

Lower Osage River Protection and Enhancement Program

2023 Annual Report

Prepared by the
U.S. Fish and Wildlife Service

For:
Ameren Missouri



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Cover Photo: USFWS employees retrieve a mussel sampling quadrat during 2023 monitoring efforts in the lower Osage River.

U.S. Fish and Wildlife Service

LOWER OSAGE RESTORATION PARTNERS

The following is a list of current and past partners responsible for the continued restoration of lower Osage River:

Ameren Missouri

Missouri Department of Conservation

U.S. Fish and Wildlife Service

HDR Engineering, Inc

Iowa State University

Kansas City Zoo

Missouri State University

Inter-Fluve

U.S. Corps of Engineers, Kansas City District

Missouri Department of Natural Resources

TABLE OF CONTENTS

INTRODUCTION	1
CURRENT LORPEP PROJECTS.....	2

APPENDIX I

Summaries of Completed Projects of the Lower Osage River Protection and Enhancement Program

APPENDIX II

Project 15-1: Freshwater Mussel Monitoring in the Lower Osage River. 2023
Progress Memo.

Lower Osage River Protection and Enhancement Program 2022 Annual Report

INTRODUCTION

The Lower Osage River Protection and Enhancement Program (LORPEP) was established by Ameren Missouri, the Missouri Department of Conservation (MDC), and the U.S. Fish and Wildlife Service (USFWS) as part of a Settlement Agreement filed with the Federal Energy Regulatory Commission (FERC) on May 18, 2005. The terms of the Settlement Agreement were written into Ameren Missouri's new project license issued by FERC on March 30, 2007, for the operation of Bagnell Dam. The new license articles included major environmental enhancements for the Lower Osage River (LOR) including improved minimum flows, dissolved oxygen, ramp-down rates, fish protection measures at the dam, fish propagation funding, and the LORPEP (Article 412). On January 9, 2009, Ameren Missouri submitted a plan to FERC for the implementation of the LORPEP program that was coordinated with USFWS and MDC.

The purpose of the LORPEP is to implement adaptive management actions to improve aquatic habitat, protect and enhance aquatic resources, and contribute to the recovery of federally endangered freshwater mussels in the lower Osage River. These projects will maintain the scope established in Section 4.0 of the revised Lower Osage Protection and Enhancement Plan accepted by FERC on January 12, 2009, the Joint Explanatory Statement (2005), the Settlement Agreement (2005), and the operating license (2007).

Section 6 of the operating license requires Ameren to fund (\$175,000 a year, adjusted pursuant to the methodology set forth in Section 7) LOR protection, enhancement, and aquatic habitat restoration projects. These funds would be provided to the USFWS and would support, at a minimum, projects designed to restore/create back and side channel aquatic habitat, monitor the effectiveness of measures implemented in accordance with Section 6 of the operating license, and prevent or reduce erosion that affects these initiatives. In addition, the funds would be used to develop and implement a freshwater propagation program for the LOR. The program is funded annually by Ameren Missouri and was initiated in 2008. Funding for the LORPEP is limited considering the number of habitat enhancement opportunities in the LOR. Therefore, implementation of the program will follow a habitat management model similar to the USFWS's process called Strategic Habitat Conservation (SHC) (<https://www.fws.gov/policy/052fw1.pdf>). SHC is an adaptive resource management framework for making management decisions considering where and how to deliver conservation efficiently to achieve specific biological outcomes. Such a framework will help ensure the LORPEP is successful in maximizing ecological benefits to aquatic resources in the LOR. The process of SHC includes several elements that occur in an ongoing, adaptive management loop including 1) biological planning, 2) conservation design, 3) delivery of conservation actions, and 4) monitoring and research. Within this framework, there will be a decision-making process by which proposed projects are evaluated for their potential for success and prioritized according to a set of criteria to ensure LORPEP funds are used to maximize ecological benefits. Further, the LORPEP describes the

need for the USFWS and MDC to evaluate the enhancements provided through operational changes prior to implementation of habitat restoration projects.

With respect to habitat improvement projects, LORPEP is now in the conservation design and delivery stage (see Project 10-2 below). The planning stage was important to complete before habitat improvement projects were considered. Most efforts have been aimed to gather information needed for the project decision-making process. Going forward, this procedure will be utilized to help ensure that informed decisions will be made on the identification, development, and prioritization of feasible enhancement projects. Projects related to habitat enhancement will be planned and implemented in cooperation with Ameren Missouri and other partners as annual funding accumulates in a protected account designated for the LORPEP.

REPORT FORMAT

This annual report is provided to Ameren Missouri as required by the January 14, 2007, Memorandum of Understanding between Ameren Missouri, the MDC, and the USFWS. The purpose of this document is to report on the status of LORPEP projects and describe accomplishments made during the past year. Ongoing, completed, and new projects are listed under the “Current LORPEP Projects” section of this report. A brief description and history is provided for each project followed by the status and estimated timeline for completion. All projects are numbered by the year each was initiated (first two digits) followed by a sequential numerical identifier (digits following the dash) for that year (e.g., “Project 08-1” = project 1 initiated in 2008, “Project 10-1” = project 1 initiated in 2010). Interim and final reports are provided in the referenced appendices of this report when appropriate. All active LORPEP projects will be included under the “Current LORPEP Project” section until they have been completed (including any required final reporting). Completed projects continue to be listed in Appendix I. Previous annual reports are available at the USFWS, Missouri Field Office, 101 Park DeVille Drive, Suite A, Columbia, Missouri 65203.

CURRENT LORPEP PROJECTS

Project 08-5. Propagation efforts for freshwater mussels

Description: As required by the September 15, 2006, Biological Opinion issued by the USFWS for the Osage Project and incorporated in the Project License as Article 412, a mussel propagation program was developed and implemented for the federally endangered Pink Mucket (*Lampsilis abrupta*), Scaleshell (*Leptodea leptodon*), and other select species in the LOR. A propagation plan, also referenced as the Osage Basin Mussel Conservation and Restoration Plan (C/R Plan), will be developed as required by the USFWS’s propagation policy (65 FR 56916). The goals of the project are to: 1) augment existing populations of select rare, state-listed, and federally-listed species; 2) reintroduce extirpated species; and 3) re-establish select faunal representative species into restored habitats (USFWS 2006 Biological Opinion for FERC Project 459-128).

In 2009, the USFWS fostered partnerships with Missouri State University and the Kansas City Zoo to utilize existing mussel propagation and rearing systems for Osage River propagation. In subsequent years, the USFWS helped expand both facilities to increase productivity, which included the fabrication of several innovative aquatic systems. A new technique to efficiently tag mussel shells was developed using a computer-controlled laser engraving machine to etch the shells of animals to be released into the LOR. In 2009, a pilot propagation study involving the Pink Mucket was initiated. Between 2011 and 2013, over 14,000 propagated sub-adult Pink Mucket were released into test plots at 2 sites in the LOR. These sites have been sampled intermittently between 2012 and 2020 to monitor mussel survivorship and growth. Results thus far indicate that the releases into these test plots were successful, and survivorship of the released animals remains high as reported in Appendix II of the 2020 LORPEP report.

In 2021, a Technical Working Group (TWG), composed of individuals interested in mussel conservation and restoration opportunities, was developed to help promote a basin-wide approach beyond LORPEP actions for the LOR and expand restoration benefits to the overall Osage River Basin mussel community. The TWG is currently chaired by the USFWS. The Osage River Basin Freshwater Mussel Conservation and Restoration Plan (C/R Plan) was finalized in 2022 and activities affiliated with LORPEP are being formulated (below).

Status: In 2023, we began formulating C/R activities specifically affiliated with LORPEP, including developing species-level plans for priority mussel species and coordinated with MDC as indicated in the C/R Plan. Insight to the next phases of mussel propagation will be included in our planning as the status of this opportunity at MSU is currently unclear with a pending change in university faculty. We intend to remain engaged with MSU and locate at least one facility interested in long-term restoration efforts that would help reduce travel time, simplify logistics, increase security, and maintain quality control. We also discussed the potential for initiating propagation opportunities with Neosho National Fish Hatchery and continuing collaboration with the Kansas City Zoo.

The Plan for Controlled Propagation and Release of the Scaleshell Mussel (*Leptodea leptodon*) into the Lower Osage River, Missouri was drafted in 2023 to prepare for the propagation and release of Scaleshell into the LOR. This draft document will help establish how we intend to propagate and release Scaleshell back into the LOR to restore and maintain viable Scaleshell populations. This plan should be finalized in 2024. A study plan for comparing genetic heterozygosity between wild and artificially propagated Pink Muckets (*Lampsilis abrupta*) in the LOR was also drafted in 2023 and should be finalized in 2024. The results from this study will inform how to progress with Pink Mucket propagation for the LOR. In 2023, we collected genetic samples from a few resident Pink Mucket and 30 propagated/released Pink Mucket to inform this study. Upon its completion, a Pink Mucket propagation and release plan will also follow the completion of the Scaleshell Plan (above).

As reported in 2021, the U.S. Geological Survey (USGS) began a separate, innovative research project at the upstream release site independent of LORPEP activities and funds. This project was initiated in cooperation with the USFWS and assistance from the MDC. The research involves the tagging and tracking of movements of four species of live mussels (including a number of released Pink Muckets), “sham mussels” (valves of dead pocketbook mussels glued together), and various sized rocks using radio frequency identification tags (RFID) and accelerometers. The USGS indicated numerous resurveys were conducted in 2023 to relocate tagged RFID rocks, live mussels, and sham mussels, as well as recover tagged accelerometer rocks. The USGS’s relocation success varied depending on the type of tagged tracer. More than 96% of the tagged live mussels have been relocated in RFID resurveys since initial tagging in November 2021. Most of the sham mussels and accelerometer rocks have also been resurveyed and recovered. Many sham mussels were found close to their initial deployment location but were fully burrowed under 5 to 10 cm of sediment, dislodged from their initial deployment position, or laying on the surface of the sediment. Seventeen of twenty accelerometer rocks were recovered, with movements ranging from 0.5 to 17 m downstream (mean downstream displacement = 4.7 m). The three accelerometer rocks not able to be recaptured were likely displaced out of the study reach. Less than 10% of the natural rocks that were tagged were resurveyed over the two-year study. Given the high resurvey success of live mussels, sham mussels, and larger accelerometer rocks, it thought the smaller and more naturally-sized rocks have been displaced downstream from the mussel bed. Additional work is being done examining the timing of accelerometer movements in comparison to the hydrograph. Two-dimensional modeling efforts led by USGS also indicate that although the mussel bed is located in an area of reduced bed shear stress compared to the channel both upstream and downstream, there are still areas of high shear within the mussel bed during high flow events that are likely capable of displacing bed sediment.

This study is intended to improve the understanding of substrate stability and mussel habitat suitability and help inform future mussel conservation and restoration work in the lower Osage River and elsewhere. The USGS project is ongoing and will continue to be summarized in future reporting until its completion.

Proposed timeline: Project 08-5 will continue for the remainder of the license (2047) with reporting provided annually per relevant freshwater mussel C/R activities including securing suitable propagation facilities and relevant C/R activities with TWG members and partners.

Project 10-2: Investigate potential Article 412 restoration opportunities within the lower Osage River.

Description: The implementation of habitat restoration projects under Article 412 will require the cooperation and involvement of multiple partners including Ameren Missouri, resource agencies, and private landowners. Once an opportunity is identified, it must be assessed to determine if the potential project is feasible, can attain the goals of the

LORPEP, and can be supported by the parties involved. Efforts to investigate restoration opportunities may involve meetings with potential partners, site visits, habitat assessments, and survey work to determine existing conditions so that potential projects can be evaluated. In general, no formal annual reporting is planned for these actions. However, results of on-site assessments or surveys may be provided in future annual reports as necessary.

Since 2008, the MDC and USFWS have conducted various field studies to gain a better understanding of what habitat enhancements would be most beneficial to aquatic resources in the LOR. Because there are finite LORPEP funds, the number of habitat enhancement projects is expected to be limited. Therefore, it is important to inform the selection process and identify the most cost-effective projects. Results of these studies have been included in past LORPEP annual reports. Through this process, we have developed a list of possible LORPEP habitat enhancement opportunities while the necessary funds to implement such projects were accrued via Ameren Missouri's annual Article 412 payments.

A few attempts at implementing a habitat restoration project were taken in 2019, 2020, and 2022, but cost and other factors made these projects unfeasible. Since 2022, the FWS has been investigating other avenues to implement a restoration project and find additional partners and funding sources to match existing LORPEP habitat restoration dollars. FWS is engaged with the U.S. Army Corps of Engineers (USACE) and Missouri Department of Natural Resources (MDNR) to explore restoration options that could inform the Ecosystem Restoration Feasibility Study on the Lower Osage River. The LORPEP working group is engaged in this process and helping USACE determine potential project sites and alternatives.

Status: In 2023, discussions with MDNR Soil and Water Conservation District (SWCD) took place to explore the use of LORPEP money within that program to implement larger restoration projects above the current SWCD limits. SWCD suggested the best use of LORPEP money would be to implement restoration projects in tributaries to the Osage River, because of the size and scope of the Osage River. FWS aims to use the LORPEP funds in the Osage River, and therefore, we continued to find other avenues to implement a restoration project.

FWS continued conversations with USACE to explore restoration options that could inform their current Ecosystem Restoration Feasibility Study on the Lower Osage River. This route appears to be the best option for using LORPEP money to implement a restoration project because LORPEP money can be used as a cost share, allowing the fund to go further and potentially implementing more projects. The LORPEP working group is also participating with USACE on the Brockman Spring Road CAP1135 project. This project will stabilize a road, address bank erosion, and help improve aquatic habitat at the site. LORPEP funds are reserved for actual habitat restoration and enhancement

work and activities that involve ecological uplift in the feasibility study and CAP1135 project.

Proposed Timeline: In 2024, discussions with USACE will continue to determine if there are any restoration opportunities and how to best use LORPEP to implement and/or inform any projects. A budget for the CAP1135 project should be completed in 2024, and the LORPEP working group will decide how much, if any, of the LORPEP fund will be used to assist with that project. Construction could begin in 2024, but it is more likely to begin in 2025.

Activities related to investigating potential projects will occur for the remainder of the project license. When projects are proposed and executed, they will be listed under this project category (e.g., “Project 10-2.1, 10-2.2,” etc.).

Project 15-1: Freshwater mussel monitoring

Description: Monitoring freshwater mussel populations in the LOR is required by Article 412 of the current Osage Project license. Preliminary fieldwork to find and delineate monitoring sites was conducted between 2010 and 2012. Methods and protocols for the project were completed in 2013 (Project 08-6) and monitoring began in 2014 (Project 15-1). The official protocol for this project was updated in 2020 (see Appendix V of the 2020 annual LORPEP report). The goals of this project are to track population dynamics of mussel communities in the LOR and track survival of propagated animals that are released into monitoring sites. Eighteen monitoring sites were established at locations where significant mussel beds are present. These sites are being sampled regularly (based on a schedule described in the protocol) so that each site is sampled at least once every five years. Zebra Mussel populations will also be assessed at all sites over time.

Status: Mussel monitoring was completed at the four scheduled sites in 2023. These data are briefly presented in Appendix II. This effort represents year 4 of the second 5-year sampling round of the 18 monitoring sites since the program began in 2014. The first round of sampling was completed between 2014 and 2018, and a comprehensive report for that work was provided in Appendix III of the 2020 LORPEP annual report.

Due to ongoing drought conditions across the Midwest, Ameren requested and instituted a temporary flow deviation in the LOR between December 16, 2023, and January 4, 2024. During this time, flows out of Bagnell Dam were reduced from 900 (as required by the operating license) to 700 cfs. The purpose of this approved flow deviation was to increase water capacity in Lake of the Ozarks for potential emergency use during the winter months. The stored water would be used to prevent emersion of cooling water intakes at Ameren’s Labadie power station located downstream on the Missouri River. To understand the impact of this low flow on the LOR mussel populations, USFWS visited 15 of the 18 long-term monitoring sites during the flow deviation. Using a Trimble GeoXT™, the existing waterline was traced and transect points every 2/10 of a

foot water depth obtained perpendicular to flow along and within the existing mussel beds. Those data will be used to determine the level of impacts to the existing mussel community as a result of the water level reductions during the deviation, and implication to mussel population demographics as compared to monitoring data results thus far and into the future. USFW also collected, identified, and salvaged (i.e., relocated back into adjacent habitat below the existing waterline) any live mussels found stranded on the bank. In total, 457 live mussels were salvaged representing 22 species. This included 3 federally endangered Pink Mucket, 2 Black Sandshell (a species of conservation concern), and 2 state endangered Ebonyshell. Fresh dead mussels on the bank within the receded water area were also identified and counted. A total of 1,807 fresh dead mussels were found representing 23 species, including 2 federally listed Spectaclecase and 1 species of conservation concern (Hickorynut). The data from this sampling event is still be analyzed, and a report will be prepared for the 2024 LORPEP annual report.

Proposed Timeline: The long-term mussel monitoring project will continue until the expiration of the current FERC license in 2047. Data will continue to be summarized annually and a comprehensive report will follow each complete round of sampling the 18 sites (approximately every five years, pending adequate sampling conditions). The second round of sampling is scheduled to be completed in 2024. The sampling protocol may continue to be revised as necessary.