Ring Pink
(*Obovaria retusa*)

5-Year Status Review:
Summary and Evaluation

(Photo courtesy of Price Sewell)

U.S. Fish and Wildlife Service
Southeast Region
Kentucky Ecological Services Field Office
Frankfort, Kentucky

January 2025

5-YEAR STATUS REVIEW
Ring Pink (*Obovaria retusa*)

GENERAL INFORMATION

Current Classification: Endangered

Lead Field Office: Kentucky Ecological Services Field Office, Taylor Fagin, (502) 653-0541

Reviewers:

Lead Regional Office: Southeast Region, Carrie Straight, (404) 679-7226

Cooperating Field Office(s): Anthony Ford, Tennessee Ecological Services Field Office, (931) 319-7747.

Date of original listing: October 30, 1989 (54 FR 40109; September 29, 1989)

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 ring pink's biology, habitat, and threats of to inform this status review.

Public notice of this 5-Year Review was provided in the Federal Register on May 11, 2023, and a 60-day public comment period was opened (82 FR 29916). We received one public comment from the National Council for Air and Stream Improvement, Inc (NCASI) during the public comment period. The comment received refers to best management practices for silviculture practices and their benefit, when employed, to water quality. These comments were reviewed and incorporated into the discussion of Threats, below. To inform this review, we also requested and obtained information on the status of this species from several species experts, and additional data was obtained from the recovery plan, peer-reviewed scientific literature, and our state partners. Once all known literature and information was compiled, the review was completed by the species' lead recovery biologist, Taylor Fagin, Fish and Wildlife Biologist with the Kentucky Ecological Services Field Office.

FR Notice citation announcing the species is under active review:
May 11, 2023 (88 FR 30324)

Species' Recovery Priority Number at start of 5-year review (48 FR 43098):
5: The listed entity is a species with a high degree of threat and low recovery potential.

Review History:
Two previous 5-year reviews were signed, one on August 18, 2011, and another on September 27, 2019. Both reviews recommended no change in status (Service 2011, 2019).

REVIEW ANALYSIS

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.

Recovery Criteria

Recovery Plan or Outline
A final recovery plan was completed for the species on March 25, 1991 (Service 1991).

Recovery plans are not regulatory documents; instead, they are intended to provide guidance to the Service, states, and other partners on methods for minimizing threats to listed species and on criteria that may be used to determine when recovery is achieved. If the recovery criteria defined in the plan are still valid, meeting those 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).

Delisting Criteria

The Recovery plan states the ring pink will be considered for delisting upon completion of the following (Service 1991):

1. Through protection of existing populations and successful establishment of reintroduced populations or discovery of additional populations, a total of at least nine Ohio River system tributaries that contain viable populations. These populations will be distributed within the Ohio River system as follows: one population in Pennsylvania, one population in Ohio, one population in West Virginia, one population in Indiana, one population in Illinois, two populations in Kentucky (one in the lower Tennessee or Cumberland River and one in another Ohio River tributary such as the Green River), and two populations in the Tennessee River.
2. Studies of the mussel's biological and ecological requirements have been completed, and the recovery measures developed and implemented from these studies have been successful, as evidenced by an increase in population density and/or an increase in the population size and length of the river reach inhabited within each of the nine populations.
3. No foreseeable threats exist that would likely threaten survival of any of these nine populations.
4. Where habitat had been degraded, noticeable improvements in water and substratum quality have occurred.

The Service believes these criteria are appropriate and relevant; however, no criteria have currently been met.

Biology and Habitat Summary

Populations

At the time of the recovery plan, the ring pink was known from only five river reaches - two in Kentucky (Tennessee River and Green River), two in Tennessee (Cumberland River and Tennessee River), and one in West Virginia (Kanawha River) (Service 1991). The Kanawha River record has since been determined to be a misidentification; therefore, it will not be discussed further in this review (Tolin 1991).

Currently, extant populations appear to be limited to the following three river reaches: the Green River in Kentucky and the Tennessee River downstream of Pickwick Landing Dam in Tennessee, and the Tennessee River downstream of Kentucky Dam in Kentucky. All populations have critically low abundances, and the last live individual was observed almost a decade ago. Further details regarding each population can be found below.

Cumberland River

The ring pink is likely extirpated from the Cumberland River in Kentucky and Tennessee, with the last known observation consisting of three fresh dead specimens recovered in 1982 from a commercial sheller. If the species is still present, it occurs in such low densities that it is unlikely to be detected during typical mussel surveys, which are often limited in scope and duration and unlikely to result in detection of such a rare species.

Tennessee River

The species is thought to persist in two locations on the Tennessee River, downstream of Pickwick Landing Dam in Tennessee and downstream of Kentucky Dam in Kentucky. If the species is still present, it occurs in such low densities that it is unlikely to be detected during typical mussel surveys, which are often limited in scope and duration and unlikely to result in detection of such a rare species. Any efforts to locate individuals in these areas would be extremely challenging given the vast search area and high density of mussels present. It has been estimated that weeks of search time and hundreds of thousands of mussels would need to be collected and identified to find one ring pink individual. The last few records from the Tennessee River are at least 25 years old.

Green River

We believe the species still exists in the Green River in similarly low densities. We do not know if a population is reproducing and/or possibly recruiting; however, there have been positive indications of several other mussel species reproducing and/or recruiting in the Green River in recent years, so conditions may also be suitable for the ring pink.

In the summer of 2023, the Kentucky Ecological Field Office collaborated with an Environmental Protection Agency lab to conduct an environmental DNA (eDNA) study on the Green River with the goal of identifying areas where this species may persist. The team concentrated on 15 specific sites within the Green River, spanning from KY Hwy 31E north of Canmer, KY, to half a mile downstream of Green River Lock and Dam #5, focusing on areas where previous individuals had been found. At the time of this review, analysis of multiple samples from all sites have been negative for ring pink eDNA; however, analyses are not complete.

The Service and its partners collaborated with multiple partners to remove Green River Lock and Dam #6 in 2017, Barren River Lock and Dam #1 in 2022, and Green River Lock and Dam #5 in 2024. The removal of the dilapidated and partially collapsed Green River Lock and Dam #4 is anticipated during the summer of 2025. These dam removals are likely to improve habitat conditions for the species in previously inundated reaches.

Ohio River
Presumed extirpated. There are few reports of living or recently dead ring pink from the Ohio river since impoundment of the stream for navigation in 1929 (Service 1991).

Threats (Five-Factor Analysis) Summary

The status of a species is determined from an assessment of factors specified in section 4 (a)(1) of the Act. A summary of this assessment is detailed below.

Factor A. Present or threatened destruction, modification or curtailment of its habitat or range:
Threats for this species remain very similar to those present when the recovery plan was developed (Service 1991). Current threats to the ring pink are primarily associated with water quality and habitat modifications from land use changes, gravel dredging, channel dredging maintenance, and impoundments.

The recovery plan identified oil and gas production as a potential threat in the Green River drainage referring to impacts from activities in the 1950s and 1960s that resulted in salt brine entering the river. This contamination affected approximately 100 miles of the Green River and led to the deaths of thousands of mussels. While oil and gas production are now subject to much stricter regulations, which we believe has significantly reduced the current level of risk, other pollutants remain a concern. Nutrients and sediments entering the stream resulting from agricultural practices and urbanization throughout the watershed continue to pose a low to moderate threat to the basin.

Gravel dredging and channel maintenance were also listed as threats in the recovery plan, and these activities continue to occur sporadically throughout the historical range of the ring pink. Any remaining suitable habitat for the ring pink likely occurs in high density mussel beds which can lack appropriate protection and remain susceptible to dredging and channel maintenance activities.

This species does not adapt well to the altered riverine conditions created by impoundments; the species' distribution and suitable habitat has been drastically reduced due to the loss of free-flowing habitats. Hydrologic and water quality alterations from impoundment operations also impact the species' ability to occupy or reproduce in tailwater habitats. The alteration of free-flowing habitats and adverse effects related to dam releases threaten any remaining populations in the Ohio, Tennessee, Cumberland, and Green rivers. Although the construction of new dams is unlikely and most adverse effects to the species' habitats have already occurred, suitable habitat has been drastically reduced throughout the species' range, which has serious and complicated implications for the recovery of this species.

The Service recognizes that utilizing appropriate Best Management Practice's (BMPs) for agriculture, silviculture, erosion control, and stormwater management serve as an effective conservation strategy for many aquatic species. A large body of research suggests that forest management practices that adhere to state approved BMPs maintain the environmental conditions necessary for the conservation of aquatic species, including the ring pink mussel.

Factor B. Overutilization for commercial, recreational, scientific, or educational purposes: Overutilization for commercial, recreational, scientific or educational purposes is not considered to be a threat to the species. Commercial harvesting of mussels has dramatically declined over the past few decades, diminishing the threat to the species. Overutilization for recreational, scientific, or educational purposes was not considered to be a limiting factor in the recovery plan, and we have no new information to indicate this has changed.

Factor C. Disease or predation:
We have no new information indicating that disease or predation represents a direct threat to the species; however, disease and predation is a threat to mussels, in general, and we have no evidence to suggest that the ring pink would be less susceptible to these threats.

In general, mussels have several natural predators, including muskrats, raccoons, otters, molluscivorous fish, and some invertebrates. Such predation could locally reduce populations which could become a serious threat given the rarity of the ring pink. The black carp (*Mylopharyngodon piceus*), an introduced species of invasive carp that is known to predate on snails and mussels, has been recorded in the lower Ohio, Tennessee, and Cumberland rivers, but it has not been found in the Green River. This new threat is most likely to affect juveniles and small adults, creating additional obstacles for the species' recovery where it co-occurs. It remains unknown if the black carp will be a significant predator to this species or how extensive the carp would spread throughout the Ohio River basin; however, it has the potential to impact all or a significant portion of the ring pink's range.

It is unknown if disease is, or was, a serious threat to the ring pink, but disease-related mussel die-offs in the Tennessee River basin are a significant concern, and these types of declines of mussel species may occur in other basins. Recent research in the Clinch River (tributary of the Tennessee River) suggests that an ongoing mussel die-off is strongly associated with an infection and high viral load of densovirus, which is known to be the cause of lethal epidemics in other invertebrate groups (Richard et al. 2020). Novel viruses and diseases could be a significant threat to any remaining ring pink populations given their low abundances.

Unidentified threats could lead to local extirpations, as observed in tributaries of the Green, Ohio, and Tennessee rivers, where significant declines in mussel populations remain unexplained despite water and sediment testing. Similar enigmatic declines in other freshwater mussel populations in the southeast cause ongoing concerns, necessitating continued monitoring and research efforts. Haag (2019) suggests several causes for these declines: unknown bivalve diseases, the introduction of the invasive Asian clam (*Corbicula* spp.), or a combination of the two causes where the Asian clam species serve as vectors for native bivalve diseases.

Factor D. Inadequacy of existing regulatory mechanisms:
Existing regulatory mechanisms have provided some improvement in water quality and habitat conditions throughout the species range, but existing regulatory mechanisms are inadequate in fully protecting streams inhabited by the species. Sedimentation and non-point source pollutants continue to represent an imminent threat of low to moderate magnitude across the species' range. Available information indicates that the magnitude or imminence of these threats are not likely to be appreciably reduced in the foreseeable future.

Factor E. Other natural or manmade factors affecting its continued existence:
We have no new information on any natural or manmade factors that are affecting the continued existence of the ring pink.

Synthesis

Ring pink populations are currently restricted to three specific river reaches, the Green River in Kentucky and the Tennessee River downstream of Pickwick Landing Dam and downstream of Kentucky Dam. Historically, the species was known from the Cumberland River and Ohio River, but it is now believed to be extirpated from these systems. Efforts are underway to find a breeding pair for propagation, which may be this species' only chance at survival. Ongoing eDNA studies in the Green River have yet to confirm the species' presence. Water quality issues and habitat modification remain significant concerns to the ring pink due to factors such land use changes, gravel dredging, channel dredging maintenance, and impoundments, which affect the availability and quality of suitable habitat for the species. Although the recovery plan previously identified oil and gas production as a threat to the Green River basin, the current magnitude of this threat is believed to be minimal, although nutrients and sediments from agriculture and urbanization still pose a low to moderate threat to the area. Overutilization for commercial and recreational purposes is not considered a threat, and there is limited information on disease or predation as direct threats, although the introduction of black carp, *Corbicula* spp., and ongoing mysterious mussel die-offs in other areas raise concerns. Existing regulatory mechanisms have made some improvements, but they remain largely inadequate in fully protecting the species' habitats from sedimentation and non-point source pollutants. Due to these reasons, we believe the species continues to meet the definition of endangered, and no change is needed to its status.

RECOMMENDED FUTURE ACTIVITIES

The following recovery activities should be made a priority over the next five years:

1. Conduct comprehensive surveys of the Green River in areas with suitable habitats, specifically the reach from Green River Lake Dam downstream to Green River Lock and Dam 4. Any captured individuals should be pit tagged and located in areas of suitable habitat, where they can be accessed for life history research and propagation efforts.

2. Search for unknown ring pink populations in the Tennessee and Cumberland rivers using eDNA methods at sites with suitable habitat and diverse mussel assemblages.

3. Identify the species' fish host(s) for use in propagation of the ring pink. Any propagated juveniles should be translocated to areas with suitable habitat in the Green River and/or other suitable streams within the species' historic range.

4. Initiate studies in the cryopreservation of gametes and glochidia of a surrogate mussel in anticipation of using this technique on the ring pink. If successful, this work will preserve gametes and glochidia for propagation. This is needed because of the difficulty of bringing male and female ring pink mussels together for reproduction.

5. Update the recovery plan with any new information on the species' status

6. Seek funding to continue survey efforts for the ring pink. Surveys for the species often require diving methods in deep water, resulting in higher survey costs.

REFERENCES

Haag, W.R. and J.A. Stoeckel. 2021. Demographic characteristics of young-of-year freshwater mussel populations in ponds. Hydrobiologia 848:311-320.

Richard, J.C., E. Leis, C.D. Dunn, R. Agbalog, D. Waller, S. Knowles, J. Putnam, and T.L. Goldberg. 2020. Mass mortality in freshwater mussels (*Actinonais pectorosa*) in the Clinch River, USA, linked to a novel densovirus. Scientific Reports 10: 14498.

Tolin, W. 1991. Personal communication. Email from William Tolin, to the U.S. Fish and Wildlife Service documenting the mis- identification of the Ring Pink mussel in the Kanawha River in West Virginia, Elkins, WV. Unknow Date.

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RESULTS / SIGNATURES

U.S. Fish and Wildlife Service
Status Review of the Ring Pink

Status Recommendation:

On the basis of this review, we recommend the following status for this species. 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 extinct*
  ____ *The species does not meet the definition of an endangered or threatened species*
  ____ *The listed entity does not meet the statutory definition of a species*
__X_ No change needed

FIELD OFFICE APPROVAL:

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

Approve JOSHUA LILLPOP Digitally signed by JOSHUA LILLPOP Date: 2025.05.09 14:49:43 -04'00' _____