Fat Pocketbook
(Potamilus capax)

5-Year Review:
Summary and Evaluation

Source: US Fish and Wildlife Service

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

5-YEAR REVIEW

Fat pocketbook (*Potamilus capax*)

I. GENERAL INFORMATION

A. Methodology used to complete the review:

In conducting this 5-year review, we relied on available information pertaining to historical and current distribution, life history, and habitat of the fat pocketbook, a freshwater mussel. Our sources included the final rule listing the species under the Act; the Recovery Plan; peer reviewed scientific publications; unpublished field observations by Service, State, and other experienced biologists; unpublished survey reports; and notes and communications from other qualified biologists or experts. We announced initiation of this review and requested information in a published *Federal Register* notice with a 60-day comment period (72 FR 42425). Information regarding recent collections of fat pocketbook mussels and active or potential threats to known populations was requested through the *Unio* Listserver, which reaches scientists and consultants working on mollusks throughout the nation. We also sought the input of the Fat Pocketbook Recovery Workgroup, an informal group of biologists and other representatives from public and private agencies and institutions, and other persons working with or familiar with the species. Comments received were evaluated and incorporated into this final document as appropriate (see Appendix A).

B. Reviewers

Lead Region: Southeast Region: Kelly Bibb, 404-679-7132

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C. Background

1. Federal Register Notice citation announcing initiation of this review:

72 FR 42425, August 2, 2007.

2. **Species status:** Improving. (2011 Recovery Data Call) There continues to be a lack of a range-wide survey for this mussel, but site records indicate it is increasing in lower Ohio River. Morphological and genetic studies completed this year confirmed that the Ohio River population is the fat pocketbook mussel. This is the reason why we believe some threats are more reduced now.

3. **Recovery achieved:** 2 (26-50% recovery objectives achieved): The species' status has improved and expanded in the St. Francis River and Ohio River drainages. A new population has been discovered in the Lower Mississippi River.

4. **Listing history**
   Original Listing
   FR notice: 41 FR 24062
   Date listed: June 14, 1976
   Entity listed: species
   Classification: endangered

5. **Review History**:
   A previous 5-year review for this species was published on November 6, 1991 (56 FR 56882)). In this review, the status of many species was simultaneously evaluated with no in-depth assessment of the five factors, threats, etc. as they pertained to the individual species. The published notices summarily listed these species and stated that no changes in the designation of these species were warranted at that time. In particular, no changes were proposed for the status of the species in this review. A similar 5-year review was completed in 1987 (52 FR 25523) and no changes were proposed for the status of the fat pocketbook mussel.

   Recovery Data Call: 2011, 2010, 2009, 2008, 2007, 2006, 2005, 2004, 2003, 2002, 2001, and 2000
   Recovery Plan: 1985
   Revised Recovery Plan 1989

6. **Species' Recovery Priority Number at start of review: 8**
   Magnitude of Threat: Moderate
   Recovery Potential: High
   Taxonomy: Species

7. **Recovery Plan**
   Name of plan: Fat Pocketbook Pearly Mussel Recovery Plan
   Date of original plan: October 4, 1985
   Date of revision: November 14, 1989

II. REVIEW ANALYSIS

A. Application of the 1996 Distinct Population Segment (DPS) policy

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 DPSs to only vertebrate species of fish and wildlife. Because the species under review is an invertebrate, the DPS policy is not applicable.

B. Recovery Criteria

1. Does the species have a final, approved recovery plan containing objective, measurable criteria? Yes.

The 1989 Recovery Plan contains a recovery objective to reclassify the fat pocketbook mussel from endangered to threatened status. Only two broad criteria for meeting this objective are provided.

2. Adequacy of recovery criteria.

a. Do the recovery criteria reflect the best available and most up-to-date information on the biology of the species and its habitat? No. The recovery criteria do not reflect information developed over the past 20 years on the range and habitat of the species.

b. Are all of the 5 listing factors that are relevant to the species addressed in the recovery criteria? No. New information regarding distribution, density, host fish, propagation technology, and threats has been developed since the recovery criteria were developed (see Section C, below).

3. List the recovery criteria as they appear in the recovery plan, and discuss how each criterion has or has not been met, citing information.

Recovery criteria for reclassification to threatened status are:

1) **The existing population in the St. Francis drainage is protected from habitat modification**. The St. Francis drainage population has been successfully protected under the ESA for more than 30 years. Federal actions which may affect the species have been minimized through formal and informal section 7 consultations. Federal and State agencies are working together to protect and enhance populations through consideration of the species during project planning and development of protective best management practices.

2) **At least two additional viable populations are located (or established) and protected in two other river systems within the historical range of the species**. The Ohio River population has expanded in recent years, and a population has been discovered in the Lower Mississippi River. Both new populations are considered viable, based on the presence of juvenile and subadult specimens. Both populations are being considered by State and Federal agencies during project planning and protected through formal and informal consultations.

Listing factors were not considered in the recovery criteria, but were addressed in the recovery tasks.

C. Updated Information and Current Species Status

1. Biology and Habitat:

a. Abundance, population trends (e.g. increasing, decreasing, stable), demographic features, or demographic trends:

Dennis (1985) prepared the initial recovery plan for the fat pocketbook mussel. At that time, the only known viable population of the species occurred in the channelized St. Francis Floodway of Arkansas, which was estimated at 11,000 to 24,000 individuals in a 43 mile reach of the floodway channel (Clarke 1985). In 1989, the recovery plan was updated (U.S. Fish and Wildlife Service 1989) to include new records from the St. Francis Floodway, the unchannelized St. Francis River, and 21 tributaries and/or drainage ditches associated with those channels (Ahlstedt and Jenkinson 1987). Since the 1989 Recovery Plan revision, an additional 5 stream populations in the St. Francis River drainage have been discovered.

Quantification of St. Francis River drainage populations in recent years has been sporadic. Jenkinson (1989) reported collecting 2,321 fat pocketbook mussels from a 4 mile reach of the Clarke Corner Cutoff in the floodway channel. Harris (1990) collected 32 specimens from a 1,800 square meter area in the Floodway downstream of Clarke Corner Cutoff. Fat pocketbook population estimates in a 5,600 meter reach of Stateline Ditch were found to exceed 6,000 individuals in 2005 (Harris *et al., in litt.* 2009). Most known populations exhibit lower densities. Fat pocketbook abundance was recently estimated at approximately 550 individuals in a 3.8 mile reach of Riverdale Outlet Ditch, Poinsett County, AR (U.S. Army Corps of Engineers 2009). Mussels less than 5 years of age, an indication of recruitment, have been collected from most sites in the St. Francis River drainage.

During the mid 1980's, only a few other small fat pocketbook populations were suspected to survive in other drainages apart from the St. Francis River drainage, within the historical range. By the time of the Recovery Plan revision (1989), live fat pocketbook individuals had been collected from the Ohio River drainage in the lower Wabash and White rivers, Indiana, and the lower Cumberland River, Kentucky. Although young specimens were among the live animals collected, it was unknown or considered unlikely that these populations were recruiting or viable (U.S. Fish and Wildlife Service 1989). In recent years, the species has been reported from a number of locations in the Ohio River and several tributaries in Kentucky, Illinois, and Indiana (U.S. Fish and Wildlife Service *in litt*. 2009b). These reports, however, have usually been associated with site-specific surveys targeting specific areas (e.g.. fleeting areas, loading/unloading facilities), and there has been no comprehensive quantification of habitat or population size in the Ohio River drainage. At some locations, however, fat pocketbook represents a substantial proportion of the native bivalve fauna (e.g, Lewis 2007a, b), and recruitment (based on the presence of juvenile mussels) has been apparent at most collection sites in the Ohio River.

Records of live individuals from the Wabash River in Illinois and Indiana have also increased in recent years (U.S. Fish and Wildlife Service *in litt*. 2009). In one survey, the fat pocketbook was found at 13 of 26 locations surveyed in the Wabash River, and was overall 3rd in abundance of the mussel species collected during the survey (Frankland 1996). Sizes of fat pocketbook individuals reported indicate a fairly young population exhibiting recruitment. Live and fresh dead fat pocketbook specimens also have been observed or collected from tributaries of the Wabash River, including Little Wabash and White rivers, and Big Creek (U.S. Fish and Wildlife Service *in litt*. 2009).

The revised Recovery Plan noted a report of fat pocketbook shells from the Mississippi River in 1986 (U.S. Fish and Wildlife Service 1989), however, little was known of the status of this historical population. In 1992, a population of fat pocketbook was discovered in Gilliam Chute, an abandoned channel of the Lower Mississippi River in Jefferson County, Mississippi (Mississippi Museum of Natural Science *in litt*. 2007). In 1997, live and fresh dead fat pocketbook specimens were observed on Island No. 1, downstream from the Ohio River confluence. Spot surveys and reported observations now indicate the species is widely distributed in the Lower Mississippi River, between the confluence of the St. Francis River and Natchez, Mississippi (U.S. Fish and Wildlife Service *in litt*. 2009). Collections are localized in small areas of relatively stable secondary channels and side channels. Population densities are extremely low in the secondary channel habitats where they are found, however,

recruitment appears to be occurring based on the occurrence of young individuals (P. Hartfield, pers. obsv. 2003-2007).

Shells or live fat pocketbook individuals also have been reported from the lower Tennessee River, Kentucky (Lewis *in litt*. 2008), and the White River, Arkansas (Harris *et al*. 2009), however, there is no information available on population extent, size, trends, or structure in these systems.

In summary, a comparison of the past and recent collection history of fat pocketbook suggests that the species is recruiting and increasing in abundance in the St. Francis, Ohio, and Lower Mississippi rivers and some of their tributaries.

b. Genetics, genetic variation, or trends in genetic variation:

Two shell morphotypes have been noted in the Ohio River fat pocketbook mussel population and there was some concern that one of these morphotypes deviated significantly from other populations (P. Hartfield, pers. obsv. 2009). While genetic analysis found no evidence of divergence between the two putative morphotypes within the Ohio River population, there were significant differences between the Ohio and St. Francis River fat pocketbook populations (Moyer 2011). These results suggest the two populations should be managed as distinct evolutionary units.

c. Taxonomic classification or changes in nomenclature:

While two shell forms of fat pocketbook have been identified in the Ohio River drainage (see b, above); a thin-shelled small form with occasional faint rays on the posterior of the shell, and a larger heavier-shelled form with no rays that is similar to other portions of the range, a range-wide evaluation of shell variation found there was no quantifiable evidence of morphological divergence within the Ohio River population (Harris *et al*. 2011). This is supported by genetic analyses (Moyer 2011). Therefore, no changes in taxonomic classification or nomenclature are under consideration.

d. Spatial distribution, trends in spatial distribution, or historic range:

The fat pocketbook was historically widely distributed in the Mississippi River drainage from the confluence of the Minnesota and St. Croix rivers downstream to the White River system and was known in Minnesota, Wisconsin, Iowa, Illinois, Indiana, Missouri, Kentucky, and Arkansas (NatureServe 2011). Most historical records for this species are from the upper Mississippi River (above St. Louis), the Wabash River in Indiana,

and the St. Francis River in Arkansas (U.S. Fish and Wildlife Service 1989). There have been no records for at least two decades from the Upper Mississippi River. When listed, only the St. Francis River drainage population of fat pocketbook was believed to be viable (U.S. Fish and Wildlife Service 1976).

The fat pocketbook appears to have expanded its range in the St. Francis River drainage since it was listed, based on collection records. It is now known from at least 27 stream and ditch channels , including approximately 200 miles of the St. Francis River, the St. Francis River Floodway, Right Hand Chute Little River, Left Hand Chute Little River, L'Anguille River, Tyronza River, Staight Slough, Iron Mines Creek, State Line Ditch, and in other drainage ditches associated with these streams in Arkansas, and Belle Fountain Ditch in Missouri (e.g., Ahlstedt and Jenkinson 1987, Barnhart 1997a, Harris 2001, Harris *et al*., *in litt*. 2009; Wentz 2008).

In the Ohio River drainage, the species is now found in a 163 mi reach of the Ohio River between RM 782 – 945 in Kentucky, Illinois and Indiana. The species is present in approximately 100 mi of the lower Wabash River, Indiana and Illinois, and in the lower reaches of some Wabash River tributaries, including the White and Little Wabash rivers, and Big Creek. The fat pocketbook also occurs in the lower reaches of other Ohio River tributaries, including the Cumberland River, Kentucky (U.S. Fish and Wildlife Service *in litt*. 2009), and possibly in the lower Tennessee River, Kentucky, based on the recent collection of a dead shell (Lewis *in litt*. 2008).

The species also has been discovered inhabiting some secondary channels and cutoffs along a 300 mile reach of the Lower Mississippi River between the confluence of the St. Francis River and Natchez, Mississippi (U.S. Fish and Wildlife Service *in litt*. 2009), and a single live individual has been reported from the lower White River, Arkansas (Harris and Christian 2003).

An attempt was made in 1989 to re-establish fat pocketbook populations at two locations in the Upper Mississippi River (River Mile 291 & 355) (Koch 1990), however, it was apparently unsuccessful (Moore 1995). Surveys of 27 sites in the Middle Mississippi River (i.e., the reach between the Missouri and Ohio rivers confluences) during a period of extreme and unusual low water conditions found no evidence of fat pocketbook (Keevin *in litt*. 2006).

In summary, a comparison of the past and recent collection history of fat pocketbook suggests that the species is expanding its range within the St. Francis and Ohio river drainages. Harris *et al*. (1997, *in litt*. 2009) revised

the fat pocketbook conservation status in Arkansas from endangered to threatened, due to the number of new occurrence records in the St. Francis River drainage. While this improvement may be due, at least in part, to increased collection efforts in both systems, the distribution and demographics of fat pocketbook collected in some St. Francis and Ohio rivers drainage populations suggest at least local expansions in population size and range. The presence of the species in the Lower Mississippi River is more likely to be due to the discovery of an unknown historical population than the recent expansion of the species into that geographical area.

e. Habitat or ecosystem conditions:

Fat pocketbook is generally found in sand, mud, and silt substrates associated with depositional areas (e.g., Bates and Dennis 1983, Clarke1985, Ahlstedt and Jenkinson 1987, Payne *et al*. 2007, Lewis 2007a). Parmalee (1967) reported the fat pocketbook from sand and mud bottoms, in flowing water a few inches to more than eight feet in depth. In the St. Francis River, Arkansas, the species has been collected in sand, mud, and fine gravel substrates (e.g., Bates and Dennis 1983, Clarke 1985, Ahlstedt and Jenkinson 1987). In the Ohio River drainage, fat pocketbook have been collected from sand, silt, and mixed sand/gravel substrates at depths ranging from a few inches to more than 20 ft. (e.g., Lewis 2007 a & b). In the Lower Mississippi River, the species has been collected in sand in secondary channel habitats, and in sand/silt/mud in side channels (P. Hartfield, U.S. Fish and Wildlife Service, pers. obsv. 2003-2007). In the Ohio River, mussel species commonly collected with fat pocketbook include mapleleaf (*Quadrula quadrula*), pink papershell (*Potamilus ohiensis*), and fragile papershell (*Leptodea fragilis*) (Lewis 2007a). In the St. Francis River system, common associates include yellow sandshell (*Lampsilis teres*), fragile papershell, pink papershell, and bleufer (*Potamilus purpuratus*) (e.g., Harris, 1990). In the Lower Mississippi, mussel species commonly found with fat pocketbook include fragile papershell and pink papershell (Hartfield, pers. obsv. 2003-2007).

f. Other:

In laboratory studies, the freshwater drum (*Aplodinotus grunniens*) was the only suitable glochidial host of 28 fish species tested (Barnhart 1997b). However, method of facilitating glochidial attachment to the host fish is unknown.

2. Five-Factor Analysis

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 its historical habitat and range due to navigation and flood control activities (e.g., impoundment, channel maintenance, dredging) on the rivers where it was once found (U.S. Fish and Wildlife Service 1989). Construction of impoundments for flood control and navigation in some of the river basins in which fat pocketbook historically occurred (e.g., upper Mississippi River, Ohio River, White River) inundated habitats, changed flow distributions, and are likely to have contributed to local extirpations of fat pocketbook populations. Among the surviving fat pocketbook populations, the Ohio River is the only one currently directly affected by impoundment. The species continues to survive, and may be expanding its range in the dam tailwaters as well as in riverine sections and the upper pools of impounded reaches of the lower Ohio River. In the Ohio River, the Corps is constructing a new dam, Olmsted Dam at approximately ORM 964.6. The fat pocketbook is currently found both upstream and downstream of the Olmsted Dam site (Koch *in litt*. 2009). To our knowledge, no other new impoundments have been proposed or are being considered for any other river or stream reach where the fat pocketbook currently survives.

The construction of a hydropower generation facility has been proposed for Smithland Lock and Dam on the Ohio River (U.S. Fish and Wildlife Service 2009a). The project had a ground breaking in 2010 and is expected to be operational by 2014. Detrimental effects of hydroelectric construction and operation include the potential for direct and/or indirect mortality of individual adult and juvenile mussels during construction activities, alteration of flows, dissolved oxygen levels, and availability of fish hosts. Construction and operation of hydroelectric facilities may also harm and/or harass individuals through degradation of habitat, interference with respiration, feeding, and reproduction. In addition, hydroelectric operations can affect fish host behavior and presence through flow alterations, turbidity, or changes in sediment (U.S. Fish and Wildlife Service 2009a).

Hydrokinetic operations are currently in the planning stages for Uniontown, J.T. Myers, and Olmsted Lock and Dams on the Ohio River, as well as for several flowing river sites between dams on the Ohio River, and numerous sites on the Lower Mississippi River (Ziewitz *in litt*. 2009). While hydrokinetic generation takes advantage of existing flow conditions, construction and operation of hydrokinetic facilities and/or transmission facilities and infrastructure may have local effects on mussels or their host fish.

Channel dredging may physically remove fat pocketbook from its habitat, initiate accelerated channel erosion, decrease habitat diversity, increase bedload, and/or increase habitat instability. The effects of channel dredging also may alter the behavior of host fish due to changes in flow patterns, decreased biomass, and/or altered species composition and abundance. Maintenance dredging is periodically required for navigation and barge fleeting areas in the Mississippi and Ohio rivers, and for flood control and drainage efficiency in tributaries and ditches of the St. Francis River drainage. However, the expansion of range and records of the species within these systems may be due to the stabilization and occupation of areas not subject to dredging (e.g., secondary channels of the Ohio and Mississippi rivers), reduced dredge frequency (all three river systems), or dredging methods (St. Francis River system) allowing adaptation of either or both the fat pocketbook and its host fish (freshwater drum) to existing conditions. There is also evidence that fat pocketbook survival and population recovery may be high in some dredge or cleanout situations. Harris (1997) has noted that fat pocketbook mussels comprise a high percentage of the mussel fauna in some St. Francis River drainage ditches 4 to 7 years following maintenance dredging. Prior to maintenance dredging of Stateline Outlet Ditch (2001), the fat pocketbook mussel population in the project area was estimated at more than 3,000 individuals (Harris 2001, Harris *et al*., *in litt*. 2009). An attempt to minimize the effect of the project involved collecting and relocating more than 2,000 fat pocketbook (Payne *et al*. 2007). Although approximately 60 percent of the estimated pre-dredging population was relocated, a 2005 post-project survey estimated the fat pocketbook population size in Stateline Outlet Ditch at more than 6,000 individuals (Harris *et al*., *in litt.* 2009). It is currently unknown if the post-project increase in fat pocketbook in Stateline Outlet Ditch is due to dredge method or quantity, vertical movement of mussels in the substrate, robust recruitment following dredging, a combination of these factors, or some other unforeseen factor. Further investigations of the short and long-term effects of ditch cleanouts on fat pocketbook in the St. Francis River system are ongoing.

Sedimentation (siltation) and turbidity (suspended silt) have been implicated as limiting factors to many mussels, including the fat pocketbook (U.S. Fish and Wildlife Service 1989). Research on a variety of mussel species has demonstrated detrimental effects including reduced feeding and respiration due to clogged gills, disrupted metabolic processes, reduced growth, limited burrowing activity, and physical smothering (e.g., Ellis 1936, Watters 2000, and others). Effects of excess sediments may be sublethal, and not immediately apparent (Brim Box and Mossa 1999). Although no studies have been conducted on the affects of sediment and turbidity on the fat pocketbook, collection locations and habitat associations observed for the species over the past two decades

suggest some level of tolerance to sediment deposition and turbidity. As noted in Section C.1.e, fat pocketbook is generally found in sand, mud, and silt substrates associated with depositional areas (e.g., Bates and Dennis 1983, Clarke1985, Ahlstedt and Jenkinson 1987, Payne *et al*.2007, Lewis 2007a), and in systems that experience seasonally high suspended sediments (i.e., St. Francis, Mississippi, and Ohio rivers).

Historical episodes of water quality degradation (metals, pesticides, and other pollutants) from point sources discharges have been linked to detrimental effects to freshwater mussels, and are suspected to be a factor in the range curtailment of the fat pocketbook (U.S. Fish and Wildlife Service 1989). While implementation of the Clean Water Act has reduced the effects of point source discharges on aquatic systems, fat pocketbook remains vulnerable to illegal discharges. In 2007, illegal discharge of glycerin on fields and in ditches tributary to Belle Fountain Ditch, Missouri, killed more than 80 fat pocketbook mussels, as well as other mussel and fish species, in 7 miles of the stream (Roberts *in litt*. 2007).

Non-point source pollution (stormwater runoff that includes complex mixtures of pesticides, fecal coliform bacteria, metals, suspended solids, and pharmaceuticals) may also have had a negative impact on fat pocketbook populations in areas of concentrated agriculture and urbanization (e.g., Bringolf *et al*. 2007).

b. Overutilization for commercial, recreational, scientific, or educational purposes:

Overutilization was not, and is not considered a threat to the fat pocketbook mussel.

c. Disease or predation:

Disease and predation were not considered threats to the fat pocketbook mussel when it was listed, and there is no evidence that they are currently factors in its conservation.

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 current State and Federal regulations regarding pollutants are generally assumed to be protective of most freshwater mollusks, recent studies suggest that some pollutant standards may not be protective of all freshwater mussel species or life stages (e.g., Augspurger

et al. 2007, Bringolf *et al*. 2007). However, there is little information on effects of common pollutants on the fat pocketbook (e.g., Cope *et al*. 2008).

As noted under Factor A (above), maintenance dredging or cleanouts conducted under the Rivers and Harbors Act, or other Federal regulations, may adversely affect fat pocketbook mussel populations. Agencies are collaborating to develop Best Management Practices for dredging and cleanouts that will minimize adverse effects to the species, and promote rapid recovery of affected populations.

e. Other natural or manmade factors affecting its continued existence:

Since the fat pocketbook was listed, the Ohio, Mississippi, and White (Arkansas) rivers have been occupied by the invasive zebra mussel *(Dreissena polymorpha)*. Effects of zebra mussels on native unionids may include competition for food and habitat resources (Hunter *et al*. 1996, Scholesser *et al*. 1996).

There is a growing concern that climate change may lead to increased frequency of severe storms and droughts (for example, Golladay *et al*. 2004; McLaughlin *et al*. 2002; Lubchencho and Carl 2012). Information in our files documents mollusk declines within small perennial streams that have lost flow as a direct result of drought (for example, Golladay *et al*. 2004; Haag and Warren 2008). Habitats occupied by the fat pocketbook include small streams and ditches to large rivers. Low gradient ditches and streams (e.g., upper St. Francis drainage) and large rivers (e.g., Mississippi, Ohio, St. Francis, Ouachita rivers) where fat pocketbook is known to occur are less susceptible to total loss of flow by drought. In addition, the wide distribution of the species reduces its vulnerability to extinction due to local stochastic threats.

D. Synthesis

The status of the fat pocketbook has improved significantly over the past two decades. The range of the species in the St. Francis and Lower Ohio River systems has expanded, a population has been discovered in a significant portion of the Lower Mississippi River, and there is evidence that most populations are recruiting and are naturally sustainable. Taxonomic uncertainty of the Ohio River population has been addressed by genetic and morphological studies completed in 2011.

Most historical records for the fat pocketbook are from the upper Mississippi River (above St. Louis), the Wabash River (Ohio River drainage) in Indiana, and the St. Francis River in Arkansas (U.S. Fish and Wildlife Service 1989). When listed, the fat pocketbook mussel was considered extirpated from the Mississippi

and Ohio River drainages, and viable in only a short reach of the St. Francis River in Arkansas. While the species remains extirpated from the upper Mississippi River drainage, over the past four decades, the fat pocketbook has reinvaded or been discovered in 200 miles of the St. Francis River and 26 stream or ditch channels in Arkansas and Missouri; a 163 mi reach of the Ohio River and approximately 100 mi of the lower Wabash River and tributaries in Kentucky, Illinois and Indiana, as well as the lower reaches the Cumberland River, Kentucky, and Tennessee Rivers; and along a 300 mi reach of the Lower Mississippi River. Although some of these fat pocketbook mussel populations are localized and small, most have shown evidence of recruitment, and there is evidence of population expansion in all of the major drainages (St. Francis, Ohio, Mississippi).

While fat pocketbook population segments can be locally or temporarily affected by navigation dredging (Ohio and Mississippi rivers), channel cleanout (St. Francis River system), or other activities (e.g., fleeting areas, loading/unloading facilities, hydropower, pollution, etc.), the species has persisted or expanded its range and numbers in areas where such activities periodically occur. State and Federal regulatory agencies are currently working to develop management strategies and Best Management Practices (BMPs) that will minimize adverse effects of such activities to the fat pocketbook mussel.

Therefore, we believe that the expanded distribution, evidence of recruitment, and persistence of the fat pocketbook mussel provides evidence that threats to the species have been reduced, and recovery potential has increased. Therefore, we recommend that the recovery priority number be changed from 8 to 14. Although the species is showing improvement, threats are still present and habitat in key portions of its range is not protected from habitat modification and other threats, such as channel maintenance. Therefore, we believe the mussel continues to meet the definition of endangered. We anticipate making additional progress with our partners in evaluating recruitment, management strategies, and BMPs for this species and believe downlisting could be considered for this species in the near future.

III. RESULTS

A. Recommended Classification:

No change is needed

IV. RECOMMENDATIONS FOR FUTURE ACTIONS

1) Update the Recovery Plan to include new information and updated measurable recovery criteria.

2) Develop and implement monitoring plans for populations and activities associated with the St. Francis, Ohio, and Mississippi river drainage populations.

3) Work with partners to develop conservation strategies and plans for each drainage population.

4) Conduct additional research on fat pocketbook, including identifying mussel/host fish interactions.

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U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW of Fat pocketbook (*Potamilus capax*)

Current Classification _Endangered_

Recommendation resulting from the 5-Year Review

____ Downlist to Threatened
____ Uplist to Endangered
____ Delist
__X__ No change is needed

Review Conducted By ___Paul Hartfield, Jackson, MS, Ecological Services Field Office___

FIELD OFFICE APPROVAL:

Lead Field Supervisor, Fish and Wildlife Service, Jackson, MS

Approve _____ Date 11/29/11

REGIONAL OFFICE APPROVAL:

for **Regional Director, Fish and Wildlife Service, Southeast Region**

Approve _____ Date 2/10/12

Cooperating Regional Director, Fish and Wildlife Service, Great Lakes Big Rivers Region

__X__ Concur _____ Do Not Concur

Signature Lynn M. Lewis Date 3/30/2012

APPENDIX A: Summary of peer review for the 5-year review of fat pocketbook (*Potamilus capax*)

A. Peer Review Method: The 5-year review was emailed to reviewers with known expertise and interest in the fat pocketbook, along with a request for peer review. Solicited reviewers included State, Federal, University, and Museum biologists.

B. Peer Review Charge: The following request was made of all peer reviewers:
The purpose of a 5-year review is to summarize new information for the species, ensure that the classification of species as threatened or endangered is accurate and reflects the best available information, and to identify actions required to conserve the species.

You have recently provided data regarding the status of the fat pocketbook, and you have been identified as knowledgeable about the species, its range and habitat. In order to ensure that the best available information has been used to conduct this 5-year review, we now request your peer review of the attached document. The format is standardized, and we are seeking comments on the accuracy of the data used, and identification of any additional new information on any of these species that has not been considered in this review. Also note that this review will not be published, but will become a part of the species administrative record.

We appreciate your interest in furthering the conservation of rare plants and animals by becoming directly involved in the review process of our Nation's threatened and endangered species. Your review and comments will also become a part of the administrative record for this species, and you can be certain that your information, comments, and recommendations will receive serious consideration.

We hope that you view this peer review process as a worthwhile undertaking. Please give me a call if you have any questions (601-321-1125). Also feel free to respond by email (paul_hartfield@fws.gov) or letter, whichever is most convenient.

C. Summary of Peer Review Comments/Report –

Peer Reviewers:
Dr. Bob Jones, Mississippi Museum of Natural Sciences
Dr. John Harris, Arkansas State Highway and Transportation Department
Dr. Chris Barnhart, Missouri State University
Chad Lewis, Lewis Environmental Consulting, LLC
Mark Smith, U.S. Army Corps of Engineers
Chris Davidson, U.S. Fish and Wildlife Service
Leroy Koch, U.S. Fish and Wildlife Service
Jason Phillips, U.S. Fish and Wildlife Service
Andy Roberts, U.S. Fish and Wildlife Service

All peer reviewers provided minor editorial corrections and suggestions. One reviewer expressed an opinion that evidence for range expansion is overstated.

D. Response to Peer Review – Editorial comments and suggestions were incorporated where appropriate.

Knowledge of the range and distribution of the fat pocketbook has increased significantly since the 1989 Recovery Plan revision. Whether this improvement in the status of the species results from natural range expansion and recruitment, or reflects an increase in mussel survey efforts throughout the historical range is currently unknown.