



US Army Corps
of Engineers®

Buffalo District
Great Lakes and Ohio River Division

GLFER Sandusky River, Grass Carp Barrier Fremont, OH

Section 506 Great Lakes Fisheries and Ecosystem Restoration Program

P2/Project Number: 500146

Review Plan – Decision Document

PREPARED
BY:

RECOMMENDED

ENDORSED
BY:

APPROVED
BY:

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1. PURPOSE, AUTHORITY, STUDY DESCRIPTION, AND PRODUCTS

a. Purpose. This review plan defines levels and scopes of review required for the feasibility phase products. The review plan is a component of the Project Management Plan for the Sandusky River Grass Carp Barrier GLFER Section 506 project.

b. Authority. Great Lakes Fishery and Ecosystem Restoration (GLFER). Section 506 of the Water Resources Development Act (WRDA) of 2000, as amended by Section 5011 WRDA 2007 (Great Lakes Fishery and Ecosystem Restoration).

Study Description. This study was initiated to investigate alternatives that would deter the movement of grass carp (*Ctenopharyngodon idella*) to spawning areas in the Sandusky River. Inhibiting the expansion of grass carp populations is important for the preservation of aquatic vegetation used by native species. The scope of the project will include evaluation of engineering solutions and barrier technologies for the prevention of upstream migration of grass carp. The invasive grass carp infestation to the Great Lakes has considerable economic and ecologic ramifications. Grass carp damage or destroy native wildlife and fish habitats by removing aquatic plants and indirectly causing increased water turbidity. Without mitigation of grass carp spawning, the species will continue to be a threat to both the fishery and natural ecosystems in the Sandusky River and Lake Erie watersheds.

The Sandusky River originates in northwestern Ohio, flows north for approximately 133 miles, and drains into Lake Erie. The entire drainage basin for the Sandusky River is 1,828 square miles. The study area consists of two locations on the mainstem of the Sandusky River in the town of Fremont, Ohio (Figure 1). The two proposed project locations are within 4,000 feet of one another, near Brady's Island in the City of Fremont. A barrier at this location would prevent grass carp from accessing high quality spawning habitat immediately upstream of the recently removed Ballville Dam. In Figure 1, below, the white shaded area, (the upper watershed) represents a potential ~3,100 acres that could be protected from grass carp, if the project were implemented at or nearby the proposed location. As the study progresses, additional locations may be further evaluated for their suitability in preventing the migration of grass carp.

Based on the investigations conducted to support the Federal Interest Determination (FID) Report that was approved by LRD on June 28, 2022, alternatives to be considered during the feasibility phase include combined acoustic/bubble curtain barrier and physical-hydraulic barrier systems. The PDT acknowledges that there may be a higher degree of uncertainty in quantifying the benefits among similar alternatives, especially when considering distinct components of a typical behavioral barrier (e.g., light, sound, air). It is intended that a risk-informed decision-making approach be utilized, similar to the methodology of the Great Lakes and Mississippi River Interbasin Study (GLMRIS). This will help distinguish between and quantify the benefits of each alternative. The non-federal sponsor for this study is the Ohio Department of Natural Resources.



Figure 1: Sandusky River Study Area (USACE, 2022)

c. Products.

Table 1. List of Products to Be Prepared and Reviewed					
Product / Document	Prepared By	Type of Review to be Performed			
		DQC	ATR	Type I IEPR	Policy / Legal
Detailed Project Report (DPR) and Environmental Assessment (Main Report / Integrated DPR/EA)	In-house Resources	X	X		X
Environmental Appendix	In-house Resources	X	X		X
Real Estate Plan (Appendix)	In-house Resources	X	X		X
Hydrology and Hydraulic (H&H) Engineering Appendix	In-house Resources	X	X		X
Geotechnical Engineering Appendix	In-house Resources	X	X		X
Civil / Structural Engineering Appendix	In-house Resources	X			X
Cost Estimate	In-house Resources	X	X		X
HTRW Assessment (Phase 1 ESA)	In-house Resources	X			X
Environmental Coordination Appendix Including: • Summary of Comments & Responses from Public and Agency Review • FONSI • Cultural Resources Report	In-house Resources	X	X		X

2. REVIEW REQUIREMENTS

a. Types of Review. The feasibility phase activities and documents are required to be reviewed in accordance with ER 1110-1-12 and ER 1165-2-217. Based upon the factors under each heading, this study will undergo the reviews identified and described below.

(1) District Quality Control (DQC): DQC procedures will be performed and formally documented for all study products, including supporting documents.

- The District will perform and manage DQC procedures in accordance with the District DQC process.
- DQC will be documented with a summary report / certification.

- Supervisors within each area of responsibility will assign appropriate, qualified staff to perform QC on their respective products. Personnel performing QC shall have the necessary expertise to address compliance with Corps policy.
- The following disciplines will be playing a critical role in the DQC for this ecosystem study:

Table 2a. DQC Team Technical Disciplines and Expertise		
Technical Discipline	Peer DQC Reviewer	Chief Level DQC Reviewer
Project Management	Each peer-level DQC reviewer will have no production role in the study/project and will have the necessary expertise/experience to thoroughly review the study products identified in Table (1).	CELRB-PMP-M Chief
Plan Formulation		CELRB-PML-P Chief
Climate Preparedness and Resiliency		CELRB-PML-P Chief
Economist		CELRB- PML-P Chief
Cost Estimator		CELRB-TDD-T Chief
Real Estate Specialist		CELRB-RE Chief
Biologist/Cultural Resources		CELRB-PML-E Chief
Hydraulic Engineer		CELRB-TDH-D Chief
Geotechnical Engineer		CELRB-TDD-C Chief
Civil/Structural Engineer		CELRB-TDD-S Chief
Environmental Engineer		CELRB-TDE-E Chief

(2) Agency Technical Review (ATR): ATR will be scaled to a level commensurate with the risk and complexity of the products to be reviewed. The ATR will assess whether the analyses presented are technically correct and comply with published USACE guidance, and that the document explains the analyses and results in a reasonably clear manner for the public and decision makers. ATR is mandatory for all decision documents (including supporting data, analyses, environmental compliance documents, etc.).

- ATR is managed within USACE by the designated RMO and is conducted by a qualified team from outside the home district that is not involved in the day-to-day production of the project/product.
- ATR teams will be comprised of senior USACE personnel and may be supplemented by outside experts as appropriate.
- All ATR reviewers must be certified to perform ATR by USACE. Multiple disciplines may be covered by a single reviewer based on appropriate experience, expertise, and certification.
- The team lead will be from outside LRD.
- The ATR review will be documented using DrChecks, and an ATR Summary Report and certification will be completed.
- The ATR team may be expanded to include the civil/structural discipline, should a physical barrier or other technically similar alternative be carried forward to the focused array of alternatives. The project delivery team will check in with the ATR

lead to confirm the final ATR review team disciplines at the time of the Focused Array of Alternatives Milestone (FAAM).

Table 2b. ATR Technical Disciplines and Expertise Required

ATR Disciplines	Expertise Required	Justification / Rationale
ATR Lead/Plan Formulation/ Ecosystem Restoration	The ATR lead should be a senior professional preferably with experience in preparing GLFER Section 506 decision documents and conducting ATR. Experience with grass carp barriers is also desired. This reviewer will be responsible for reviewing all plan formulation components of the feasibility study, including the benefits analysis that will focus on ecological outputs associated with the identified project alternatives and use CE/ICA to help identify the tentatively selected plan. The lead should also have the necessary skills and experience to lead a virtual team through the ATR process. The ATR lead may also serve as a reviewer for a specific discipline.	Coordinate all ATR activities. ATR Lead suggested based on GLFER Conneaut Sea Lamprey Barrier project.
Environmental (NEPA)	The Environmental reviewer should be experienced in analysis of impacts as required by the National Environmental Policy Act (NEPA) and other applicable laws, regulations, and executive orders.	Team member will be experienced in the NEPA process and analysis and have a biological or environmental background that is familiar with the project area and ecosystem restoration. Team member should be familiar with cultural/historic resources. Should also be familiar with models (IWR) used for assessing ecological outputs.
Climate Preparedness and Resiliency	At least one member of the ATR team for inland hydrology, designs, and projects must be certified by the Climate Preparedness and Resiliency CoP in CERCAP.	Required by ECB 2018-14; alternatives can be affected by future climate conditions; a climate analysis will be used to determine resiliency.
Hydrology and Hydraulic Engineering	The Hydrology and Hydraulic Engineering reviewer should have expertise with the following hydrologic analyses: flow frequency analysis for determination of ACE flows; flow duration analysis for fish passage criteria. The reviewer should be an expert in the field of hydraulics and have expertise with the following hydraulic analyses: HEC-RAS modeling for grass carp barrier alternatives and physical/hydraulic barrier analyses (e.g., submerged hydraulic jump, cavitation, etc.), and flood impact analysis.	Reviewer will need to be an expert in HEC-RAS modeling of flow frequency due to the complexity of the model for the construction of the grass carp barrier alternatives. Reviewer will also need expertise in physical barrier safety analysis and flood impact analysis.
Geotechnical Design Engineering	The Geotechnical Engineering reviewer should be familiar with low-head in-stream structure foundation treatment, scour and overtopping protection.	Level of review will be based on screening of alternatives. It may be possible to have the same individual perform review on both geotechnical

		and civil/structural components of this project.
Real Estate	The Real Estate reviewer should have experience in permitting processes and ownership agreements, which will require extensive coordination with the project sponsor and stakeholders.	The project requires permitting and ownership coordination with the sponsor and stakeholders that will lead to side agreements (MOA, MOU, etc.) other than the PPA. An ATR reviewer with experience in these types of side agreements will be sought out to review project.
Cost Engineering Reviewer	Cost MCX Staff or Cost MCX Pre-Certified Professional as assigned by the Walla Walla Cost Engineering Mandatory Center of Expertise with experience preparing cost estimates for GLFER projects. Must be Certification and Access Program (CERCAP) certified.	Required by ER 1165-2-217.
Disciplines not anticipated to be needed on ATR Team		
Economics	Expertise not anticipated to be needed on ATR team.	The project team will consider the four accounts (NED, RED, OSE and EQ) in the formulation of the recommended plan, but because the objective of this project is ecosystem restoration, an in-depth, separate economics ATR is not required. The ecological benefits analyses will be reviewed by the plan formulation/ecosystem restoration reviewer.
HTRW	Expertise not anticipated to be needed on ATR team.	Risks of HTRW impact to project are low. HTRW not anticipated.
Civil/Structural Engineering	Expertise not anticipated to be needed on ATR team.	There are no significant civil/structural engineering risks on this project; there is enough in-house expertise in this discipline to satisfy review requirements through DQC.

(3) Independent External Peer Review (IEPR): An IEPR is not required based on the mandatory triggers outlined in ER 1165-2-217. Project studies may be excluded IEPR if the project does not meet any of the mandatory IEPR triggers. This feasibility study does not meet any of the three mandatory IEPR triggers for the following reasons:

- The estimated total cost of the project, including mitigation costs, is not greater than \$200 million.
- The Governor of Ohio has not requested a peer review by independent experts.

- The study is not controversial due to significant public dispute over size, nature, or effects of the project or the economic or environmental costs or benefits of the project.

When none of the three mandatory triggers for IEPR are met, MSC Commanders have the discretion to conduct IEPR on a risk-informed assessment of the expected contribution of IEPR to the project. An IEPR would not provide additional benefit to the study for the following reasons:

- a. This study does not include the development or use of any novel methods.
- b. This project does not pose likely threats to health and public safety.
- c. There is no anticipated inter-agency interest.
- d. Buffalo District has not received a request from the head of any Federal or State agency for an IEPR.
- e. The proposed project is not anticipated to have unique construction sequencing or a reduced or overlapping design construction schedule.

(4) Safety Assurance Review (SAR): In accordance with ER 1165-2-217, Section 7.3, SAR is conducted on PED and construction activities for projects where potential hazards pose a significant threat to human life (public safety). Since this review plan pertains to the feasibility phase of this project, an SAR is not applicable.

(5) Policy and Legal Review: All decision documents will be reviewed for compliance with law and policy. Guidance for policy and legal compliance reviews is addressed in Appendix H, ER 1105-2-100.

- (6) Public Participation.
 - a. A public involvement program will be included to satisfy NEPA requirements and solicit public and government agency input.
 - b. The District shall contact agencies with regulatory review for coordination as required by applicable laws and procedures.
 - c. The District will review comments resulting from public and agency review, and will provide the ATR team copies of public and agency comments and responses.

3. MODEL CERTIFICATION OR APPROVAL

The following models may be used to develop the decision documents:

Table 3a. Planning Models		
Model Name and Version	Model Description and How It Will Be Used	Certification / Approval Status & Date
IWR Planning Suite Version 2.0.9	Cost Effectiveness, Incremental Cost Analysis. The Institute for Water Resources Planning Suite (IWR-PLAN) is a decision support software package that is designed to assist with the formulation and comparison of alternative plans. While IWR-PLAN was initially developed to assist with environmental restoration and watershed planning studies, the program can be useful in planning studies addressing a wide variety of problems. IWR-PLAN can assist with plan formulation by combining solutions to planning problems and calculating the additive effects of each combination, or "plan." IWR-PLAN can assist with plan comparison by conducting cost effectiveness and incremental cost analyses, identifying the plans which are the best financial investments and displaying the effects of each on a range of decision variables. The ecological habitat units calculated using the Habitat Evaluation Process will be used as inputs in IWR-PLAN to evaluate the benefits associated with each project alternative.	Certified
Qualitative Habitat Evaluation Index (QHEI) 2015	The Qualitative Habitat Evaluation Index (QHEI) is a physical habitat index designed to provide an empirical, quantified evaluation of the general lotic macrohabitat characteristics that are important to fish communities. A detailed analysis of the development and use of the QHEI is available in Rankin (1989) and Rankin (1995). The QHEI is composed of six principal metrics. The maximum possible QHEI site score is 100. Each of the metrics are scored individually and then summed to provide the total QHEI site score.	QHEI has been approved for regional use in Ohio as per the Ecosystem Restoration Planning Center Expertise Model Library

Table 3b. Engineering Models		
Model Name and Version	Model Description and How It Will Be Used	Approval Status
HEC-RAS	Hydrologic Engineering Center River Analysis System; Used to determine detailed water surface elevations and flow properties throughout the project reach and as a primary aid in alternative development.	Approved
MII	MII is the second generation of the Micro-Computer Aided Cost Estimating System (MCACES). It is a detailed cost estimating software application that was developed in conjunction with Project Time & Cost LLC. MII provides an integrated cost estimating system (software and databases) that meets the U.S. Army Corps of Engineers (USACE) requirements for preparing cost estimates.	Enterprise Model

4. **REVIEW SCHEDULE AND BUDGET.** The schedule and budgets for reviews are shown in below table.

Table 3. Product and Review Schedule				
Product(s) to undergo Review	Review Level	Start Date	Finish Date	Budget (\$)
TSP Draft Detailed Project Report and Integrated Environmental Assessment (DPR & EA)	District Quality Control	AUG 2024	OCT 2024	
TSP Draft DPR & EA	Agency Technical Review	OCT 2024	JAN 2025	
TSP Draft DPR & EA	LRD Policy and Legal Review (TSP)	AUG 2024	OCT 2024	
TSP Draft DPR & EA	Public and Agency Review	NOV 2024	DEC 2024	
Final DPR & EA	District Quality Control	FEB 2025	APR 2025	
Final DPR & EA	Agency Technical Review	MAR 2025	JUN 2025	
Final DPR & EA	LRD Policy and Legal Review	MAR 2025	APR 2025	
*Scheduled Dates will be updated with Actual Dates as the project progresses				

ATTACHMENT 1 – Contacts

Function	Name (Last, First)	Phone	Office
RMO Contact			CELRD-PDS-P
MSC Contact – District Support Program Manager			CELRB-PDS

PROJECT DELIVERY TEAM			
Function/Discipline	Name (Last, First)	Phone	Office Org Code
Project Manager (Lead)			CELRB-PMP-M
Planner			CELRB-PML-P
Biologist & Cult. Resources			CELRB-PML-E
Geotechnical Engineer			CELRB-TDD-C
Cost Engineer			CELRB-TDD-T
Civil/Structural Engineer			CELRB-TDD-S
Hydraulic Engineer			CELRB-TDDH-D
Real Estate			CELRB-RE-P
Program Analyst			CELRB-PMP-O
Legal Counsel			CELRB-OC
Project Management Specialist			CELRB-PMP-O

DISTRICT QUALITY CONTROL (DQC) TEAM			
Function/Discipline	Name (Last, First)	Phone	Office
DQC Lead, P3M Program Advocate			CELRB-PML
Design Branch Chief, TSD Program Advocate			CELRB-TDD
Plan Formulation/Climate Preparedness and Resiliency			CELRB-PML-P
Env. Analysis & Cult. Resources			CELRB-PML-E
Civil/Structural Engineer			CELRB-TDD-S
Geotechnical/Coastal Engineer			CELRB-TDD-C
Project Management			CELRB-PMP-O
Cost Engineer			CELRB-TDD-T
Real Estate			CELRB-RE
External Technical Lead/Expert			CELRB-PDL-E

AGENCY TECHNICAL REVIEW (ATR) TEAM*			
Function/Discipline	Name (Last, First)	Phone	Office
ATR Lead			CENAE-PDE
Planning Reviewer			
Geotechnical Design Reviewer			
Environmental Reviewer			
Hydrology and Hydraulic Engineering/Climate Reviewer			
Cost Engineering Reviewer			
Real Estate Reviewer			
District will coordinate with LRD and appropriate PCX to determine the ATR Lead and composition of the ATR Team.			

MSC / HQ Policy and Legal Compliance Review Team			
Function/Discipline	Name (Last, First)	Phone	Office
Review Manager			CELRD-PDS
Planning Reviewer			CELRD-PDP
Environmental Reviewer			CELRD-PDP
RIDM Reviewer			CELRD-PDP
Economics Reviewer			CELRD-PDP
Technical Design Reviewer			CELRD-RBT
Hydrology and Hydraulic Engineering/Climate Reviewer			CELRD-RB-W
Office of Counsel			CECC-LRD