

An Illinois
Species Status Assessment
for
Sturgeon Chub and
Sicklefin Chub



STURGEON CHUB *Macrhybopsis gelida* (Girard 1856)



SICKLEFIN CHUB *Macrhybopsis meeki* (Jordan & Evermann 1896)

Sturgeon Chub and Sicklefin Chub Recovery Team
and
Illinois Department of Natural Resources

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NOTE

Both Sturgeon Chub and Sicklefin Chub are included in this Illinois Species Status Assessment as they have similar status in Illinois; however, abundance and distribution information are summarized separately. The U.S. Fish and Wildlife Service has engaged in a simultaneous status review of both species that is expected in fiscal year 2023.

SECTION 1. SPECIES DESCRIPTION

Physical Characteristics and Ecology

Sturgeon Chub, *Macrhybopsis gelida*, is a slender minnow with a fleshy upper lip that overhangs a subterminal mouth. Its color is tan with brown flecks. Its maximum length is approximately 9cm. Sturgeon Chub can be found in medium to large rivers over sand, silt, and gravel, typically in turbid waters. They feed primarily on benthic insects.

Sicklefin Chub, *Macrhybopsis meeki*, is slender minnow with a fleshy upper lip that overhangs a subterminal mouth and a small eye. Its first dorsal ray is long and creates a sickle-like appearance in the dorsal fin. It has a silvery color with brown specs. It grows to approximately 11cm. Sicklefin Chub occur in turbid, medium to large rivers over sand and gravel. It feeds upon benthic invertebrates.

SECTION 2. QUALITATIVE CONSERVATION STATUS ASSESSMENTS

Sturgeon Chub and Sicklefin Chub conservation status has been synthesized at multiple spatial scales using qualitative assessment frameworks (Table 1).

Table 1. Global, regional, subregional, and state conservation status of Sturgeon Chub and Sicklefin Chub.

<u>Assessment</u>	<u>Sturgeon Chub</u>	<u>Sicklefin Chub</u>
Global Rank (G-rank) ¹	G3 (vulnerable)	G3 (vulnerable)
Midwest Species of Greatest Conservation Need ²	SGCN	SGCN
Subregional Rank (S-rank) ³	S1 (critically imperiled)	S1 (critically imperiled)
Federal Conservation Status	In review (candidate species)	In review (candidate species)
Illinois Conservation Status ⁴	Endangered	SGCN

1. NatureServe (2022)

2. Terwillger Consulting (2021)

3. Feng et al. (2021). Assessment conducted using data through 2018.

4. Illinois Endangered Species Protection Board 2020

5. Illinois Wildlife Action Plan

The global conservation rank for both species is G3 (vulnerable). The subregional rank for Sturgeon Chub is S1 (critically imperiled) in six states, S2 (imperiled) in three states, S3 (vulnerable) in one state, and SH (possibly extirpated) in two states (Figure 1). Sicklefin Chub is ranked S1 (critically imperiled) in nine states, S2 (imperiled) in two states, and secure in one state (Figure 2). Both Sturgeon Chub and Sicklefin Chub are Midwest regional Species of Greatest Conservation Need (SGCN) of high concern and are SGCN in all eight Midwest states where they occur (Terwillger Consulting 2021). Both species are ranked S1 (critically imperiled) in Illinois due to a high number of threats, small range extent, and low number of occurrences (Feng et al. 2021). The short-term trend for Sicklefin Chub is assessed as “declining” while that of Sturgeon Chub is stable (Illinois Department of Natural Resources 2015). Sturgeon Chub was listed as endangered by the Illinois Endangered Species Protection Board in 1994

while Sicklefin Chub is a SGCN. Both species are candidates for listing under the U.S. Endangered Species Act and will be under review by the U.S. Fish and Wildlife Service until the end of FY'23.

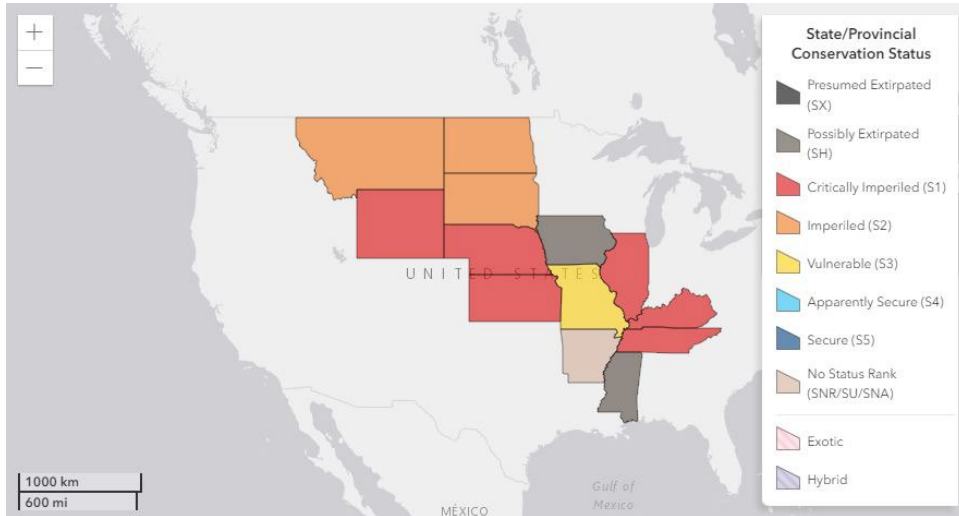


Figure 1. State-ranks (S-ranks) for Sturgeon Chub (NatureServe 2022).

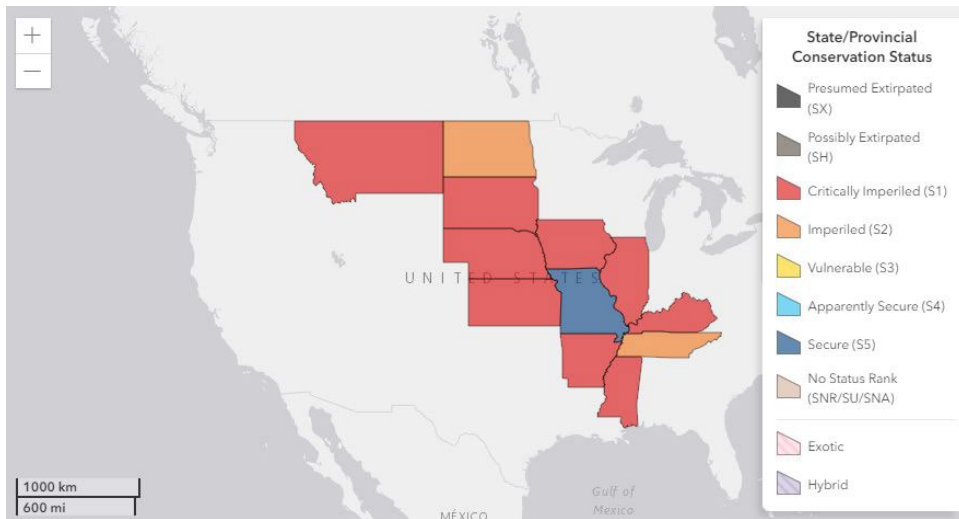


Figure 2. State-ranks (S-ranks) for Sicklefin Chub (NatureServe 2022).

SECTION 3. DISTRIBUTION

North American Range

The potential distribution of Sturgeon Chub includes in the unimpounded portions of the Missouri River from Montana through Missouri, several major tributaries of the Missouri River, and the Mississippi River from the Missouri River to central Louisiana (Figure 3). The potential distribution of Sicklefin Chub

includes the unimpounded portions of the Missouri River from Montana through Missouri, the Yellowstone River in Montana, and the Mississippi River from the Missouri River to northern Louisiana (Figure 4). Occurrence records for both species are sparse throughout their ranges over the past 20 years (Figure 5) and so their realized distribution is likely much smaller than potential distribution.



Figure 3. Potential Sturgeon Chub range (Montana Field Guide 2022b).

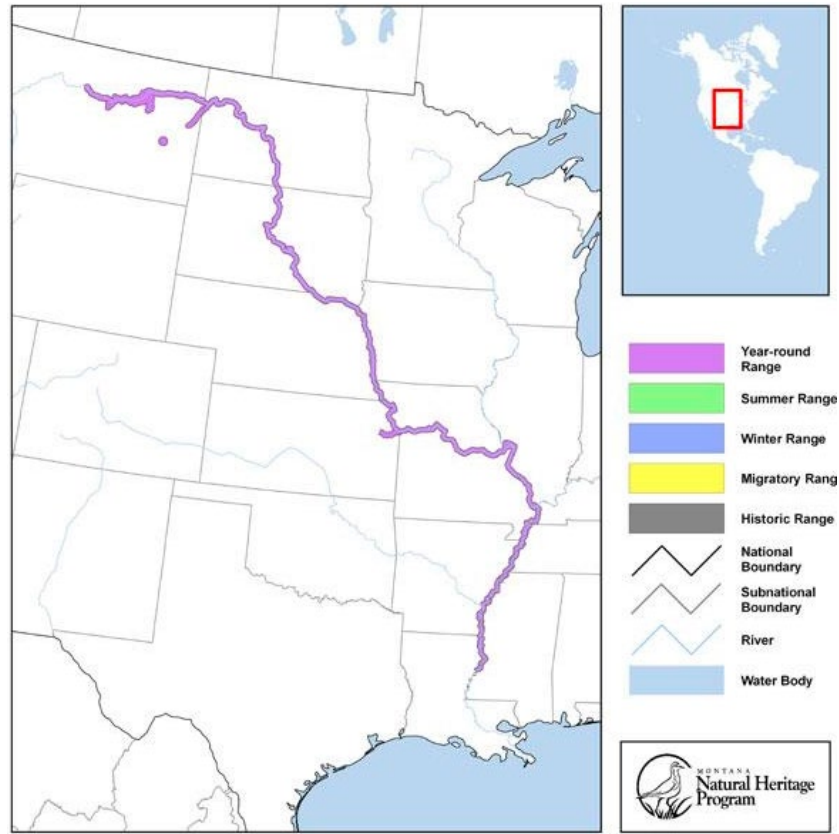


Figure 4. Potential Sicklefın Chub range (Montana Field Guide 2022a).

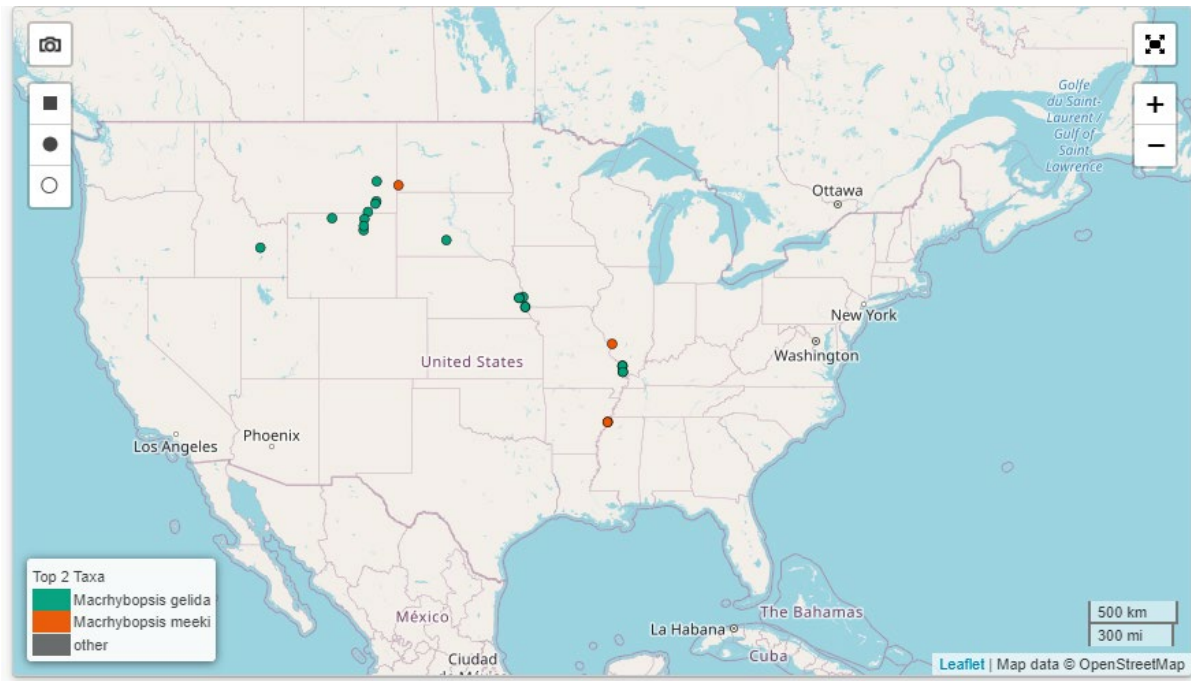


Figure 5. Sturgeon Chub and Sicklefın Chub occurrence records since 2000 (IDigBio 2022).

Illinois Distribution

Sturgeon Chub and Sicklefin Chub have been recorded in the Mississippi River downstream of the Missouri River since the 1930s (Metzke et al. 2022; Figure 6, Figure 7). Since 2012 both species have been recorded infrequently in this reach of the Mississippi River (Figure 8). Sicklefin Chub is more frequently encountered than Sturgeon Chub with a mean of 1.1 occurrence records per year over the past 30 years relative to Sturgeon Chub's 0.2 records per year.

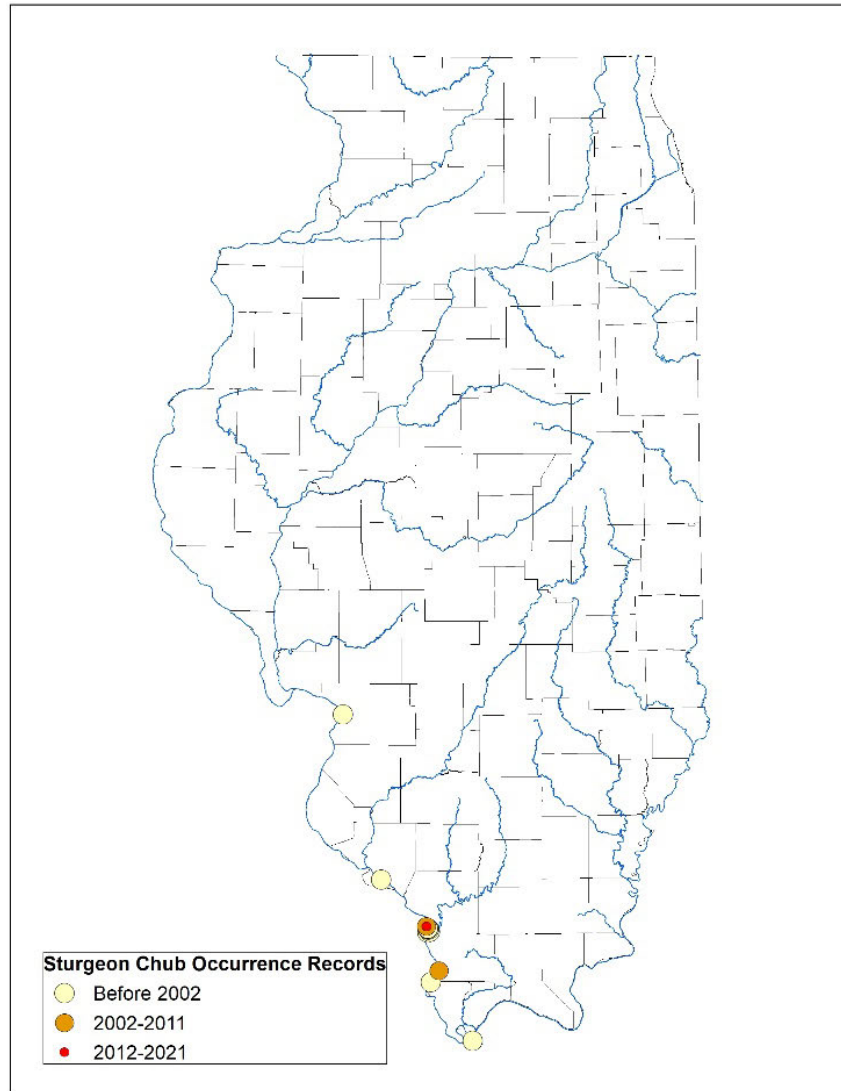


Figure 6. Illinois Sturgeon Chub occurrence records.

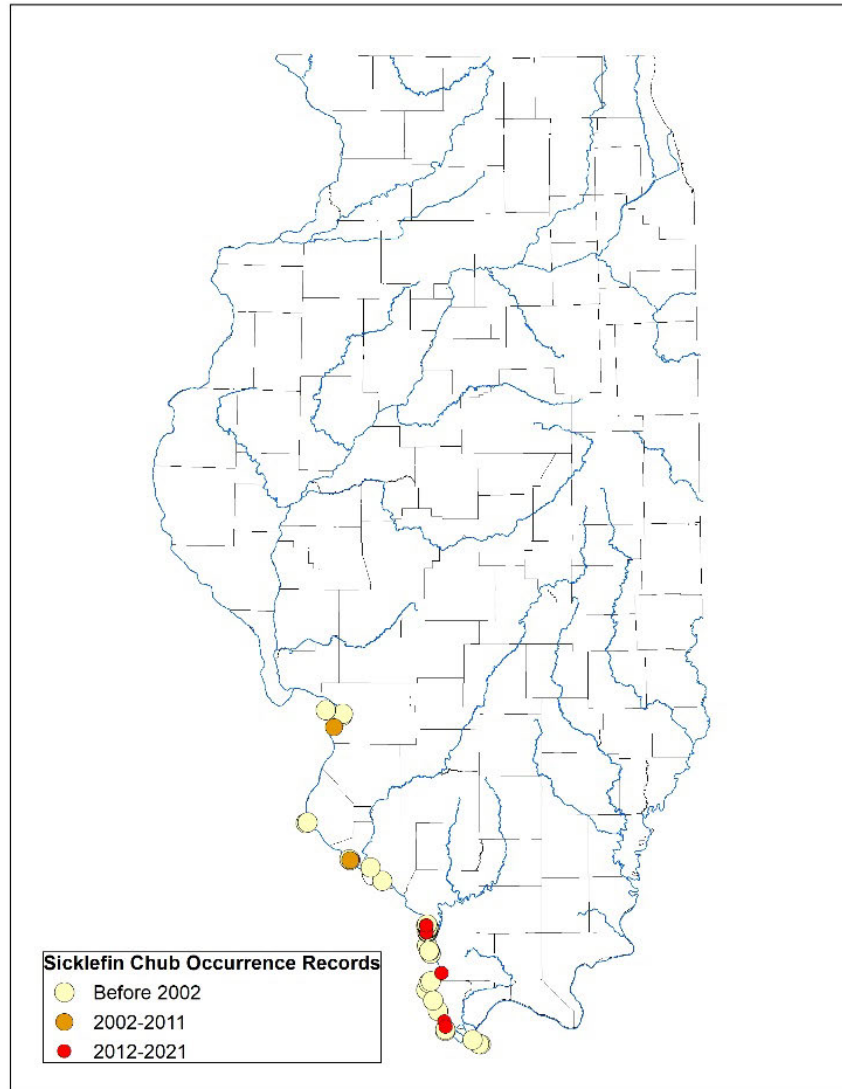


Figure 7. Illinois Sicklefin Chub occurrence records.

Limitations of Surveys and Occurrence Records

Typical large river sampling methods, like boat electrofishing, gill nets, and hoop nets, are inefficient at capturing small benthic fishes, like Sturgeon Chub and Sicklefin Chub. Of the 58 Long Term Resource Monitoring Program (LTRMP) occurrence records for both species, 7% were collected via electrofishing, 14% seining, 34% mini fyke net, and 43% trawling. Even though it is the preferred gear for sampling both species, trawling sampling efficiency can be low; Herzog (2004) reported most trawling samples resulting in a capture rate of less than one individual per 100m for both species. Schloesser et al. (2012) calculated probability of detection for Sturgeon Chub in the Missouri River was always <0.55 using multiple trawls and <0.20 for Sicklefin Chub. These studies suggest the species are rare, difficult to capture even with relatively efficient gear, or both.

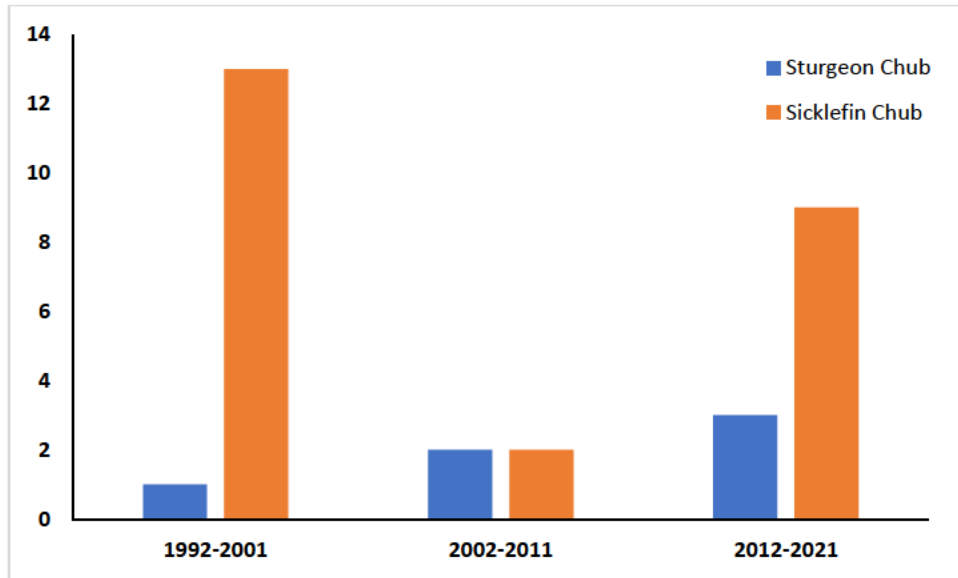


Figure 8. Number of Illinois Sturgeon Chub and Sicklefin Chub occurrence records for each of the past three decades. Records are from the IDNR Division of Fisheries and the Long-Term Resource Monitoring Program. Similar survey effort has been expended in each of these decades.

SECTION 4. ABUNDANCE

It is difficult to divide the known Sturgeon Chub and Sicklefin Chub distribution in Illinois into discrete reaches that might be relevant to the species' ecology, and so abundance is reported as per survey event. Surveys used for abundance estimates include multiple gear types and similar effort per sampled reach. Three Sturgeon Chub records report abundance, which ranged from one to four individuals. Abundance of Sicklefin Chub was reported for 24 records and ranged from one to eighteen and a median of one. Mean abundance of Sicklefin Chub is highest and most variable in the decade beginning in 1992 (Figure 9). In the most recent decade mean abundance is 1.4 individuals per survey event. No survey site has been sampled more than two times and so abundance trends at individual locales are not meaningful.

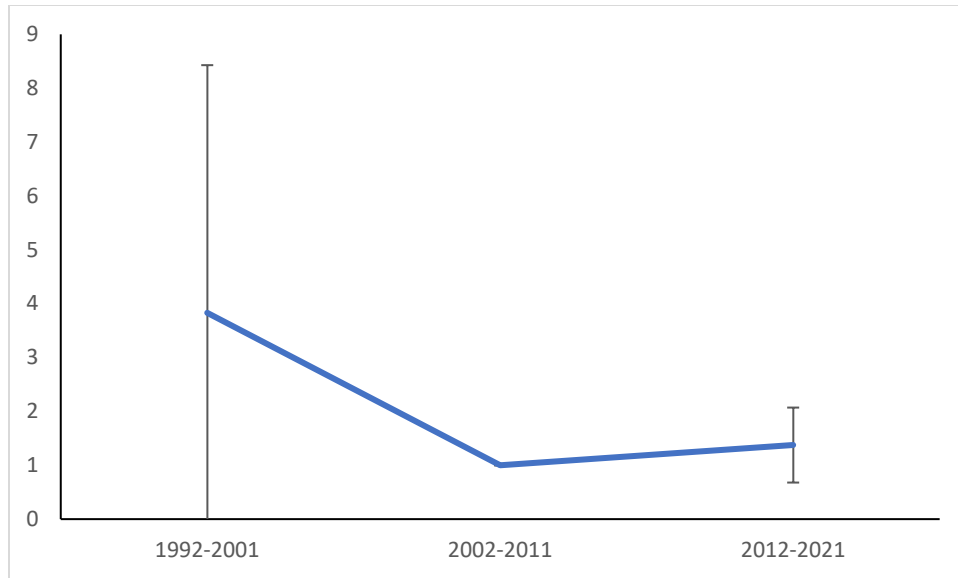


Figure 9. Mean and standard deviation of Sicklefin Chub abundance per survey event in each of the past three decades. Abundance is reported as number of individuals per event. Number of records is 12 for 1992-2001, one for 2002-2011, and eight for 2012-2021.

SECTION 5. POPULATION VIABILITY

Population Delineation

There are no clearly identifiable populations of Sturgeon Chub or Sicklefin Chub in Illinois. There are no lock and dam facilities, which have been shown to limit dispersal of *Macrhybopsis spp.* (Luttrell et al. 1999), that could result in distinct populations in the segment of the Mississippi River where the species have been recorded. Little is known regarding potential or realized dispersal of either species. Robison and Buchanan (2020) report *Macrhybopsis spp.* have been observed dispersing upstream during spawning periods and that semi-buoyant eggs and larvae drift downstream. It is likely there is a single population of both Sturgeon Chub and Sicklefin Chub in Illinois.

Element Occurrence Ranks

Element Occurrences (EOs), or occurrence records grouped by proximity, can be used as surrogates for populations. NatureServe provides guidance for ranking the viability, or likelihood of continued persistence over the next 20-30 years, of EOs (Hammerson et al. 2020). The Natural Heritage database identifies four Sturgeon Chub EOs (Table 1, Figure 10). Three are ranked H (historic) as the species has not been recorded in more than 10 years, and the number of survey events at these EOs is unknown. The fourth EO is ranked C (fair viability) as the species has been recorded during multiple survey events, but always at low abundance. Sicklefin Chub is not state-listed and so no EOs have been identified in the Natural Heritage database; however, using database standards 23 EOs may be identified from the 62 occurrence records (Table 1, Figure 10). Eighteen EOs are ranked H (historic) as the species has not been recorded in more than 10 years, and the number of survey events at these EOs is unknown. Four

EOs are ranked C (fair viability); abundance is low (1 to 10 individuals per survey event) for each occurrence record and the species is not detected during each survey event at these EOs.

Table 2. Sturgeon Chub and Sicklefin Chub Element Occurrence (EO) ranks.

<u>Species</u>	<u>EOID</u>	<u>EO Name</u>	<u>Most Recent</u>		
			<u>Record</u>	<u>EO Rank</u>	<u>Justification</u>
Sturgeon Chub	2	[REDACTED]	1940	H	
Sturgeon Chub	1	[REDACTED]	2015	C	Abundance range 1 - 10. Not recorded during every survey event.
Sturgeon Chub	3	[REDACTED]	1978	H	
Sturgeon Chub	4	[REDACTED]	2000	H	
Sicklefin Chub	n/a	[REDACTED]	1990	H	
Sicklefin Chub	n/a	[REDACTED]	2005	H	
Sicklefin Chub	n/a	[REDACTED]	1944	H	
Sicklefin Chub	n/a	[REDACTED]	2009	H	
Sicklefin Chub	n/a	[REDACTED]	1959	H	
Sicklefin Chub	n/a	[REDACTED]	1963	H	
Sicklefin Chub	n/a	[REDACTED]	2015	C	Abundance = 1 (3 surveys). Not recorded during every survey event.
Sicklefin Chub	n/a	[REDACTED]	1998	H	
Sicklefin Chub	n/a	[REDACTED]	2018	C	Abundance 1 in 3 most recent records. Not recorded during every survey event.
Sicklefin Chub	n/a	[REDACTED]	1995	H	
Sicklefin Chub	n/a	[REDACTED]	1998	H	
Sicklefin Chub	n/a	[REDACTED]	1997	H	
Sicklefin Chub	n/a	[REDACTED]	2016	C	Abundance = 1 (1 surveys). Not recorded during every survey event.
Sicklefin Chub	n/a	[REDACTED]	2000	H	
Sicklefin Chub	n/a	[REDACTED]	1992	H	
Sicklefin Chub	n/a	[REDACTED]	1992	H	
Sicklefin Chub	n/a	[REDACTED]	1963	H	
Sicklefin Chub	n/a	[REDACTED]	1962	H	
Sicklefin Chub	n/a	[REDACTED]	2015	C	Abundance = 1 (1 survey). Not recorded during every survey event.
Sicklefin Chub	n/a	[REDACTED]	2015	C	Abundance = 2 (1 survey). Not recorded during every survey event.
Sicklefin Chub	n/a	[REDACTED]	1992	H	
Sicklefin Chub	n/a	[REDACTED]	1944	H	
Sicklefin Chub	n/a	[REDACTED]	1962	H	

Demographic Evaluation

Robison and Buchanan (2020) report juvenile Sturgeon Chub are those less than 35mm and Sicklefin Chub are less than 30mm. Six Sturgeon Chub have been measured, and all are adults. Sixty-two individual Sicklefin Chub had been measured, and 27 (0.48) are likely juveniles.

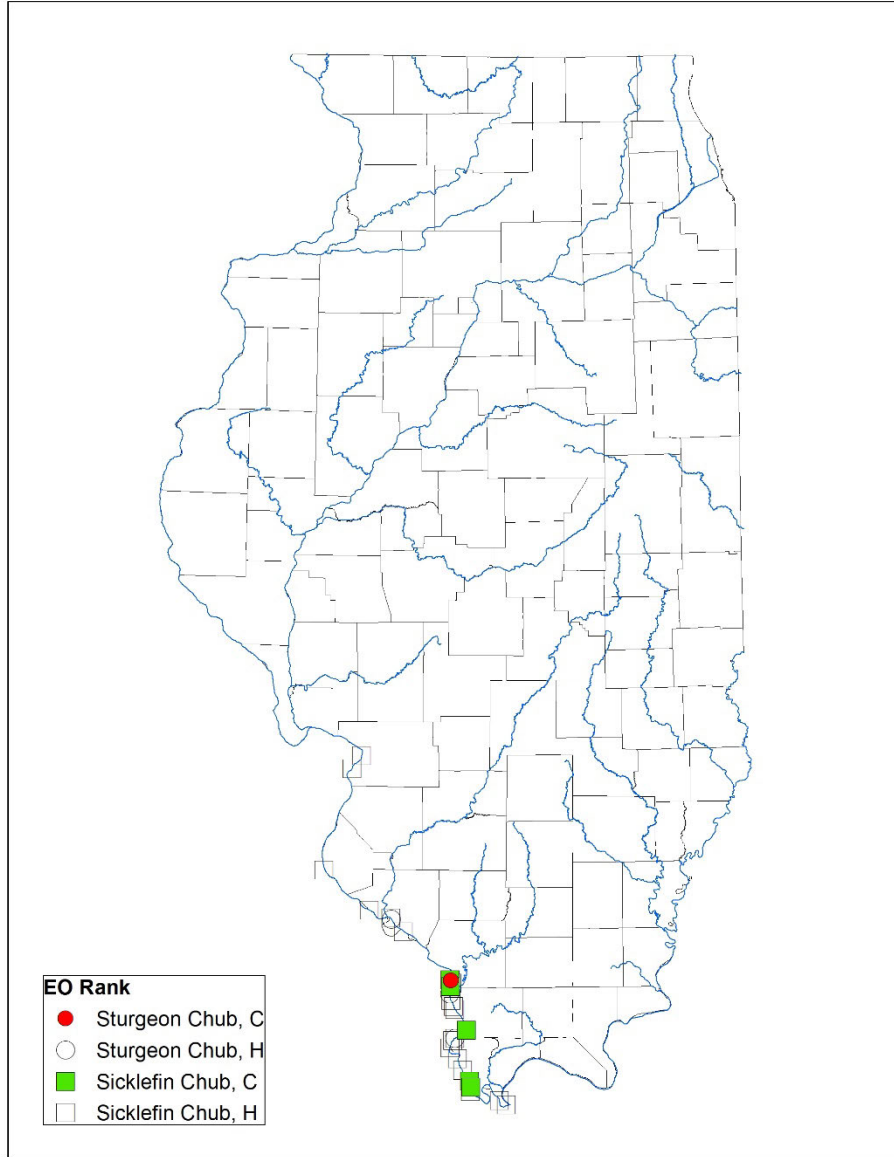


Figure 10. Sturgeon Chub and Sicklefin Chub element occurrence (EO) ranks.

SECTION 6. CURRENT RESEARCH, MONITORING EFFORTS, AND DATA NEEDS

Most Sturgeon Chub and Sicklefin Chub occurrence records originate from LTRMP and IDNR survey efforts. Survey gears and methods used during LTRMP and IDNR efforts likely under-sample both species (Neebling and Quist 2011, Schloesser et al. 2012). There is no survey or monitoring program that specifically targets these species.

Assuming Sturgeon Chub and Sicklefin Chub are under-sampled by ongoing survey efforts the status of both species is uncertain. Existing records likely accurately reflect the Illinois distribution for both

species, but frequency of occurrence in space and time and abundance or density are difficult to estimate. Development of a sampling protocol that estimates and improves detection probability and facilitates accurate estimates of abundance and density is needed.

Although juvenile Sicklefin Chub are encountered it is unclear if reproduction and recruitment occur in Illinois for either species. It is possible all individuals are dispersing from the Missouri River where both species are more common. Observation of reproduction or hard-structure microchemistry to identify system of origin would elucidate this uncertainty.

SECTION 7. LITERATURE CITED

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