

**SCIENTIFIC NAME: PLETHOBASUS COOPERIANUS**

**COMMON NAME: ORANGEFOOT PIMPLEBACK**

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**SPECIES PHOTO:**



### **Species Status Assessment Goal**

A SSA provides a contemporary evaluation of a species' distribution, abundance, and population structure and viability. It provides baseline information for estimating trends in distribution and abundance. **If the data is not available for the required elements of the SSA, please specify the lack of information as appropriate in each section.**

#### **1. Species description and conservation status**

- A. Taxonomic classification, including notes regarding disagreement in classification and alternative common and scientific names.

The current classification for the species is (NatureServe Explorer 2022):

Phylum: Mollusca

Class: Bivalvia

Order: Unionoida

Family: Unionidae

Genus: Plethobasus

Species: *Plethobasus cooperianus* (I. Lea, 1834)

The Orangefoot Pimpleback mussel (*Plethobasus cooperianus*) was described in 1834 by Lea. Alternative common names for the species are Orange-footed Pimpleback Mussel and Orange-foot pimpleback pearlymussel. Synonymous, but outdated scientific names are *Obovaria striata* and *Plethobasus striatus* (NatureServe Explorer 2022).

- B. A general description of habitat associations and life history characteristics.

The Orangefoot Pimpleback is found in clean, deep, fast-flowing water of medium to large rivers. The bottom substrate usually silt-free rubble, gravel or mixed sand and gravel. They live on the stream bottom, often completely burying themselves in the substrate leaving only their siphons exposed (U.S. Fish and Wildlife Service 2019b).

Mussels are filter feeders; they mainly eat phytoplankton, zooplankton, and bacteria suspended in the water. By drawing water inside their shells through a siphon, their gills filter out food and take in oxygen (Illinois Natural History Survey 2022).

Reproduction requires a stable, undisturbed habitat and a sufficient population of fish hosts to complete the mussel's larval development. When the male discharges sperm into the current, females downstream siphon in the sperm to fertilize their eggs, which they store in their gill pouches until the larvae hatch. The females then expel the larvae (glochidia). This species is considered a tachytictic bivalve (short-term breeder) as they breed in the spring and release glochidia by mid to late summer of the same year. Glochidia parasitize fish by attaching themselves to the gills and grow into juveniles with shells of their own. At that point they detach from the host fish and settle into the streambed, ready for a long (possibly up to 50 years) life as an adult mussel (Ahlstedt 1984, U.S. Fish and Wildlife Service 2019a).

- C. Existing national, regional/subnational rank (i.e., G-rank and S-rank), state and federal listing status, and state/regional conservation status (i.e., Illinois Wildlife Action Plan and Midwest Regional Species of Greatest Conservation Need List). If the S-rank was reevaluated, include the details of the reevaluation.

Orangefoot Pimpleback has been evaluated under state, regional, and global conservation status schemes (Table 1). It was Federally-listed as endangered in 1976. Since its listing, the species has been placed on Illinois’s endangered species list and Midwest Species of Greatest Conservation Need list. It also holds a global and subnational status of critically imperiled.

**Table. 1 Global, federal, regional, and state conservation status of the Orangefoot Pimpleback.**

<u>Assessment</u>	<u>Status</u>
Global Rank (G-rank) <sup>1</sup>	G1 (critically imperiled)
Midwest Species of Greatest Conservation Need <sup>2</sup>	SGCN
State Rank (S-rank), 2021 <sup>3</sup>	S1 (critically imperiled)
Illinois Conservation Status <sup>4</sup>	Endangered
Federal Conservation Status <sup>1</sup>	Endangered

1. NatureServe Explorer (2022)
2. Terwillger Consulting (2021)
3. Feng et al. (2021)
4. Illinois Endangered Species Protection Board (2020)

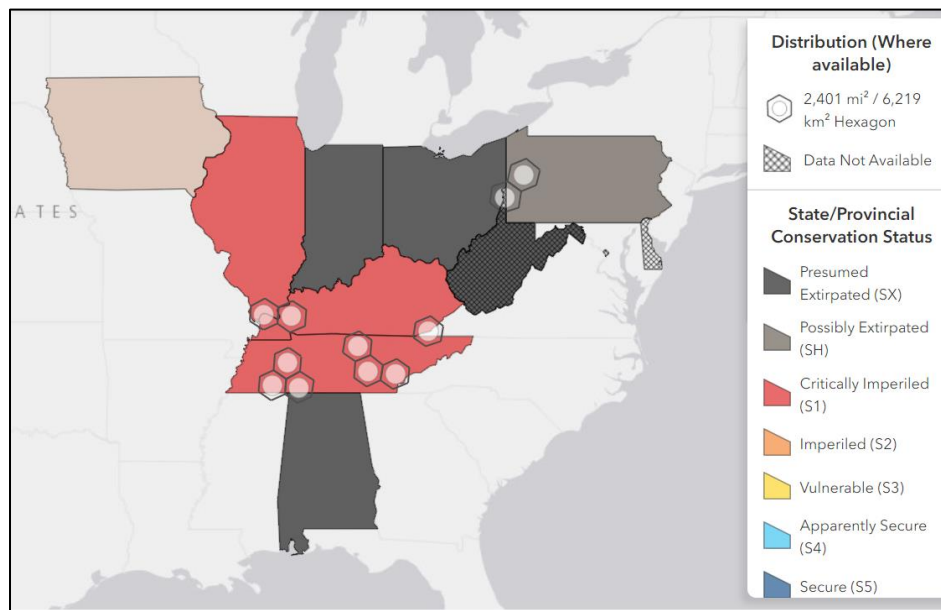
**2. Range and Distribution estimate**

- A. A narrative explaining the species’ estimated range. Provide the finest resolution as possible using a national or global scale.

The historic range of Orangefoot Pimpleback includes portions of the Ohio River, Tennessee River, and Cumberland River watersheds. In the early 1900s the species was extant in the Ohio River from western Pennsylvania through southern Illinois and the Wabash River south of Mt. Carmel. It was “common” in both the Ohio River and Wabash River in the early 1900s, but by the 1980s it was extirpated from the Wabash River and middle Ohio River and was recorded at low abundance in the lower Ohio River. The species exhibited a similar pattern of decline in the Tennessee and Cumberland River watersheds. By the 1970s the species was nearly extirpated from these watersheds and was limited to just a few reaches in the mainstem rivers (Ahlstedt 1984, NatureServe Explorer 2022).

The current range of this species is limited to the Lower Ohio River (Pulaski and Massac County, Illinois), Cumberland River, and Tennessee River systems. It is considered extirpated from the Ohio River, except the Illinois/Kentucky reach of the River, Wabash River, and much of the Tennessee and Cumberland River Watersheds (Figure 1; NatureServe Explorer 2022).

i. Range Map



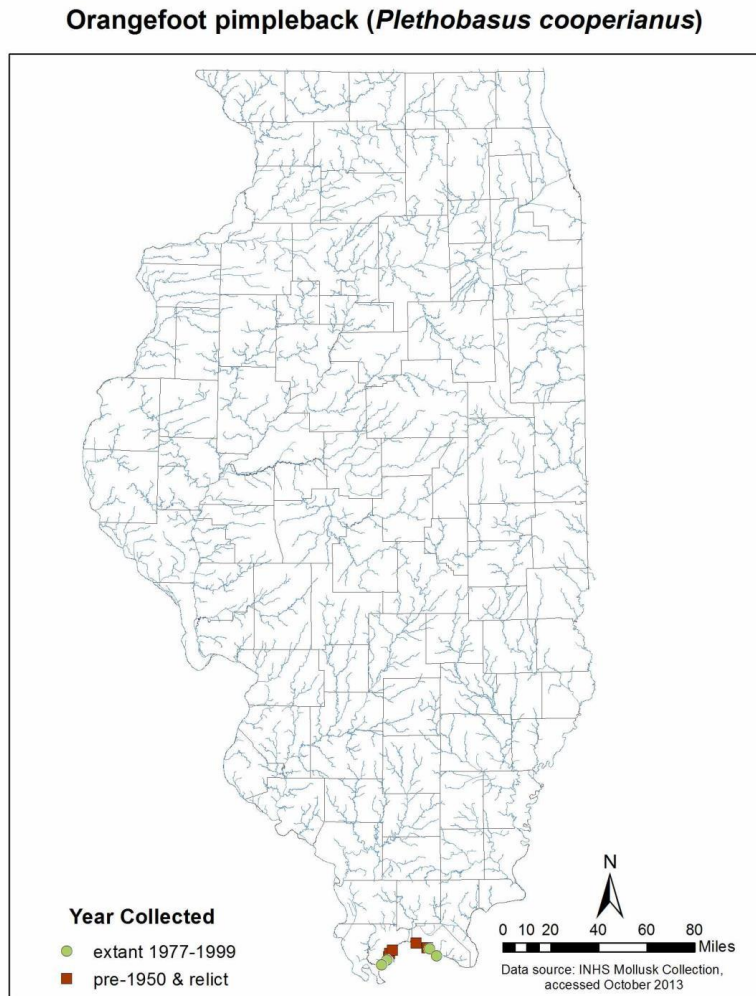
**Figure 1. Documented global range distribution of the Orangefoot Pimpleback (NatureServe Explorer 2022).**

B. A narrative explaining the species’ estimated distribution and occurrence records. Provide the finest resolution as possible using a state scale.

In Illinois, Orangefoot Pimpleback is found infrequently in the Ohio River (Figure 2). It has declined in distribution by more than 50% (Douglass and Stodola 2014, Illinois Department of Natural Resources

2015). The species' range extent is an estimated 241km<sup>2</sup> and the area of occupancy is 14 to 21 1-km<sup>2</sup> grid cells occupied (Feng et al. 2021).

i. Distribution/Occurrence Map



**Figure 2. Illinois occurrence records of Orangefoot Pimpleback (Douglass and Stodola 2014). Post-1999 occurrence records fall within the same general areas as those records depicted in this figure.**

C. A narrative detailing sampling limitations.

Orangefoot Pimpleback occurrence records originate from mussel community surveys or targeted surveys associated with ongoing conservation efforts. Spatiotemporal coverage of these surveys is limited, and most records lack sampling effort, survey extent, or mussel assemblage information. No

systematic survey of Ohio River mussels has been conducted and most recent surveys within the species' Illinois range result from regulatory actions.

D. Additional Range and Distribution Information (optional)

- i. E.g., Habitat suitability, occupancy, or distribution modeling; Changes in distribution over time.

Although Orangefoot Pimpleback remains extant in the Ohio River, infrequent surveys make it difficult to know if the species' distribution is changing.

**3. Abundance estimate**

- A. A count of individuals and density estimate at multiple spatial scales. The scale will be relevant to the data (e.g., locale, EO, watershed, state-wide).

There are seven occurrence records of Orangefoot Pimpleback in Illinois. Six recorded one of two live individuals and one recorded the species as "observed" (Table 2). Two records have occurred since 2000, one with one live individual and one with two live individuals collected. The record with two individuals estimated search effort at 24 hours. The record with one individual did not record search effort but did estimate the relative abundance of Orangefoot Pimpleback at 0.1%. In fall 2021 more than 3700 mussels were relocated from an area adjacent to one of the 2015 records as part of an Incidental Take Authorization, but no Orangefoot Pimpleback were recorded.

**Table 2. Abundance and Demographic Information Recorded for Each Orangefoot Pimpleback Source Feature.**

<u>Record Year</u>	<u>Recorded Abundance</u>	<u>Juveniles Recorded</u>
1981	1 (freshly dead)	N
1982	1	N
1984	1	N
1984	Observed	N
1999	1	N
2015	1	N
2015	2	N

- B. Additional Abundance Estimate Information (optional)

- i. E.g., Model-based, or mathematical estimates of true abundance at multiple spatial scales; Changes in abundance over time.

Meaningful evaluation of abundance trends is not possible given the scarcity of records and variation in search effort.

**4. Population identification and viability**

- A. Narrative explaining EO viability ranking. NatureServe's [Ranking Species Occurrences: Generic Guidelines and Decision Key](#) should be used to determine EO Ranking.

Data traditionally used to delineate populations are not available for Orangefoot Pimpleback, so Element Occurrences (EOs) are used as a surrogate for identifying and evaluating populations. EOs for Orangefoot Pimpleback were ranked using guidance in Hammerson et al. (2020). Of the four EOs in Illinois two are rank D (poor viability) and two are historic (no records within 10 years, but unknown status; Figure 2, Table 3).

No juveniles have been recorded for any source feature (Table 2), and no demographic information is provided in EO documentation.

i. EO Ranking Map

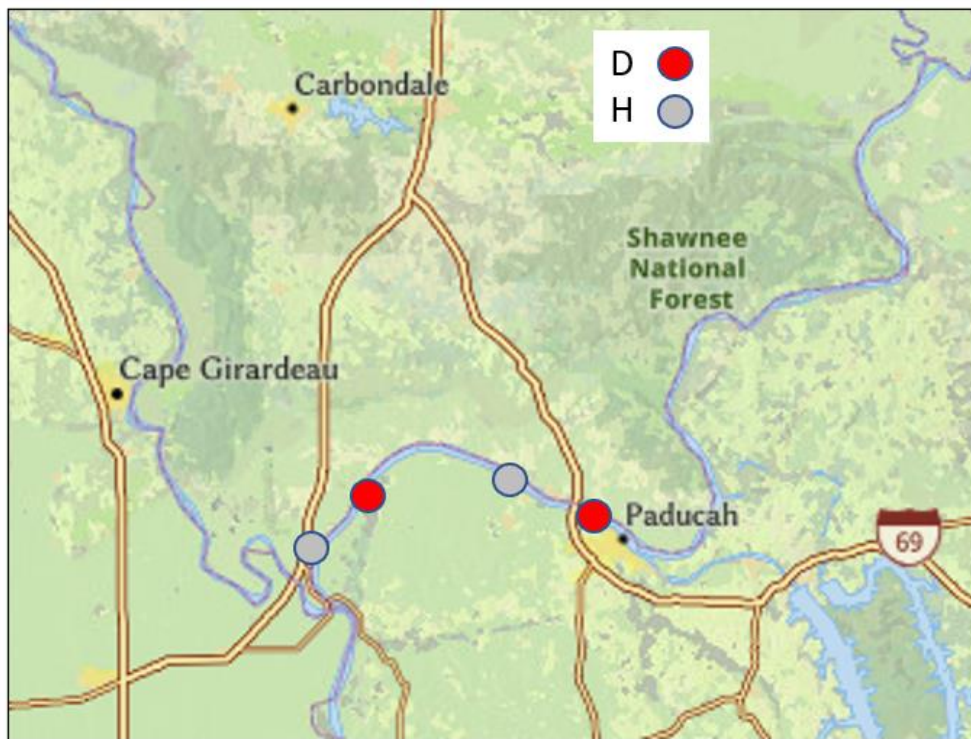


Figure 3. Element Occurrence (EO) rank map.

- ii. EO Ranking Table. Each column heading should include: EO Number and/or EO ID, EO Name, Last Survey Date, EO Rank, and Justification for the rank. Large tables may be appended.

Table 3. Element Occurrence (EO) Ranks for Orangefoot Pimpleback.

EO Num	EO Name	Last Date	EO Rank*	Justification
6	██████████ ██████████	2015	D	Few individuals. 2021 survey failed to find the species in this EO.
5	██████████ ██████	1999	H	Unknown status of record. Unknown if additional surveys have occurred.

1	[REDACTED]	2015	D	Few individuals.
8	[REDACTED]	1984	H	Unknown status of record. Unknown if additional surveys have occurred.

- B. Generally, explain the protection status of EOs (private property, nature preserves/land and water reserves, INAs (including relevant qualifying feature), state-owned lands, conservation lands owned by partner organizations or agencies)

The Ohio River is an Illinois Public Water (17 IL Admin. Code 3704). No critical habitat has been designated by the USFWS.

- C. Brief explanation of the significance of the populations for Federal recovery, if applicable. For Federally listed species briefly describe the relative importance of Illinois’ populations for Federally recovery efforts.

Ohio River EOs occur within the Ohio River population, which is one of only five extant Orangefoot Pimpleback populations (US Fish and Wildlife Service 2022).

- D. Additional population identification and viability information (optional)
- i. E.g., Delineation and count of populations using ecological and behavioral knowledge of the focal species; Abundance estimates within each population; Genetic analysis; Individual tracking; Population viability analysis (PVA).

No additional information is available.

## 5. Citations

Ahlstedt, S. 1984. Recovery plan for the Orange-footed Pearly Mussel *Plethobasus cooperianus* (Lea, 1834). U.S. Fish and Wildlife Service, Atlanta, Georgia. 44pp. Accessed online at [https://ecos.fws.gov/docs/recovery\\_plan/840930b.pdf](https://ecos.fws.gov/docs/recovery_plan/840930b.pdf) on 1/24/2022.

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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).

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U.S. Fish and Wildlife Service. 2019a. Orangefoot pimpleback *Plethobasus cooperianus*. Accessed online at <https://www.fws.gov/southeast/wildlife/mussels/orangefoot-pimpleback/#:~:text=with%20the%20flow-,Appearance,is%20covered%20with%20raised%20tubercles>

U.S. Fish and Wildlife Service. 2019b. Orange-Footed Pearly Mussel (*Plethobasus cooperianus*). Accessed online at [https://www.fws.gov/midwest/endangered/clams/orang\\_fc.html#:~:text=Habitat%3A%20This%20mussel%20prefers%20clean,its%20feeding%20siphons%20are%20exposed](https://www.fws.gov/midwest/endangered/clams/orang_fc.html#:~:text=Habitat%3A%20This%20mussel%20prefers%20clean,its%20feeding%20siphons%20are%20exposed)

U.S. Fish and Wildlife Service. 2022. Orangefoot Pimpleback (Pearlymussel) (*Plethobasus cooperianus*) Status Review: Summary and Evaluation. Accessed online at [https://ecos.fws.gov/docs/tess/species\\_nonpublish/4048.pdf](https://ecos.fws.gov/docs/tess/species_nonpublish/4048.pdf)