall/barrier) 7/27/06	longnose dace	19	47	61	56.4
		mottled sculpin	3	53	53	53
10030102 Upper Missouri-Dearborn	Box Elder Creek (below waterfall/barrier) 7/27/06	brook stickleback	2	45	48	46.5
		brown trout	7	72	87	80.9
		fathead minnow	1	52	52	52
		longnose dace	20	32	77	49.1
		longnose sucker	11	35	55	48
		mottled sculpin	7	40	50	44.7
		rainbow trout	2	64	66	65
		white sucker	118	30	135	55.7
10030102 Upper Missouri-Dearborn	Castner Coulee 7/19/06	brassy minnow	5	67	73	68.6
		common carp	4	162	178	169.3
		fathead minnow	545	53	78	65.7
		golden shiner	2	69	69	69
		lake chub	12	54	93	77.2
		longnose dace	16	69	83	75
		longnose sucker	20	43	125	85.1
		northern redbelly dace X finescale dace	1	61	61	61
		pumpkinseed	16	53	73	63.7
		white sucker	107	44	150	94.8
10030102 Upper Missouri-Dearborn	Huff Creek 7/20/06	fathead minnow	64	54	67	62.2
		longnose dace	1	78	78	78
		northern redbelly dace	7	46	54	49.1
10030102 Upper Missouri-Dearborn	Keaster Creek 9/13/06	brassy minnow	85	62	79	72.6
		fathead minnow	190	55	74	63.7
		lake chub	329	34	107	76.8
		longnose dace	53	46	83	67.1
		mountain sucker	45	58	113	85.3
		northern redbelly dace	80	50	77	61.6
		northern redbelly dace X finescale dace	19	54	83	67.6
		white sucker	379	46	233	93.9
10030103 Smith	Cannonball Coulee 7/19/06	fathead minnow	348	18	62	25.9
10030103 Smith	Clark Creek 7/18/06	longnose dace	26	19	30	21.8
		white sucker	285	28	44	33.4

Table 2 – continued.

HUC (Drainage)	Site Name / Date	Species	N	Total Length (mm) Min	Max	Mean
10030104 Sun	Adobe Creek 10/3/06	brassy minnow	95	43	81	62.7
		brook stickleback	1	59	59	59
		fathead minnow	128	30	75	48.1
		lake chub	142	39	145	85.1
		longnose dace	21	38	52	43.7
		mountain sucker	30	37	60	51.1
		northern redbelly dace	132	26	69	44.9
		northern redbelly dace X finescale dace	36	62	74	65.5
		white sucker	109	49	131	75.5
10030104 Sun	Big Coulee 10/3/06	fathead minnow	17	31	65	45.6
		longnose dace	20	23	96	47.3
		mottled sculpin	2	69	103	86
		mountain whitefish	1	125	125	125
		northern redbelly dace	2	52	56	54
		rainbow trout	12	110	226	177.8
		white sucker	11	135	180	153
10030104 Sun	Blackfoot Coulee 10/16/06	brassy minnow	1	77	77	77
		fathead minnow	80	34	73	51.6
		lake chub	38	60	117	95.4
		longnose dace	75	43	78	66.6
		longnose sucker	1	106	106	106
		northern redbelly dace	29	33	77	55.9
		northern redbelly dace X finescale dace	15	58	83	66.6
		rainbow trout	2	156	200	178
		white sucker	1	149	149	149
10030104 Sun	Cutting Shed Coulee 10/16/06	brown trout	6	95	135	110.5
		mountain whitefish	1	116	116	116
		rainbow trout	39	68	308	173.4
10030105 Belt	Big Willow Creek 5/23/06	brassy minnow	4	69	72	70.5
		fathead minnow	36	46	72	59.7
		lake chub	104	51	151	88.4
		longnose dace	3	74	80	76.7
		northern redbelly dace	12	35	64	55.9
		white sucker	115	46	298	129
10030105 Belt	North Willow Creek 5/24/06	lake chub	15	51	134	86.8
10030105 Belt	Williams Creek (upper end) 5/25/06	brassy minnow	11	37	79	61.8
		fathead minnow	62	54	71	60.6
		lake chub	372	39	120	86.9
		longnose dace	47	32	72	48.1
		longnose sucker	28	49	300	70.4
		white sucker	117	38	230	99.3

Table 2 – continued.

HUC (Drainage)	Site Name / Date	Species	N	Total Length (mm) Min	Max	Mean
10030105 Belt	Williams Creek (lower end) 5/25/06	brown trout	10	130	430	258.2
		mottled sculpin	3	91	104	95.7
10030201 Two Medicine	Sheep Creek (1) 8/1/06	fathead minnow	30	29	63	51.5
		lake chub	314	33	120	58.1
		longnose dace	171	28	78	48.6
		white sucker	158	23	237	75
10030201 Two Medicine	Sheep Creek (2) 8/1/06	fathead minnow	5			
		lake chub	67			
		longnose dace	129			
		white sucker	69			
10030201 Two Medicine	Sheep Creek (oxbow pond) 8/1/06	fathead minnow	12	33	49	40.8
		northern redbelly dace	303	17	63	42.8
		northern redbelly dace X finescale dace	1	49	49	49
10030202 Cut Bank	Big Rock Coulee (below weir) 8/3/06	brassy minnow	32	58	84	71.2
		brook stickleback	26	33	60	45.5
		fathead minnow	62	42	69	56.5
		lake chub	56	26	111	85.6
		longnose dace	44	52	78	60.6
		longnose sucker	2	30	138	84
		white sucker	62	33	200	106.4
10030202 Cut Bank	Big Rock Coulee (above weir) 8/3/06	brassy minnow	36			
		brook stickleback	1			
		fathead minnow	1165			
		lake chub	6			
		longnose dace	1			
		white sucker	222			
10030203 Marias	Big Flat Coulee 6/8/06	brook stickleback	46	32	54	41.1
		fathead minnow	2	42	48	45
		lake chub	8	55	138	82.4
		longnose dace	5	35	66	48.8
		spottail shiner	2	44	65	54.5
		white sucker	3	65	74	69
10030203 Marias	Bullhead Creek 6/7/06	brassy minnow	11	37	74	54
		brook stickleback	18	37	59	49.1
		fathead minnow	37	34	77	56.9
		lake chub	55	47	120	69.3
		longnose dace	35	38	109	67
		longnose sucker	2	94	102	98
		northern redbelly dace	2	32	54	43
		spottail shiner	1	45	45	45
		white sucker	7	63	127	103.4

Table 2 – continued.

HUC (Drainage)	Site Name / Date	Species	N	Total Length (mm) Min	Max	Mean
10030203 Marias	Dry Fork Marias River (1) 6/6/06	brassy minnow	1			
		brook stickleback	148			
		fathead minnow	16			
		lake chub	59			
		longnose dace	124			
		spottail shiner	12			
		white sucker	36			
10030203 Marias	Dry Fork Marias River (2) 6/6/06	brassy minnow	40	39	74	55.4
		brook stickleback	124	42	67	51.2
		fathead minnow	39	36	71	45.5
		lake chub	108	58	125	78.1
		longnose dace	19	42	94	55.7
		spottail shiner	7	36	47	43
		white sucker	60	62	238	104.7
10030203 Marias	Unnamed tributary to Dry Fork Marias River (3) 6/6/06	brook stickleback	53	37	62	49.5
10030203 Marias	Unnamed tributary to Dry Fork Marias River (4) 6/6/06	brook stickleback	53	42	64	50.2
		fathead minnow	2	43	55	49
		white sucker	1	32	32	32
10030203 Marias	Little Flat Coulee 10/17/06	brook stickleback	154	33	67	52.7
10030203 Marias	Pondera Coulee 10/17/06	brook stickleback	144	46	68	56.9
		fathead minnow	155	38	86	58.1
		lake chub	10	60	117	83.9
		spottail shiner	3	68	77	71.7
		white sucker	14	73	193	96.4
10030203 Marias	Ringwald Coulee 6/7/06	fathead minnow	5	30	42	37.6
		lake chub	31	49	141	89.3
		longnose dace	42	37	95	75.3
		longnose sucker	1	103	103	103
		spottail shiner	1	69	69	69
		white sucker	26	62	258	137.5
10030203 Marias	School Section Coulee 10/17/06	brook stickleback	2	52	62	57
10030203 Marias	Spring Creek 6/8/06	brook stickleback	26	17	56	45.7

Table 2 – continued.

HUC (Drainage)	Site Name / Date	Species	N	Total Length (mm) Min	Max	Mean
10030203 Marias	Winginaw Coulee	brassy minnow	4	37	83	58.5
	6/7/06	brook stickleback	15	38	63	53
		fathead minnow	5	41	62	50.4
		lake chub	29	47	121	79.05
		longnose dace	2	60	70	65
		longnose sucker	1	110	110	110
		spottail shiner	1	49	49	49
		white sucker	3	76	135	115
10030205 Teton	Blindhorse Creek	brassy minnow	67	57	81	70.2
	8/2/06	brook stickleback	21	42	55	48.2
		fathead minnow	2	62	74	68
		lake chub	50	56	141	86.2
		longnose dace	2	65	71	68
		northern redbelly dace	871	36	72	52.5
		northern redbelly dace X finescale dace	325	54	67	59.7
		white sucker	41	82	187	126
10030205 Teton	Brady Canal	brook stickleback	66	18	49	37
	6/21/06	fathead minnow	2	24	44	34
		white sucker	18	22	162	47.8
		yellow perch	2	75	95	85
10030205 Teton	Farmers Coulee	brook stickleback	2	42	49	45.5
	6/21/06	fathead minnow	4	52	70	59.5
10030205 Teton	Gamble Coulee	brassy minnow	70	53	74	63.4
	6/21/06	brook stickleback	7	43	62	50.4
		fathead minnow	60	36	62	46.3
		longnose dace	5	43	72	56.4
		northern redbelly dace	116	40	64	53.2
		northern redbelly dace X finescale dace	7	59	61	60
10030205 Teton	Spring Coulee	brook stickleback	146	20	55	38.3
	6/22/06	fathead minnow	2	35	36	35.5
		lake chub	9	67	122	92.4
		longnose dace	26	51	89	71.3
		mountain sucker	1	113	113	113
		northern redbelly dace X finescale dace	1	59	59	59
10040101 Bullwhacker-Dog	Birch Creek	brassy minnow	3	69	78	72
	9/21/06	fathead minnow	3	30	51	41.7
		lake chub	1	86	86	86
		longnose dace	23	26	73	50.2
		mountain sucker	13	46	131	95.3
		white sucker	79	47	270	146.3

Table 2 – continued.

HUC (Drainage)	Site Name	Date	Species	N	Total Length (mm) Min	Max	Mean
10040102 Arrow	Davis Creek		fathead minnow	123	21	36	29.6
		9/5/06	lake chub	43	37	103	60.6
			white sucker	142	33	262	110.9
10040102 Arrow	Possum Run Coulee		brassy minnow	80	55	67	60.1
		7/10/06	fathead minnow	8	52	69	61.6
			lake chub	2	96	110	103
			northern redbelly dace	3	51	53	52
10040103 Judith	Boyd Creek		fathead minnow	5	43	60	50.6
		5/16/06	northern redbelly dace	4	44	53	48
10040103 Judith	Buffalo Creek		brassy minnow	1	61	61	61
		7/13/06	fathead minnow	12	38	69	54.4
			lake chub	252	47	158	80.1
			longnose dace	78	50	97	69.1
			mottled sculpin	1	110	110	110
			northern redbelly dace	131	42	81	59
			northern redbelly dace X finescale dace	3	58	58	58
			white sucker	104	86	265	143.8
10040103 Judith	Coyote Creek		fathead minnow	20	29	66	36.9
		9/20/06	lake chub	16	43	67	50.6
			longnose dace	20	36	49	41.6
			northern redbelly dace	160	26	43	31.5
			northern redbelly dace X finescale dace	24	72	72	72
10040103 Judith	Hamilton Coulee		fathead minnow	56	23	69	53.2
		9/19/06	northern redbelly dace	220	39	84	59.8
			northern redbelly dace X finescale dace	4	64	74	70.5
10040103 Judith	Indian Creek		brassy minnow	3	61	81	71.7
		9/19/06	brook stickleback	1	51	51	51
			brown trout	3	104	146	122
			common carp	1	98	98	98
			fathead minnow	9	27	59	41.8
			lake chub	41	59	95	73.2
			longnose dace	53	25	55	39.7
			longnose sucker	11	39	71	53.1
			northern redbelly dace	7	52	64	56
			white sucker	64	45	261	116.1
10040103 Judith	Rock Creek		eastern brook trout	236	70	295	133.7
		7/25/06	mottled sculpin	70	60	129	83.6
			rainbow trout	17	41	435	171.7

Table 2 – continued.

HUC (Drainage)	Site Name / Date	Species	N	Total Length (mm) Min	Max	Mean
10040103 Judith	Ross Fork Creek 6/1/06	brassy minnow	34	37	64	49.3
		common carp	3	93	119	107
		fathead minnow	18	28	63	45.3
		lake chub	148	57	122	80.2
		longnose dace	289	45	91	65.3
		northern redbelly dace	47	24	75	46.3
		northern redbelly dace X finescale dace	8	44	73	62.5
		white sucker	45	67	242	133.6
10040103 Judith	Smith Creek 7/10/06	fathead minnow	371	54	70	63.5
		northern redbelly dace	172	57	71	64.8
10040201 Upper Musselshell	Muddy Creek 7/11/06	eastern brook trout	5	175	290	230.8
		mottled sculpin	12	64	115	91.1
10040203 Flatwillow	Flatwillow Creek (Petrolia Res. overflow canal) 5/17/06	fathead minnow	19	26	50	35.6
10040203 Flatwillow	Pike Creek 7/26/06	fathead minnow	317	39	66	48.3
10040204 Box Elder	Akins Coulee 7/13/06	fathead minnow	67	29	36	33
10040204 Box Elder	Log Gulch 9/14/06	fathead minnow	432	24	64	47.9
		northern redbelly dace	8	35	42	38.9
		northern redbelly dace X finescale dace	2	47	49	48
10040204 Box Elder	South Fork Bear Creek 5/16/06	fathead minnow	237	43	61	53.9
		green sunfish	13	85	95	89.9
10050002 Upper Milk	Breed Creek 10/18/06	eastern brook trout	75	57	290	130
		lake chub	86	68	134	98.3
		longnose dace	79	42	68	55.4
		mountain sucker	42	72	168	114.2
		white sucker	17	52	248	123.5

Table 3. Reptiles and amphibians observed while conducting Region 4 prairie stream surveys, May – October 2006.

Family Common Name	Species	Number of Sites	Total Observed
Ambystomatidae (mole salamanders)			
tiger salamander	*Ambystoma tigrinum*	6	32
Bufonidae (true toads)			
great plains toad	*Bufo cognatus*	1	1
Hylidae (treefrogs)			
boreal chorus frog	*Pseudacris maculata*	5	13
Ranidae (true frogs)			
northern leopard frog	*Rana pipiens*	10	480
Colubridae (colubrids)			
common garter snake	*Thamnophis sirtalis*	4	5
gopher snake	*Pituophis catenifer*	8	8
plains garter snake	*Thamnophis radix*	3	3
eastern racer	*Coluber constrictor*	7	8
terrestrial garter snake	*Thamnophis elegans*	8	8
western hog-nose snake	*Heterodon nasicus*	1	1
Viperidae (vipers)			
western rattlesnake	*Crotalus viridis*	14	14

Table 4. Reptiles and amphibians observed by HUC and survey site during Region 4 prairie stream surveys, May - October 2006.

HUC (Drainage)	Site Name	Date	Species	Number of Adults	Number of Larvae
10030102 Upper Missouri -Dearborn	Cherry Coulee	7/20/06	tiger salamander		5
10030105 Belt	Red Coulee	5/24/06	tiger salamander		6
10030105 Belt	Williams Creek (upper end)	5/25/06	terrestrial garter snake	1	
10030201 Two Medicine	Sheep Creek (2)	8/1/06	northern leopard frog	12	
10030205 Teton	Blindhorse Creek	8/2/06	common garter snake terrestrial garter snake	2 1	
10030205 Teton	Farmers Coulee	6/21/06	boreal chorus frog	1	
10030205 Teton	Maucki Coulee	6/21/06	tiger salamander	1	1
10040103 Judith	Buffalo Creek	7/13/06	northern leopard frog	3	
10040103 Judith	Hamilton Coulee	9/19/06	northern leopard frog	13	
10040103 Judith	Indian Creek	9/19/06	northern leopard frog	16	
10040103 Judith	Mutton Coulee	7/10/06	northern leopard frog tiger salamander	150 15	
10040103 Judith	Rock Creek	7/25/06	common garter snake terrestrial garter snake	1 1	
10040203 Flatwillow	Pike Creek	7/26/06	boreal chorus frog northern leopard frog	4 223	 50
10040204 Box Elder	Log Gulch	9/14/06	northern leopard frog	4	
10040204 Box Elder	Maiden Creek	5/16/06	boreal chorus frog	1	1
10040204 Box Elder	South Fork Bear Creek	5/16/06	boreal chorus frog	5	

Table 5. Water quality and length statistics of fish species captured during Region 4 prairie stream surveys, May – October 2006.

				Ranges					
Species	**Number of Sites**	**N**	**Mean Total Length (mm)**	**Total Length (mm)**	**Water Temperature (˚C)**	**pH**	**Conductivity (µS)**	**Turbidity (NTU)**	**Dissolved Oxygen (%)**
brassy minnow	19	583	63.0	37 - 84	5.4 – 24.1	7.37 – 8.75	488 – 3,570	8.57 - 147	17 – 140.8
brook stickleback	21	1,056	46.1	17 - 68	4.2 – 24.6	7.4 – 9.16	359 – 4,080	6.9 – 45.2	19.7 – 127.0
brown trout	4	26	160.7	72 - 430	4.6 – 20.3	8.09 – 9.01	570 – 2,770	7.2 – 19.4	88 – 127.0
common carp	3	8	137.0	93 - 178	12.1 – 20.5	8.09 – 8.75	777 – 2,770	8.57 – 19.4	88 – 140.8
eastern brook trout	3	316	134.6	57 - 295	4.4 – 17.3	8.21 – 8.26	290 - 673	7.13 – 21.4	86.5 – 93.6
fathead minnow	44	5,087	49.7	18 - 86	5.3 – 28.7	7.37 – 10.12	341 – 4,080	7.2 – 147	17 – 140.8
golden shiner	1	2	69	69	20.5	8.75	777	8.57	128.2
green sunfish	1	13	89.9	85 - 95	28.7	8.6	1,957	92.1	
lake chub	29	2,837	80.9	26 - 158	4.4 – 24.1	7.37 – 8.75	359 – 3,570	8.57 - 147	17 – 140.8
longnose dace	31	2,041	56.7	19 - 109	4.4 – 25.7	7.37 – 8.81	446 – 3,570	7.2 - 147	57.3 – 140.8
longnose sucker	9	77	71.1	30 - 300	5.4 – 21.2	8.09- 8.81	606 – 3,570	7.2 - 75	57.3 – 128.2
mottled sculpin	7	98	81.5	40 - 129	14.5 – 20.3	8.21 – 8.81	290 – 1,626	7.13 – 36.4	75.9 – 127
mountain sucker	5	131	86.0	37 - 168	4.4 – 18.6	7.37 – 8.41	527 – 1,292	12 - 147	65 – 120.9
mountain whitefish	2	2	120.5	116 - 125	4.6 – 14.5	8.7 – 9.01	570 – 1,626	12 - 19	106.9 – 110.6
northern redbelly dace	19	2,306	52.3	17 - 84	5.4 – 24.1	7.49 – 9.28	341 – 3,160	7.2 - 75	17 – 140.8
northern redbelly dace X finescale dace	13	455	64.7	44 - 83	5.4 – 20.5	7.56 – 9.28	341 – 1,742	8.57 - 75	42 – 140.8
pumpkinseed	1	16	63.7	53 - 73	20.5	8.75	777	8.57	128.2
rainbow trout	5	72	170.9	41 - 435	4.6 – 20.3	8.23 – 9.01	570 – 1,626	7.13 - 75	93.6 – 127
spottail shiner	7	27	52.5	36 - 77	5.3 – 23.8	8.16 – 8.59	359 - 999	9.71 – 45.2	63 – 114.6
white sucker	31	2,514	104.4	22 - 298	4.4 – 25.7	7.37 – 9.16	359 – 3,570	7.2 - 147	35.2 – 140.8
yellow perch	1	2	85.0	75 - 95	17.2	9.16	823	12	122.3
Water Quality Ranges Where Fish Were Observed					4.2 – 28.7	7.37 – 10.12	290 – 4,080	6.9 - 147	17 – 140.8

Table 6. Water type and quality measurement data collected during Region 4 prairie stream surveys, May – October 2006.

Site		Water Type				Water Quality Measurements				
	Date	Dry	Water Flowing	Interrupted Standing Pools	Continuous Standing Water	Water Temperature (˚C)	Conductivity (µS)	pH	Turbidity (NTU)	Dissolved Oxygen (%)/(mg/L)
10030102 – Upper Missouri River-Dearborn										
Allen Creek	7/20/06	X								
Antelope Coulee	8/15/06	X								
Big Sag	9/5/06		X			15.1	811	8.25	29.7	81.7 / 8.46
Big Sag Creek	9/13/06	X								
Blaine Creek[1]	7/20/06		X			16.0	516	7.74	10.29	63.2 / 6.34
Box Elder Creek[1]	7/27/06		X			20.3	672	8.81	7.20	127.0 / 11.39
Brown Coulee	9/6/06	X								
Castner Coulee[1]	7/19/06		X			20.5	777	8.75	8.57	128.2 / 11.43
Cherry Coulee[2]	7/20/06				X	25.5	323	7.5	18.5	25.5 / 4.25
Dutchman Coulee	8/15/06	X								
Geyser Creek	7/19/06		X			16.3	788	7.91	15.8	65.7 / 6.63
Giffen Coulee	8/15/06	X								
Goon Coulee	8/15/06	X								
Huff Creek[1]	7/20/06			X		21.4	1,176	8.36	14.3	80.4 / 6.90
Indian Coulee	9/5/06		X			15.9	1,612	8.17	12.6	96.7 / 9.51
Keaster Creek[1]	9/13/06			X		18.6	570	7.66	33.9	65.0 / 6.57
Mining Coulee	8/15/06	X								
Number Five Coulee	8/15/06	X								
Sand Coulee	8/15/06	X								
Sand Coulee Creek	8/15/06	X								
Walker Coulee	8/15/06	X								

[1] Fish Present
[2] Amphibians Present
[3] Reptiles Present

Table 6 – continued.

Site	Date	Water Type				Water Quality Measurements				
		Dry	Water Flowing	Interrupted Standing Pools	Continuous Standing Water	Water Temperature (˚C)	Conductivity (µS)	pH	Turbidity (NTU)	Dissolved Oxygen (%)/(mg/L)
10030103 - Smith										
Cannonball Coulee[1]	7/19/06		X			16.8	625	8.44	7.77	84.3 / 8.19
Clark Creek[1]	7/18/06		X			25.7	446	8.63	7.42	78.7 / 6.05
Lord Coulee	7/19/06	X								
Murphy Coulee	7/18/06	X								
10030104 – Sun										
Adobe Creek site 1[1]	10/3/06		X			13.0	1,175	8.41	17.0	120.9/12.14
Adobe Creek site 2	10/3/06		X			11.0	1,121	7.86	13.6	58.7 / 6.48
Big Coulee[1]	10/3/06		X			14.5	1,626	8.70	19.0	110.6/11.27
Blackfoot Coulee[1]	10/16/06		X			5.4	1,267	8.73	75.0	100.7/12.67
Clemons Coulee	10/16/06	X								
Cutting Shed Coulee[1]	10/16/06		X			4.6	570	9.01	12.0	106.9/13.79
Fourmile Creek	10/3/06	X								
10030105 – Belt										
Big Willow Creek[1]	5/23/06		X			17.6	539	7.94	25.5	
Neil Creek	5/24/06	X								
North Willow Creek[1]	5/24/06		X			14.9	632	8.43	20.1	
Red Coulee[2]	5/24/06		X			17.0	3,100	8.15	10.4	
Williams Creek[1,3]	5/25/06		X			15.5	606	8.23	12.9	
10030201 – Two Medicine										
Sheep Creek[1,2]	8/1/06		X			15.8	486	8.23	20.4	60.8 / 6.00
Sheep Creek oxbow pond[1]	8/1/06				X	20.1	434	8.28	10.1	75.6 / 6.58
10030202 – Cut Bank										
Big Rock Coulee[1]	8/3/06		X			13.0	3,570	8.22	20.4	57.3 / 6.04
10030203 – Marias										
Big Flat Coulee[1]	6/8/06		X			16.5			45.2	63.0 / 6.14
Bullhead Creek[1]	6/7/06		X			18.1			45.2	97.2 / 9.27
Dry Fork Marias River site 1[1]	6/6/06		X			23.8			10.46	113.8/9.47
Dry Fork Marias River site 2[1]	6/6/06		X			21.7			9.71	114.6/10.03
Unnamed tributary to Dry Fork Marias River site 3[1]	6/6/06		X			22.0			17.7	60.4 / 5.27
Unnamed tributary to Dry Fork Marias River site 4[1]	6/6/06		X			24.6			26.8	35.2 / 2.91

[1] Fish Present
[2] Amphibians Present
[3] Reptiles Present

Table 6 – continued.

Site	Date	Water Type				Water Quality Measurements				
		Dry	Water Flowing	Interrupted Standing Pools	Continuous Standing Water	Water Temperature (˚C)	Conductivity (µS)	pH	Turbidity (NTU)	Dissolved Oxygen (%)/(mg/L)
10030203 – Marias (continued)										
Favot Coulee	10/17/06			X		5.8	701	8.42	12.0	59.4 / ---
Little Flat Coulee[1]	10/17/06		X			6.1	1,755	8.96	7.56	126.5/16.24
Oliver Coulee	10/17/06	X								
Pearson Coulee	10/17/06	X								
Pondera Coulee[1]	10/17/06		X			5.3	359	8.59	12.0	103.0/13.80
Railroad Coulee	10/17/06	X								
Ringwald Coulee[1]	6/7/06		X			20.5			10.29	92.0 / 8.33
School Section Coulee[1]	10/17/06			X		4.2	619	7.66	6.9	77.0 / 10.75
Spring Creek[1]	6/8/06			X		16.1			20.0	19.7 / 1.94
Swift Coulee	10/17/06	X								
Winginaw Coulee[1]	6/7/06		X			21.2			22.4	74.3 / 6.56
10030204 – Willow										
Alkali Coulee	10/18/06	X								
Black Coulee	10/18/06	X								
Cavitt Coulee	10/18/06	X								
Elmer Coulee	10/18/06	X								
Fernell Coulee	10/18/06	X								
Johannson Coulee	10/18/06	X								
Price Coulee	10/18/06	X								
Steep Coulee	10/18/06	X								
Taylor Coulee	10/18/06	X								
10030205 – Teton										
Blindhorse Creek[1,3]	8/2/06		X			13.9	541	8.15	16.4	80.5 / 9.05
Brady Canal[1]	6/21/06		X			17.2	823	9.16	12.0	122.3/11.52
Farmers Coulee[1,2]	6/21/06			X		24.4	4,080	8.24	10.0	79.7 / 6.78
Gamble Coulee[1]	6/21/06		X			16.4	488	8.29	14.0	97.5 / 9.75
Kropp Coulee	6/21/06			X		17.3	4,350	7.75	11.0	52.0 / 5.10
Maucki Coulee[2]	6/21/06			X		18.1	3,410	8.28	6.9	74.0 / 7.15
Spring Coulee[1]	6/22/06		X			17.2	1,008	8.12	34.0	70.9 / 6.80
10040101 – Bullwhacker-Dog										
Birch Creek site 1	9/21/06		X			13.3	1,052	8.08	>1,100	53.5 / 5.58
Birch Creek site 2[1]	9/21/06		X			13.8	1,292	7.37	147.0	68.7 / 7.30
Kings Coulee	9/21/06	X								

[1] Fish Present
[2] Amphibians Present
[3] Reptiles Present

Table 6 – continued.

Site	Date	Water Type				Water Quality Measurements				
		Dry	Water Flowing	Interrupted Standing Pools	Continuous Standing Water	Water Temperature (˚C)	Conductivity (µS)	pH	Turbidity (NTU)	Dissolved Oxygen (%)/(mg/L)
10040101 – Bullwhacker-Dog (continued)										
Little Birch Creek	9/21/06	X								
Sand Creek	9/21/06			X		15.9	907	8.24	>1,100	48.0 / 4.63
10040102 – Arrow										
Braun Creek	9/5/06	X								
Cowboy Creek	9/13/06	X								
Davis Creek[1]	9/5/06		X			14.4	831	7.67	9.98	56.1 / 5.20
Flat Creek	9/20/06	X								
Lepleys Creek	9/6/06		X			15.3	612	8.57	7.60	101.3/10.52
Possum Run Coulee[1]	7/10/06			X		24.1	3,160	7.49	36.5	17.0 / 1.51
Sun Creek	9/5/06	X								
Tom Dale Coulee	9/20/06	X								
10040103 - Judith										
Blood Coulee	7/10/06			X		24.9	4,890	7.74	74.9	32.5 / 2.48
Boyd Creek[1]	5/16/06		X			13.0	771	7.75	7.20	
Buffalo Creek[1,2]	7/13/06		X			18.9	578	8.23	36.4	75.9 / 7.37
Campbell Coulee	7/10/06	X								
Coal Mine Coulee	8/29/06	X								
Coyote Creek site 1[1]	9/20/06		X			10.3	1,173	7.70	10.44	89.8 / 10.01
Coyote Creek site 2	9/20/06	X								
Falls Coulee	7/10/06	X								
Hamilton Coulee[1,2]	9/19/06			X		11.7	1,742	7.56	16.7	42.0 / 4.51
Indian Creek[1,2]	9/19/06		X			12.1	2,770	8.09	19.4	88.0 / 9.41
Mossey Coulee	7/10/06	X								
Mutton Coulee[2]	7/10/06			X		30.9	1,950	8.58	9.14	164.0/12.2
Rock Creek[1,3]	7/25/06		X			15.4	673	8.23	7.13	93.6 / 9.37
Ross Fork Creek[1]	6/1/06		X			20.2	898	8.50	10.88	140.8/12.54
Scotchman Coulee	9/19/06		X			9.9	2,780	7.87	8.57	78.5 / 8.85
Skull Creek	9/5/06	X								
Smith Creek[1]	7/10/06			X		21.3	1,482	8.14	15.5	73.0 / 6.64
10040104 – Fort Peck										
Badland Creek	9/14/06	X								
Downer Coulee	6/14/06	X								

[1] Fish Present
[2] Amphibians Present
[3] Reptiles Present

Table 6 – continued.

Site	Date	Water Type				Water Quality Measurements				
		Dry	Water Flowing	Interrupted Standing Pools	Continuous Standing Water	Water Temperature (˚C)	Conductivity (µS)	pH	Turbidity (NTU)	Dissolved Oxygen (%)/(mg/L)
10040104 – Fort Peck (continued)										
Fritzner Coulee	6/14/06	X								
Haines Coulee	9/26/06	X								
King Coulee	6/14/06	X								
Musselman Coulee	6/14/06	X								
Phillips Coulee	6/14/06	X								
Roach Coulee	6/14/06	X								
Sandstrom Coulee	9/26/06	X								
Tomty Coulee	9/26/06	X								
10040201 – Upper Musselshell										
Cooper Creek	7/11/06		X			10.1	432	8.19	10.8	80.1 / 9.00
Hereim Creek	7/11/06		X			20.2	552	8.28	94.5	82.5 / 7.44
Muddy Creek[1]	7/11/06		X			17.3	290	8.21	21.4	86.5 / 8.29
10040202 – Middle Musselshell										
Galloway Creek	7/12/06		X			20.6	449	8.31	57.4	79.2 / 7.07
10040203 – Flatwillow										
Bender Creek	5/17/06			X		15.6	1,880	7.15	11.9	
Butler Coulee	5/17/06		X			17.9	552	7.24	15.1	
Flatwillow Creek overflow canal[1]	5/17/06			X		15.0	1,005	8.07	16.5	
Kinnick Coulee	5/17/06	X								
North Fork Yellow Water Creek	5/17/06	X								
Pike Creek[1,2]	7/26/06			X		25.9	1,805	8.83	105.3	43.8 / 3.48
10040204 – Box Elder										
Akins Coulee[1,2]	7/13/06				X	24.7	3,260	10.12	13.7	104.2/7.95
Christ Creek	9/14/06	X								
Dry Creek	10/4/06	X								
Edwards Creek	9/14/06		X			15.1	457	8.44	60.5	86.6 / 8.91
Feldt Coulee	7/13/06	X								
Log Gulch[1,2]	9/14/06				X	16.4	341	9.28	14.1	100.0 / 9.38
Lone Tree Gulch	9/14/06	X								
Maiden Creek[2]	5/16/06	X								
Parr Creek	5/16/06		X			15.2	1,626	7.94	8.87	
South Fork Bear Creek[1,2]	5/16/06				X	28.7	1,957	8.60	92.1	

[1] Fish Present
[2] Amphibians Present
[3] Reptiles Present

Table 6 – continued.

Site		Water Type				Water Quality Measurements				
	Date	Dry	Water Flowing	Interrupted Standing Pools	Continuous Standing Water	Water Temperature (˚C)	Conductivity (µS)	pH	Turbidity (NTU)	Dissolved Oxygen (%)/(mg/L)
10040205 – Lower Musselshell										
Biggett Coulee	5/18/06	X								
Camelbratten Coulee	5/18/06	X								
Deep Coulee	5/18/06	X								
Dovetail Creek	5/18/06	X								
Gibbs Coulee	5/18/06	X								
Haley Coulee	5/18/06	X								
Raundal Coulee	5/18/06	X								
10050002 – Upper Milk										
Breed Creek[1]	10/18/06		X			4.4	527	8.26	12.0	91.0 / 11.80

[1] Fish Present
[2] Amphibians Present
[3] Reptiles Present

ACKNOWLEDGEMENTS

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Appendix A. Name and location by HUC of Region 4 prairie stream survey sites sampled, May – October 2006.

Name	LLID	Stream Length (miles)	Latitude	Longitude	Township	Range	Section	Land Ownership
10030102 – Upper Missouri-Dearborn								
Allen Creek	1116789472087	3.30	47.2107	-111.6799	17N	1W	24	Private
Antelope Coulee	1111736474535	12.02	47.44946	-111.15445	20N	4E	36	Private
Big Sag	1108033475803	3.55	47.5837	-110.79068	21N	7E	12	Private
Big Sag Creek	1106138476074	9.26	47.60792	-110.61852	21N	9E	5	Private
Blaine Creek	1115907472076	4.98	47.19628	-111.59402	17N	1E	27	Private
Box Elder Creek	1110916475671	42.38	47.56552	-111.09130	21N	5E	21	Private
Brown Coulee	1106438476045	2.90	47.61037	-110.66559	21N	8E	2	State
Castner Coulee	1115063473791	7.64	47.37121	-111.50204	19N	2E	29	Private
Cherry Coulee	1116482472261	1.08	47.21902	-111.64293	17N	1E	17	Private
Dutchman Coulee	1111776472720	1.75	47.27024	-111.14497	18N	5E	31	Private
Geyser Creek	1114965473049	3.44	47.29427	-111.52219	18N	2E	19	Private
Giffen Coulee	1111887473083	3.22	47.30606	-111.19258	18N	4E	14	Private
Goon Coulee	1112209474408	2.53	47.44139	-111.22155	20N	4E	33	Private
Huff Creek	1115941471957	2.69	47.18923	-111.60574	17N	1E	28	Private
Indian Coulee	1108055475817	4.67	47.57244	-110.80666	21N	7E	14	Private
Keaster Creek	1105889476141	11.52	47.6039	-110.61984	21N	9E	5	Private
Mining Coulee	1111770473896	2.82	47.3884	-111.1767	19N	4E	23	Private
Number Five Coulee	1111588473700	13.29	47.34925	-111.18822	19N	4E	35	Private
Sand Coulee	1111557474160	5.45	47.40301	-111.16515	19N	4E	13	Private
Sand Coulee Creek	1113007474492	47.84	47.41329	-111.15573	19N	4E	12	Private
Walker Coulee	1112074474535	7.83	47.4507	-111.20177	20N	4E	34	Private
10030103 – Smith								
Cannonball Coulee	1114388473739	2.12	47.36215	-111.43587	19N	2E	35	Private
Clark Creek	1113907471950	12.44	47.19527	-111.39396	17N	3E	30	Private
Lord Coulee	1114435473789	2.91	47.37479	-111.43386	19N	2E	26	Private
Murphy Coulee	1113883472405	3.22	47.24041	-111.37817	17N	3E	8	Private

Appendix A. – Continued.

Name	LLID	Stream Length (miles)	Latitude	Longitude	Township	Range	Section	Land Ownership
			10030104 - Sun					
Adobe Creek (site 1)	1117195475240	14.42	47.47623	-111.78352	20N	1W	19	Private
Adobe Creek (site 2)	1117195475240	14.42	47.4808	-111.71941	20N	1W	15	State
Big Coulee	1118756475163	22.14	47.52963	-111.92258	21N	3W	36	State
Blackfoot Coulee	1119039475253	6.13	47.53164	-111.90302	21N	2W	31	Private
Clemons Coulee	1122975475405	11.66	47.56928	-112.37781	21N	6W	16	State
Cutting Shed Coulee	1122975475406	7.84	47.54123	-112.29765	21N	5W	30	Private
Fourmile Creek	1115829475456	10.07	47.5355	-111.58661	21N	1E	34	Private
			10030105 – Belt					
Big Willow Creek	1108782475073	17.99	47.45025	-110.83902	20N	7E	33	Private
Neil Creek	1109164473746	13.27	47.31459	-110.93533	18N	6E	14	Private
North Willow Creek	1108582475185	10.17	47.47885	-110.79524	20N	7E	23	Private
Red Coulee	1109548475596	10.92	47.49795	-110.96323	20N	6E	16	State
Williams Creek (upper end)	1107061472657	11.50	47.27483	-110.68631	18N	8E	34	Private
Williams Creek (lower end)	1107061472657	11.50	47.26769	-110.70434	17N	8E	4	Private
			10030201 – Two Medicine					
Sheep Creek (site 1)	1124797482019	30.20	48.19966	-112.53717	28N	7W	8	Private
Sheep Creek (site 2)	1124797482019	30.20	48.20144	-112.51305	28N	7W	9	Private
Sheep Creek (oxbow pond)	1124797482019	30.20	48.20127	-112.49500	28N	7W	10	Private
			10030202 – Cut Bank					
Big Rock Coulee	1123909486830	32.92	48.696	-112.36788	34N	6W	22	Private
			10030203 - Marias					
Big Flat Coulee	1119503482159	9.06	48.23539	-111.96502	29N	3W	26	Private
Bullhead Creek	1119994483613	11.50	48.3741	-112.14235	30N	4W	9	Private

Appendix A. – Continued.

Name	LLID	Stream Length (miles)	Latitude	Longitude	Township	Range	Section	Land Ownership
10030203 – Marias (Continued)								
Dry Fork Marias River (site 1)	1117441483714	55.10	48.21488	-111.94450	28N	4E	4	Private
Dry Fork Marias River (site 2)	1117441483714	55.10	48.2161	-111.94183	28N	3W	2	Private
Unnamed tributary to Dry Fork Marias (site 3)		5.40	48.21005	-111.94187	28N	3W	2	Private
Unnamed tributary to Dry Fork Marias (site 4)		5.40	48.2077	-111.92855	28N	3W	1	Private
Favot Coulee	1117197481772	4.38	48.21233	-111.75388	28N	1W	5	Private
Little Flat Coulee	1118187482616	7.30	48.27913	-111.83998	29N	2W	10	Private
Oliver Coulee	1118852481742	2.42	48.17377	-111.88609	28N	2W	20	Private
Pearson Coulee	1118808483848	3.14	48.36444	-111.8533	30N	2W	15	Private
Pondera Coulee	1110434482738	115.90	48.17902	-111.75364	28N	1W	17	State
Railroad Coulee	1119399481635	4.45	48.13038	-111.95868	27N	3W	2	Private
Ringwald Coulee	1121246483707	6.22	48.36974	-112.12402	30N	4W	9	Private
School Section Coulee	1118722481873	5.66	48.18031	-111.87583	28N	2W	17	Private
Spring Creek	1119981482185	32.96	48.2108	-112.04621	28N	3W	6	State
Swift Coulee	1118419482982	3.19	48.31252	-111.86104	30N	2W	33	Private
Winginaw Coulee	1121323483733	7.86	48.37091	-112.14036	30N	4W	9	Private
10030204 - Willow								
Alkali Coulee	1113757487381	2.49	48.7403	-111.37506	34N	3E	5	Private
Black Coulee	1114598486306	6.88	48.64719	-111.55706	33N	1E	2	Private
Cavitt Coulee	1113568487375	2.43	48.74034	-111.35283	34N	3E	4	Private
Elmer Coulee	1116549487664	2.97	48.78292	-111.65493	35N	1E	19	Private
Fernell Coulee	1114208486371	4.99	48.65371	-111.39429	33N	3E	6	Private

Appendix A. – Continued.

Name	LLID	Stream Length (miles)	Latitude	Longitude	Township	Range	Section	Land Ownership
10030204 – Willow (Continued)								
Johannson Coulee	1116181486885	2.54	48.69035	-111.60091	34N	1E	21	Private
Price Coulee	1113908487346	4.23	48.73296	-111.33904	34N	3E	4	Private
Steep Coulee	1112700487667	3.06	48.74042	-111.30459	34N	3E	2	Private
Taylor Coulee	1116638487181	2.63	48.69676	-111.6717	34N	1W	24	Private
10030205 - Teton								
Blindhorse Creek		11.90	47.69109	-112.62211	26N	8W	34	Private
Brady Canal	1120691479580	3.83	47.96352	-112.04858	26N	4W	36	State
Farmers Coulee	1120382479905	27.75	47.98961	-112.04884	26N	4W	24	Private
Gamble Coulee	1120327478424	9.39	47.85975	-112.09105	24N	4W	2	Private
Kropp Coulee	1119366479814	11.93	48.01579	-112.00581	26N	3W	8	Private
Maucki Coulee	1120058480158	12.81	48.05628	-112.13493	27N	4W	32	Private
Spring Coulee	1120072478655	10.01	47.89809	-112.05536	25N	4W	25	Private
10040101 – Bullwhacker-Dog								
Birch Creek (site 1)	1095765477472	49.67	47.87164	-109.61491	24N	16E	1	Private
Birch Creek (site 2)	1095765477472	49.67	47.98105	-109.63928	26N	16E	26	Private
Kings Coulee	1096962478118	7.03	47.85581	-109.6909	24N	16E	16	Private
Little Birch Creek	1097008479526	15.64	47.99576	-109.71292	26N	16E	19	Private
Sand Creek	1096095478695	28.60	47.86994	-109.60918	24N	16E	12	State
10040102 - Arrow								
Braun Creek	1103264473228	15.03	47.32892	-110.38286	18N	11E	18	Private
Cowboy Creek	1100821474527	19.80	47.46268	-110.11076	20N	13E	30	State
Davis Creek	1102362473755	17.10	47.37366	-110.36613	19N	11E	30	Private
Flat Creek	1098384477070	58.00	47.69339	-110.06802	22N	13E	4	Private
Lepleys Creek	1104186476250	11.86	47.57224	-110.45215	21N	10E	16	Private
Possum Run Coulee	1099515474106	4.03	47.41063	-109.95811	19N	14E	17	State
Sun Creek	1103181471981	12.26	47.17407	-110.31558	16N	11E	3	Private
Tom Dale Coulee	1099294476788	12.62	47.66604	-109.92375	22N	14E	15	Private

Appendix A. – Continued.

Name	LLID	Stream Length (miles)	Latitude	Longitude	Township	Range	Section	Land Ownership
			10040103 - Judith					
Blood Coulee	1097181474421	8.95	47.43996	-109.78854	19N	15E	3	Private
Boyd Creek	1094262470732	10.39	47.06964	-109.37571	15N	18E	12	Private
Buffalo Creek	1097948468619	13.26	46.85268	-109.76321	13N	15E	25	State
Campbell Coulee	1097440473941	6.47	47.39785	-109.80879	19N	15E	21	Private
Coal Mine Coulee	1102995470981	1.43	47.09569	-110.29569	15N	11E	2	Private
Coyote Creek	1099729473155	28.87	47.28695	-110.02077	18N	13E	26	Private
Coyote Creek	1099729473155	28.87	47.21394	-110.11408	17N	13E	19	Private
Falls Coulee	1096702475346	6.31	47.5386	-109.76834	21N	15E	35	Private
Hamilton Coulee	1096634473538	10.18	47.31783	-109.61948	18N	16E	13	Private
Indian Creek	1096821472367	20.49	47.23447	-109.68352	17N	16E	16	State
Mossey Coulee	1097393474049	5.80	47.41285	-109.78765	19N	15E	15	Private
Mutton Coulee	1096522476474	8.08	47.62432	-109.76151	21N	15E	2	Private
Rock Creek	1097266470574	27.35	46.87786	-109.53057	13N	17E	23	Private
Ross Fork Creek	1097192470725	51.34	46.96735	-109.79946	14N	15E	22	State
Scotchman Coulee	1097060472565	6.15	47.22893	-109.72478	17N	16E	18	Private
Skull Creek	1101527471774	12.17	47.13829	-110.21454	16N	12E	21	Private
Smith Creek	1097834473527	8.91	47.36678	-109.89416	19N	14E	35	Private
			10040104 – Fort Peck					
Badland Creek	1092076473537	10.15	47.28884	-109.13432	18N	20E	26	Private
Downer Coulee	1086497475457	3.69	47.54951	-108.64920	21N	24E	28	BLM
Fritzner Coulee	1085752475844	3.81	47.57462	-108.5638	21N	25E	18	BLM
Haines Coulee	1085276475881	4.42	47.58714	-108.52707	21N	25E	17	State
King Coulee	1086563475742	5.28	47.57595	-108.67687	21N	24E	18	USFWS
Musselman Coulee	1086610475591	5.12	47.52706	-108.63636	20N	24E	3	BLM
Phillips Coulee	1085638475427	2.70	47.53024	-108.57336	20N	24E	1	BLM
Roach Gulch	1086852475523	3.53	47.56079	-108.74571	21N	23E	22	Private
Sandstrom Coulee	1084962475341	1.62	47.53648	-108.49275	21N	25E	34	BLM
Tomty Coulee	1084901475376	2.15	47.54154	-108.49757	21N	25E	34	Private

Appendix A. – Continued.

Name	LLID	Stream Length (miles)	Latitude	Longitude	Township	Range	Section	Land Ownership
10040201 – Upper Musselshell								
Cooper Creek	1104467465417	3.27	46.53181	-110.45316	9N	10E	22	USDA - N.F.
Hereim Creek	1104283463808	4.31	46.35918	-110.45518	7N	10E	15	Private
Muddy Creek	1104179464311	10.89	46.35617	-110.43315	7N	10E	23	Private
10040202 – Middle Musselshell								
Galloway Creek	1096136465057	18.97	46.60656	-109.58126	10N	17E	21	Private
10040203 – Flatwillow								
Bender Creek	1085177468958	11.21	46.89037	-108.59086	13N	25E	18	Private
Butler Coulee	1087561469393	2.55	46.9352	-108.74659	14N	23E	36	Private
Flatwillow Creek (overflow canal)		118.00	46.941	-108.2354	14N	27E	25	Private
Kinnick Coulee	1086995468669	2.54	46.87661	-108.6875	13N	24E	1	Private
North Fork Yellow Water Creek	1084955469088	11.94	46.93167	-108.60064	14N	25E	31	Private
Pike Creek	1083909468524	27.30	46.83616	-108.51536	13N	25E	36	BLM
10040204 – Box Elder								
Akins Coulee	1083304470822	2.99	47.08164	-108.33226	15N	27E	8	Private
Crist Creek	1089718472645	3.32	47.25917	-108.98524	17N	21E	1	Private
Dry Creek	1083959471615	5.61	47.08265	-108.4713	15N	26E	7	BLM
Edwards Creek	1090207471836	4.77	47.18725	-109.02906	17N	21E	34	Private
Feldt Coulee	1082964470748	2.08	47.07988	-108.29856	15N	27E	9	BLM
Log Gulch	1090049471878	5.47	47.19471	-109.00434	17N	21E	35	Private
Lone Tree Gulch	1090049471877	4.26	47.19153	-109.01128	17N	21E	35	Private
Maiden Creek	1090472471314	10.70	47.15783	-109.18695	16N	20E	9	Private
Parr Creek	1091645470576	4.00	47.06845	-109.17227	15N	20E	15	Private
South Fork Bear Creek	1085431472263	36.03	47.22994	-108.55343	17N	25E	17	Private

Appendix A. – Continued.

Name	LLID	Stream Length (miles)	Latitude	Longitude	Township	Range	Section	Land Ownership
10040205 – Lower Musselshell								
Biggett Coulee	1079397471897	6.09	47.18079	-107.94067	16N	30E	5	State
Camelbratten Coulee	1080575472466	4.64	47.24371	-108.05433	17N	29E	7	BLM
Deep Coulee	1079563471385	2.29	47.13939	-107.96629	16N	30E	19	BLM
Dovetail Creek	1079641472750	38.49	47.27813	-107.96777	18N	29E	35	Private
Gibbs Coulee	1079560473166	3.68	47.31326	-107.96413	18N	29E	23	BLM
Haley Coulee	1079520471550	8.95	47.15228	-107.95985	16N	30E	18	BLM
Raundal Coulee	1079436472188	3.67	47.21104	-107.9491	17N	29E	25	Private
10050002 – Upper Milk								
Breed Creek	1112900489971	20.80	48.87481	-111.24038	36N	4E	17	Private

Appendix B. Procedures used to determine Eastern Montana prairie stream survey sites.

Goal: Select 160 eastern Montana streams by HUC that have not been sampled before and fall within the Northern Plains area ecoregion.

Data Layers used:

- Bailey's Ecoregions layer-Great Plains polygon, too gross a scale for analysis
- Climax vegetation layer-from Natural resources Information System (NRIS), represents the same Great Plains Prairie area as Bailey's but at a finer scale.
- 100,000K stream routes-MFWP-built on the National Hydrography from the named streams
- 4th code HUCs- from Natural resources Information System (NRIS)
- Montana Rivers Information System (MRIS) database-for determining sampled streams

Steps:

1. Intersected the Prairie area (climax veg layer) with the 4th code HUCs to find HUCs that fell within the prairie. Dropped those HUCs that are less than 50% Prairie.
2. Determined the number of streams to sample in each HUC by dividing the amount of prairie in each HUC by the total amount of Prairie in Eastern Montana and then multiplying by 160(the total number of streams to be sampled).
3. Generated a list of streams that are sampled within the HUC's in step 1.
4. Intersected the remainder of streams (the unsurveyed with the Prairie Area) to remove streams that were in a HUC but not in an area of Prairie.
5. Sorted these unsurveyed streams by HUC and descending by length.
6. Selected the number of streams to sample for each HUC (from step2) starting with the longest streams. The alternatives were selected by taking the next consecutive streams in the list (approximately twice the number of sample streams). Length was chosen as the criteria as the perennial-intermittent stream category was not useable.
7. A random river mile was derived from each selected stream. A Lat-long was determined for each point and whether that point fell within public land.

The Numbers:

52 HUC's determined to fall within the Prairie ecoregion.
4207 unsurveyed streams in these 52 HUC's.
367 streams surveyed in these 52 HUC's

<u>1-9 streams selected to sample in each HUC.</u>
160 samples, 264 alternates, total of 424 streams selected
84% if the streams have some public access along them
21% of the selected sample points fall in public land

Appendix C. Fish and habitat sampling protocol and gear list for prairie stream surveys in Region 4, May – October 2006.

1. ***Site location***.-Locate the sampling site using GPS for random sites, or by convenience for non-random sites. The GPS location will be the center of the reach, this is where you place the "F" flag (see Step 2). If the site is dry, shift the reach up or downstream to capture the most wetted channel possible on the parcel of land where you have permission for sampling.
2. ***Laying out the sample reach***.-Lay out a 300 m sample reach using a measuring tape and a set of 11 pin flags (labeled A-K). Follow the curves in the stream channel with the measuring tape; do not cut across curves. To avoid spooking fish, walk along the bank, not in the stream. Place a flag every 30 m. The "A" flag will be at the downstream end; the "K" flag will be at the upstream end of the reach. The "F" flag will go in the center of the reach.
3. ***Block nets***.-Place block nets (these can be old seines, 1/4" mesh) at the upstream (K flag) and downstream (A flag) ends of the sample reach if the water in the channel is continuous, deeper than 25 cm, and relatively clear. This prevents fish from leaving the sample reach.
4. ***Seining***.-Select the seine based on the size of the stream to be sampled. The seine length to be used should be approximately equal to or slightly greater than the stream width, and the seine height should be about 1.5 to 2 times greater than the depth of the stream. Dip nets can be used in very shallow, small habitats. Seining begins at the upstream end (K flag) and proceeds downstream to the A flag. Two people perform seining, one on each end of the seine. In pools, the seine is pulled down the stream channel, using the shore and other natural habitat features as barriers. Begin with the seine rolled up on each seine braille. The seine is typically set perpendicular to shore and hauled downstream parallel to shore. As you proceed, let out enough seine so that the seine forms a "U" shape, but not so much that the net is hard to control. Adjust the length of the seine by rolling or un-rolling net on the seine braille. The speed of seining should be fast enough to maintain the "U" shape, but not so fast that the floats become submerged, or that the seine's lead line come way up off the bottom of the stream. If rocks or other snags are on the bottom, the seine can be lifted off the bottom for a moment to avoid the snag, or one of the netters can bring the seine around the snag to avoid it, all the while maintaining the forward progress of the seine. Similarly, areas of dense aquatic vegetation can be avoided. It is important not to stop the forward progress, because fish will swim out of the seine. It is better to avoid a snag while keeping moving than to become snagged, which will allow fish to escape. In "snaggy" waters, keep more of your seine rolled up for better control.

   Proceed downstream while seining. In narrow streams, the entire channel width is spanned with the seine. In wider streams, one person walks along the shore, while the other wades through the channel. The length of each seine haul will depend on the natural features of the stream channel and shoreline, but seine hauls should not normally be more than 60 or 90 m long. Side channel bars or the end of a standing pool are good areas to haul out or "beach" the seine. Where a large bar or end of a standing

pool is present both netters can simply run the net up on the shore. In streams with steep banks or lack of obvious seine beaching areas the "snap" technique can be used. At the end of the haul, the person near shore stops, while the person farthest out turns into shore, quickly, until the seine is up against the bank. The two netters then walk away from each other, taking the slack out of the seine, and keeping the seine's lead line up against the bank.

In riffles, with moderate to fast current, the "kick seine" technique can be used. The seine is held stationary in a "U" shape, while the other team member disturbs the substrate immediately upstream of the net. Then the net is quickly "snapped" out of the water by both team members using an upstream scooping motion.

Seine the entire 300 m reach, covering the linear distance at least once. If part of the 300 m is dry, just skip it. If the stream is much wider than your seine, do extra seine hauls in the large pools to cover the extra width. Sample all habitat types (shoreline, thalweg, side channels, backwaters).

After each seine haul, place fish in a bucket. If the water is warm, or you have captured many fish, place fish in a fish bag to keep them alive until seining is completed. If you have to work up fish before seining is completed, release processed fish in an area that has already been seined, as far away from the area remaining to be seined as possible (or outside of the block nets). Large fish such as northern pike, common carp, white sucker, shorthead redhorse, or channel catfish, can be measured, given a small clip to the lower caudal fin and released immediately.

5. ***Processing captured fish***.-Record the species of each fish captured, and measure 20 "randomly" selected fish to the nearest millimeter, total length. If the species of fish is unknown, try to at least record it as Unknown type 1, Unknown type 2, etc. Keep track of and record the minimum and maximum length of each species.

   For each species, preserve a subsample of at least 10 individuals per site to serve as voucher specimens. Record a small letter "v" next to the recorded length of the fish that is vouchered to allow for later validation. For Hybognathus spp., voucher up to 20 individuals per site. Kill the fish to be vouchered by placing them in a small bucket or 1000 ml nalgene jar with an overdose solution of MS-222. After fish processing is completed, drain the MS-222 solution and place the fish in a 1000 ml nalgene jar with a 10% solution of formalin (in clear water, if possible). For specimens longer than 150 mm, an incision should be made on the right ventral side of the abdomen after death, to allow fixative to enter the body cavity. The volume of formalin solution should be approximately equal to the twice the volume of fish tissue to be preserved, and the fish volume should be considered water when concentrations are determined. For example, if the fish take up 250 ml of the 1000 ml volume,

you need about 500 ml of 10 % formalin solution (75 ml formalin and 425 ml water) in the 1000 ml nalgene jar. If necessary, use a second jar to accommodate all of the specimens. Use safety glasses and gloves when pouring formalin. Do not let the fish "cook" in the sun for a while and preserve them later, do it as soon as possible. Label all jars inside and out with Site, Site Number, Lat/Long, Date, Collectors names. Use pencil on Write-In-the-Rain or high rag paper for inside labels (just put the label right in with the fish), use a sticker label on the outside, cover it with clear (ScotchPad high performance packing tape pad 3750-P). Fish specimens should be left in formalin solution for at least 2-7 days. Fish specimens must have formalin solution soaked out before being handled extensively. Specimens should be soaked in water for at least 2 days, and water should be changed at least four times during this period. After soaking out the formalin, the fish specimens should be placed in either 70% ethanol or 40% isopropanol for long-term storage.

6. ***Habitat survey***.-Channel width, depth of water, and substrate will be measured at 11 transects perpendicular to the stream channel (located at Flags A-K), and along the thalweg in 10 thalweg intervals between transects (deepest part of channel). Stream width is measured to the nearest 0.1 m, depth is measured to the nearest cm, and substrate sizes and codes are on the data sheet. One person will be in the stream taking measurements while the other records data. Record the Latitude and Longitude (in digital degrees) of the F flag, the stream name, site number, the date, the flow status (flowing, continuous standing water, or interrupted standing water) and the names of the crew members on the data sheet. Take photographs of the site, capturing as much of the sampling reach as possible. Make sure the date feature on the camera is turned on, to allow for later identification of site photographs.

   Transects.-Start on the left bank (facing downstream) at Flag A. Measure and record the wetted width of the channel to the nearest 0.1 m. Measure and record (separated by a comma on the data sheet) five equally spaced depth and substrate measurements across the wetted stream channel:

   1. Left Bank-5 cm from the left bank;
   2. Left Center-halfway between the Center and the Left Bank;
   3. Center-center of the wetted stream;
   4. Right Center-halfway between the Center and the Right Bank;
   5. Right Bank-5 cm from the right bank

   Thalweg.-Begin by recording the depth and substrate 3 m upstream of the transect, in the deepest part of the channel (thalweg). Proceed up the thalweg to Flag B, recording depth and substrate every 3 m along the thalweg. You will record a total of 10 depths and substrates between each pair of transects. If the stream channel is dry, record a 0 for depth, and record the substrate. The last thalweg measurement point should fall on the next upstream transect. The 3 m interval can be

estimated, and it is helpful if the data recorder helps to keep the person in the stream from "squeezing" or "stretching" the thalweg measurements.

Repeat this procedure until all 11 transects and 10 thalweg intervals are completed.

Gear List

- 20', x 6' x ¼" heavy delta seines
- 15' x 4' x ¼" heavy delta
- 30' x 6' x ¼" heavy delta (or delta) with 6' x 6' x 6' bag
- Fish bags: nylon diver's bags, ¼" mesh 18" x 30"
- Mudders – 109.00 at Ben Meadows
- Block nets, Tent stakes
- Stream Conductivity meter
- Thermometer
- Turbidity meter (LaMotte, Ben Meadows 224805, $795.00-might try the ""transparency tube" Ben Meadows 224196, $52.95)
- Waders (breathable waders are essential for this work-Cabelas has them for about $100/pair), hip boots are usually too low
- Lug sole wading boots (Cabelas)
- Habitat pole (I make habitat poles out of 1.0" OD PVC pipe. 1.5 m long including caps. Score the pipe every 10 cm with a pipe cutter, then use a Sharpie to mark rings around the pole at the scores, and label the pole 10, 20, 30, etc. 5 cm marks are made between the 10 cm rings, you can visually estimate between the 5 cm marks to get to the nearest cm. Spray or brush a Urethane finish on the pole or your marks will come off fast with sunscreen and bug dope.)
- Metric 30 m tape (Ace Hardware actually carries a tape with metric on one side)
- Measuring boards, one short 300 mm (half a 6" PVC works well for Hybognathus "fin flotation", one long, ~0.5-1 m, you can just use a meter stick for the odd big fish)
- Hand lens
- Small 1 gallon red bucket from Ace for doping fish
- 5 gallon buckets
- MS-222
- Labels and tape pads for fish samples
- 1000 ml Nalgene jars
- Formalin (buffered is great, but more expensive-I throw a Rolaids in each jar of fish to neutralize the acidity)
- Clip board
- 11 Pin flags labeled A-F

Appendix D. Fish data entry form used during Region 4 prairie stream surveys, 2006.

Site: ______________________ Date: ____________ Water Flowing: ________

HUC: ______________ Continuous Standing Water: ________

Interrupted Standing Pools: ________

Dry: ________

Latitude: ________________ Observers: ________________

Longitude: ________________ ________________

Species Total Length (mm)

	Total Count						Max. Length
							Min. Length

	Total Count						Max. Length
							Min. Length

	Total Count						Max. Length
							Min. Length

	Total Count						Max. Length
							Min. Length

	Total Count						Max. Length
							Min. Length

	Total Count						Max. Length
							Min. Length

Dissolved Oxygen: ____________________ Private: ______________

Temperature: ____________________ State: ______________

pH: ____________________ BLM: ______________

Conductivity: ____________________ Other: ______________

Turbidity: ____________________

Additional Comments: Page_____of_____

Appendix E. Percent fish species composition observed by HUC and site during Region 4 prairie stream surveys, May – October 2006.

HUC (Drainage)	Site Name	Date	Species	N	Percent Composition
10030102 Upper Missouri-Dearborn	Blaine Creek	7/20/06	longnose dace	593	41.4
			lake chub	434	30.3
			fathead minnow	314	21.9
			white sucker	93	6.5
			Total	**1,434**	**100**
10030102 Upper Missouri-Dearborn	Box Elder Creek (above waterfall/barrier)	7/27/06	longnose dace	19	86.4
			mottled sculpin	3	13.6
			Total	**22**	**100**
10030102 Upper Missouri-Dearborn	Box Elder Creek (below waterfall/barrier)	7/27/06	white sucker	118	70.2
			longnose dace	20	11.9
			longnose sucker	11	6.5
			brown trout	7	4.2
			mottled sculpin	7	4.2
			brook stickleback	2	1.2
			rainbow trout	2	1.2
			fathead minnow	1	0.6
			Total	**168**	**100**
10030102 Upper Missouri-Dearborn	Castner Coulee	7/19/06	fathead minnow	545	74.9
			white sucker	107	14.7
			longnose sucker	20	2.7
			longnose dace	16	2.2
			pumpkinseed	16	2.2
			lake chub	12	1.6
			brassy minnow	5	0.7
			common carp	4	0.5
			golden shiner	2	0.3
			northern redbelly dace X finescale dace	1	0.1
			Total	**728**	**100**
10030102 Upper Missouri-Dearborn	Huff Creek	7/20/06	fathead minnow	64	88.9
			northern redbelly dace	7	9.7
			longnose dace	1	1.4
			Total	**72**	**100**
10030102 Upper Missouri-Dearborn	Keaster Creek	9/13/06	white sucker	379	32.1
			lake chub	329	27.9
			fathead minnow	190	16.1
			brassy minnow	85	7.2
			northern redbelly dace	80	6.8
			longnose dace	53	4.5
			mountain sucker	45	3.8
			northern redbelly dace X finescale dace	19	1.6
			Total	**1,180**	**100**

Appendix E. – Continued.

HUC (Drainage)	Site Name	Date	Species	N	Percent Composition
10030103 Smith	Cannonball Coulee	7/19/06	fathead minnow	348	100
			Total	**348**	**100**
10030103 Smith	Clark Creek	7/18/06	white sucker	285	91.6
			longnose dace	26	8.4
			Total	**311**	**100**
10030104 Sun	Adobe Creek	10/3/06	lake chub	142	20.5
			northern redbelly dace	132	19.0
			fathead minnow	128	18.4
			white sucker	109	15.7
			brassy minnow	95	13.7
			northern redbelly dace X finescale dace	36	5.2
			mountain sucker	30	4.3
			longnose dace	21	3.0
			brook stickleback	1	0.1
			Total	**694**	**100**
10030104 Sun	Big Coulee	10/3/06	longnose dace	20	30.8
			fathead minnow	17	26.2
			rainbow trout	12	18.5
			white sucker	11	16.9
			mottled sculpin	2	3.1
			northern redbelly dace	2	3.1
			mountain whitefish	1	1.5
			Total	**65**	**100**
10030104 Sun	Blackfoot Coulee	10/16/06	fathead minnow	80	33.1
			longnose dace	75	31.0
			lake chub	38	15.7
			northern redbelly dace	29	12.0
			northern redbelly dace X finescale dace	15	6.2
			rainbow trout	2	0.8
			brassy minnow	1	0.4
			longnose sucker	1	0.4
			white sucker	1	0.4
			Total	**242**	**100**
10030104 Sun	Cutting Shed Coulee	10/16/06	rainbow trout	39	84.8
			brown trout	6	13.0
			mountain whitefish	1	2.2
			Total	**46**	**100**

Appendix E. – Continued.

HUC (Drainage)	Site Name / Date	Species	N	Percent Composition
10030105 Belt	Big Willow Creek 5/23/06	white sucker	115	42.0
		lake chub	104	38.0
		fathead minnow	36	13.1
		northern redbelly dace	12	4.4
		brassy minnow	4	1.5
		longnose dace	3	1.1
		Total	**274**	**100**
10030105 Belt	North Willow Creek 5/24/06	lake chub	15	100.0
		Total	**15**	**100**
10030105 Belt	Williams Creek (upper end) 5/25/06	lake chub	372	58.4
		white sucker	117	18.4
		fathead minnow	62	9.7
		longnose dace	47	7.4
		longnose sucker	28	4.4
		brassy minnow	11	1.7
		Total	**637**	**100**
10030105 Belt	Williams Creek (lower end) 5/25/06	brown trout	10	76.9
		mottled sculpin	3	23.1
		Total	**13**	**100**
10030201 Two Medicine	Sheep Creek (1) 8/1/06	lake chub	314	46.7
		longnose dace	171	25.4
		white sucker	158	23.5
		fathead minnow	30	4.5
		Total	**673**	**100**
10030201 Two Medicine	Sheep Creek (2) 8/1/06	longnose dace	129	47.8
		white sucker	69	25.6
		lake chub	67	24.8
		fathead minnow	5	1.9
		Total	**270**	**100**
10030201 Two Medicine	Sheep Creek (oxbow pond) 8/1/06	northern redbelly dace	303	95.9
		fathead minnow	12	3.8
		northern redbelly dace X finescale dace	1	0.3
		Total	**316**	**100**

Appendix E. – Continued.

HUC (Drainage)	Site Name / Date	Species	N	Percent Composition
10030202 Cut Bank	Big Rock Coulee (below weir) 8/3/06	fathead minnow	62	21.8
		white sucker	62	21.8
		lake chub	56	19.7
		longnose dace	44	15.5
		brassy minnow	32	11.3
		brook stickleback	26	9.2
		longnose sucker	2	0.7
		Total	**284**	**100**
10030202 Cut Bank	Big Rock Coulee (above weir) 8/3/06	fathead minnow	1,165	81.4
		white sucker	222	15.5
		brassy minnow	36	2.5
		lake chub	6	0.4
		brook stickleback	1	0.1
		longnose dace	1	0.1
		Total	**1,431**	**100**
10030203 Marias	Big Flat Coulee 6/8/06	brook stickleback	46	69.7
		lake chub	8	12.1
		longnose dace	5	7.6
		white sucker	3	4.5
		fathead minnow	2	3.0
		spottail shiner	2	3.0
		Total	**66**	**100**
10030203 Marias	Bullhead Creek 6/7/06	lake chub	55	32.7
		fathead minnow	37	22.0
		longnose dace	35	20.8
		brook stickleback	18	10.7
		brassy minnow	11	6.5
		white sucker	7	4.2
		longnose sucker	2	1.2
		northern redbelly dace	2	1.2
		spottail shiner	1	0.6
		Total	**168**	**100**
10030203 Marias	Dry Fork Marias River (1) 6/6/06	brook stickleback	148	37.4
		longnose dace	124	31.3
		lake chub	59	14.9
		white sucker	36	9.1
		fathead minnow	16	4.0
		spottail shiner	12	3.0
		brassy minnow	1	0.3
		Total	**396**	**100**

Appendix E. – Continued.

HUC (Drainage)	Site Name / Date	Species	N	Percent Composition
10030203 Marias	Dry Fork Marias River (2) 6/6/06	brook stickleback	124	31.2
		lake chub	108	27.2
		white sucker	60	15.1
		brassy minnow	40	10.1
		fathead minnow	39	9.8
		longnose dace	19	4.8
		spottail shiner	7	1.8
		Total	**397**	**100**
10030203 Marias	Unnamed tributary to Dry Fork Marias River (3) 6/6/06	brook stickleback	53	100.0
		Total	**53**	**100**
10030203 Marias	Unnamed tributary to Dry Fork Marias River (4) 6/6/06	brook stickleback	53	94.6
		fathead minnow	2	3.6
		white sucker	1	1.8
		Total	**56**	**100**
10030203 Marias	Little Flat Coulee 10/17/06	brook stickleback	154	100.0
		Total	**154**	**100**
10030203 Marias	Pondera Coulee 10/17/06	fathead minnow	155	47.5
		brook stickleback	144	44.2
		white sucker	14	4.3
		lake chub	10	3.1
		spottail shiner	3	0.9
		Total	**326**	**100**
10030203 Marias	Ringwald Coulee 6/7/06	longnose dace	42	39.6
		lake chub	31	29.2
		white sucker	26	24.5
		fathead minnow	5	4.7
		longnose sucker	1	0.9
		spottail shiner	1	0.9
		Total	**106**	**100**
10030203 Marias	School Section Coulee 10/17/06	brook stickleback	2	100.0
		Total	**2**	**100**
10030203 Marias	Spring Creek 6/8/06	brook stickleback	26	100.0
		Total	**26**	**100**

Appendix E. – Continued.

HUC (Drainage)	Site Name / Date	Species	N	Percent Composition
10030203 Marias	Winginaw Coulee	lake chub	29	48.3
	6/7/06	brook stickleback	15	25.0
		fathead minnow	5	8.3
		brassy minnow	4	6.7
		white sucker	3	5.0
		longnose dace	2	3.3
		longnose sucker	1	1.7
		spottail shiner	1	1.7
		Total	**60**	**100**
10030205 Teton	Blindhorse Creek	northern redbelly dace	871	63.2
	8/2/06	northern redbelly dace X finescale dace	325	23.6
		brassy minnow	67	4.9
		lake chub	50	3.6
		white sucker	41	3.0
		brook stickleback	21	1.5
		fathead minnow	2	0.1
		longnose dace	2	0.1
		Total	**1,379**	**100**
10030205 Teton	Brady Canal	brook stickleback	66	75.0
	6/21/06	white sucker	18	20.5
		fathead minnow	2	2.3
		yellow perch	2	2.3
		Total	**88**	**100**
10030205 Teton	Farmers Coulee	fathead minnow	4	66.7
	6/21/06	brook stickleback	2	33.3
		Total	**6**	**100**
10030205 Teton	Gamble Coulee	northern redbelly dace	116	43.8
	6/21/06	brassy minnow	70	26.4
		fathead minnow	60	22.6
		brook stickleback	7	2.6
		northern redbelly dace X finescale dace	7	2.6
		longnose dace	5	1.9
		Total	**265**	**100**
10030205 Teton	Spring Coulee	brook stickleback	146	78.9
	6/22/06	longnose dace	26	14.1
		lake chub	9	4.9
		fathead minnow	2	1.1
		mountain sucker	1	0.5
		northern redbelly dace X finescale dace	1	0.5
		Total	**185**	**100**

Appendix E. Continued.

HUC (Drainage)	Site Name	Date	Species	N	Percent Composition
10040101 Bullwhacker-Dog	Birch Creek	9/21/06	white sucker	79	64.8
			longnose dace	23	18.9
			mountain sucker	13	10.7
			brassy minnow	3	2.5
			fathead minnow	3	2.5
			lake chub	1	0.8
			Total	**122**	**100**
10040102 Arrow	Davis Creek	9/5/06	white sucker	142	46.1
			fathead minnow	123	39.9
			lake chub	43	14.0
			Total	**308**	**100**
10040102 Arrow	Possum Run Coulee	7/10/06	brassy minnow	80	86.0
			fathead minnow	8	8.6
			northern redbelly dace	3	3.2
			lake chub	2	2.2
			Total	**93**	**100**
10040103 Judith	Boyd Creek	5/16/06	fathead minnow	5	55.6
			northern redbelly dace	4	44.4
			Total	**9**	**100**
10040103 Judith	Buffalo Creek	7/13/06	lake chub	252	43.3
			northern redbelly dace	131	22.5
			white sucker	104	17.9
			longnose dace	78	13.4
			fathead minnow	12	2.1
			northern redbelly dace X finescale dace	3	0.5
			brassy minnow	1	0.2
			mottled sculpin	1	0.2
			Total	**582**	**100**
10040103 Judith	Coyote Creek	9/20/06	northern redbelly dace	160	66.7
			northern redbelly dace X finescale dace	24	10.0
			fathead minnow	20	8.3
			longnose dace	20	8.3
			lake chub	16	6.7
			Total	**240**	**100**
10040103 Judith	Hamilton Coulee	9/19/06	northern redbelly dace	220	78.6
			fathead minnow	56	20.0
			northern redbelly dace X finescale dace	4	1.4
			Total	**280**	**100**

Appendix E. Continued.

HUC (Drainage)	Site Name	Date	Species	N	Percent Composition
10040103 Judith	Indian Creek	9/19/06	white sucker	64	33.2
			longnose dace	53	27.5
			lake chub	41	21.2
			longnose sucker	11	5.7
			fathead minnow	9	4.7
			northern redbelly dace	7	3.6
			brassy minnow	3	1.6
			brown trout	3	1.6
			brook stickleback	1	0.5
			common carp	1	0.5
			Total	**193**	**100**
10040103 Judith	Rock Creek	7/25/06	eastern brook trout	236	73.1
			mottled sculpin	70	21.7
			rainbow trout	17	5.3
			Total	**323**	**100**
10040103 Judith	Ross Fork Creek	6/1/06	longnose dace	289	48.8
			lake chub	148	25.0
			northern redbelly dace	47	7.9
			white sucker	45	7.6
			brassy minnow	34	5.7
			fathead minnow	18	3.0
			northern redbelly dace X finescale dace	8	1.4
			common carp	3	0.5
			Total	**592**	**100**
10040103 Judith	Smith Creek	7/10/06	fathead minnow	371	68.3
			northern redbelly dace	172	31.7
			Total	**543**	**100**
10040201 Upper Musselshell	Muddy Creek	7/11/06	mottled sculpin	12	70.6
			eastern brook trout	5	29.4
			Total	**17**	**100**
10040203 Flatwillow	Flatwillow Creek (Petrolia Res. overflow canal)	5/17/06	fathead minnow	19	100.0
			Total	**19**	**100**
10040203 Flatwillow	Pike Creek	7/26/06	fathead minnow	317	100.0
			Total	**317**	**100**
10040204 Box Elder	Akins Coulee	7/13/06	fathead minnow	67	100.0
			Total	**67**	**100**

Appendix E. – Continued.

HUC (Drainage)	Site Name	Date	Species	N	Percent Composition
10040204 Box Elder	Log Gulch	9/14/06	fathead minnow	432	97.7
			northern redbelly dace	8	1.8
			northern redbelly dace X finescale dace	2	0.5
			Total	**442**	**100**
10040204 Box Elder	South Fork Bear Creek	5/16/06	fathead minnow	237	94.8
			green sunfish	13	5.2
			Total	**250**	**100**
10050002 Upper Milk	Breed Creek	10/18/06	lake chub	86	28.8
			longnose dace	79	26.4
			eastern brook trout	75	25.1
			mountain sucker	42	14.0
			white sucker	17	5.7
			Total	**299**	**100**

Appendix F. Amphibians and reptiles observed in Region 4 during prairie stream surveys, May – October 2006.

Species	Location	HUC	County	Latitude	Longitude	Date	Number of Adults	Number of Larvae	Total
western hog-nose snake	15 miles Northeast of Mosby	10040205	Garfield	47.14437	-107.89463	5/1/2006	1		1
boreal chorus frog	2 mile east of Lewistown near Boyd Creek	10040103	Fergus	47.06532	-109.37594	5/16/2006	1		1
boreal chorus frog	at Maiden creek site	10040204	Fergus	47.15783	-109.18695	5/16/2006	1	1	2
boreal chorus frog	at the South Fork of Bear creek site	10040204	Petroleum	47.22994	-108.55343	5/16/2006	5		5
common garter snake	Pike Creek rd.	10040203	Fergus	47.0001	-108.73166	5/17/2006	1		1
gopher snake	on Highway 200 east of Grass Range	10040203	Petroleum	46.94103	-108.23541	5/18/2006	1		1
gopher snake	on route 191 near Roy	10040204	Fergus	47.33345	-108.94325	5/18/2006	1		1
eastern racer	on Cat Creek rd.	10040205	Petroleum	47.03965	-108.01819	5/18/2006	1		1
eastern racer	on Cat Creek rd. near Highway 200	10040205	Petroleum	47.01233	-108.00871	5/18/2006	1		1
gopher snake	between Grass Range and Winnett	10040204	Petroleum	47.02497	-108.50248	5/22/2006	1		1
western rattlesnake	Belt creek rd. 2 miles east of Belt, MT	10030105	Cascade	47.37796	-110.91751	5/23/2006	1		1
eastern racer	East Highwood road	10030105	Cascade	47.50088	-110.82301	5/24/2006	1		1
tiger salamander	Red Coulee	10030105	Cascade	47.49795	-110.96323	5/24/2006		6	6

Appendix F. – Continued.

Species	Location	HUC	County	Latitude	Longitude	Date	Number of Adults	Number of Larvae	Total
terrestrial garter snake	Williams Creek	10030105	Judith Basin	47.27483	-110.68631	5/25/2006	1		1
northern leopard frog	5 miles SW of Eddies Corner	10040103	Judith Basin	46.96735	-109.79946	6/1/2006	1		1
common garter snake	2 Miles N of Conrad	10030203	Pondera	48.20745	-111.92567	6/6/2006	1		1
northern leopard frog	1.5 miles NW of Conrad	10030203	Pondera	48.21005	-111.94187	6/6/2006	3		3
northern leopard frog	2 Miles N of Conrad	10030203	Pondera	48.2161	-111. 94183	6/6/2006	5		5
plains garter snake	Winginaw Rd. 1.5 miles N of Hwy 44	10030203	Pondera	48.32972	-112.14245	6/7/2006	1		1
western rattlesnake	US 191 MP 73	10040205	Fergus	47.42937	-108.75131	6/14/2006	1		1
western rattlesnake	US 191 MP 74	10040205	Fergus	47.43832	-108.75137	6/14/2006	1		1
western rattlesnake	US 191 MP 77	10040205	Fergus	47.48396	-108.75118	6/14/2006	1		1
western rattlesnake	Wilder Trail 1/2 mile east of US 191	10040205	Fergus	47.48315	-108.75126	6/14/2006	1		1
great plains toad	3 miles from Harris Larval fish site	10040205	Garfield	47.20261	-107.93111	6/19/2006	1		1
plains garter snake	On the beach at Arod Lake	10030205	Teton	47.99554	-112.02874	6/20/2006	1		1
terrestrial garter snake	Near Arod Lake	10030205	Teton	47.99084	-112.03626	6/20/2006	1		1
boreal chorus frog	Farmers Coulee by Arod Lake	10030205	Teton	47.98961	-112.04884	6/21/2006	1		1
tiger salamander	1 Mile S of Pendroy Rd.	10030205	Teton	48.0582	-112.14192	6/21/2006		3	3
tiger salamander	Maucki Coulee site	10030205	Teton	48.05628	-112.13493	6/21/2006	1	1	2

Appendix F. – Continued.

Species	Location	HUC	County	Latitude	Longitude	Date	Number of Adults	Number of Larvae	Total
northern leopard frog	Mutton Coulee site	10040103	Fergus	47.62432	-109.76151	7/10/2006	150		150
tiger salamander	Mutton Coulee site	10040103	Fergus	47.62432	-109.76152	7/10/2006	15		15
northern leopard frog	Buffalo Creek site	10040103	Fergus	46.85268	-109.76321	7/12/2006	3		3
tiger salamander	Akins Coulee site	10040204	Petroleum	47.08164	-108.33226	7/13/2006		1	1
gopher snake	Boston Coulee Rd.	10030103	Cascade	47.22453	-111.39663	7/18/2006	1		1
western rattlesnake	1 mile from Eden Bridge	10030103	Cascade	47.23895	-111.40794	7/18/2006	1		1
western rattlesnake	15 miles N of Ulm	10030103	Cascade	47.30312	-111.42556	7/19/2006	1		1
tiger salamander	Cherry Coulee site	10030102	Cascade	47.21902	-111.64293	7/20/2006		5	5
western rattlesnake	5 miles S on Adel Rd.	10030102	Cascade	47.17706	-111.57585	7/20/2006	1		1
common garter snake	Rock creek site	10040103	Fergus	46.87786	-109.53057	7/25/2006	1		1
terrestrial garter snake	Rock creek site	10040103	Fergus	46.87786	-109.53057	7/25/2006	1		1
boreal chorus frog	Pike Creek site	10040203	Petroleum	46.83616	-108.51536	7/26/2006	4		4
northern leopard frog	Pike Creek site	10040203	Petroleum	46.83616	-108.51536	7/26/2006	223	50	273
northern leopard frog	Sheep creek site	10030201	Pondera	48.20144	-112.51305	8/1/2006	12		12
terrestrial garter snake	East Lake Rd.	10030203	Pondera	48.2401	-112.2296	8/2/2006	1		1
common garter snake	Blindhorse site	10030205	Teton	47.96109	-112.62211	8/2/2006	2		2
terrestrial garter snake	Blindhorse site	10030205	Teton	47.96109	-112.62211	8/2/2006	1		1

Appendix F. – Continued.

Species	Location	HUC	County	Latitude	Longitude	Date	Number of Adults	Number of Larvae	Total
eastern racer	in route - near Little Running Wolf Creek	10040103	Judith Basin	47.03024	-110.33114	8/29/2006	1		1
eastern racer	in route - near Little Running Wolf Creek	10040103	Judith Basin	47.02683	-110.33807	8/29/2006	1		1
plains garter snake	in route - near Little Running Wolf Creek	10040103	Judith Basin	47.03024	-110.33114	8/29/2006	1		1
terrestrial garter snake	in route - near Little Running Wolf Creek	10040103	Judith Basin	47.03024	-110.33114	8/29/2006	1		1
terrestrial garter snake	in route - near Little Running Wolf Creek	10040103	Judith Basin	47.01791	-110.36626	8/29/2006	1		1
western rattlesnake	in route - near Little Running Wolf Creek	10040103	Judith Basin	47.03024	-110.33114	8/29/2006	1		1
terrestrial garter snake	on gravel road near Thaine Cr. C. G.	10030102	Choteau	47.47189	-110.58939	9/5/2006	1		1
western rattlesnake	dead on road Big Sag rd.	10030102	Choteau	47.5344	-110.51502	9/5/2006	1		1
western rattlesnake	dead on road	10040102	Choteau	47.5344	-110.42931	9/5/2006	1		1
eastern racer	dead on road	10030102	Choteau	47.593	-110.55353	9/13/2006	1		1
gopher snake	dead on road	10030102	Choteau	47.56666	-110.55254	9/13/2006	1		1
gopher snake	dead on road	10030102	Choteau	47.62711	-110.58504	9/13/2006	1		1
western rattlesnake	alive on road	10030102	Choteau	47.62576	-110.56968	9/13/2006	1		1
gopher snake	on Black Butte road	10040204	Fergus	47.24724	-108.99175	9/14/2006	1		1
northern leopard frog	log gulch site	10040204	Fergus	47.19471	-109.00434	9/14/2006	4		4

Appendix F. – Continued.

Species	Location	HUC	County	Latitude	Longitude	Date	Number of Adults	Number of Larvae	Total
northern leopard frog	Indian Creek site	10040103	Fergus	47.23447	-109.68352	9/19/2006	16		16
northern leopard frog	Hamilton Coulee site	10040103	Fergus	47.31783	-109.61948	9/19/2006	13		13
western rattlesnake	on Plum Creek road	10040103	Fergus	47.24141	-109.56911	9/19/2006	1		1
eastern racer	on Cow Island road	10040101	Choteau	47.99271	-109.69982	9/21/2006	1		1
western rattlesnake	on Eskay road	10040101	Choteau	47.85875	-109.77541	9/21/2006	1		1
eastern racer		10040205	Fergus	47.51476	-108.53984	9/26/2006	1		1
gopher snake	dead on HWY 200 east of Teigan	10040204	Petroleum	47.01855	-108.48328	10/4/2006	1		1

Appendix G. Region 4 Prairie Stream Survey sites sampled, 2003-2006.