An Illinois

Species Status Assessment
for

# Crystal Darter (*Crystallaria asprella*)

Missouri Department of Conservation photo

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## SECTION 1. SPECIES DESCRIPTION

Physical Characteristics and Ecology

The Crystal Darter (*Crystallaria asprella*) is one of the largest species in the Family Percidae. It can reach a body length of 15 centimeters (6 inches). Crystal Darters are slender-bodied and light brown in color, with a side-to-side compressed head, three to five broad dusky saddles across their backs (the first saddle originating in front of the pectoral fin), and a distinctly forked tail. (Citations: Smith 1979; Page 1983; Page and Burr 2011).

The darter inhabits clear to slightly turbid streams with clean sand / gravel substrates and moderately swift flowing currents. Individuals often bury themselves in sand with only their eyes protruding from the substrate (Citations: George et al. 1996; Ross 2001; Boschung and Mayden 2004).

Sexual maturity for the Crystal Darter is reached at the age of one year. Spawning presumably begins when water temperatures reach 12-15°C (53-59°F), at which females will slightly bury themselves in the rocky-sandy substrates. After copulation, the fertilized eggs are strongly adhesive and attach to sand and gravel. Fecundity for Crystal Darters is 106-576 eggs. (Citations: George et al. 1996; Boschung and Mayden 2004).

## SECTION 2. QUALITATIVE CONSERVATION STATUS ASSESSMENTS

Crystal Darter 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 the Crystal Darter (*Crystallaria asprella*).**

| Assessment | Crystal Darter |
|---|---|
| Global Rank (G-rank)[1] | G3 (globally vulnerable) |
| Midwest Species of Greatest Conservation Need[2] | SGNC |
| Subregional Rank (S-rank)[3] | S1 (critically imperiled) |
| Federal Conservation Status | None |
| Illinois Conservation Status[4] | Endangered |

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)

Jelks et al. (2011) listed the Crystal Darter as “Vulnerable” due to destruction, modification, or reduction of habitat. The global conservation rank for the Crystal Darter is G3, globally vulnerable (NatureServe 2022) and the species is a Midwest Species of Greatest Conservation Need, receiving a “High” rating from Terwillger Consulting (2021). The subregional conservation rank for the Crystal Darter is S1 – critically imperiled (Feng et al. 2021). The Crystal Darter is ranked S1 in eight states, S2 in two states, S3 in one state, and SX in one state

(Figure 1). The Crystal Darter was considered extirpated in Illinois until six individuals were discovered in a 450 mile stretch of the Mississippi River between 1998-2015, after which the species was considered state-endangered in Illinois (Smith 1979; Stewart et al. 2005; Tiemann et al. 2015; Illinois Endangered Species Protection Board 2015, 2020).

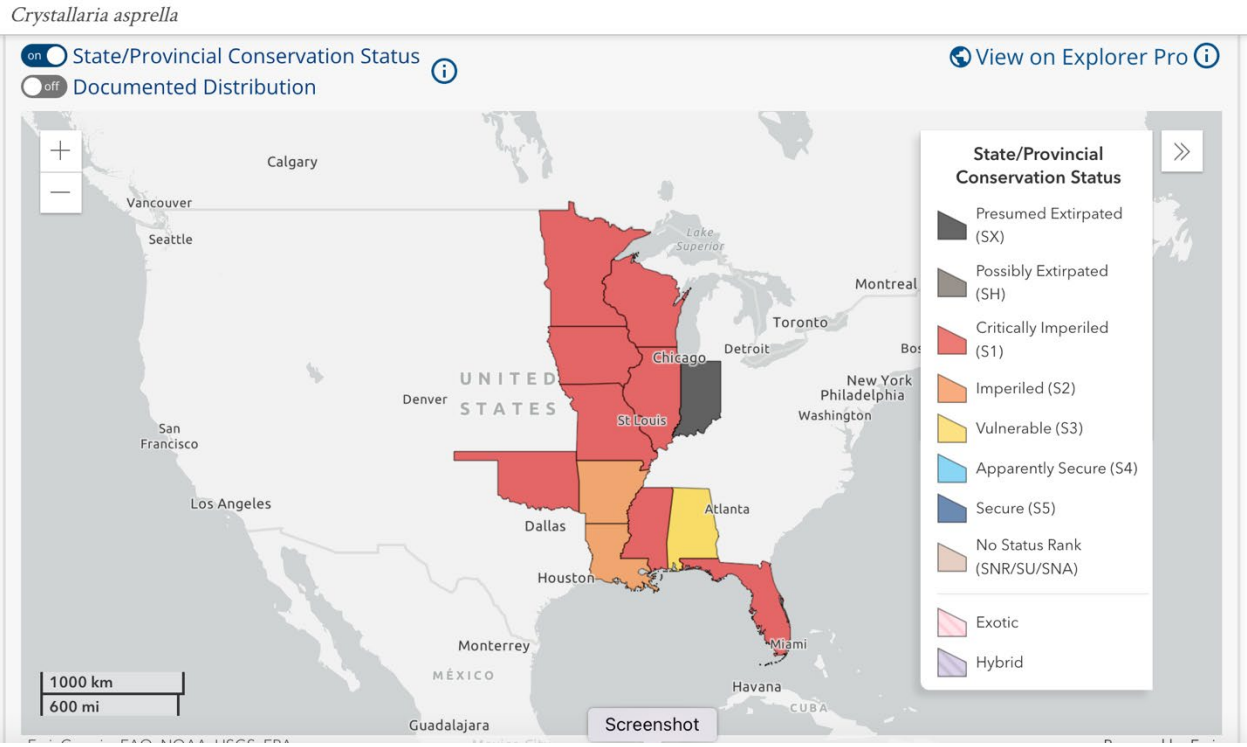


**Figure 1. Subnational ranks (i.e., S-ranks) for the Crystal Darter (*Crystallaria asprella*) (NatureServe 2022).**

## SECTION 3. DISTRIBUTION

North American Range

The historical range for the Crystal Darter is as reported from NatureServe (2022):

> "The historical range included the Mississippi River basin, from Wisconsin (Becker 1983) and southwestern Minnesota and the Wabash River, Indiana, south to southeastern Oklahoma (Miller and Robison 2004), northern Louisiana, southern Mississippi (Ross 2001), Gulf Slope in the Escambia, Mobile Basin, Pascagoula, and Pearl River drainages, Florida, Alabama, and Mississippi (Ross 2001, Boschung and Mayden 2004, Page and Burr 2011). The species is now absent from much of the former range, including almost all of the northeastern portion of the range in Indiana and Illinois (Smith 1979), and it has apparently disappeared from much of the upper Mississippi River basin. It is rare in Wisconsin (Becker 1983), Minnesota, Iowa, and Missouri (Pflieger 1997)."

Illinois Distribution

The type locality of the Crystal Darter is "rocky tributary, Mississippi River, Hancock County, Illinois" which suggests somewhere near Warsaw, Illinois. In addition to this location, additional locations have been reported from the Mississippi River between Cordova, Illinois to Dubuque, Iowa, as well as near the mouth of the [redacted] near St Louis, Missouri, [redacted], Jackson County, Illinois, and [redacted], Alexander County, Illinois; the Rock River at Cleveland, Erie, and Milan, Illinois; the Little Wabash River at Effingham, Illinois and the Wabash River near Vincennes, Indiana (Smith 1979; Bowler 2001; Stewart et al. 2005; Tiemann et al. 2015; Table 2; Figure 2). However, only 18 individuals have been recorded in Illinois or border waters (e.g., Mississippi River in Iowa and Missouri) since 1900 (Table 2).

## SECTION 4. ABUNDANCE

Meaningful estimates of Crystal Darter abundance are difficult given the rarity of records and lack of supporting information that facilitates calculation of abundance measures. Like other darters, the Crystal Darter lacks a swim bladder and does no recruit to traditional standardized sampling methods like electrofishing. Most long-term monitoring programs do not include targeted, specialized gear (e.g., trawling) that would increase the chances of capturing the Crystal Darter (Stewart et al. 2005; Herzog et al. 2009). Methods used during surveys that capture Crystal Darters vary among time periods and collecting entity, therefore, evaluation of temporal trends in abundance also is difficult.

Reported abundance per record is either one or two individuals (Table 2). Estimates of density or abundance per standardized sample unit are not possible with available information.

## SECTION 5. POPULATION VIABILITY

Population Delineation

No estimates of dispersal or recruitment are available for the Crystal Darter. No more than two individuals have been reported for any EOR (Table 2). Therefore, its population estimations cannot be calculated. However, because of its sporadic encounters in three areas (e.g., near Bellevue, IA / Jo Daviess County; near Cordova, IL / Rock Island County; and near Cape Girardeau, MO / Jackson and Alexander counties; Table 2; Figure 3), it seems likely that the Crystal Darter has small, yet viable and persistent populations in some areas of the Mississippi River along the Illinois border.

Element Occurrence Ranks

The Illinois Department of Natural Resources Natural Heritage database identifies 13 EOs for the Crystal Darter (Table 2 – column 1), of which only seven have not been reconfirmed since pre-1901. Of the remaining six, only two – EO IDs 9 (near Cordova, IL) and 14 (near Bellevue, IA) – have continuous reportings (Table 2). While the species went undetected for more than a century, there have been 16 EOR reportings since 1998 (Table 2; Figure 4). Given the infrequent encounters, EOR grading is not possible for the Crystal Darter.

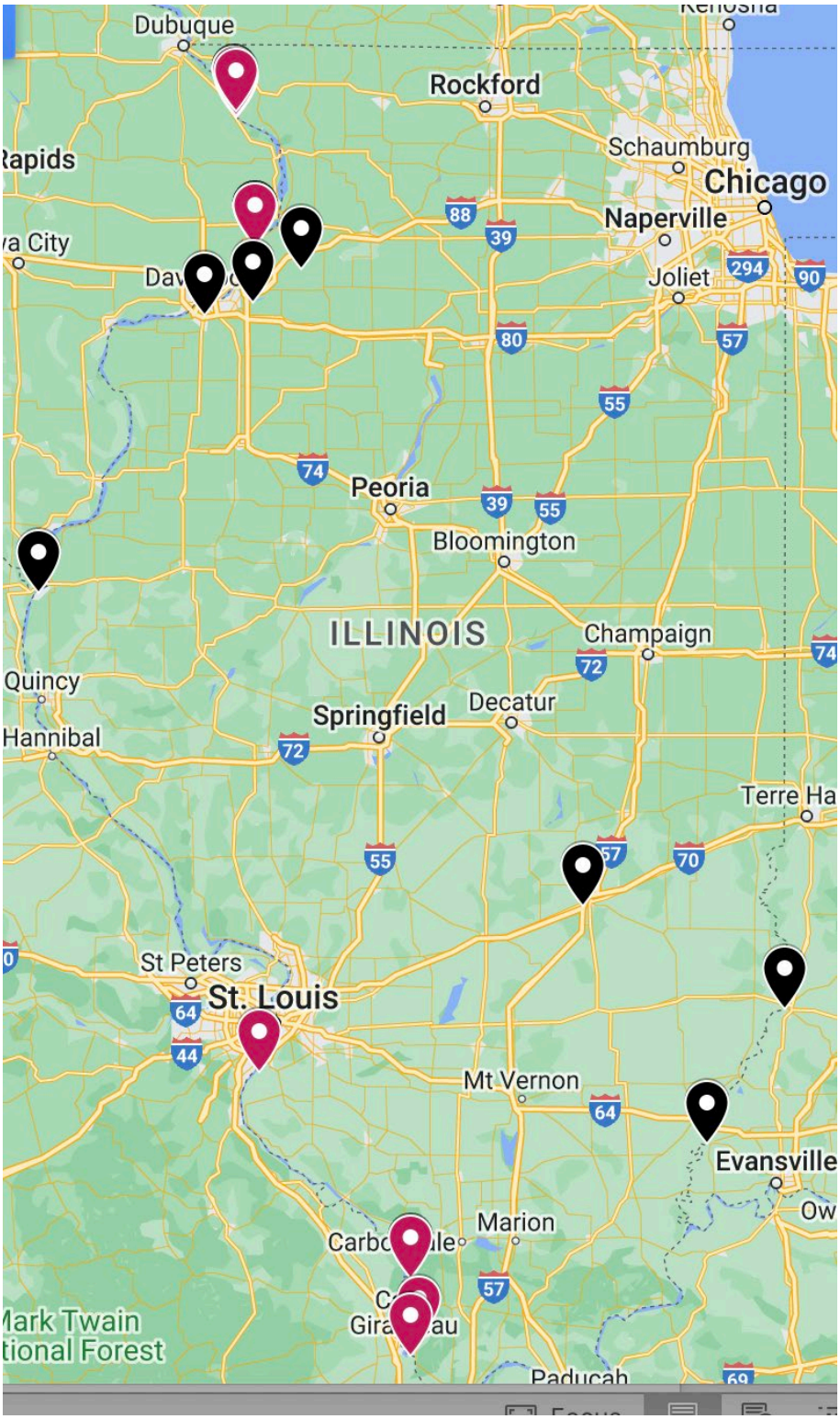


**Figure 2. Distribution of the Crystal Darter (*Crystallaria asprella*) in Illinois based upon element occurrence record (EOR). Data were provided by both the Illinois and Iowa Departments of Natural Resources. Black balloons are those records collected prior to 1901 and red balloons are those records collected since 1998 (no data exist between 1901-1998).**

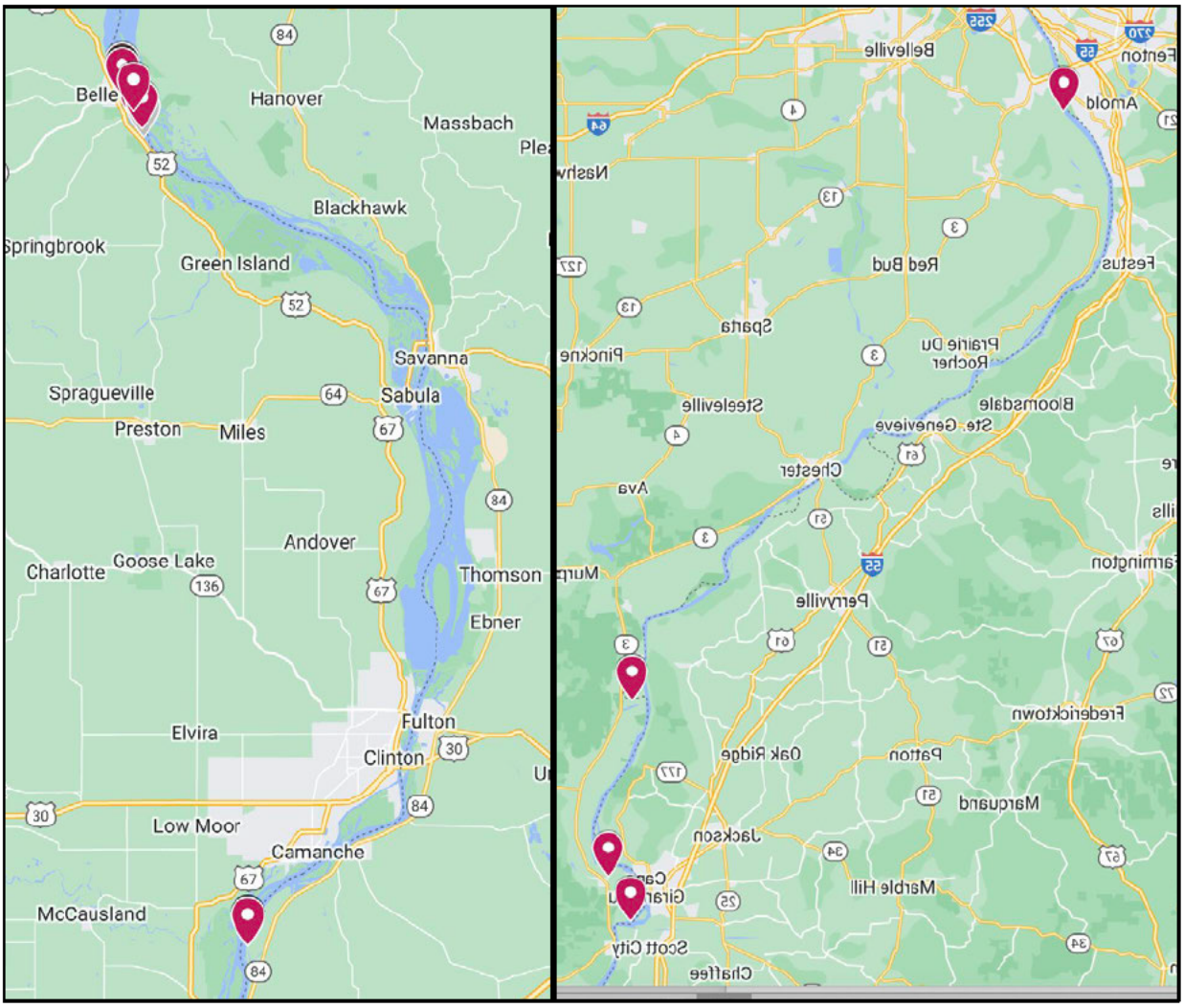


**Figure 3. Distribution of the Crystal Darter (*Crystallaria asprella*) in the upper Mississippi River (left) and middle Mississippi River (right), Illinois, based upon element occurrence record (EOR) since 1998. Data were provided by both the Illinois and Iowa Departments of Natural Resources.**

**Table 2. Element occurrence record (EOR) reportings for the Crystal Darter (*Crystallaria asprella*). Data were provided by both the Illinois and Iowa Departments of Natural Resources. EOR Grade includes H – historical (no surveys within the past 10 years, and status unknown) and E – (extant [i.e., recorded within the past 10 years], but data insufficient for further grading resolution).**

| EO Num | State | County | River | Location | Lat/Long | Date | Source | EO ID | EOR grade | No indiv | Collector |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 14 | IL | Jo Daviess | Mississippi River | [redacted] | [redacted] | 12-Aug-2005 | IA DNR | 4017098 | E | 1 | Bowler, Mel (IA DNR) |
| 14 | IL | Jo Daviess | Mississippi River | [redacted] | [redacted] | 11-Aug-2015 | IA DNR | 4019368 | E | 1 | Bowler, Mel (IA DNR) |
| 14 | IL | Jo Daviess | Mississippi River | [redacted] | [redacted] | 9-Sep-2015 | IA DNR | 4019270 | E | 2 | Bowler, Mel (IA DNR) |
| 14 | IL | Jo Daviess | Mississippi River | [redacted] | [redacted] | 16-Sep-2015 | IA DNR | 4019415 | E | 1 | Bowler, Mel (IA DNR) |
| 14 | IL | Jo Daviess | Mississippi River | [redacted] | [redacted] | 13-Oct-2015 | IA DNR | 4019416 | E | 1 | Bowler, Mel (IA DNR) |
| 14 | IL | Jo Daviess | Mississippi River | [redacted] | [redacted] | 31-Oct-2018 | IA DNR | 4027159 | E | 2 | Bowler, Mel (IA DNR) |
| 14 | IL | Jo Daviess | Mississippi River | [redacted] | [redacted] | 4-Aug-2022 | IA DNR | 4027212 | E | 1 | Tiemann, JS (INHS) |
| 9 | IL | Rock Island | Mississippi River | [redacted] | [redacted] | 9-Jun-22 | IL DNR | 10048 | E | 1 | Exelon |
| 9 | IL | Rock Island | Mississippi River | [redacted] | [redacted] | 11-Aug-2006 | IL DNR | 10046 | E | 1 | Exelon |
| 9 | IL | Rock Island | Mississippi River | [redacted] | [redacted] | 8-Oct-2009 | IL DNR | 10046 | E | 1 | Exelon |
| 9 | IL | Rock Island | Mississippi River | [redacted] | [redacted] | 16-Apr-2020 | IL DNR | 10047 | E | 1 | Exelon |
| 4 | IL | Rock Island | Rock River | [redacted] | [redacted] | Pre-1901 | IL DNR | 10041 | H | 1 | Historic |
| 1 | IL | Hancock | Mississippi River | [redacted] | [redacted] | 1877 | IL DNR | 10038 | H | 1 | Historic |
| 2 | IL | Rock Island | Rock River | [redacted] | [redacted] | Pre-1901 | IL DNR | 10039 | H | 1 | Historic |
| 3 | IL | Whiteside | Rock River | [redacted] | [redacted] | 1901 | IL DNR | 10040 | H | 1 | Historic |
| 12 | IL | Monroe | Mississippi River | [redacted] | [redacted] | 11-Jul-2013 | IL DNR | 10049 | H | 1 | Lubinski, B (INHS) |
| 15 | IL | Jackson | Mississippi River | [redacted] | [redacted] | 6-Jun-1998 | IL DNR | 11368 | H | 1 | MDC |
| 15 | IL | Jackson | Mississippi River | [redacted] | [redacted] | 3-Apr-2009 | IL DNR | 11368 | H | 1 | MDC |
| 8 | IL | Alexander | Mississippi River | [redacted] | [redacted] | 9-Jun-2004 | IL DNR | 10045 | H | 1 | MDC |
| 10 | IL | Alexander | Mississippi River | [redacted] | [redacted] | 2010 | IL DNR | 10047 | H | 1 | MDC |
| 6 | IL | Lawrence | Wabash River | [redacted] | [redacted] | 1888 | IL DNR | 10043 | H | 1 | Historic |
| 7 | IL | White | Wabash River | [redacted] | [redacted] | 1899 | IL DNR | 10044 | H | 1 | Historic |
| 5 | IL | Effingham | Little Wabash River | [redacted] | [redacted] | Pre-1901 | IL DNR | 10042 | H | 1 | Historic |

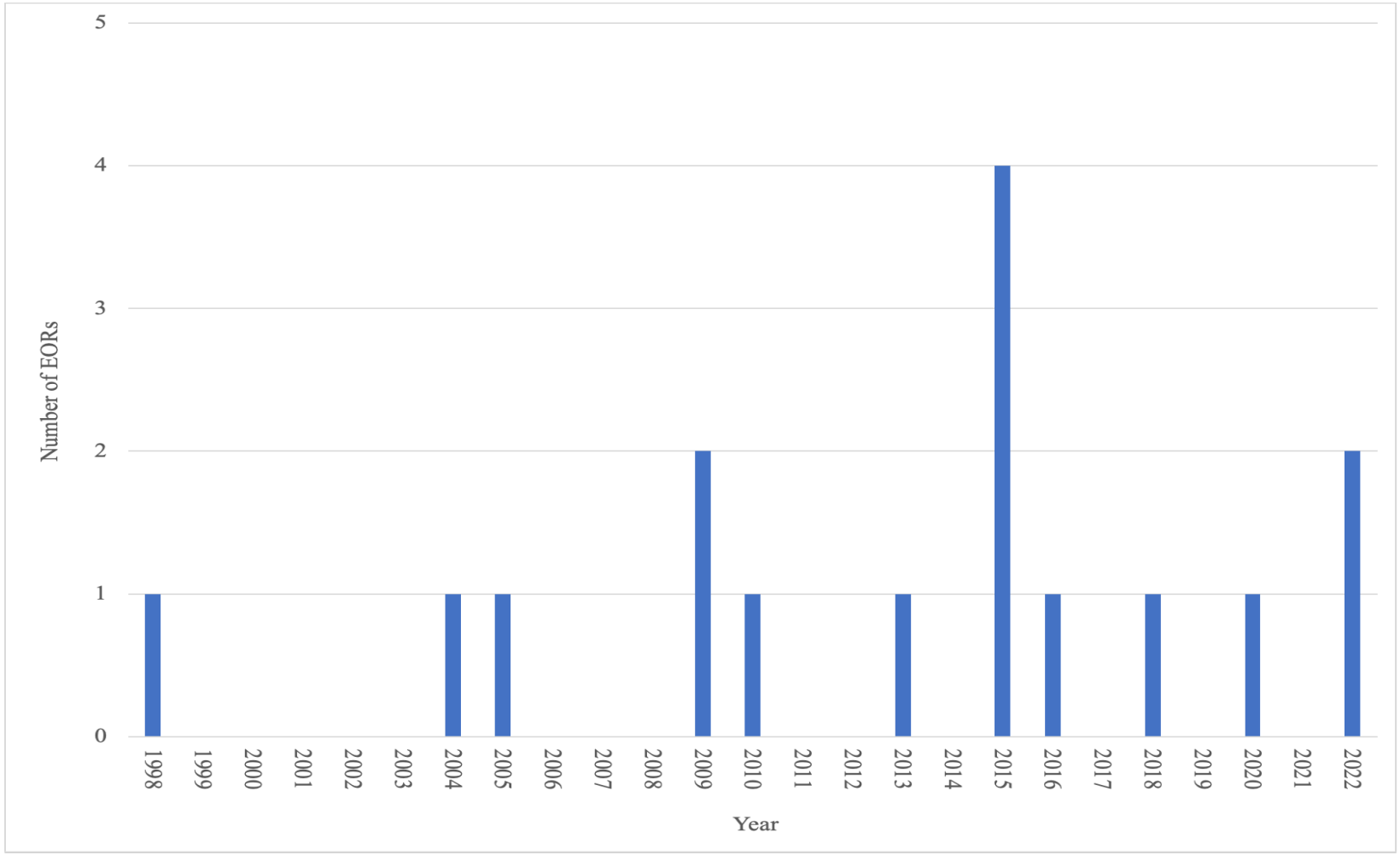


**Figure 4. Number of Crystal Darter (*Crystallaria asprella*) element occur record (EOR) reportings since 1998. Data were provided by both the Illinois and Iowa Departments of Natural Resources.**

**SECTION 6. LITERATURE CITED**


Becker, G.C. 1983. Fishes of Wisconsin. University of Wisconsin Press, Madison. 1052 pp.

Boschung H.T. and R.L. Mayden. 2004. Fishes of Alabama. The Smithsonian Institution. Washington, D.C. 736 pp.

Bowler, M.C. 2001. Recent Observations of the distribution and status of Bluntnose Darters and Crystal Darters in Iowa. The Journal of the Iowa Academy of Science 108:15-18.

Feng, M-L., T.E. Schartel, E. South, B. Henning, Y. Cao, and L.C. Hinz, Jr. 2021. Effectiveness of Illinois' protected lands network at supporting SGCN and their habitats. INHS Technical Report 2021(19). 122 pp.

George, S.G., W.T. Slack, and N.H. Douglas. 1996. Demography, habitat, reproduction, and sexual dimorphism of the Crystal Darter, *Crystallaria asprella* (Jordan), from south central Arkansas. Copeia 1996:68-78.

Herzog, D.P., D.E. Ostendorf., R.A. Hrabik, and V.A. Barko. 2009. The mini-Missouri trawl: A useful methodology for sampling small-bodied fishes in small and large river systems. Journal of Freshwater Ecology 24:103-108.

Illinois Endangered Species Protection Board (IESPB). 2015. Checklist of Endangered and Threatened Animals and Plants of Illinois. Illinois Endangered Species Protection Board, Springfield, Illinois. 18 pp.

Illinois Endangered Species Protection Board (IESPB). 2020. Checklist of Endangered and Threatened Animals and Plants of Illinois. Illinois Endangered Species Protection Board, Springfield, Illinois. 10 pp.

Jelks, H.L., S.J. Walsh, N.M. Burkhead, S. Contreras-Balderas, E. Diaz-Pardo, D.A. Hendrickson, J. Lyons, N.E. Mandrak, F. McCormick, J.S. Nelson, S.P. Platania, B.A. Porter, C.B. Renaud, J.J. Schmitter-Soto, E.B. Taylor, and M.L. Warren, Jr. 2008. Conservation status of imperiled North American freshwater and diadromous fishes. Fisheries 33:372-407.

Miller, R.J. and H.W. Robison. 2004. Fishes of Oklahoma. University of Oklahoma Press, Norman. 450 pp.

Natureserve. 2022. NatureServe Explorer: An online encyclopedia of life. http://explorer.natureserve.org. (Accessed: 24-August-2022).

Page, L.M., 1983. Handbook of Darters. T.F.H. Publishers, Neptune City, New Jersey. 271 pp.

Page, L.M. and B.M. Burr. 2011. Peterson Field Guide to Freshwater Fishes of North America North of Mexico. Houghton Mifflin Harcourt, Boston. 663 pp.

Ross, S.T. (with W. M. Brennaman, W. T. Slack, M. T. O'Connell, and T. L. Peterson). 2001. The Inland Fishes of Mississippi. University Press of Mississippi: Mississippi. 624 pp.

Smith, P.W. 1979. Fishes of Illinois. University of Illinois Press, Urbana, Illinois. 314 pp.

Stewart, J.G., V.A. Barko, D.B. Henry, D.P. Herzog, J.W. Ridings, A.F. Kelley, and J.E. Wallace. 2005. New records of the Crystal Darter (*Crystallaria asprella*) in the Middle Mississippi River. American Midland Naturalist 154:471-473.

Terwilliger Consulting. 2021. Regional species of greatest conservation need in the Midwestern United States. Prepared for the Midwest Association of Fish and Wildlife Agencies and the Midwest Landscape Initiative. 213 pp.

Tiemann, J.S., C.A. Taylor, D. Wylie, J. Lamer, P.W. Willink, F.M. Veraldi, S. Pescitelli, B. Lubinski, T. Thomas, R. Sauer, and B. Cantrell. 2015. Range expansions and new drainage records for select Illinois fishes. Transactions of the Illinois State Academy of Science 108:47-52.