

First Record of the Plains Minnow, *Hybognathus placitus*, in Canada

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Seven Plains Minnows, *Hybognathus placitus*, Family Cyprinidae, were collected on 11 June 2003 from Morgan Creek, in Grasslands National Park, Saskatchewan, Canada. This collection is the first record of the species in Canada and extends the northern distribution limit of the species. Of 95 *Hybognathus* spp. collected at the site, only eight specimens were retained for positive identification because of the uncertain status of two conspecifics, the Western Silvery Minnow, *H. argyritis*, and the Brassy Minnow, *H. hankinsoni*, in Saskatchewan. Our findings should stimulate additional sampling to assess the identification and status of *Hybognathus* spp. in southwestern Saskatchewan. Accurate field identification of *Hybognathus* spp. remains an issue and collection of all specimens is recommended to accurately identify members within the genus.

Key Words: Plains Minnow, *Hybognathus placitus*, *Hybognathus* spp., first record, range extension, Morgan Creek, Rock Creek, Saskatchewan, Canada.

The Plains Minnow, *Hybognathus placitus*, Family Cyprinidae, is a small (≤ 15 cm; Baxter and Stone 1995), short-lived (Taylor and Miller 1990; Pflieger 1997), sexually dimorphic (Ostrand et al. 2001), herbivorous species (Page and Burr 1991; Hesse 1994). Reproduction coincides with high or receding flows in the spring and summer, after which many adults die (Sliger 1967; Taylor and Miller 1990; Pflieger 1997; Platania and Altenbach 1998). The Plains Minnow inhabits slower waters and side pools of larger, turbid streams, mainly west of the Missouri River from Montana and North Dakota, south to central Texas (Baxter and Stone 1995; Pflieger 1997).

Similar morphology and variation in meristics within *Hybognathus* spp. has made many aspects regarding identification, taxonomy, and phylogeny difficult, but efforts have been made to clarify sources of confusion throughout their range (Niazi and Moore 1962; Al-Rawi and Cross 1964; Schmidt 1994; Scheurer et al. 2003). Efforts concerning identification have proven beneficial, especially when morphologically similar species of the genus *Hybognathus* coexist. The shape of the basioccipital bone, dorsal fin profile, and number of apical scale radii are the most definitive methods to distinguish among members of the genus. The basioccipital bone appears peg-like in *H. placitus* compared to the broad process of the Western Silvery Minnow, *H. argyritis*, and the Mississippi Silvery Minnow, *H. nuchalis*, and the straight-edged process of the Eastern Silvery Minnow, *H. regius* (Page and Burr 1991). The rounded dorsal fin profile and number of apical scale radii (about 20) can be used to separate the Brassy Minnow, *H. hankinsoni*, from other *Hybognathus* spp. that

have a pointed dorsal fin profile and from 8-14 apical scale radii (Baxter and Stone 1995; Pflieger 1997). When *H. placitus* and *H. argyritis* coexist, they often segregate ecologically, with *H. placitus* inhabiting the main channel and *H. argyritis* inhabiting protected backwaters and channel border habitats (Pflieger 1971; Welker 2000).

The Plains Minnow is listed in Colorado, Kansas, and North Dakota as a species of concern but has no status in Alberta, Saskatchewan, Montana, Wyoming, South Dakota, Nebraska, Iowa, and Missouri (Loomis 1997). Plains Minnow have been collected from the Rock Creek drainage (R. Lott, Montana Fish, Wildlife, and Parks, Glasgow, unpublished data, 2003), the Frenchman River drainage (Sylvester 2004), and several tributaries to the Missouri and Yellowstone Rivers (Gould and Brown 1966) in Montana. Plains Minnows have never been reported in Canada but absence of the species in Saskatchewan is likely due to lack of sampling effort (R. E. Jensen, Saskatchewan Environment and Resource Management Swift Current personal communication, 2003). Modifications such as dams that cause changes in the hydrologic regime, increases in water clarity, and species introductions have caused the species to be extirpated from many systems (Cross and Moss 1987; Pflieger and Grace 1987; Tomelleri and Eberle 1990; Hesse 1994). However, the species often persists where relatively undisturbed habitat conditions exist in the upper Missouri River basin.

The purpose of this study is to report the first known finding of the Plains Minnow, *H. placitus*, in Canada. Information was collected in the Rock Creek drainage, Saskatchewan, as part of an accuracy assessment of

the fish distribution models for the Aquatic Gap Analysis Program of the United States Geological Survey (Wall et al. 2002*).

Materials and Methods

Study Area

The Rock Creek drainage is located in southwestern Saskatchewan and north-central Montana (Figure 1). Rock Creek flows southerly and is a direct tributary to the Milk River, which flows into the Missouri River below Fort Peck Reservoir, Montana. Rock Creek flows through mixed-grass prairie that contains species such as Needle-and-thread Grass (*Stipa comata*), Blue Gramma (*Bouteloua gracilis*), Western Wheat Grass (*Agropyron smithii*), sagebrush (*Artemisia* sp.), Greasewood (*Sarcobatus vermiculatus*), Prickly Pear Cactus (*Opuntia polyacantha*), Buckbrush, (*Symphoricarpos accidentalis*), willow (*Salix* sp.), Thorny Buffalo Berry (*Shepherdia azgenteas*), Trembling Aspen (*Populus tremuloides*), and Manitoba Maple (*Acer negundo*), (Parks Canada 2002*). Major anthropogenic features such as dams have not altered the drainage in Saskat-

chewan but farming and livestock grazing have impacted the local landscape and some streams (Parks Canada 2002*). Three sites were sampled from 10 June 2003 to 11 June 2003 (Figure 1).

Site Selection and Fish Sampling

Site selections in the Rock Creek drainage were based on access to streams via public road crossings and contacts with personnel from the Grasslands National Park office in Val Marie, Saskatchewan. A Smith-Root Model LR-24 backpack electrofisher was the primary fish sampling gear and no block nets were used. Settings were adjusted outside of the reach until fish were sufficiently stunned and vulnerable to dip netting. Electrofishing proceeded upstream in a zigzag pattern and sampled all available habitat types. Fishes captured while electrofishing were held in a live cage, while additional sampling with a bag seine (5 or 10 m \times 1.2 m, 4.8 mm mesh) was performed. Fishes collected using the seine were placed in a separate live cage. All fishes were then identified to species and counted by gear type. Specimens that could not be identified

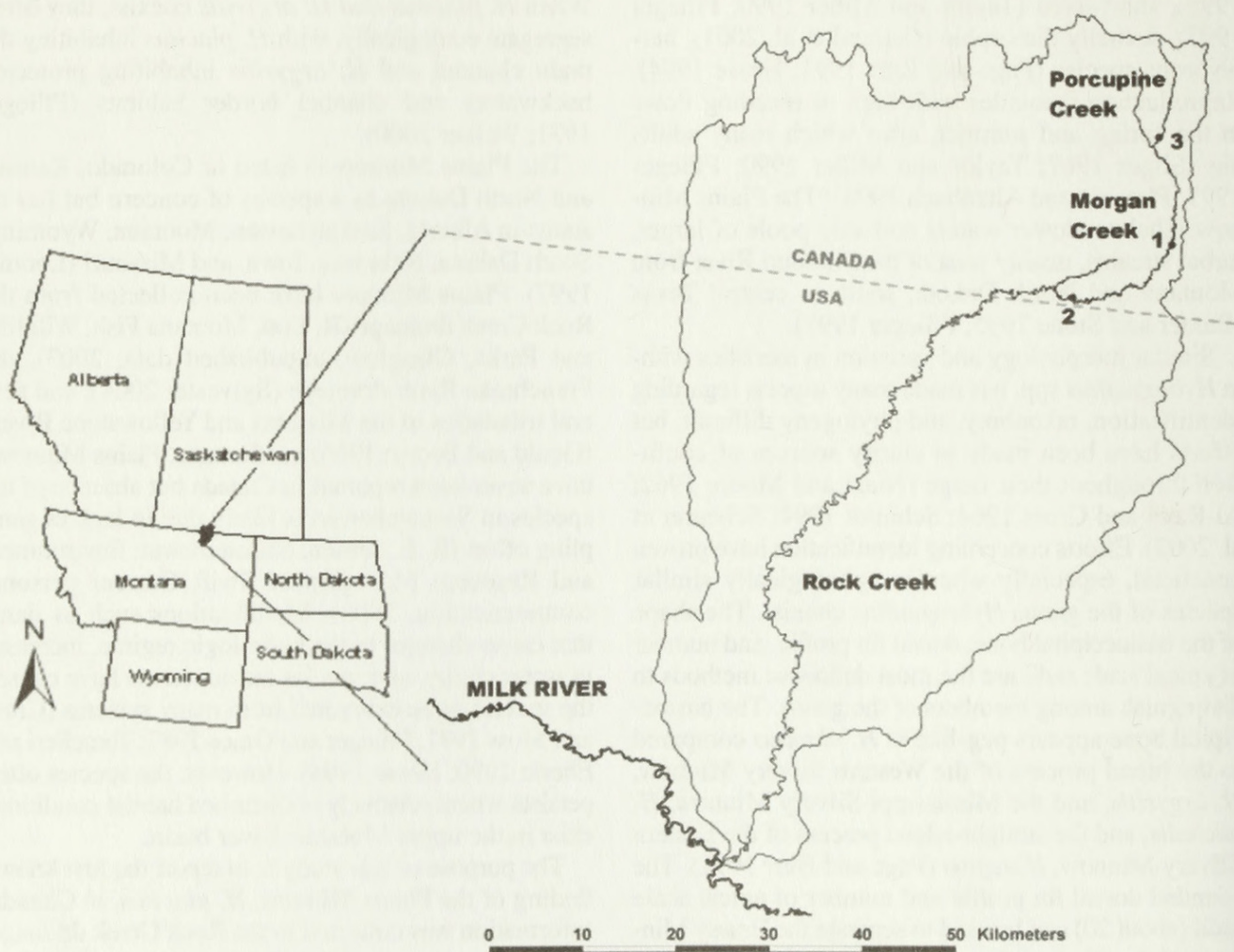


FIGURE 1. Location of the Rock Creek watershed in Canada and the United States. The dashed line indicates the international boundary between Canada and the United States and the points with corresponding numbers represent the 2003 sample locations within the Rock Creek watershed.

TABLE 1. Number of fish collected by species at each of three sites sampled in the Rock Creek drainage, Saskatchewan, Canada, from 10 to 11 June 2003.

Species	Common Name	Site 1	Site 2	Site 3
<i>Catostomus commersonii</i>	White Sucker	36	20	55
<i>Couesius plumbeus</i>	Lake Chub	5	73	118
<i>Culea inconstans</i>	Brook Stickleback	10	0	67
<i>Etheostoma exile</i>	Iowa Darter	1	0	0
<i>Hybognathus hankinsoni</i>	Brassy Minnow	0	1	20
<i>Hybognathus placitus</i>	Plains Minnow	0	7	0
<i>Hybognathus</i> spp.	Unknown	0	87	127
<i>Margariscus margarita</i>	Pearl Dace	33	69	347
<i>Phoxinus eos</i>	Northern Redbelly Dace	35	0	197
<i>Pimephales promelas</i>	Fathead Minnow	64	157	107
<i>Rhinichthys cataractae</i>	Longnose Dace	7	7	6

in the field were retained following collection permit stipulations, fixed in 10% formalin, and later identified in the laboratory at South Dakota State University, Brookings, South Dakota, United States.

Measurements, Meristic Counts, Sex, and Maturity

Hybognathus placitus were measured to the nearest millimeter for total and fork length and weighed to the nearest gram. Meristic counts were performed following standard methods (Al-Rawi and Cross 1964). Scales above the lateral line were counted across the back using the second row of scales in front of the dorsal fin insertion. Scales below the lateral line were counted around the belly using the second row of scales in front of the pelvic fins. Scales were collected below the dorsal fin and above the lateral line for approximate apical scale radii count (i.e., <15 or closer to 20). Sex and maturity of *H. placitus* vouchers were determined in the lab by dissection and microscopic examination of gonads. The shape and profile of the basioccipital process was also examined after dissection. Voucher specimens were added to the fish collection at South Dakota State University.

Results and Discussion

A total of 1656 fish representing 10 species were collected in our survey of the Rock Creek drainage in Saskatchewan. Pearl Dace, *Margariscus margarita*, Fathead Minnow, *Pimephales promelas*, and Northern Redbelly Dace, *Phoxinus eos*, dominated the catch (Table 1). No *Hybognathus* spp. were collected at site 1 (49°04'15.6"N 106°31'49.9"W). A total of 222 specimens were tentatively identified as *Hybognathus* spp. in the field from sites 2 (49°00'32.2"N 106°39'51.9"W) and site 3 (49°10'27.9"N 106°33'57.7"W). Eight *Hybognathus* specimens were retained for positive identification from site 2 and the remaining specimens ($N = 87$) were released because of the uncertain status of conspecifics, *H. argyritis* and *H. hankinsoni*. Based on communications with provincial fisheries personnel (R. E. Jensen, Saskatchewan and Resource Management, personal communication), the field identity of

voucher *Hybognathus* spp. specimens from site 2 was believed to be *H. argyritis*. Of the eight *Hybognathus* spp. vouchers collected from site 2, 1 was identified as *H. hankinsoni* and 7 as *H. placitus*, a previously undocumented species in Saskatchewan and Canada. The pointed dorsal fin profile, peg-like shape of the basioccipital bone, and the number of apical scale radii (<15) were used to identify *Hybognathus placitus* specimens. *Hybognathus placitus* specimens (post fixation) ranged from 46 to 91 mm total length, from 44 to 84 mm fork length, weighed from 0.7 to 5.8 g, and included one mature, gravid female (Table 2). Meristic counts were similar to specimens from Wyoming and South Dakota (Al-Rawi and Cross 1964). No specimens were identified as *H. argyritis*. Known *H. hankinsoni* were collected at site 3 (males in color) and unknown vouchers from site 3 believed to be *H. hankinsoni* were verified as *H. hankinsoni* in the lab.

Habitat at site 2 appeared to represent the preferred habitat of the *H. placitus*. The majority of the site was run and pool habitat, water velocities were slow (< 0.5 m/s), substrates were generally small (< 2.0 mm), and water was turbid. Site 1 contained predominately cobble substrate, which is not the preferred habitat of *H. placitus* (Pflieger 1997). Site 3 had some boulder and cobble present due to a culvert and road crossing, was spring fed, had high water clarity, and contained bog-like vegetation and cattails (*Typha* spp.). Habitat conditions at site 3 were more suitable for the Northern Redbelly Dace, which were the second most abundant species at the site. Mean wetted width of the sites ranged from 2.26 to 3.24 m, total dissolved solids ranged from 740 to 1270 (S, temperature from 13.9 to 16.8°C, salinity from 0.3 to 0.6 ppt, specific conductivity from 699 to 1150 (S, pH from 8.4 to 8.9, and dissolved oxygen ranged from 7.6 to 10.7 ppm. Riparian vegetation was a mixture of grasses, sedges, and shrubs at all three sites.

This collection of seven Plains Minnow, *H. placitus*, in Morgan Creek, Saskatchewan represents a new species record in Canadian waters and extends the northern

TABLE 2. Post fixation measurements, meristic counts, sex, and maturity of *H. placitus* specimens collected from Morgan Creek, Saskatchewan on 11 June 2003. An asterisk identifies characteristics used to identify *H. placitus* specimens from other members of the genus.

Characteristic	Specimen Number						
	1	2	3	4	5	6	7
Sex	Unknown	Female	Male	Male	Male	Male	Male
Maturity	Immature	Mature	Mature	Mature	Mature	Mature	Immature
Total length (mm)	46	76	87	91	86	91	71
Fork length (mm)	44	70	79	84	79	84	66
Weight (g)	0.7	4.1	5.8	5.6	4.4	5.5	2.7
Lateral line scales	36	38	38	37	39	38	39
Scales above lateral line	13	13	13	13	13	13	13
Scales below lateral line	17	18	15	15	15	16	18
Pectoral fin rays	15	16	16	16	15	16	15
Anal fin rays	8	8	8	8	8	8	8
Dorsal fin rays	8	8	8	8	8	8	8
Dorsal fin profile*	Pointed	Pointed	Pointed	Pointed	Pointed	Pointed	Pointed
Basioccipital process shape*	Peg-like	Peg-like	Peg-like	Peg-like	Peg-like	Peg-like	Peg-like
Apical scale radii*	<15	<15	<15	<15	<15	<15	<15

distribution limit of the species. *Hybognathus argyritis*, *H. hankinsoni*, *H. nuchalis*, and *H. regius* have all been documented in Canada (Willock 1969; Scott and Crossman 1973; Bishop 1975; Harbicht et al. 1988; Page and Burr 1991; Nelson and Paetz 1992; Houston 1998) and *Hybognathus argyritis* is listed as threatened in Alberta. Although collection of *H. placitus* from Morgan Creek is not surprising based on other collection locations within the Rock Creek drainage and the adjacent Frenchman River drainage, it is the first known record in Canada. Presence of the species is likely due to the relatively undisturbed conditions in that portion of the Rock Creek watershed. After our survey in 2003, more detailed examination of *H. argyritis* museum specimens previously collected in Saskatchewan resulted in changes of their identity to *H. hankinsoni* (K. M. Murphy, Saskatchewan Environment and Resource Management, Swift Current, personal communication). Therefore, the presence of *H. argyritis* in Saskatchewan has not been verified to date.

Collection and preservation of all *Hybognathus* specimens may be the only way to determine the true identity and presence of *Hybognathus* spp. in Canada because accurate field identification is difficult. We recommend further investigation into the distribution, abundance, population characteristics, life history, and identification of *Hybognathus* spp. in Saskatchewan and suggest addition of *H. placitus* to the species list of both Saskatchewan and Canada. Although the species is common elsewhere, protection under the recently passed Species at Risk Act in Canada may be warranted after further investigation into the population status of the species and other members in the genus.

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Documents Cited (marked * in text)
Parks Canada. 2002. Grasslands National Park of Canada Management Plan, October 2002.
Wall, S. S., C. J. Kopplin, B. L. Kopplin, J. A. Jenks, and C. R. Berry, Jr. 2002. Expanding South Dakota Aquatic Gap Analysis to the Upper Missouri River Basin. Pages 40-43 in GAP Analysis Bulletin Number 11. United States Department of the Interior and United States Geological Survey, Moscow, Idaho.

Literature Cited
Al-Rawi, A. H., and F. B. Cross. 1964. Variation in the plains minnow, *Hybognathus placitus* Girard. Transactions of the Kansas Academy of Science 67: 154-168.
Baxter, G. T., and M. D. Stone. 1995. Fishes of Wyoming. Wyoming Game and Fish Department, Cheyenne, Wyoming.
Bishop, F. G. 1975. A new distribution record for brassy minnow in northwestern Alberta. Canadian Field-Naturalist 89: 319-320.
Cross, F. B., and R. E. Moss. 1987. Historic changes in fish communities and aquatic habitats in plains streams of Kansas. Pages 155-165 in Community and evolutionary ecology of North American stream fishes. Edited by W. J. Matthews and D. C. Heins. University of Oklahoma Press, Norman.
Gould, W. R., and C. J. D. Brown. 1966. The distribution of *Hybognathus* (Cyprinidae) in Montana. Proceedings of the Montana Academy of Sciences 26: 54-56.
Harbicht, S. M., W. G. Franzin, and K. W. Stewart. 1988. New distributional records for the minnows *Hybognathus*

- hankinsoni*, *Phoxinus eos*, and *P. neogaeus* in Manitoba. Canadian Field-Naturalist 102: 475-484.
- Hesse, L. W.** 1994. The status of Nebraska fishes in the Missouri River, 5. Selected chubs and minnows (Cyprinidae): sicklefin chub (*Macrhybopsis meeki*), sturgeon chub (*M. gelida*), silver chub (*M. storeriana*), speckled chub (*M. aestivalis*), flathead chub (*Platygobio gracilis*), plains minnow (*Hybognathus placitus*), and western silvery minnow (*H. argyritis*). Transactions of the Nebraska Academy of Sciences 21: 99-108.
- Houston, J.** 1998. Status of the Western Silvery Minnow, *Hybognathus argyritis*, in Canada. Canadian Field-Naturalist 112: 147-153.
- Loomis, T. M.** 1997. Survey of the fishes and habitat in the upper Moreau River, Perkins County, South Dakota. Master's thesis. South Dakota State University, Brookings.
- Nelson, J. S., and M. J. Paetz.** 1992. The fishes of Alberta. Second edition. University of Alberta Press, Edmonton, Alberta.
- Niazi, A. D., and G. A. Moore.** 1962. The Weberian apparatus of *Hybognathus placitus* and *H. nuchalis* (Cyprinidae). Southwestern Naturalist 7: 41-50.
- Ostrand, K. G., G. R. Wilde, R. E. Strauss, and R. R. Young.** 2001. Sexual dimorphism in plains minnow, *Hybognathus placitus*. Copeia 2001: 563-565.
- Page, L. M., and B. M. Burr.** 1991. A field guide to freshwater fishes of North America north of Mexico. Houghton Mifflin Company, Boston.
- Pflieger, W. L.** 1971. A distributional study of Missouri Fishes. University of Kansas Publications Museum of Natural History 20: 225-570.
- Pflieger, W. L.** 1997. The fishes of Missouri. Missouri Department of Conservation, Jefferson City, Missouri.
- Pflieger, W. L., and T. B. Grace.** 1987. Changes in fish fauna of the lower Missouri River 1940-1983. Pages 166-177 in Community and evolutionary ecology of North American stream fishes. Edited by W. J. Matthews and D. C. Heins. University of Oklahoma Press, Norman.
- Platania, S. P., and C. S. Altenbach.** 1998. Reproductive strategies and egg types of seven Rio Grande Basin Cyprinids. Copeia 1998: 559-569.
- Scheurer, J. A., K. R. Bestgen, and K. D. Fausch.** 2003. Resolving taxonomy and historic distribution for conservation of rare Great Plains fishes: *Hybognathus* (Teleostei: Cyprinidae) in eastern Colorado basins. Copeia 2003: 1-12.
- Schmidt, T. R.** 1994. Phylogenetic relationships of the genus *Hybognathus* (Teleostei: Cyprinidae). Copeia 1994: 622-630.
- Scott, W. B., and E. J. Crossman.** 1973. Freshwater Fishes of Canada. Fisheries Research Board of Canada Bulletin 184. 966 pages.
- Sliger, W. A.** 1967. The embryology, egg structure, micropyle, and egg membranes of the plains minnow, *Hybognathus placitus* (Girard). Master's thesis, Oklahoma State University, Stillwater.
- Sylvester, R. M.** 2004. Upper Missouri River Basin Aquatic GAP fish distribution model accuracy assessment and white sucker, *Catostomus commersonii*, population characteristics in the upper Missouri River basin. Master's thesis. South Dakota State University, Brookings.
- Taylor, C. M., and R. J. Miller.** 1990. Reproductive ecology and population structure of the plains minnow, *Hybognathus placitus* (Pisces: Cyprinidae), in Central Oklahoma. American Midland Naturalist 123: 32-39.
- Tomelleri, J. R., and M. E. Eberle.** 1990. Fishes of the Central United States. University Press of Kansas, Lawrence.
- Welker, T. L.** 2000. Ecology and structure of fish communities in the Missouri and Lower Yellowstone River. Ph.D. dissertation, University of Idaho, Moscow.
- Willock, T. A.** 1969. Distributional list of fishes in the Missouri drainage of Canada. Journal Fisheries Research Board of Canada 26: 1439-1449.

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