Fat Pocketbook
(*Potamilus capax*)

5-Year Status Review:
Summary and Evaluation

Photos of shells of fat pocketbook. Photo by M. Wagner.

U.S. Fish and Wildlife Service
Southeast Region
Mississippi Ecological Services Field Office
Jackson, Mississippi

July 2025

5-YEAR STATUS REVIEW
Fat Pocketbook (*Potamilus capax*)

GENERAL INFORMATION

Current classification: Endangered

Lead Field Office: Mississippi Ecological Services Field Office, Jackson, Mississippi

Review prepared by: Matthew Wagner, Mississippi Ecological Services Field Office

Reviewers:

Lead Regional Office: Southeast Region, Carrie Straight

Cooperating Field Office(s): Arkansas Ecological Services Field Office, Chris Davidson and Jason Phillips; Illinois-Iowa Ecological Services Field Office, Matthew Mangan; Indiana Ecological Services Field Office, Will Tucker; Missouri Ecological Services Field Office, Josh Hundley; Tennessee Ecological Services Field Office, Andy Ford

Cooperating Regional Office: Laura Ragan, Midwest Region

Date of original listing: July 14, 1976 (41 FR 24062; June 14, 1976)

Methodology used to complete the review:

In accordance with section 4(c)(2) of the Endangered Species Act of 1973, as amended (Act), the purpose of a status review is to assess each threatened species or endangered species to determine whether its status has changed and if it should be classified differently or removed from the Lists of Threatened and Endangered Wildlife and Plants (50 CFR 424.11). The U.S. Fish and Wildlife Service (Service) evaluated the best available information about the fat pocketbook's biology, habitat, and threats to inform this status review.

We announced initiation of this review in the Federal Register on June 6, 2024 (89 FR 48437), with a 60-day comment period and received one comment. The primary sources of information used in this analysis were the 1976 final listing rule (41 FR 24062), the 2019 5-year review, peer-reviewed reports, agency reports, unpublished survey data and reports, and personal communication with recognized experts. This review was completed by the U.S. Fish and Wildlife Service, Mississippi Ecological Services Field Office, Jackson, Mississippi. All literature and documents used for this review are on file at the Field Office. Along with information and data received from state agencies, we received one public comment from the National Council for Air and Stream Improvement Incorporated. The public comment received discussed silviculture best practices and impacts on water quality, which was evaluated and incorporated into this final document as appropriate. A completed draft of this 5-year review was sent to other affected Service offices in the species' range for review and comment. All comments received were evaluated and incorporated into this final document as appropriate. All recommendations resulting from this review are the result of thoroughly reviewing the best available information on the fat pocketbook.

FR Notice citation announcing the species is under active review:

June 6, 2024 (89 FR 48437)

Species' Recovery Priority Number at start of 5-year review (48 FR 43098):

14. Fat pocketbook is a species with a low degree of threat and a high recovery potential.

Review history:

Previous 5-year reviews for this species were conducted on July 7, 1987 (52 FR 25523) and November 6, 1991 (56 FR 56882). In these reviews, the status of many species was simultaneously evaluated with no in-depth assessment of the five factors as they pertained to the species and stated that no changes in the designation of these species were warranted at that time. The first species-specific 5-year review was published March 30, 2012 (Service 2012) and recommended no change in status. The previous 5-year review was published on December 26, 2019 (Service 2019) and recommended the species be removed from the List of Endangered and Threatened Wildlife due to recovery.

REVIEW ANALYSIS

Listed Entity

Taxonomy and nomenclature

We are not aware of any changes to the taxonomy of this entity, and it is still considered valid by the Service, the Freshwater Mollusk Conservation Society checklist of freshwater mussels (Mollusca: Bivalvia: Unionidae) of the United States and Canada (2023), and the Integrated Taxonomic Information System (2025).

Distinct Population Segment (DPS) (61 FR 4722)

The Act defines species as including any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate wildlife. This definition limits listing of a DPS to only vertebrate species. Because the species under review is a not a vertebrate, the DPS policy does not apply.

Recovery Criteria

Recovery Plan

A Recovery Plan for the Fat Pocketbook Pearly Mussel *Potamilus capax* (Green 1832), November 14, 1989 (Revision 1).

Recovery Plan Amendment for Fat Pocketbook, September 24, 2019

Recovery plans are non-regulatory documents providing guidance to the Service, States, and other partners on methods of minimizing threats to listed species and the criteria that may be used to determine when recovery is achieved. If the recovery criteria defined in the plan are still valid, meeting recovery criteria can indicate that the species no longer requires protections under the Act. However, when recommending whether a listed species should be delisted, the Service must apply the factors in section 4(a) of the Act (84 FR 45020). Recovery criteria for the fat pocketbook mussel are listed below (Service 2019).

"The fat pocketbook mussel will be considered for delisting when:

1) All three drainage populations (Saint Francis, Ohio, and Mississippi River) exhibit a stable or increasing trend, evidenced by natural recruitment, and multiple age classes (Factors A, D).
2) Fat pocketbook mussels are documented from a minimum of 12 sites along 200 km [kilometer] (125 mi [mile]) reaches of the Saint Francis, Ohio, and Mississippi River drainages (Factors A, E).
3) Active USACE [U.S. Army Corps of Engineers] management programs are in place, and assured to continue into the foreseeable future, within each of the three drainages leading to maintenance or improvement of fat pocketbook mussel habitats and population expansion (Factors A, D)."

The Service believes these criteria are appropriate and relevant. Criteria 1 and 2 have been fully met; however, criterion 3 has not currently been met.

Biology and Habitat Summary

Since the last 5-year review (Service 2019), a comprehensive distribution database of all occurrence records of fat pocketbook was assembled to assess the maximum known range of the species and compare it to the current range of the species (Service 2025; Figure 1). Each occurrence record in the database represents one or more individuals collected at a locality on a separate date. The new dataset allowed for an assessment of the river kilometers (rkm)/river miles (rmi) occupied through time grouped by five drainages (Ohio River, Upper Mississippi River, Lower Mississippi River, Saint Francis River, and White River) across three time periods [1879 to 1976 (pre-listing), 1977 to 1999 (post-listing historic), and 2000 to present (recent)] (Table 1). When fat pocketbook was listed in 1976 (Service 1976), it was thought to be restricted to the Saint Francis River and White River in Arkansas; however, the new comprehensive dataset includes data unavailable to the Service at the time of listing and subsequent 5-year reviews, and indicates the species was more widespread in 1976 than previously known (see Appendix A for additional information). Not included in this review are two suspect records of the species from New York (BSM 3651-6/1 and BSM 3651-6/2, Strayer and Jirka, 1997) as these two records are outside of the Mississippi drainage and are considered unreliable locations by the Service.

Ohio River Drainage. From 2000-2024, 93,794 individuals were documented across 760 occurrence records in the Ohio River and its tributaries. The species is widespread as it currently occupies the Saline River, lower Tennessee River, lower Clarks River, lower Cumberland River, lower Green River, and the Wabash River and its tributaries totaling over 1,004 rkm (624 rmi). In the mainstem Ohio River, the species has been documented from Rockport, Indiana downstream to Mound City, Illinois since 2000, which encompasses the lower two thirds of the maximum known range in the mainstem Ohio River. The presence of multiple size classes of fat pocketbook throughout the Ohio River and its tributaries has been documented by multiple sources since 2000, indicating recruitment throughout the drainage (Service 2019).

Upper Mississippi River Drainage. There are five occurrence records of the species in the Upper Mississippi River drainage (upstream of the mouth of the Ohio River) between 2000 and 2024 (Figure 1); however, none are records of live individuals (Mangan pers. comm. 2025). With no records of live individuals in the last 24 years, it may be potentially extirpated from this part of the historical range which once spanned 1564 rkm (971 rmi).

Lower Mississippi River. From 2000-2024, 542 individuals were documented across 320 occurrence records of the species in the Lower Mississippi River drainage (downstream of the mouth of the Ohio River). The records are widespread indicating that 1,114 rkm (692 rmi) in the drainage are occupied by the species. Excluding the White River and Saint Francis River, the Big Sunflower is the only tributary with species occurrences in Lower Mississippi River, known from two relic shells collected in 2004 (MMNS8589). The presence of multiple size classes of fat pocketbook throughout the Lower Mississippi River has been documented by multiple sources since 2000 (Service 2019), indicating recruitment throughout the drainage.

Saint Francis River. From 2000-2024, 107,200 individuals were documented across 238 occurrence records of the species in the Saint Francis River and its tributaries. The records are widespread throughout the system and its tributaries indicating that 888 rkm (552 rmi) are occupied by the species. The presence of multiple size classes of fat pocketbook throughout the Saint Francis River and its tributaries has been documented by multiple sources (Service 2019), indicating recruitment throughout the drainage.

White River. From 2000-2024, only a single live fat pocketbook has been reported from the White River in Arkansas (Harris and Christian 2003); however, none of the subsequent surveys in the White River have detected the species (Phillips pers. comm. 2025). The single record is 21 rkm (13 rmi) upstream of the mouth compared to the most upstream historic record at 204 rkm (127 rmi) upstream of the mouth. Despite multiple surveys of the drainage through time, only four individuals have ever been detected in the drainage indicating the species is rare in the drainage. No information on recruitment exists for the White River System.

Table 1. Number of river kilometers and river miles occupied by fat pocketbook at three different time periods. The calculation of occupied river kilometers (river miles) is based on the Service's distribution database of occurrence records and does not consider sampling effort. No standardized, repeated, range-wide surveys exist for the species. An * indicates that a zero may not represent a range reduction, but rather a lack of surveys or extreme rarity of the species.

Drainage	River Kilometers (River Miles) Occupied 1879–1976	River Kilometers (River Miles) Occupied 1977–1999	River Kilometers (River Miles) Occupied 2000–2024
Upper Mississippi River	1564 (971)	700 (435)	0 (0)
Lower Mississippi River	0 (0)*	978 (608)	1114 (692)
White River	204 (127)	0 (0)*	21 (13)
Saint Francis River	883 (549)	1043 (648)	888 (552)
Ohio River	768 (477)	929 (577)	1015 (631)

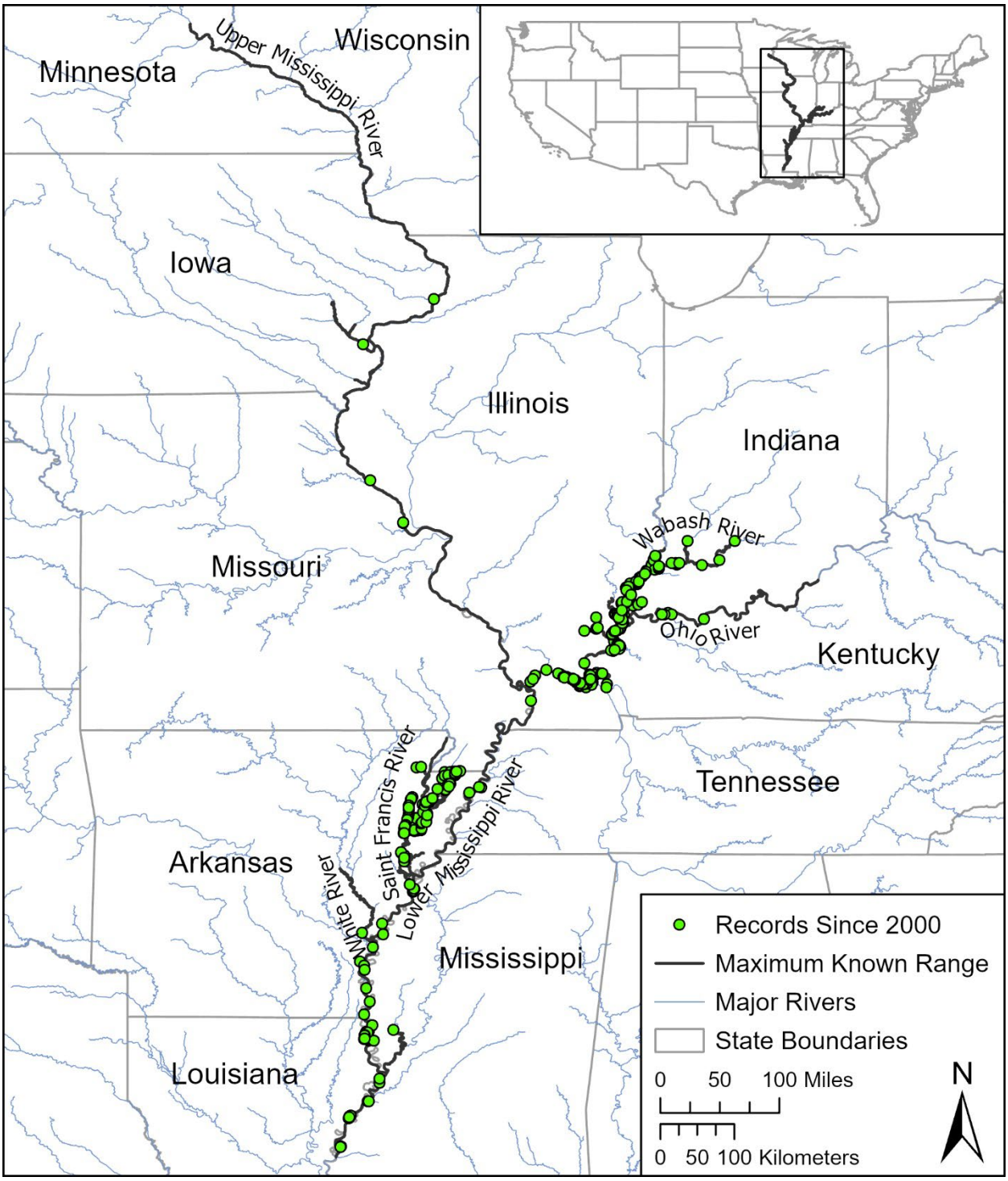

Figure 1. Map of maximum known range of fat pocketbook with all records of the species documented from 2000 to 2024.

Threats (Five-Factor Analysis) Summary

The status of a species is determined from an assessment of the five factors specified in section 4(a)(1) of the Act. Summaries of our assessments are detailed below.

Factor A. Present or threatened destruction, modification or curtailment of its habitat or range

The primary threats identified for the fat pocketbook have included the destruction, modification, and curtailment of historical habitats throughout its range, primarily due to navigation and flood control activities (i.e., impoundment, channelization, channel maintenance, dredging) on rivers (Service 1989). The recovery plan also described concerns about the effects of siltation and pollution on mussels in general (Service 1989); however, there was no information available on the impact of these threats specific to the fat pocketbook or its habitat at that time. The 2012 5-year review identified ongoing threats to habitat and range as impoundment, hydropower and hydrokinetic power development, channel dredging, and illegal discharges and spills (Service 2012). Potential stressors to the species included sedimentation and non-point source pollution (Service 2012). However, the 2019 5-year review notes impoundment and hydropower projects with potentially adverse effects on the fat pocketbook have been completed with minimal impact to the species, and future hydrokinetic development in the Lower Mississippi River has been abandoned. Negative effects from channelization, channel maintenance, and dredging have been further reduced by development and implementation of United States Army Corps of Engineers (USACE) programs protective of fat pocketbook and its habitats in the Saint Francis River, Lower Mississippi River, and Ohio River drainages. However, the historical loss of the species from the 1564 rkm (971 rmi) section of the Upper Mississippi River drainage may be attributed to the extensive system of 29 locks and dams (Olsen et al. 2021) and riverine modification. The increase in abundance and range of the species, including within channelized ditches highly affected by agricultural runoff and dredging for channel (ditch) maintenance and in navigable river channels subject to dredging, shows resiliency to non-point source pollution and channel maintenance activities (Service 2019). The uniqueness and importance of constructed drainages (ditches) as fat pocketbook habitat and their resiliency to habitat disturbance has become more apparent in the past 20 years (CCR Environmental, Inc. & Harris, J.L. 2009; U.S. Army Corps of Engineers 2018). While the fat pocketbook remains locally vulnerable to illegal discharges, spills, and non-point source pollution, the expansion of its range provides redundancy in the face of such threats. Therefore, threats previously identified to fat pocketbook habitat and range have declined, or the species has become locally adapted to conditions across its range, or both.

Factor B. Overutilization for commercial, recreational, scientific, or educational purposes

We have no information indicating that overutilization for commercial, recreational, scientific, or educational purposes pose a threat to the species.

Factor C. Disease or predation

We have no information indicating that disease or predation pose a threat to the species.

Factor D. Inadequacy of existing regulatory mechanisms

Since the implementation of the U.S. Environmental Protection Agency's National Pollutant Discharge Elimination System in 1972, industrial discharges have been regulated and point source pollutants have significantly declined in the large river systems inhabited by fat pocketbook. While studies suggest that some pollutant standards may not be protective of all freshwater mussel species or life stages (e.g., Augspurger et al. 2007), the fat pocketbook has experienced an increase in abundance and range within areas affected by point and/or non-point

source discharges (Service 2012, 2019; USACE 2014, 2018). Therefore, current State and Federal regulations for pollutants may be generally protective of the fat pocketbook.

Maintenance dredging or cleanouts conducted under the Rivers and Harbors Act, or other Federal regulations, may adversely affect individual fat pocketbook but populations are resilient to - and often increase following - these activities. Best management practices developed by the USACE (2014, 2018) for dredging in the Mississippi River and for channel cleanouts in the Saint Francis River drainage minimize adverse effects to the species and promote rapid recuperation of affected populations.

Factor E. Other natural or manmade factors affecting its continued existence

The spread of the invasive zebra mussel (*Dreissena polymorpha*) has been noted to have harmful effects to freshwater mussels in the Mississippi River drainage due to competition for food and habitat resources (Service 2012). However, fat pocketbook has expanded in range and abundance concurrent with the spread of the zebra mussel and there is no evidence of any impact of zebra mussel competition to the fat pocketbook.

Increased frequency and severity of floods and droughts may have negative effects on populations of freshwater mussels (Golladay et al. 2004; McLaughlin et al. 2002; Lubchencho and Carl 2012). However, substantial horizontal movement by fat pocketbook within the stream bottom has been documented that could be a potential adaptive mechanism in surviving extreme drought or dissolved oxygen depletion events (Peck et al. 2014). Habitats currently occupied by the fat pocketbook include low gradient small streams and ditches (i.e., upper Saint Francis River drainage) to large rivers (e.g., Mississippi River, Ohio River, and Saint Francis River). This expanded distribution throughout a variety of stream and river orders reduces the species vulnerability to extinction from local stochastic or catastrophic events, such as severe storms or droughts.

Species Status Summary (3 Rs)

The Species Status Assessment (SSA; https://www.fws.gov/project/species-status-assessment) Framework is an analytical approach to deliver foundational science for informing all decisions under the Act. Part of the SSA framework is to assess the listed entity's ability to sustain populations over time. To sustain populations over time, a species must have the capacity to withstand:

(1) environmental and demographic stochasticity and disturbances (Resiliency), catastrophes (Redundancy), and
(2) novel changes in its biological and physical environment (Representation).

Although this species does not have a formal SSA, we have briefly assessed Resiliency, Redundancy, and Representation.

Resiliency is the ability of a species to withstand normal, year-to-year variations in environmental conditions such as temperature, rainfall, periodic disturbances within the normal range of variation (fire, floods, storms), and normal variation in demographic rates such as mortality and fecundity.

The species has experienced a significant increase in abundance and range since its listing in 1976, when it was only known from the Saint Francis River and White River. The increase in abundance and range of the species across multiple river systems that have been subject to

habitat disturbance (non-point source pollution and channel maintenance activities) demonstrates the resiliency of the species (USACE 2018). The known range now includes the Saint Francis River, White River, Upper Mississippi River, Lower Mississippi River, and Ohio River drainages (Figure 1). Based on occurrence data since 2000, the populations in the Saint Francis River, Lower Mississippi River, and Ohio River drainages have widespread and stable distributions, with the mainstems and multiple tributaries occupied in both the Saint Francis River and Ohio River drainages (Service 2019). We are unable to assess abundance or recruitment in the White River or Upper Mississippi River currently with only one record from the White River and five records from the Upper Mississippi River since 2000.

Extensive lock and dam systems exist throughout the range of fat pocketbook on the Upper Mississippi River and Ohio River drainages. Available information does not indicate the Ohio River anthropogenic modifications cause current issues with population connectivity or access to the common and widespread fish host (freshwater drum, *Aplodinotus grunniens*). However, the extensive system of 29 locks and dams on the 1564 rkm (971 rmi) section of the Upper Mississippi River drainage likely contributed to the extirpation of the species in that drainage. A test of genetic differentiation between the Saint Francis and Ohio rivers indicated that populations genetically diverged over time (Moyer et al. 2011). The divergence can be attributed to restricted gene flow or selective pressures or both, indicating that there are some natural connectivity barriers between the drainage populations.

The contribution of individual factors to the increase in range and abundance is unknown; however, improved habitat conditions, adaptation to conditions, or the increase in mussel survey efforts since listing all influence the current species condition.

Redundancy is the ability of a species to withstand catastrophes. Catastrophes are random events that are expected to lead to population collapse regardless of population health and for which adaptation is unlikely.

Widespread species with multiple populations across a variety of environmental conditions generally exhibit a greater ability to withstand catastrophic events. Fat pocketbook is considered to have high redundancy as it is widespread across the Saint Francis River, Lower Mississippi River, and Ohio River drainages occupying over 3,027 rkm (1,875 rmi) across a variety of environmental conditions (Figures 1 and Table 1). Except for the White River and Upper Mississippi River, the extent of the range in all other populations should buffer the populations from negative effects from widespread spills and extreme drought with associated dissolved oxygen depletion events (i.e., the majority of catastrophic events). The variety of stream and river orders currently occupied by the species reduces the vulnerability of the species to extinction from severe droughts as the larger rivers are unlikely to be dewatered. Additionally, the highly branched distribution of the Saint Francis River and Ohio River populations makes them particularly resistant to catastrophic events as they can quickly recolonize areas subject to catastrophic events from other nearby tributaries.

Representation is the ability of a species to adapt to both near-term and long-term changes in its physical and biological environments.

Fat pocketbook is widespread across multiple regions with varying climate extremes. The species exists in a variety of conditions, including large rivers, small streams, dredged channels, and secondary channels in areas a few inches deep to areas over 20 feet deep, in areas with or without current, in gravel, sand, or mud substrates. Additionally, genetic variation among

populations has been documented across the range of the species (Moyer et al. 2011). As the species has genetic variation among populations and uses a wide variety of habitats over a large geographic area across a large portion of its historical range, it can be considered to have high adaptive capacity.

Synthesis

The fat pocketbook is a medium-sized freshwater mussel found throughout the Ohio River, Saint Francis River, White River, Upper Mississippi River, and Lower Mississippi River drainages. The species has experienced a significant increase in abundance and range since its listing in 1976, when it was only known from the Saint Francis River and White River. Part of this increase is a better understanding of the species' range after it was listed (historically occurring over a much wider area than the Service believed in 1976). It is now known to have stable and widespread populations in the Saint Francis River, Lower Mississippi River, and Ohio River drainages as indicated by surveys from 2000 to 2024. However, the status of the populations in the White River and Upper Mississippi River drainages remain uncertain due to a lack of data or live individuals. Although threats to the species exist, they are not acting on the species at a level that reduces its resiliency, redundancy, or representation, and the species has the unique ability to quickly recolonize areas following habitat disturbance. The increase in abundance and range of the fat pocketbook reflects a decrease in the risk of range and habitat curtailment (Factor A) and provides redundancy which reduces the species vulnerability to catastrophic events (Factor E). The currently occupied drainages have been extensively modified; however, the continued presence and recruitment of fat pocketbook throughout this variety of modified and engineered river and stream reaches demonstrates population and species resilience to habitat modification, as well as the adequacy of regulatory mechanisms to protect the species (Factor D). The implementation and success of U.S. Army Corps of Engineer's management programs in the Saint Francis River and the Lower Mississippi River supports fat pocketbook resiliency, representation, and redundancy. The incorporation of these programs into projects impacting those waterways provides assurances that protective best management practices, as well as some degree of monitoring, will continue in the Saint Francis River and Lower Mississippi River should the species be delisted. There is no formal fat pocketbook management program in the Ohio River drainage, but some management and monitoring actions that benefit habitat for fat pocketbook are currently implemented. Based on the best available information, we recommend that the fat pocketbook mussel no longer meets the definition of an endangered or threatened species under the Act and should be considered for delisting.

RECOMMENDED FUTURE ACTIVITIES

A detailed discussion of recovery actions and criteria are presented in the Recovery Plan (Service 1989) and the Recovery Plan Amendment (Service 2019). New and targeted potential recovery activities include:

Recovery Activities

- Develop and formalize a USACE conservation program in the Ohio River that supports continued consideration of fat pocketbook resiliency, representation, and redundancy following delisting.

Monitoring and Research Activities

- Conduct surveys in cooperation with Federal, State, and private partners to confirm and update current distribution and status of drainage populations.
- Work with the States and USACE to develop a post-delisting monitoring plan for the Saint Francis, Ohio, and Mississippi River drainage populations.

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RESULTS / SIGNATURES

U.S. Fish and Wildlife Service
Status Review of Fat Pocketbook

Status Recommendation:

On the basis of this review, we recommend the following status for this species (50 CFR § 424.11). A 5-year review presents a recommendation of the species status. Any change to the status requires a separate rulemaking process that includes public review and comment, as defined in the Act.

- ☐ Downlist to Threatened
- ☐ Uplist to Endangered
- ☒ Delist:
  - ☒ *The species is recovered*
- ☐ No change needed

With this recommendation, the Service will move the species into the de- and down-listing workplan. We will conduct a more detailed review to assess species resiliency, redundancy, and representation and hold a Service meeting to determine if the best scientific information available continues to support the recommendation. The Service will then get approvals from different levels of leadership and develop a proposed rule. Any proposed rule will be published in the Federal Register. At that stage, any interested person can comment and provide additional information on the proposed rule—generally during a 60-day comment period. After the proposed rule, the Service will analyze information received in public comments and any new information. Typically, within one year of a listing proposal, we may: 1) publish a final rule; 2) withdraw the proposal because the biological information does not support the listing; or 3) extend the proposal if there is substantial disagreement within the scientific community concerning the rule.

FIELD OFFICE APPROVAL:

Field Supervisor, Mississippi Ecological Services Field Office, U.S. Fish and Wildlife Service

Approve JAMES AUSTIN Digitally signed by JAMES AUSTIN Date: 2025.08.11 10:47:39 -05'00'

LEAD REGIONAL OFFICE APPROVAL:

Assistant Regional Director – Ecological Services, U.S. Fish and Wildlife Service

Approve CATHERINE PHILLIPS CZARNECKI Digitally signed by CATHERINE PHILLIPS CZARNECKI Date: 2025.09.05 11:54:08 -04'00'

COOPERATING REGIONAL OFFICE APPROVAL:

We emailed this 5-year review to the Midwest Regional Office for their concurrence prior to finalizing the document. We will retain any comments that we received, as well as verification of concurrence from other regions, in the administrative record for this 5-year review.

APPENDIX A. SUPPORTING DOCUMENTATION

Detailed Biology and Habitat

Below are range maps of the distribution of the fat pocketbook from 1879 to 1976 (pre-listing) and 1977 to 1999 (post-listing historic) from a comprehensive distribution database of all records of fat pocketbook (Service 2025). This data was recently made available by nationwide efforts to digitize and geolocate data from museum collections (Pfieffer et al. 2024). This complete dataset was unavailable to the Service at the time of listing in 1976 when the species was only known to occupy the Saint Francis and White Rivers in Arkansas and during all past reviews. The 1879 to 1976 data shows that the species was widespread in the Ohio River and Upper Mississippi River drainages pre-listing but not known from the Lower Mississippi River drainage outside of the Saint Francis and White Rivers (Figure 2). The 1977 to 1999 data shows that the species was found in the Ohio River, Upper Mississippi River, Lower Mississippi River, and Saint Francis River drainages, but not the White River drainage (Figure 3).

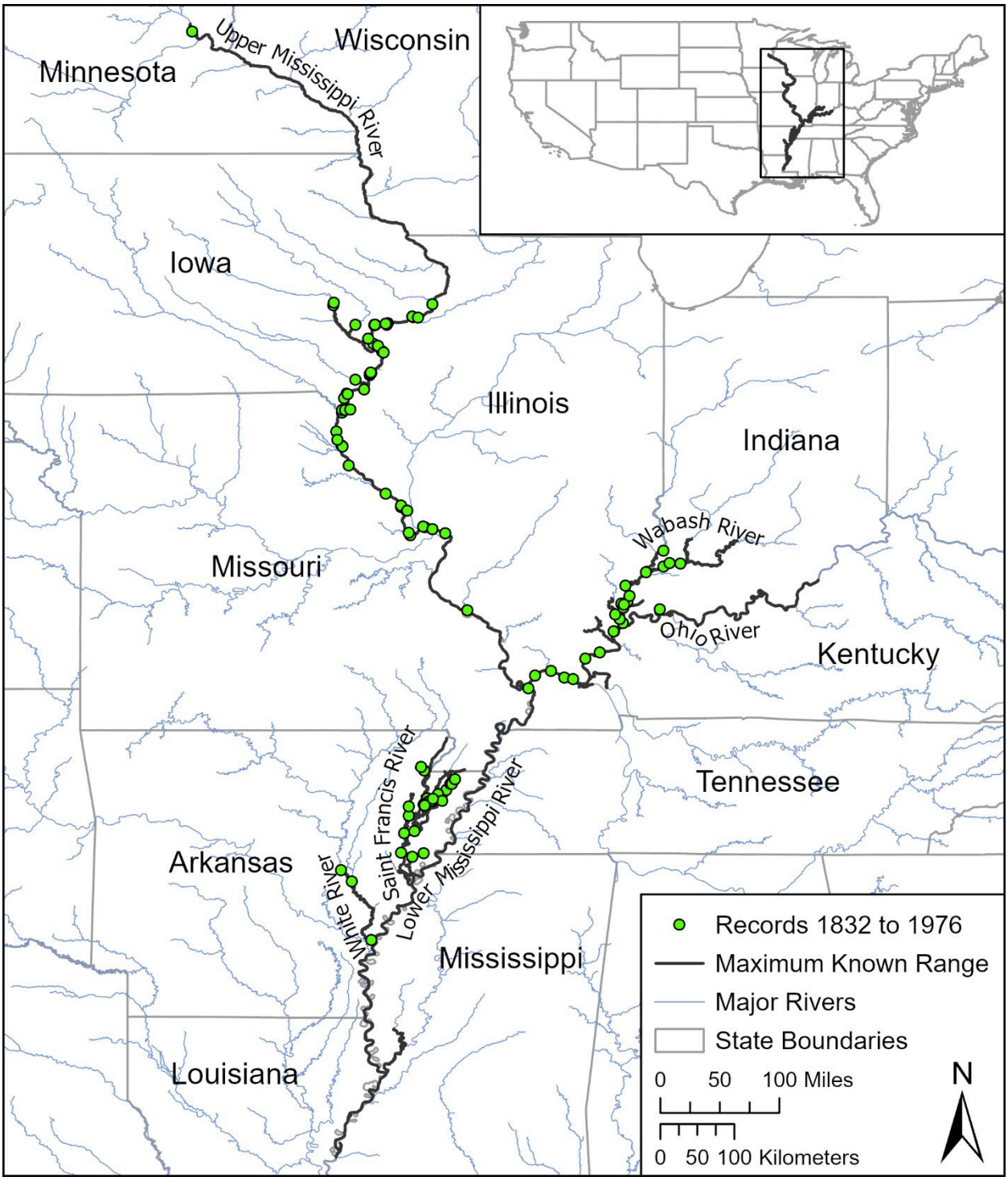

Figure 2. Map of maximum known range of fat pocketbook with all records of the species documented from 1879 to 1976.

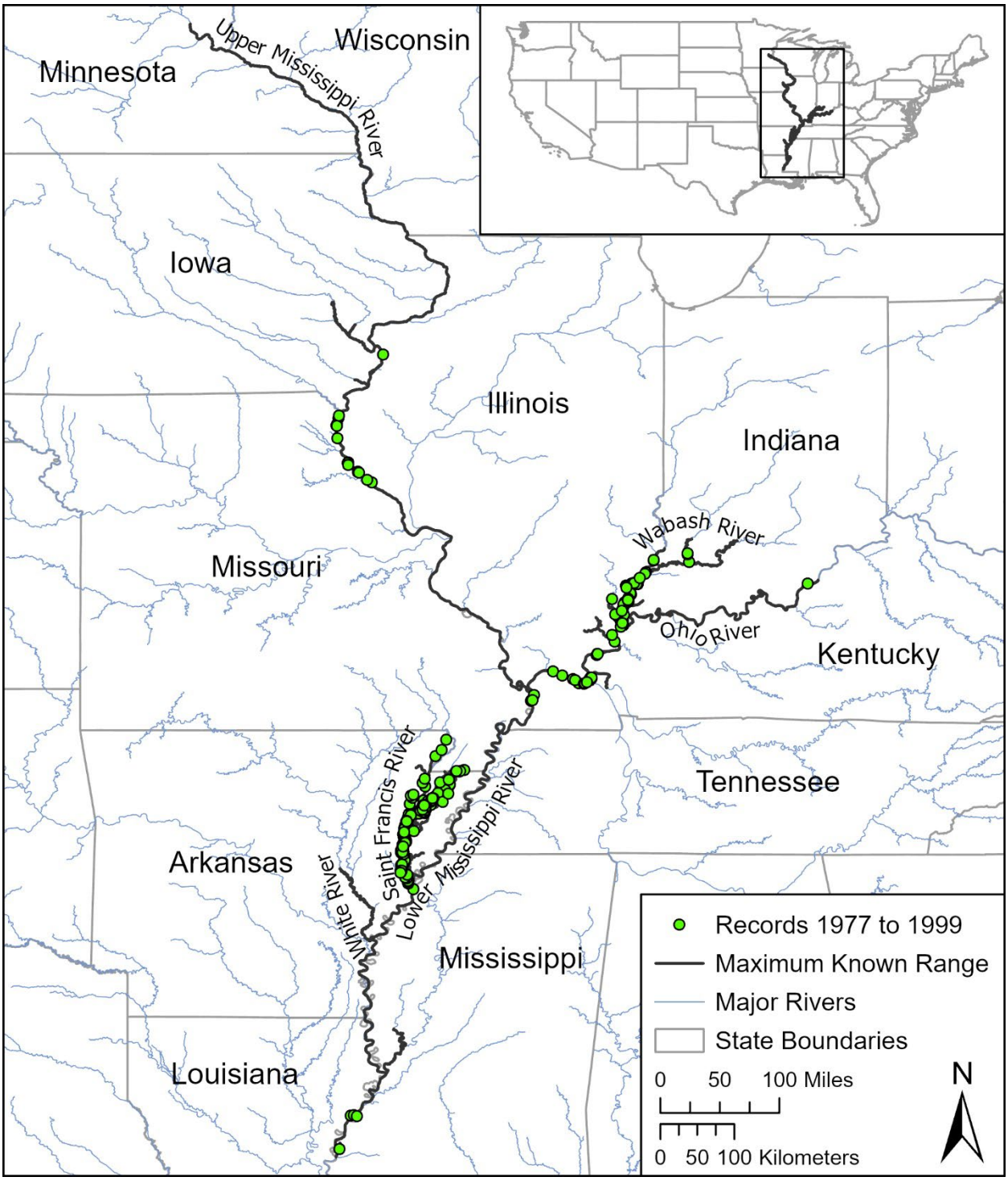

Figure 3. Map of maximum known range of fat pocketbook with all records of the species documented from 1977 to 1999.