

**Kansas Recovery Plan
for
Three Big River Fish Species: Sicklefin chub
(*Macrhybopsis meeki*), Sturgeon Chub
(*Macrhybopsis gelida*), and Western silvery
minnow (*Hybognathus argyritis*)**



Sturgeon chub photo courtesy of Wyoming Dept. of Game and Fish



Western silvery minnow photo courtesy of Suzanne Collins



Sicklefin chub

October, 2003

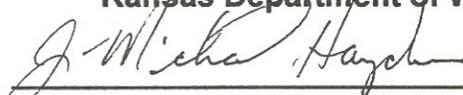
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For

Kansas Department of Wildlife & Parks

Approved:


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I. Introduction

This plan addresses the recovery needs for four fish species known to occur in specific large rivers of Kansas, primarily the Kansas and Missouri Rivers. These fishes are the western silvery minnow, *Hybognathus argyritis*, sicklefin chub, *Macrhybopsis meeki*; and the sturgeon chub, *Macrhybopsis gelida*. The western silvery minnow and the sturgeon chub are currently listed as threatened in Kansas while the sicklefin chub is listed as endangered (K.A.R. 115-5-1 and 115-5-2).

This plan, as governed by K.A.R. 115-5-4, outlines specific strategies and methods to recover and delist these three fishes.

II. Species Accounts

A. Western Silvery Minnow *Hybognathus argyritis* Girard

I. Taxonomy and Description:

Original Description: Formerly recognized as a distinct species by Pflieger (1971). Type specimens include seven individuals (USNM 87) from Milk River, Montana and one specimen from Arkansas River, near Ft. Smith, Arkansas. (MCZ 1788) (Girard 1856). The latter specimen is considered *H. nuchalis* as *H. argyritis* is not known from the Arkansas River.

Taxonomic Discussion: Four species of *Hybognathus* were recognized. *H. hanksoni* and *H. hayi* represented no taxonomic difficulties. *H. nuchalis* and *H. placitus* are superficially similar. Niazi and Moore (1962) and Baily and Allum (1962) present differences in the pharyngeal apparatus clearly defining them as separate species. Different workers formerly described them as separate species, subspecies, or environmental variants. *H. nuchalis* was divided into two subspecies *H. n. regius* Girard and *H.n. nuchalis*. The former occurred on the Atlantic Coast while the latter occurred in the Mississippi Valley. Because the species are allopatric (Bailey 1954) and differences occur between the species in the shape of the basioccipital process, they are considered separate species (Pflieger 1971). Additionally, Pflieger (1971) observed the formerly reported *H. n. nuchalis* to be a complex of two forms upon examination of specimens. One of the forms occurs sympatrically with *H. placitus* in the Missouri River system and it is this form that compelled Pflieger (1971) to resurrect the name *Hybognathus argyritis* Girard for application. The other form formerly recognized as *H. n. nuchalis* became *H. nuchalis*, the central silvery minnow. This species occurs in Missouri along its eastern border and throughout the Mississippi River. Both *H. argyritis* and *H. nuchalis* are sympatric in portions of the Mississippi River drainage but retain characteristic differences.

Description: Very similar to central silvery minnow but differs in having a slightly smaller eye (diameter going 4.0 to 4.8 times into head length; diameter of eye less than or equal to width of mouth opening; basioccipital process broad and blade-like with a straight or slightly concave back margin; and muscles of pharyngeal arches moderately well separated at point of attachment to rear part of basioccipital process (Pflieger 1975). The western silvery minnow has a slender flattened body ventrally. Mouth is thin-lipped, set ventrally, and lacks barbels. Gut of the fish is long and coiled, peritoneum black. Dorsal fin is high and pointed and is located directly over pelvic fins. Anal fin contains eight rays. The fish is straw colored with yellowish white or dull silvery sides that are not transparent (Cross and Collins 1995).

2. **Historical and Current Distribution**

The Western Silvery Minnow occurs most commonly in the Missouri River and large tributaries of the Prairie Region (Pflieger 1975). It also occurs in the Mississippi River from the mouth of the Missouri River downstream to Scott County, Missouri. Cross and Collins (1995) report the former occurrence of the species in the lower Kansas River especially after flooding or high water. Cross (1995) reported the species commonly collected in the Kansas River except for the last three years yielding no specimens during sampling. The Kansas Natural Heritage Inventory lists fourteen records (Table 1) of these species occurrence in Kansas. Additionally Stark et. al (1987) report *H. argyritis* from the N.F. Wolf River in Brown County and from the Nemaha River Nemaha County. Interestingly specimens of mixed taxonomic characters, between *H. argyritis* and *H. placitis*, were also reported as well as specimens of *H. placitis* in the latter collection.

3. **Species Associations**

Little information is known relating to sample sizes and abundance data relative to other species for *H. argyritis*. In Nebraska the species was reported to have increased in abundance from 1890 to 1940 (Johnson 1942) however Pflieger and Grace (1987) reported declines in the populations after 1940. Pflieger (1975) indicated that the fish was much less abundant than the plains minnow in the Missouri River. *H. argyritis* was often found in schools with plains minnows, sliver chubs, and flathead chubs. Hesse (1994) reported that seven species: sicklefin chubs, *Macrhybopsis meeki*, sturgeon chub, *M. gelida*; sliver chub, *M. Storeriana*; speckled chub, *M. aestivalis*; flathead chub, *Platygobio gracilis*; plains minnow, *H. placitus*; and the western silvery minnow, *H. argyritis*; have declined in the Missouri River in Nebraska by 98 per cent.

All of these fishes are adapted to life in rivers of large size, warm temperatures, turbid conditions and with numerous sandbars, backwaters, and snags.

4. Population Size and Abundance

Little data is available for Kansas waters concerning populations. Hesse (1994) summarizes catch data for many locations based on CPUE data for seine hauls. It appears clear that data indicate an overall decline with extirpation having occurred in the Lower Kansas River as noted by Cross (1991). Most reports on decline are qualitative in nature.

5. Reproduction

Habits and life history of *H. argyritis* are not well known (Pflieger 1975). Habits may be similar to *H. nuchalis* however no reproductive studies have been carried out for that species. *H. regius* Girard is known to deposit non-adhesive eggs in quiet waters over a silt bottom (Raney 1939). Collins et al. (1995) report reproduction of *H. argyritis* from April to August and presume eggs are released in strong currents with development occurring as eggs drift. No source was provided for this information given.

6. Food and Feeding Requirements

No studies were found documenting food habits of *H. argyritis*. *H. placitus* is reported to feed on diatoms or algae in calm, shallow back waters (Cross and Collins 1995).

B. Sicklefin Chub, *Macrhybopsis meeki*: Jordan and Evermann

1. Taxonomy and Description:

Original Description: Type specimens are from collections made by Jordan and Evermann (1896) (USNM 35889).

Taxonomic Discussion (USFWS 1993): The first collection of the sicklefin chub was from the Missouri River near St. Joseph, Missouri in 1884 by Jordan and Meek (1895). These specimens were misidentified and the type specimens came from collections as noted above which were taken in the same general locale. Jordan and Evermann (1896) named the sicklefin chub, placing it in a genus *Erimystax* with the scientific binomial *Hybopsis meeki*. Jordan (1929) failed to include *Erimyotax meeki* in the genus. Bailey (1951) recombined *E. meeki* into the genus *Hybopsis*. Guillory (1979) listed the species as *H. meeki* in his collections. Mayden (1989) moved the species to the genus *Macrhybopsis* as *M. meeki*.

Description (Cross 1967): Body terete, caudal peduncle slender; head large, bluntly rounded, its length about ¼ of standard length; snout not depressed, protruding slightly beyond mouth; barbells conspicuous; eye small, its diameter 8.0 or more in head length in adults, often partly overgrown by skin; scale pockets studded with taste buds but without fleshy ridges; lateral-line scales 46-50 (given as 44 by Jordan and Evermann, loc cit.); scale rows around body 17-2-21, breast mostly scaleless; fins large and strongly falcate; pectoral fins longer than head, and extending beyond insertion of pelvics; dorsal, anal, and pelvic fin-rays 8, pectoral rays 15 or 16, pharyngeal teeth 0,4-4,0; intestine short, peritoneum silvery; vertebrae usually 43.

Coloration pallid, silvery; lower lobe of caudal fin dark-pigmented, with narrow white ventral edge; fins otherwise unpigmented.

Longest Kansas specimen 4 inches.

2. Historical and Current Distribution

The sicklefin chub occurs in or has been known to occur in thirteen states (USFWS 1993). It is principally found in the Missouri River mainstream and the Mississippi mainstem below the mouth of the Missouri River (Baily and Allum 1962). The only records of the fish in any tributary of either river are from the lower Kansas River at Lawrence and Eudora in Douglas County, Kansas. The USFWS (1993) indicates the species is extirpated from the Kansas River, however the few collections ever made there suggest vagrant specimens perhaps after high flows. Currently it may only be found in Kansas in the Missouri River, however its present status there is unknown (Collins et al. 1995).

3. Species Associations

The sicklefin chub is found over smooth, sand or gravel bottoms in deep water with strong currents (Cross 1967) in turbid rivers (Pflieger 1975). Species with similar habitat utilization include the sturgeon chub (Jenkins 1980), flathead chub (Olund and Cross 1961), and pallid sturgeon (Baily and Cross 1954).

4. Population Size and Abundance

Collections of *M. meeki* in the Kansas River are few and the most recent reported is 1965 (Kansas Biological Survey records). In all cases but a few specimens were collected with no data available concerning other species or numbers collected simultaneously from the samples. Pflieger and Grace (1987) reported sicklefin chubs comprised from 0.7 to 2.8% of fishes collected in historic samples in the Missouri River. Interestingly they found the species

nearly absent from the Missouri River between Kansas City and the Iowa border. In short, virtually nothing is known about the status of this species in Kansas, other than it appears extremely rare if present at all.

5. Reproduction

Pflieger (1975) reports young sicklefin chubs being collected in July from the Missouri River in Missouri. That suggests a spring spawning season. Lopinot and Smith (1973) report reproduction occurs at age 1 and spawning occurs annually. However the reproductive biology of the fish is unknown.

6. Food and Feeding Requirements

Food habits of *H. meeki* are largely unknown. Reigh and Elsen (1979) examined stomach contents of three specimens. Contents included blackfly pupa, insect exoskeletons, and unidentifiable material.

C. Sturgeon Chub, *Macrhybopsis gelida* (Girard)

1. Taxonomy and Description

Original Description: Sturgeon chub were collected firstly from the Milk River in Montana, during the Pacific Railroad Surveys of 1853-1855 by Dr. George Suckley, under Governor Isaac I. Stevens (Girard 1856). Ten type specimens are housed in the United States National Museum (USNM 59137).

Taxonomic Discussion: Jordan and Gilbert (1882) listed the species as *Ceratichthys gelidus*. The genus *Ceratichthys* was consolidated by Jordan and Evermann (1896) into the genus *Hybopsis* with the sturgeon chub being placed in the subgenus *Erimystax* as *H. gelidus*. The species was moved into the subgenus *Macrhybopsis* by Cockerel and Allison (1909). Jordan (1920) gave *Marchybopsis* generic status. *H. gelidus* was changed to *gelida* (Jordan et al. 1930). Bailey (1951) returned the species to *Hybopsis*. Later, the species was reclassified to *Macrhybopsis* (Mayden 1989).

Description (Cross 1967): Body slender, with fleshy longitudinal ridges on scale pockets; head depressed, with minute sensory buds dorsally and large sensory papillae ventrally; snout long, depressed, and fleshy, extending far forward of horizontal mouth; single barbell at each corner of mouth; eye small, diameter 1/5 to 1/6 of head length; lateral line scales 39-43; scale rows over back, above lateral line 13 or 14; 4-7 rows below lateral line, venter naked in front of pelvic fins; fins low, not strongly falcate; dorsal,

pelvic, and anal rays usually eight; pectoral rays 13-15; pharyngeal teeth 1,4-4,1; intestine short, peritoneum silvery; vertebra 39-40.

Coloration pallid, brown dorsally, silvery on lower sides and venter; less transparent in life than, and lacking discrete dark speckles characteristic of *H. aestivalis*; caudal fin with lower lobe dark-pigmented except along its milky-white ventral margin; fins otherwise unpigmented.

Breeding males seemingly lack tubercles except on rays 2-9 of pectoral fins; tubercles small, in single file on basal stem and branches of each ray, best developed distally.

Longest Kansas specimen 3 ½ inches.

2. Historical and Current Distribution

Sturgeon chub are endemic to the Missouri and lower Mississippi Rivers and many Missouri River tributaries. In Kansas, sturgeon chub have been collected from the Smoky Hill River near its confluence with the Republican River in Geary County; the Kansas River, and the Missouri River. The Smoky Hill collection occurred in 1964. Subsequent surveys in 1990 failed to find *H. gelida* at the former location. Other sites sampled in the Kansas River in 1990 produced specimens during 1990 as well as in the Missouri River (Kansas Biological Survey 2002). The sturgeon chub inhabits shallow areas with strong currents over fine gravel or coarse sand. Islands and braided channels seem to provide needed habitat (Cross and Collins 1995). Werdon (1992) sampled 106 sites in the Missouri River basin where *H. gelida* was formerly reported. Specimens were not collected at any formerly known sites of occurrence in Kansas.

3. Species Associations

Species having similar habitat requirements and distributions include the sicklefin chub (Jenkins 1980); and the flathead chub, *Platygio cataractae* (Olund and Cross 1961).

4. Population Size and Abundance

Sturgeon chub were historically collected infrequently and their abundance in relation to other species in historic collections was usually not reported (USFWS 1993b). Pflieger and Grace (1987) reported sturgeon chub percent species composition (by number) in historic collections for three time periods as ranging from 0.1 percent to 0.8 percent. Sturgeon chub were reported absent from collections between Kansas City and the Iowa border. Of 97,766 fishes collected in the Lower Kansas River only three sturgeon

chub were collected (Cross and Randall 1987). Ninety-six additional collections in a 22-km reach upstream of St. Joseph, Missouri yielded one specimen of the *H. gelida* out of 13,512 fishes representing 44 species (Cross and Randall 1987). Hesse et al. (1982) reported similar results for sampling the Missouri River mainstem in Nebraska. Population estimates are not available.

5. Reproduction

Young sicklefin chub have been collected from the Missouri River in Missouri in July, suggesting a spring spawning season (Pflieger 1975). Breeding habits of the species are unknown (Cross and Collins 1995).

6. Food and Feeding Requirements

It is suggested the *H. gelida* may consume larval insects (Cross and Collins 1995). Pflieger (1975) reports good habits as unknown but presumes that it is a bottom feeder and locates food primarily by taste. The presence of numerous taste buds in the mouth suggest that bottom material may be taken in, sorted and concentrated.

III. Ownership of Species Habitats

The three species addressed in this report all occur principally in either the Kansas River or the Missouri River. Both of these rivers are Phase I Navigable Waterways with the Missouri and lower Kansas River supporting commercial traffic. Hence, the actual habitats occupied would be considered water and properties of the United States.

IV. Potential Threats to the Species or Their Habitats

All three of the species discussed within this report require large, swift, turbid rivers to support their habitats. Habitat diversity associated with such streams include islands, braided channels, backwaters, and various depths with currents. Cross (1967) in commenting on the sicklefin chub, states “The species seems so specialized for life in large, silt-laden Missouri-Mississippi River that its survival may be threatened by impoundments and other modifications of habitat throughout its limited range.” Collins et al. (1995) suggests impoundments, dredging and pollution as causes for declines of all three species. Navigational works narrowing the channel of the Missouri River and reducing habitat diversity undoubtedly have also further resulted in habitat destruction for these fishes.

V. Protective Laws

A. Federal

A number of federal laws may be of use in the protection of these species and their habitats. Most notably the U.S. Army Corps of Engineers administer a permit program under Section 404 of the Clean Water Act. This governs fill placed in stream realignment projects. Section 401 of the Clean Water Act provides for state review of water quality impacts from

such activities and while authorized by federal law is administered by the Kansas Department of Health and Environment (KDHE). KDHE also issues NPDES permits from point source discharge. The U.S. Fish and Wildlife coordination Act provides for review and comment of both state and federal agencies concerning fish and wildlife impacts for any federal or nonfederal project which is approved by a federal agency that serves to impound, deepen the channel of, or otherwise control, pollute, or modify waters of the U.S. for any purpose whatsoever. Other federal laws may be relevant in specific instances. For review of applicable major federal laws affecting Kansas fish and wildlife, see Layher (1985).

B. State

1. Permitting Requirements

Several state statues, regulations and procedures may be invoked related to habitat alteration associated with the three fish species. K.A.R. 115-5-1 and 2 list species, which are declared to be threatened and endangered. K.A.R. 115-15-3 provides a permit system including review of habitat alterations. The permit program and review system is administered by the Kansas Department of Wildlife and Parks. This allows for the critical review of projects potentially affecting fish habitats. Based upon the review, projects may be accepted, modified, or revoked.

Various permit requirements of other agencies require permits if such developments alter stream discharges; request dam construction, or alter streams and/or floodplains. Most such requirements come under the scrutiny of the Division of Water Resources of the State Board of Agriculture. Permits applied for though this office are sent out to be reviewed by KDWP as a result of the Water Projects Coordination Act, which was designed to simplify the state's overall permitting systems and allow fish and wildlife interest review. Projects identified as potentially impacting a threatened or endangered species would require an appropriate permit as well as from KDWP.

KDWP has entered into several Memorandum of Understandings (MOU's) with other agencies, notably the Kansas Department of Transportation, which aids in the identification of road and bridge projects in areas with threatened or endangered species. This MOU has been in force for years and was recently revised February 2002.

Many other permit systems may be activated through a variety of agencies. For a comprehensive review see Mondo et al. (1992).

2. Critical Habitat Designation

The Kansas Department of Wildlife and Parks has designated the following locations as critical habitat for the following species:

- 1) Western Silvery Minnow, *Hybognathus argyritis*
 - a) All Kansas reaches of the main stem of the Missouri River that are congruent with the Kansas/Missouri border;
 - b) The main stem of the Big Nemaha River in Nemaha County from the Nebraska/Kansas border (Sec. 2-T IS-R12E) to U.S. 36 (Sec. 26-G% S-R12E); and
 - c) The main stem of the Wolf River in Brown County from U.S. 73 (Sec. 16-T35-R17E) to the confluence with the Missouri River in Doniphan County (Sec. 8-T25-R20E).
- 2) Sicklefin chub, *Macrhybopsis meeki* (Jordan and Evermann 1896)
 - a) All reaches of the mainstem Missouri River that are congruent with the Kansas-Missouri border.
- 3) Sturgeon chub, *Macrybopsis gelida* (Girard 1856)
 - a) All reaches of the main stem of the Missouri River that are congruent with the Kansas/Missouri border; and
 - b) the main stem of the Kansas River from its start at the confluence of the Republican and Smoky Hill Rivers in Geary County to its confluence with the Missouri River in Wyndotte County.

VI. Recovery Criteria

A. Additional Species Information Needs

All species addressed in this report are represented by a paucity of distributional and biological information. The last collections of the western silvery minnow are reported in 1987 from areas formerly not known to be inhabited by the species. Specimens with mixtures of characters with *H. placitus* were also reported. Resampling these areas in the Wolf River should be performed. Cross (KDWP files 1991) reported not finding the species in the lower Kansas River for his last three years of sampling. That stream also would require new sampling efforts to document the species occurrence. Last reports for the species in the Kansas River or the Missouri River date 1986, nearly 20 years ago with other records earlier.

The sicklefin chub records indicate that last specimen collected in Kansas was captured in 1982. Other records are much earlier.

The sturgeon chub was last collected in 1982. Surveys in 1990 (Kansas Biological Survey) and other surveys by Werdon (1992) at all former collection sites yielded no specimens.

It would appear that of the three species considered, the status of any of them is indeed questionable. Additionally nothing is known of food habits, reproduction, or habitat requirements for various life stages of interest. We would recommend intensive surveys be conducted in formerly known areas of occurrence to document continued existence. If substantial populations are found, biological and ecological investigations should be performed.

B. Management Activities for Maintaining Species Populations and for Species Recovery

1. Review current activities on areas of critical habitat to reduce impacts leading to loss of habitat diversity. Use existing laws and statutes to protect remaining habitats.
2. Work with the other State and Federal agencies to identify opportunities to re-create habitat conditions needed by the species discussed. Examples might include structural modifications of wing dikes on the Missouri River to create diversity in flows, depths and backwaters to provide habitats. Examining former river flow data before impoundments may lead to identifiable opportunities to re-establish variability in flow regimes on the large rivers to increase or provide diverse instream habitat types.

C. Information and Educational Programs for Public and Private Lands

1. Provide brochures or informational leaflets to entities conducting operations in areas designated as critical habitat to increase awareness of the species and loss of habitat. Provide this information to local, state, and federal governmental agencies to increase their awareness and stimulate possible dialogue concerning possible restoration activities.
2. Provide organizations and entities listed above with reports of surveys and studies on these fishes and their habitats.

D. Downlisting and Delisting Criteria

The species addressed in this report occupy habitats severely impacted both physically and hydrologically. Most importantly, little data is available to depict trends in abundance or populations. (See Sections IV.A.). Last observations of the two chub species were twenty years ago. Task force recommendations (Layher et al. 1986) suggest delisting species if not observed for 35 years. If continued sampling does not reveal the

species presence in Kansas waters by 2017, the sicklefin chub and sturgeon chub should be considered extirpated.

The status of the western silvery minnow is also unknown. Extensive sampling for this species should be conducted to reveal its current distributions.

Monitoring programs for all species need to be carried out. The paucity of data on all three species and their populations prevents the formulation of rational specific downlisting or delisting criteria at this time.

VII. Costs for Recovery Plan Implementation

As previously stated, the most immediate need is to determine the status of the three species reviewed in this report. Past surveys appear to have been limited in most cases to seining. Intensive surveys should be made, perhaps utilizing trawling as a collection method on the Kansas and Missouri Rivers. Costs associated with intensive surveys are hard to predict, however, a three-year survey by graduate students at local universities may provide the cheapest alternative. It is expected such surveys on large rivers would approach \$30,000 to \$40,000 over a three-year period. This information is sorely needed before any logical work can be initiated concerning the recovery of the species listed herein.

Table 1. Records of collections for three fish species obtained from the Kansas Natural Heritage Inventory (22 July 2002).

Hybognathus argyritis

County	Town/Range	Sect.	Date
Brown	003S018E	10	1986-06-18
Nemaha	002S012E	11	1985-07-17
Leavenworth	009S023E	16	1982-08-24
Wyandotte	010S025E	28	1964-04-21
Leavenworth	010S023E	1	1965-08-03
Leavenworth	008S022E	36	1941-08-03
Atchison	007S021E	12	1957-08-24
Doniphan	005S021E	03	1963-03-23
Doniphan	004S022E	?	1945-
Doniphan	003S023E	12	1963-10-03
Douglas	012S020E	30	1975-12-02
Doniphan	005S021E	6	1975-10-31
Johnson	011S023E	32	1980-07-17
Wyandotte	011S024E	28	1980-07-18

Macrhybopsis gelida

County	Town/Range	Sect.	Date
Douglas	012S020E	30	1968-06-06
Leavenworth	012S021E	32	1962-04-20
Douglas	013S021E	05	
Geary	012S005E	14	1964-05-09
Shawnee	011S013E	14	1964-05-09
Atchison	006S021E	17	1957-08-24
Atchison	007S021E	12	1957-08-24
Wyandotte	011S024E	28	1979-08-09
Leavenworth	009S023E	4	1982-08-24
Atchison	007S022E	17	1957-08-24
Leavenworth	012S020E	27	1952-04-05

Macrhybopsis meeki

County	Town/Range	Sect.	Date
Douglas	012S020E	30	1969-04-11
Leavenworth	012S021E	32	1962-04-20
Douglas	013S021E	05	
Doniphan	005S021E	10	1963-03-23
Atchison	007S021E	12	1957-08-24
Doniphan	002S022E	35	1982-08-24
Wyandotte	010S025E	21	1964-04-21
Leavenworth	010S023E	1	1965-08-03
Leavenworth	009S023E	4	1963-10-03

Macrhybopsis meeki (continued)

County	Town/Range	Sect.	Date
Leavenworth	008S022E	25	1941-08-03
Doniphan	004S022E	26	1945-
Doniphan	003S023E	30	1982-08-24
Atchison	007S022E	17	1957-08-24

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