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Work Unit Description AD-416
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1. Accession No.	Agency Identifiers		5. Work Unit/Project No.	6. Status
	2. NIFA	3. LA.B	LAB94173	A = New Project

7. Title
Environmental Effects on the Structure and Abundance of Invertebrate and Fish Assemblages in Louisiana's Freshwater Habitats

8. Performing Organization 1001 - 2010
School of Renewable Natural Resources
Agricultural Experiment Sta, Louisiana State Univ

9. Cooperating Departments within State Performing Institution
a. Experimental Statistics

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10. Multistate Project No.

11. Cooperating States

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14. Project Type	15. Contract/Grant/Agreement No.	16. Amount	17. FY
Hatch			

18. Award Date (Month/Day/Year)	19. Start Date (Month/Day/Year)	20. Termination Date (Month/Day/Year)
	10/01/2012	09/30/2016

Goals/Objectives/Expected Outputs

The objectives of this project are two-fold, first to determine the effects of structural complexity, water quality, and biotic interactions on the abundance of freshwater fish and invertebrate populations in Louisiana's lotic and lentic habitats, and then to use this information in the development of quantitative metrics of fish and invertebrate assemblage structure that can be used to assess the function and health of Louisiana's freshwater ecosystems. The initial project will focus on analyses of the fish assemblages and habitat characteristics of Mississippi River floodplain ponds, with the end goal of describing fish/habitat associations that can be used as restoration project endpoints and assessment criteria for project evaluation. Outputs will include extensive datasets on fish assemblage composition, water quality, and habitat characteristics of floodplain ponds differing in size, depth, location, and proximity to the Mississippi River, reports to the U.S. Fish and Wildlife Service documenting progress and results of field data collections, and completion of a M.S. student working on the project.

Methods

The proposed research will concentrate on assessment of zooplankton, macroinvertebrate, and fish community structure and the physicochemical characteristics of lentic and lotic habitats in Louisiana. Sampling design will depend on the physical characteristics of the sample site and the study objectives, but all studies will require quantitative determination of the taxonomic composition of the organisms of interest, as well as the physical, biotic, and water quality characteristics of the associated aquatic system, and the land-use characteristics of the watershed(s) being studied. Depending on project objectives, there may be numerous additional sampling considerations related to diel, seasonal, watershed, and inter-habitat variability that would affect the sampling design. Zooplankton will be collected with towed nets in open water, and tube samplers or invertebrate traps in vegetated and littoral habitats. After identification and enumeration, densities will be recorded on computerized spreadsheets for analyses. Macroinvertebrates will collected with gear such as Ekman dredges, Hess samplers, and Surber samplers, and woody will be collected in mesh bags to estimate densities of xylophilic taxa. All individuals will be identified to the lowest practical taxon and enumerated, with densities recorded in computerized spreadsheets. Fishes will be collected with backpack, barge, and/or boat electrofishing units, and will then be identified to species, enumerated, and returned live to the study reach after sampling is completed. Measurements of habitat and water quality will include river stage and in situ physicochemistry (pH, dissolved oxygen, conductivity, temperature, and turbidity). Water samples may also be collected periodically for determination of nutrient concentrations, chlorophyll a, and biochemical oxygen demand. Habitat measurements

will include depth, flow velocity, macrophyte cover, and woody debris abundance. For the proposed studies, ordination techniques such as principal component analyses (PCA) will often be used discern patterns in the data sets, which are typically comprised of abundance estimates for numerous species, as well as the associated physicochemical variables recorded at the sampling locations. Results of these analyses produce orthogonal components, and sampling location scores on each component can be used as independent variables in other types of analyses (e.g., ANOVA, MANOVA, logistic regression) to examine relationships between environmental/habitat characteristics and community abundance and distribution patterns. Other approaches include canonical correlation analysis and logistic regression. Results of these studies will be presented to stakeholders at regional and national technical meetings, as well as cooperators in the U.S. Fish and Wildlife Service (USFWS) to aid their floodplain restoration efforts. Successful implementation of the results in project goal identification and subsequent assessment of project success by the USFWS and cooperating agencies will be used to evaluate the success of these efforts.

23. Non-Technical Summary

The floodplain of the lower Mississippi River (LMR) has been subject to numerous modifications over the last century, including numerous channel training and bank armoring projects, closure of distributaries, and pervasive constriction of off-channel habitats by a virtually continuous levee system on both sides of the river. The extant floodplain does contain numerous ponds and lakes, some natural and some excavated during river management activities, that harbor a diversity of freshwater fishes and provide habitats of varying quality based on differences in depth, size, distance from the river, woody debris abundance, and water quality. Understanding the characteristics of floodplain habitats that provide suitable conditions for preferred fishes, such as sunfishes and bass or species of concern such as alligator gar, will allow restoration efforts to target specific habitat types for specific restoration goals. We will collect data on fish assemblage composition, water quality, and habitat characteristics from numerous floodplain ponds in the lower Mississippi River floodplain, and will analyze the relationships between the fish assemblages and the physicochemical characteristics of their habitat to both identify restoration priorities and provide data for assessment of the success of restoration activities. The proposed research will therefore result in a substantial increase in the knowledge base concerning the structure and function of the LMR ecosystem, and will also influence the activities of management agencies responsible for management and restoration of these unique habitats.

24. Keywords

Aquatic ecology; Fishes; Aquatic habitat; Mississippi River; Floodplain; Restoration;

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Signature	Title	Date
Dept: Admin:	*Associate Director*	