Draft Recovery Plan for the Pearl River map turtle (*Graptemys pearlensis*)

Photo credit: Gabrielle Berry

U.S. Fish and Wildlife Service
Southeast Region
Atlanta, Georgia
September 2025

Approved: _____
Regional Director, Southeast Region
U.S. Fish and Wildlife Service

PURPOSE AND DISCLAIMER

This document presents the U.S. Fish and Wildlife Service's (Service) plan for the conservation of the Pearl River map turtle. The recovery plan is the second part of the Service's 3-part recovery planning framework including the statutorily required elements pursuant to section 4(f) of the Endangered Species Act (Act). This recovery plan is informed by a Species Status Assessment (SSA) that delivers foundational science for informing decisions related to the Act and includes an analysis of the best available scientific and commercial information regarding a species' life history, biology, and current and future conditions that characterizes the species' viability (i.e., ability to sustain populations in the wild over time) and extinction risk. We have also prepared a Recovery Implementation Strategy (RIS) that is an easily updateable operational plan describing the on-the-ground recovery activities needed to complete the recovery actions contained in the recovery plan.

Recovery plans describe the envisioned recovered state (when a listed species should no longer meet the Act's definitions of a threatened species or endangered species) and include a recovery strategy, recovery criteria, recovery actions, and the estimates of time and cost needed to achieve it. Plans are published by the Service and are often prepared with the assistance of recovery teams, contractors, State agencies, and others. Recovery plans do not necessarily represent the views, official positions, or approval of any individuals or agencies involved in plan formulation, other than the Service. They represent the official position of the Service only after they have been approved and signed by the Regional Director. Recovery plans are guiding and planning documents only; identification of an action to be implemented by any public or private party does not create a legal obligation beyond existing legal requirements. Nothing in this plan should be construed as a commitment or requirement that any Federal agency obligate or pay funds in any one fiscal year in excess of appropriations made by Congress for that fiscal year in contravention of the Anti-Deficiency Act, 31 U.S.C. 1341, or any other law or regulation. Approved recovery plans are subject to modification as dictated by new findings, changes in species status, and completion of recovery actions.

ACKNOWLEDGEMENTS

This recovery plan has benefitted from the advice and assistance of many individuals, agencies, and organizations. We thank the following individuals for their assistance and apologize to anyone whose name was omitted inadvertently from this list: Matt Wagner (U.S. Fish and Wildlife Service, Mississippi Ecological Services Field Office), Dr. Peter Lindeman (Pennsylvania Western University at Edinboro), Dr. Will Selman (Millsaps College), Dr. Robert Jones (retired Mississippi Department of Wildlife, Fisheries, and Parks), and Keri Lejeune (Louisiana Department of Wildlife and Fisheries).

Lead Author(s)

Dr. Luke Pearson, Mississippi Ecological Services Field Office, Jackson, Mississippi

RECOMMENDED CITATION AND ELECTRONIC AVAILABILITY

U.S. Fish and Wildlife Service. 2025. Recovery Plan for the Pearl River map turtle (*Graptemys pearlensis*). U.S. Fish and Wildlife Service, Southeast Region, Atlanta, GA, USA. 12 pp.

An electronic copy of this Final Recovery Plan will be made available at:
https://ecos.fws.gov/ecp/species/10895

INTRODUCTION

This recovery plan describes criteria for determining when the Pearl River map turtle should be considered for delisting, identifies site-specific actions that will be necessary to meet those criteria and estimates the time and cost to achieve recovery. Additionally, a brief summary of information on the species' biology and status are included, along with a brief discussion of factors limiting its populations. A detailed discussion of these and other topics pertinent to the recovery of the Pearl River map turtle can be found in the Species Status Assessment. Detailed on the ground activities implementing recovery actions can be found in the Recovery Implementation Strategy. These supplemental documents are available at https://ecos.fws.gov/ecp/species/10895. The Recovery Implementation Strategy (RIS) and Species Status Assessment (SSA) are finalized separately from the Recovery Plan and will be updated on a routine basis.

Species Status:

The final rule listing the Pearl River map turtle (*Graptemys pearlensis*) as a threatened species under the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) (Act) was published in the Federal Register on August 12, 2024 (89 FR 57206). The Pearl River map turtle is assigned a recovery priority number of 11, which indicates the taxon faces a moderate degree of threat and has a low recovery potential. Although the Pearl River map turtle is characterized by low densities and a lack of strong genetic structure, the degree of threat is considered moderate as the species' distribution is widespread throughout its historical range in the Pearl River drainage. This wide distribution provides some measure of redundancy in the face of stochastic threats that may impact habitat quality or mollusk (prey) abundance. However, there is a low potential for recovery as the threats affecting the species occur at a severity and scale (landscape-level) that is difficult to reduce, remove, or mitigate to the level that will meaningfully contribute to species' recovery. Local habitat and conservation actions may benefit populations but are not expected to mitigate rangewide population declines. The species is considered Imperiled (S2) by the State of Mississippi and Vulnerable (S3) by the State of Louisiana.

Habitat Requirements and Limiting Factors:

The Pearl River map turtle is a freshwater turtle that inhabits flowing rivers and large creeks with sand and gravel bottoms in the Pearl River drainage in Mississippi and Louisiana. The species current range includes approximately 795 river miles (1,280 river kilometers), with approximately half the range occurring in tributaries and half in mainstem rivers. The Pearl River map turtle has long generation times (up to 20 years), delayed sexual maturity (up to 10 years), and low reproductive output (two clutches of six eggs each; Service 2023). These characteristics limit the ability of the species to respond and adapt to the increasing frequency of stochastic environmental events (e.g., out-of-season flooding, pollution, erosion). Due to the Pearl River map turtle's longevity and long generation times, populations may seem to persist in some areas; however, these populations consist of older individuals with limited recruitment occurring (i.e., perception of persistence; Lovich et al. 2018). Information suggests that the species can adapt to changing biotic conditions, such as the dietary shift from native mollusks to the invasive Asian clam (*Corbicula*; Vučenović and Lindeman 2021). This adaptive capacity may have reduced the

rate of population decline by allowing the species to shift to a supplemental, if less than ideal, food source.

Pearl River map turtle populations are negatively affected by a variety of factors, including habitat alteration through the construction of impoundments, desnagging and channelization efforts, pollution and sedimentation from various point and nonpoint source activities affecting water quality, habitat destruction from various human-related land activities, and prolonged, out-of-season flooding and sea level rise (Service 2023). Habitat alteration, especially in-stream actions, can substantially reduce optimal microhabitats within river reaches that the Pearl River map turtle relies on for food, sheltering, and basking. This species is a riverine obligate, and any conversion of riverine habitat to lake-like (lentic) habitat can cause local extirpations, as evidenced by the construction of the Ross Barnett Reservoir in 1961. Additionally, stochastic environmental events, such as prolonged out-of-season flooding or extreme drought conditions, can cause increased nest mortality, reductions in prey quality and availability, and resulting poorer body condition.

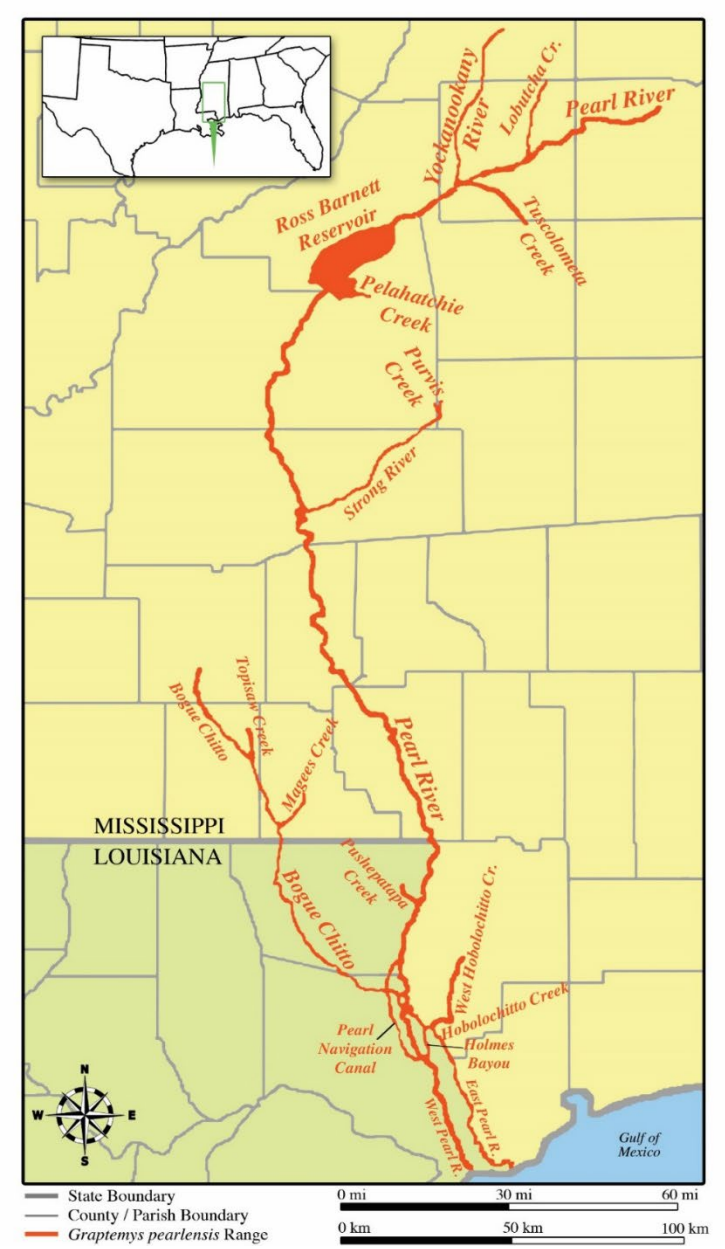

Figure 1. Known range of the Pearl River map turtle as of 2020 (Lindeman et al. 2020, p. 176). Rivers and tributaries are drawn to the known upstream extent of the range of the species.

RECOVERY STRATEGY

The recovery strategy provides a concise overview of the envisioned recovered state for the Pearl River map turtle, describes the Service's chosen approach to achieve it, and includes the rationale for why the approach was chosen. Specifically, the recovery strategy articulates how the plan's statutory elements (e.g., recovery criteria, recovery actions, and estimates of time and cost) will work together to achieve the Pearl River map turtle's recovery.

The recovery strategy for the Pearl River map turtle is to ensure long-term viability of the species throughout the species' distributional range in the Pearl River drainage in Mississippi and Louisiana at the time of listing. Achieving recovery will require stabilizing declining populations and increasing recruitment and population abundance in five extant analysis units. To do so, habitat conservation and restoration, reduction of threats to promote population growth, and research to assess reproductive biology and ecological needs of the species will help to inform recovery efforts and increased public awareness and engagement. Recovery will entail partnerships and collaboration among various stakeholders, particularly federal partners, state conservation agencies, non-governmental organizations, and private landowners to protect and improve habitat integrity and quality in rivers and streams throughout the Pearl River drainage. The initial goal of this collaboration is to reduce existing threats posed by habitat and riparian disturbance and inadequate regulatory mechanisms.

Recovery of the Pearl River map turtle is founded upon the ecological principles of resilience, representation, and redundancy (the "3 Rs"; Wolf et al. 2015). As the Pearl River map turtle is endemic to the Pearl River drainage and has limited genetic differentiation, representation necessitates that priority areas for conservation occur throughout the entire range of this species. Redundancy is considered moderate to high due to relatively widespread distribution across the range, and this species' use of tributaries as potential sites of refugia. Long-term population monitoring provides demographic data to inform on-the-ground recovery actions such as management of nest predators and/or nest sites, and habitat and landscape-level conservation actions to maintain or increase population resiliency. If necessary, augmentation of populations through captive propagation and reintroductions can assist in these recovery efforts and must follow an approved controlled propagation and reintroduction plan pursuant to the Service's Policy Regarding Controlled Propagation of Species Listed Under the Endangered Species Act (65 FR 56916). Any reintroductions should include post-release monitoring to measure success in terms of survivorship, population stability, and natural recruitment.

Several information gaps related to demographics should be addressed to inform species recovery, including reproductive biology, nest site selection, home range and movement patterns, and threat sensitivity. To assess the condition of the species, a standardized monitoring program is necessary to quantify population demographics and provide insight into habitat needs and conditions for the species over time. These and other monitoring and research actions will help to protect populations, guide federal and state coordination and permit review, and focus conservation, restoration, and recovery efforts.

RECOVERY CRITERIA

Recovery criteria are statutorily required objective, measurable descriptions of a recovered state for the Pearl River map turtle, as described in 4(f)(1)(b)(ii) of the Act. Recovery criteria describe the conditions of resiliency, redundancy, representation, and threat abatement that indicate when the Pearl River map turtle may no longer meet the Act's definitions of an endangered species or threatened species. Recovery criteria present our best estimate of a species' recovered condition at the time of recovery plan development. Changes in available information, technologies, and our understanding of the species over time might mean that the recovered state envisioned by the recovery criteria differs from our assessment in a later status determination.

Recovery (Delisting) Criteria

The following delisting criteria, when met collectively, may indicate that the Pearl River map turtle no longer meets the Act's definitions of either a threatened species or endangered species, and may be able to be the removed from the Federal List of Endangered and Threatened Wildlife:

Recovery Criterion 1:

1. Evidence of a stable or increasing population in at least eight sites distributed across the Pearl River drainage, with evidence of natural recruitment and multiple age classes over a 30-year monitoring period and meeting the following specifications:
    a. **Four** populations meet or exceed 25 Pearl River map turtles per river kilometer (rkm).
    b. **Two** populations meet or exceed 35 Pearl River map turtles per rkm.
    c. **Two** populations meet or exceed 60 Pearl River map turtles per rkm.
    d. The distribution of these eight sites should include at least one site each on the Strong, Bogue Chitto, and Yockanookany rivers, and at least five sites on the Pearl River. Sites on the Pearl River to be monitored to meet this criterion should include, but are not limited to, Carthage, Georgetown, Columbia, and the West Pearl River adjacent to or within Bogue Chitto National Wildlife Refuge. Sites should be monitored using mark-resight or mark-recapture survey techniques or other comparably effective, Service-approved methodology to estimate population density.

Rationale for Criterion 1

Populations that exhibit stable or increasing population trends, natural recruitment, and multiple age classes typically have higher resiliency and are better equipped to withstand stochastic events. The presence of populations with higher resiliency throughout the range increases the species' redundancy, which reduces vulnerability to catastrophic events. Healthy populations at the levels described in Criterion 1 that occur in at least eight sites across the Pearl River drainage are expected to provide sufficient redundancy to withstand catastrophic impacts and sufficient representation by conserving adaptive capacity among populations. Tributary populations of Pearl River map turtles generally persist in habitats that are substantially different from mainstem river populations, with higher canopy cover, more gravel and shoal substrates, and less human traffic, indicating a potential bank of adaptive capacity to provide some ability to withstand additional stochastic change. The long generation time, delayed reproduction, and low reproductive output of Pearl River map turtles mean the monitoring period to determine population trends must be longer than species with shorter lifespans, faster reproduction, or higher fecundity.

Recovery Criterion 2:

2. Pearl River map turtle populations should have a distribution comparable to that at the time of listing throughout the mainstem Pearl River, Yockanookany River, Strong River, Bogue Chitto River, and Hobolochitto Creek. As part of Criterion 2, the total distributional range (in river miles/river kilometers) of the species must be equal to or greater than the distributional range at the time of listing (1,279.6 river kilometers; 795.1 river miles).

Rationale for Criterion 2

Peripheral populations tend to exhibit the overall directional trend of a species' status and are usually the first populations to exhibit range contractions or range expansions. Thus, continued presence of the Pearl River map turtle throughout its distributional range at the time of listing in the above-mentioned tributaries, as well as inhabiting a total distributional range similar to or greater than when the species was listed, may indicate stable overall populations and provide increased representation, resiliency, and redundancy.

Recovery Criterion 3:

3. Threats have been addressed and managed to the extent that habitat factors (i.e., instream and nesting habitat, water quality and quantity, and connectivity between and among populations) are maintained at levels meeting life history requirements of the species.

Rationale for Criterion 3

The primary threat to the Pearl River map turtle is landscape-level habitat alteration and degradation. However, the severity and imminence of the threat differs across the species' range. Management or abatement of this threat should be achieved for recovery, as impaired water quality and unstable river substrates contribute to the decline of the Pearl River map turtle's prey source (i.e., mollusks) and threaten the future viability of the species. Additional threats include increasing frequency and intensity of drought and out-of-season flooding, and collection for the pet trade. Appropriate data collection, modeling, and monitoring of these threats will inform strategic implementation of recovery actions spatially and temporally within in the species' range.

RECOVERY ACTIONS

Recovery actions are the statutorily required, site-specific management actions needed to achieve recovery criteria, as described in section 4(f)(1)(B)(i) of the Act. The Service assigns recovery action priority numbers (1-3) to rank recovery actions. The assignment of priorities does not imply that some recovery actions are of low importance, but instead implies that lower priority items may be deferred while higher priority items are being implemented. Recovery action priority numbers are based on the following:

Priority 1: An action that must be taken to prevent extinction or to prevent the species from declining irreversibly.

Priority 2: An action that must be taken to prevent a significant decline in species population/habitat quality, or some other significant negative impact short of extinction.

Priority 3: All other actions necessary to provide for full recovery of the species.

Related Recovery Criterion	Recovery Action ID Number	Recovery Action	Estimated Cost	Recovery Action Priority Number
1,2	1	Develop and implement a monitoring plan to evaluate Pearl River map turtle populations and habitat quality and maintain a comprehensive database for collected data.	$1,085,000	1
1,2	2	Conduct and support research that enhances knowledge of Pearl River map turtle biology, threat sensitivity, and threat mitigation. Apply the results to recovery actions, habitat management, and protection of the species.	$684,000	1
1,2	3	Develop and implement a controlled propagation and reintroduction plan to support potential reintroduction efforts (if needed) that includes monitoring of any reintroduced populations.	$2,312,000	2
2	4	Work with partners and landowners to prioritize riverine and riparian habitat for protection, enhancement, and restoration.	$120,000	2
1,2	5	Work with regulatory agencies to address water quantity and quality concerns which could impede the recovery of the Pearl River map turtle.	$180,000	2

1,2	6	Initiate and expand outreach efforts and identify innovative ways to increase public support for the protection of the Pearl River map turtle and its habitat.	$60,000	3
		Total Cost	$4,441,000	

ESTIMATED TIME AND COSTS TO ACHIEVE RECOVERY

Estimates of time and cost, as defined in section 4(f)(1)(B)(iii) of the Act, must reflect, to the maximum extent practicable, the total amount of time and costs it will take to achieve the recovery (delisting) of the Pearl River map turtle. The cost estimates provided do not account for possible future inflation.

We estimate that the full implementation of the recovery actions would improve the status of the Pearl River map turtle so that it could be delisted within 60 years following the adoption of this recovery plan and cost $4,441,000. Refer to the RIS for a breakdown of the cost per recovery activity. We note that the recovery program may change over time, or the timeframe estimated to implement the recovery actions to achieve recovery of the species may take longer than expected. The recovery of the Pearl River map turtle will depend largely on the commitment and the ability of the Service and partners to implement the recovery actions necessary to achieve the recovery criteria.

Time Frame	Action 1 Cost	Action 2 Cost	Action 3 Cost	Action 4 Cost	Action 5 Cost	Action 6 Cost	Total Cost by Year
Year 1	$36,000	$45,000	$0	$2,000	$3,000	$1,000	$87,000
Year 2	$31,000	$45,000	$0	$2,000	$3,000	$1,000	$82,000
Year 3	$61,000	$45,000	$0	$2,000	$3,000	$1,000	$112,000
Year 4	$11,000	$37,000	$0	$2,000	$3,000	$1,000	$54,000
Year 5	$11,000	$17,000	$0	$2,000	$3,000	$1,000	$34,000
Years 6–10	$85,000	$45,000	$131,000	$10,000	$15,000	$5,000	$291,000
Years 11–20	$170,000	$90,000	$980,000	$20,000	$30,000	$10,000	$1,300,000
Total Cost by Recovery Action (60 years)	$1,085,000	$684,000	$2,312,000	$120,000	$180,000	$60,000	$4,441,000

LITERATURE CITED

Lovich, J.E., J.R. Ennen, M. Agha, and J.W. Gibbons. 2018. Where have all the turtles gone, and why does it matter? BioScience 68:771–781. https://doi.org/10.1093/biosci/biy095.

U.S. Fish and Wildlife Service. 2023. Species Status Assessment for the Pearl River map turtle (*Graptemys pearlensis*). Mississippi Ecological Services Field Office, Jackson, Mississippi. 152 pp.

Vučenović**,** J., and P.V. Lindeman. 2021. The diets of the Pearl and Pascagoula map turtles (*Graptemys pearlensis* and *Graptemys gibbonsi*). Herpetologica 77(2):121–127. https://doi.org/10.1655/HERPETOLOGICA-D-20-00040.

Wolf, S., B. Hartl, C. Carrol, M.C. Neel, and D.N. Greenwald. 2015. Beyond PVA: Why recovery under the Endangered Species Act is more than population viability. BioScience 65:200–207. https://doi.org/10.1093/biosci/biu218.