

## FISH SURVEY OF THE SASKATCHEWAN PORTION OF THE MISSOURI RIVER BASIN

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### INTRODUCTION

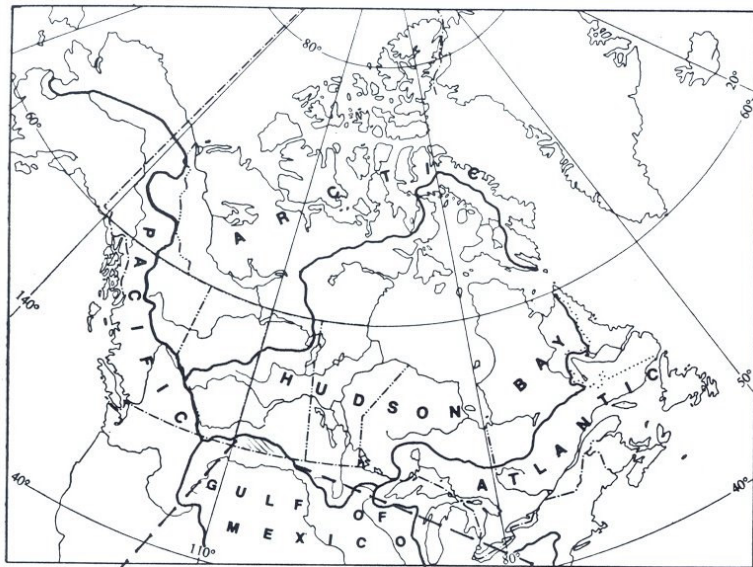
The purpose of this survey was to document the occurrence of rare and threatened fish species in the Saskatchewan portion of the upper Missouri River drainage. While much focus has been placed on species of commercial and economic importance, this survey sought information on the distribution of game and non-game fish. Many groups, such as cyprinids ("minnows"), play an important role in the food web of an aquatic ecosystem. As many cyprinids are associated with unique microhabitats, and segregate accordingly<sup>11</sup>, they serve as good indicator species for the overall health of a river, and reflect the ecosystem's ability to sustain a level of biological diversity. Other species such as the mountain sucker (*Catostomus platyrhynchus*) are also associated with specific habitats, and their population trends closely reflect habitat perturbations.<sup>5</sup>

### METHODS AND MATERIALS

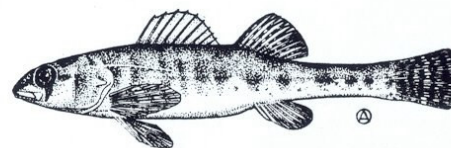
Fish were sampled throughout south-western Saskatchewan from June 19 - 30, 1993 in permanent creeks and rivers of the upper Missouri River drainage. Water from these sources eventually

flows into the Gulf of Mexico (Fig 1). Individual site selection was based mainly on accessibility. Latitude and longitude of each site was recorded using a Trimble Flightmate Global Positioning System (Model 20285-00 Rev B, Trimble Navigation Ltd.) device which is accurate to  $\pm 100$  metres on a two dimensional plane. At 11 sites, deeper and more homogeneous stretches of water were sampled by hauling a seven-metre small-mesh (3 mm bar) seine (Table 1). Wherever possible, the haul covered the entire stream width for a distance of least 20 metres. At this point, the wings of the seine were dragged up on shore, leaving the bag containing the fish in the water. Fish were then transferred to a bucket containing adequate water for respiration. For shallow, fast stretches, a Coffelt gas-powered electro-fisher was operated between 100 and 300 volts, depending on stream conductivity. Fish were dip-netted as encountered and revived in a 10 litre plastic pail with adequate water for respiration. Once the sampling procedure was completed, all fish were identified to species. Wherever possible, fish were released in the same micro-habitat from which they were removed. Any specimen which could not be confidently identified on site was anaesthetized in 2-phenoxyethanol prior to fixation in 10% formaldehyde. Subsequent identification was accomplished in the laboratory using appropriate characteristics. At each site, water temperature was recorded using a Hach digital thermometer, while stream width and

Figure 1



Drainage Basins of Canada



Iowa Darter  
*Etheostoma exile* (Girard)

▲ = Sample Site #  
(see also table 1)

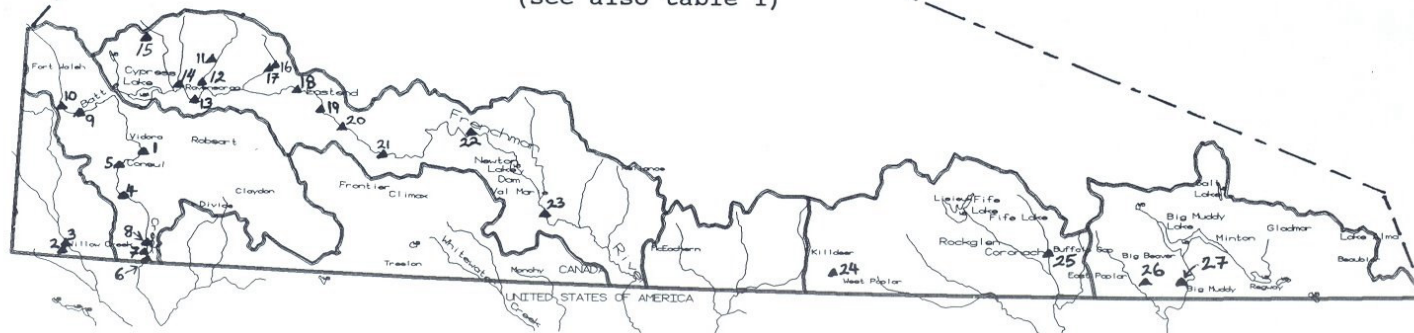


Table 1. Site Parameters

Date Sampled	Site #	Locality	Abbr.	Lat. (N)	Long. (W)	Temp (°C)	Method*	Width (m)	Depth (m)
20 June 93	1	Battle Creek 1	BC1	49° 18' 60"	109° 27' 43"	24	ES	3 - 5	0.1 - 0.65
	2	Trib. of Lodge Cr.	T.LC	49° 02' 09"	109° 48' 20"	26	SEINE	4	1
	3	Lodge Creek	LC	49° 02' 30"	109° 46' 54"		OB	3.5	0.3
	4	Battle Creek 2	BC2	49° 10' 56"	109° 32' 51"	26	ES	5	1.2
	5	Battle Creek 3	BC3	49° 15' 45"	109° 34' 06"	24.5	ES	5 - 6	0.1 - 0.65
21 June 93	6	Battle Creek 4	BC4	49° 00' 02"	109° 25' 04"	23	ES	5 - 8	0.3 - 1.0
	7	Battle Creek 5	BC5	49° 00' 08"	109° 25' 16"	23	ES	3 - 4	0.1 - 0.5
	8	Battle Creek 6	BC6	49° 02' 25"	109° 25' 22"	26	ES	3.5 - 4	0.1 - 0.5
						26	SEINE	4 - 10	0.1 - 1.0
	9	Battle Creek 7	BC7	49° 24' 45"	109° 44' 35"	22	SEINE	3.5 - 4	0.2 - 1.0
						21	SEINE	2.5 - 5.5	0.3 - 1.2
22 June 93	11	Caton Creek	CC	49° 34' 00"	109° 12' 57"	16.5	ES	1.5 - 2.5	0.1 - 0.5
	12	Farwell Creek	FC	49° 30' 12"	109° 13' 11"	17	SEINE	12 - 15	3
						16	ES	2 - 4	0.2 - 0.8
	13	Frenchman River 1	FR1	49° 27' 45"	109° 15' 22"	20	ES	10	0.2 - 0.75
	14	Davis Creek	DC	49° 30' 21"	109° 20' 02"	9	ES	4.5 - 5.0	0.5 - 1.0
23 June 93	15	Lonepine Creek	LpC	49° 37' 55"	109° 28' 48"	16	ES	1 - 4	0.2 - 1.0
27 June 93	16	Conglomerate Creek 1	CoC1	49° 34' 01"	108° 54' 26"	21	SEINE	4 - 6	0.4 - 1.0
	17	Conglomerate Creek 2	CoC2	49° 33' 48"	108° 55' 08"	19	ES	1	0.1 - 0.5
28 June 93	18	Frenchman River 2	FR2	49° 30' 50"	108° 48' 42"	19	ES	6 - 7	0.1 - 0.7
	19	Frenchman River 3	FR3	49° 27' 54"	108° 41' 49"	16	SEINE	6 - 7	0.2 - 0.8
	20	Frenchman River 4	FR4	49° 24' 40"	108° 36' 10"	14	SEINE	4 - 5	0.2 - 1.0
	21	Frenchman River 5	FR5	49° 19' 55"	108° 25' 08"	13	ES	4 - 5	0.1 - 1.0
						13	SEINE	10	0.3 - 1.2
	22	Frenchman River 6	FR6	49° 24' 37"	108° 01' 11"	13	SEINE	3 - 5	0.4 - 0.8
29 June 93	23	Frenchman River 7	FR7	49° 11' 56"	107° 41' 18"	15	ES	6	0.1 - 0.6
	24	Morgan Creek	MC	49° 04' 15"	106° 31' 44"	15	ES	1 - 3	0.4 - 0.7
30 June 93	25	E. Poplar River	EPR	49° 09' 43"	105° 28' 42"	15	ES	0.5 - 4	0.3 - 1.0
	26	Trib. of Beaver Cr	T.BC	49° 05' 24"	105° 08' 37"	15	ES	6	0.3 - 1.0
	27	Paisley Brook	PB	49° 02' 11"	104° 52' 14"	15	SEINE	2 - 8	0.1 - 0.85

\* Method: ES = electrofishing, SEINE = small mesh seine, OB = observed.

depth was measured with a metre stick. Substrate type also was noted, with all information recorded in a field book.

## RESULTS AND DISCUSSION

Twenty-seven sites were sampled (Table 1, Fig 1): Three of these were sampled twice for a total of 30 samples. Twenty of the 26 expected species<sup>6</sup> in the drainage were collected (Table 2). Of the 26 expected species, five are exotic or introduced species<sup>6</sup>. Seventeen of the 21 native or endemic species were collected. The collections made in Caton and Morgan creeks represent the first published surveys conducted on these waters (Ron Jensen, pers. comm.) New localities were also recorded for the finescale dace (*Phoxinus neogaeus*) and mountain sucker. A total of five specimens were sacrificed. Two mountain suckers and one lake chub (*Couesius plumbeus*) were taken to add to museum collections, while two brassy minnows (*Hybognathus hankinsoni*) were taken for definitive identification, since species within the genus *Hybognathus* are similar and difficult to identify in the field.<sup>12</sup>

The fathead minnow (*Pimephales promelas*), white sucker (*Catostomus commersoni*), and brook stickleback (*Culaea inconstans*) were the most common species collected in slow, deeper water, while the longnose dace (*Rhinichthys cataractae*) was common in riffle-type habitat. The northern redbelly dace (*Phoxinus eos*) was collected in good numbers from a range of habitats. All of the above species are considered common in Saskatchewan<sup>6</sup>, and it comes as no surprise that they were found

to be widespread (Table 2) and to occur in large numbers (Fig 2). These five species represented almost 88 percent of the total number of fish sampled.

Of particular interest are the species considered rare in this drainage within Saskatchewan. Single individuals of the brassy minnow and the lake chub were collected at only four and three sites, respectively (Table 2). While the lake chub is more common in lakes and other large water bodies in other parts of its range<sup>13</sup>, Wells stated that creeks and rivers are preferred in the Missouri basin.<sup>17</sup> The relative absence of the brassy minnow is also noteworthy. Scott and Crossman state that while the brassy minnow occupies creeks in eastern Canada, it is more common in bog ponds with dark, stained water.<sup>13</sup> The single Battle Creek specimen was taken in an area of dense vegetation. This habitat is favourable to the species as it feeds mainly on plant material which it is able to break down in its long, coiled digestive tract.<sup>3,12</sup>

One burbot (*Lota lota*) was collected in the same area of the Frenchman River as those specimens taken by Bevan in 1978; the distribution of this species appears to be restricted to this portion of the watershed.<sup>1</sup> The single stonecat (*Noturus flavus*), also collected in the Frenchman River at Eastend, represents a

Table 2. Presence of species in sample by site

Locality	Fish Species*																			# species/site	
	NP	RT	BT	LC	CC	BM	PD	NRBD	FD	FHM	LND	WS	MS	SR	SC	BU	BS	ID	YP		WA
Battle Creek 1							1	1	1	1	1	1						1			7
Trib. of Lodge Cr.	1																				1
Lodge Creek	1																				1
Battle Creek 2						1				1								1			3
Battle Creek 3						1	1	1		1	1	1						1			7
Battle Creek 4										1		1						1			3
Battle Creek 5											1	1						1	1		4
Battle Creek 6				1						1	1	1						1			5
Battle Creek 7								1			1		1					1			4
Battle Creek 8			1					1			1	1	1								5
Caton Creek							1	1	1	1	1	1	1					1	1		9
Fairwell Creek				1			1	1			1	1						1	1		7
Frenchman River 1								1		1		1						1	1		5
Davis Creek																		1			1
Lonepine Creek										1								1	1		3
Conglomerate Creek 1							1	1	1	1		1						1			6
Conglomerate Creek 2								1		1	1	1	1								5
Frenchman River 2						1				1	1	1				1	1				6
Frenchman River 3										1		1			1				1	1	5
Frenchman River 4										1		1							1		3
Frenchman River 5				1						1	1	1									4
Frenchman River 6				1						1	1	1									4
Frenchman River 7										1	1	1						1	1		5
Morgan Creek						1	1	1	1	1	1	1						1			8
E. Poplar River					1					1								1	1		4
Trib. of Beaver Cr										1								1			2
Paisley Brook																		1	1		2

# sites in which a species was detected:

**2 1 1 3 1 4 6 10 4 19 14 18 4 1 1 1 18 8 2 1**

\* Fish Species:

NP = Northern Pike    BM = Brassy Minnow    LND = Longnose Dace    BU = Burbot  
 RT = Rainbow Trout    PD = Pearl Dace    WS = White Sucker    BS = Brook Stickleback  
 BT = Brook Trout    NRBD = Northern Redbelly Dace    MS = Mountain Sucker    ID = Iowa Darter  
 LC = Lake Chub    FD = Finescale Dace    SR = Shorthead Redhorse    YP = Yellow Perch  
 CC = Common Carp    FHM = Fathead Minnow    SC = Stonecat    WA = Walleye

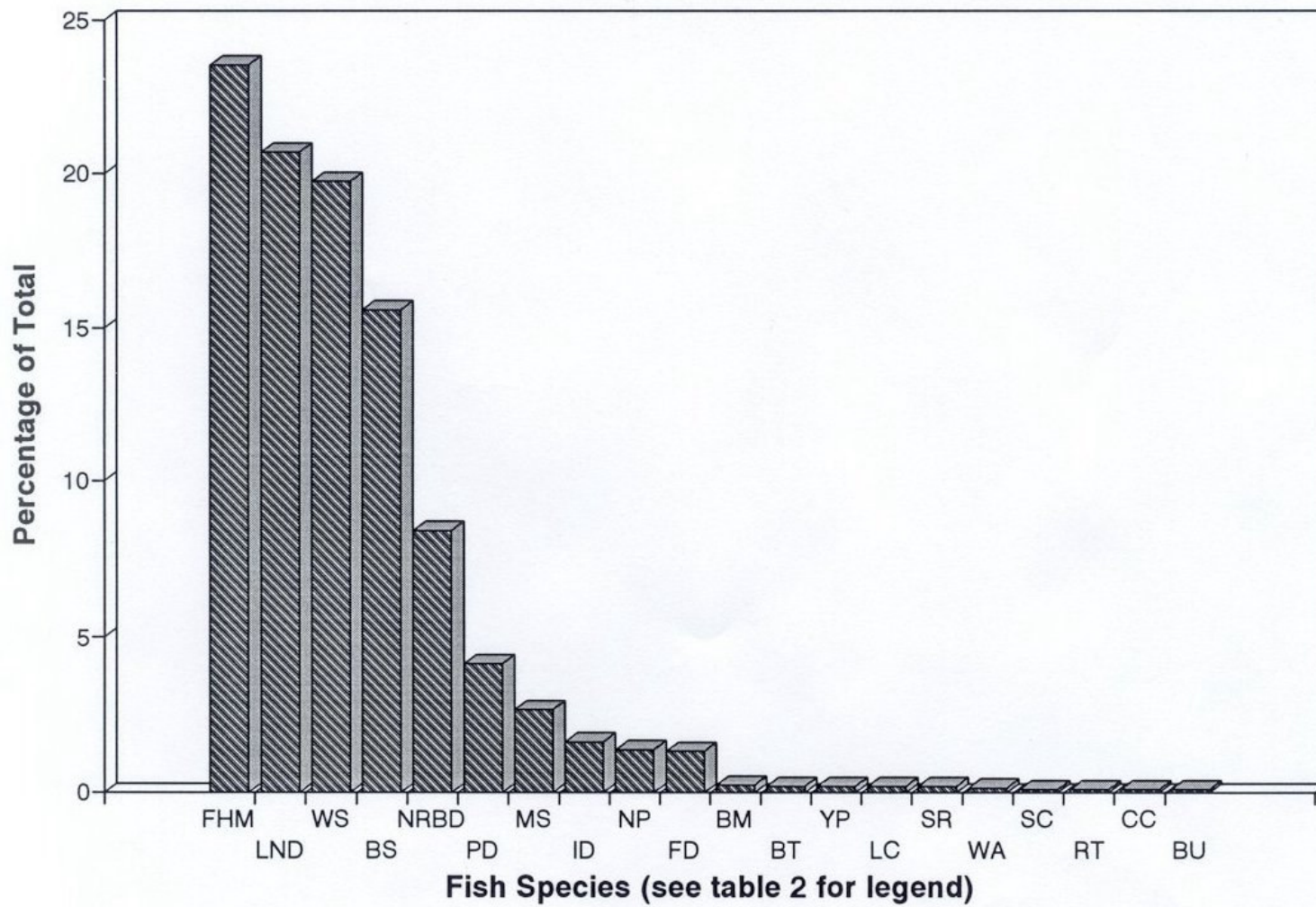


Figure 2. Relative abundance of fish species sampled (N=1696)



successfully invading species. First recorded in the Frenchman River in 1970, it expanded its range upstream in this river, and by 1982 it was present in Conglomerate Creek.<sup>1</sup> A similar invasion by the stonecat has occurred in Manitoba. Since its 1969 discovery in the Red River near Winnipeg<sup>14</sup>, it has been reported in the Assiniboine River westward to the town of Shellmouth, as well as in the Souris and Little Saskatchewan rivers.<sup>15</sup> While absent from the Qu'Appelle River in Saskatchewan, its appearance in the Assiniboine River upstream from the mouth of the Qu'Appelle would suggest occupation of the latter in future.

In general, sampling efficiency and season affect the numbers of all species. The rarity of both the stonecat and burbot in our collections may be due to sampling procedure. Both species are nocturnal<sup>10</sup> and seek shelter during the day under the cover of rocks and logs. While electrofishing effectively immobilizes these fish, both species (especially stonecats) may become wedged under rocks. Due to time constraints, only a few chosen rocks were lifted to check for wedged individuals. Nocturnal sampling may increase the yield of these two species in Missouri headwaters, thereby increasing our knowledge of their contribution to stream integrity in Saskatchewan.

Another species of interest is the mountain sucker, one of eight small catostomids restricted to western North America.<sup>4</sup> The Saskatchewan distribution of the mountain sucker includes the South Saskatchewan River and the Milk River drainage (Battle

Creek and Frenchman River tributaries), but is restricted to regions of increased elevation.<sup>4</sup> In streams, mountain suckers inhabit areas of moderate current with rocky substrate.<sup>9</sup> In a 100 metre stretch of Caton Creek, mountain suckers and longnose dace were collected exclusively in the shallow, rocky riffle areas, while white suckers, pearl dace (*Margariscus margarita*), northern redbelly dace, and fathead minnows were dominant in the pools which alternated with the riffles. The two mountain suckers taken in a seine haul of the deep pool upstream of the electrofished stretch of the creek probably were occupying the area immediately below a culvert, where a noticeable current was present. The three mountain suckers from Conglomerate Creek were also taken from a narrow, rocky stretch with high water velocity.

Curiously, no mountain suckers were collected from Sucker Creek, even though suitable habitat is plentiful. This absence of suckers may be due to the naturally-reproducing population of brook trout (*Salvelinus fontinalis*) inhabiting the creek. With a maximum size of approaching only 175 mm (Standard Length)<sup>4</sup>, the suckers are vulnerable to trout predation for a good portion of their lives.<sup>13</sup> Glover found that stream rehabilitation in South Dakota, while effective in increasing brown trout (*Salmo trutta*) populations, was detrimental to mountain sucker populations, reducing them as much as 90 percent.<sup>7</sup> Decker also found that mountain suckers become extremely rare where reservoir construction results in habitat loss due to reduced velocity and increased depth.<sup>5</sup> Similar population declines have been observed

for stonecats in areas altered to form reservoir-like conditions.<sup>16</sup> Unfortunately, no data regarding species composition in Sucker Creek are available prior to initiation of trout stocking.

While some species which occur in the Saskatchewan portion of the drainage were not collected, their absence can be attributed to restricted distribution and habitat preference or sampling bias. For example, only one locality for the flathead chub (*Platygobio gracilis*) has been reported.<sup>1</sup> Its occurrence in the Frenchman River is in accordance with its preference for fluctuating streams with turbid and alkaline water.<sup>2</sup> Collections made by the senior author in Manitoba suggest that flathead chubs also prefer relatively fast-flowing sections of medium to large rivers, where they occupy mid-channel gravel habitat. The Assiniboine River, where it flows through the Manitoba escarpment, is one such location. It is of special note that in Montana, flathead chubs are collected in association with many species considered rare in Saskatchewan, such as the mountain sucker, the stonecat, and the western silvery minnow (*Hybognathus argyritis*).<sup>8</sup>

As for the western silvery minnow, its occurrence in Saskatchewan is, at best, extremely limited, if realized at all. This species has been reported from only three localities. Of these, specimens from two of the localities were re-identified as the Mississippi Silvery Minnow (*Hybognathus nuchalis*) and

recorded as such by Atton and Merkowsky.<sup>1</sup> However, Page and Burr consider the *Hybognathus* species occurring in the upper Missouri River to be *H. argyritis*, while *H. nuchalis* is restricted to lowland areas of the Mississippi River north to Minnesota.<sup>12</sup> Both species prefer sluggish backwater areas. It is possible that positive identifications of the Saskatchewan specimens may be achieved only after examination of the basioccipital process.<sup>12</sup>

Absence of the goldeye (*Hiodon alosoides*) from our collections is due both to its limited distribution (found only in the East Poplar River) and exclusion of habitat preference from our sampling procedures. The goldeye is associated with medium to large turbid lowland rivers and lakes<sup>13</sup> where it is commercially harvested. Its added preference for impoundments<sup>12</sup> may result in population increases, given the presence of several dams on the Poplar River system.

Thus, our data suggest that possible threats to rare non-game fish species include habitat alteration, either from natural (e.g., beaver dams) or man-made sources and species introductions. The collection from the Poplar River upstream of the dams yielded a low species diversity (fathead minnows and brook sticklebacks dominated the sample) and included the only appearance of the common carp (*Cyprinus carpio*), a species regrettably introduced into North America from Europe. Impact assessments of future human-induced habitat alterations, including species introductions, should consider the consequences

to native non-game fish populations.

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