**PROJECT TITLE: Understanding bird-habitat associations on conservation lands across the Upper Mississippi River**

**I. PROJECT STATEMENT**

This project is designed to determine habitat associations of breeding bottomland forest birds in relation to forest condition and evaluate their response to habitat restoration actions. This understanding will allow manager and practitioners to target restoration actions to specific habitat conditions or bird species. In the past, Audubon has collaborated with the Minnesota DNR (MDNR), US Fish and Wildlife Service (USFWS), and the U.S. Army Corps of Engineers (USACE) to restore the quality of bottomland forest habitat along the Upper Mississippi River. These forests are under numerous threats, including habitat loss, invasive species, and altered flood cycles. Currently, much of the forest now consists of stands dominated by single species. These trees are expected to live another 50-70 years, after which they will die-off and disappear. Unfortunately, when trees are no longer there, reed canary grass and other invasive species move in and prevent natural regeneration.

In partnership with MDNR and USFWS several restoration sites have been implemented in Winona, Houston and Wabasha counties; and currently Audubon is leveraging Outdoors Heritage funds to implement more restoration. These efforts have been followed by the identification of the best restoration strategies to control invasive Reed Canary grass and establish early-successional forest. These management recommendations are improving our understanding of best practices for controlling promoting forest diversity. However, a better understanding of restoration impacts on wildlife communities is needed.

We propose to use techniques developed by Audubon and USACE at the Audubon Center in Riverlands, to evaluate the abundance, and habitat use of avian communities in bottomland forest. Improved understanding of these bird-habitat associations will allow managers to implement adaptive management and continue more effective conservation along the river. Subsequently these restoration and research efforts will contribute to the Bottomland Forest Avian Stewardship Plan developed by the USACE and Audubon. Restoration efforts often target plant communities, with the implementation of these techniques we have to objective of creating a directly link between land management and the response of wildlife communities. As we develop more understanding of human-wildlife-habitats relationships we will be able to better target conservation efforts along the Mississippi river.

**II. PROJECT ACTIVITIES AND OUTCOMES**

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| **Activity 1 Title:** Determine baseline understanding of bottomland forest bird-habitat relationships along the Upper Mississippi River in Minnesota**Description:**We will conduct surveys within bottomland forest at the Reno Bottoms area of Pool 9 near Reno Minnesota within the Upper Mississippi River National Wildlife Refuge. Surveys will be co-located with USACE forest inventory plots previously conducted at this site. Surveys will consist of a point count with two forms of auxiliary data (distance and time of detection) enabling correction for imperfect detection (Knutson et al. 2016). Survey locations will be spaced a minimum of 400 meters apart, and associated with forest inventory plots on and surrounding the survey point. We will model bird-habitat relationships, using both forms of auxiliary data to estimate densities of focal species and detection-corrected counts with habitat variables drawn from forest inventory surveys. This analysis will be used to understand relationships of multiple vegetation variables. These models will be extrapolated to forest inventory sites across Pool 9 to predict species occurrence and abundance given site conditions and management strategies. **ENRTF BUDGET: $**

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| **Outcome** | **Completion Date** |
| *1. Completion of point count surveys* | *September 2022* |
| *2. Analysis of baseline bottomland forest species-specific bird-habitat relationships* | *January 2023* |
| *3. Evaluation of species-specific bird response to implemented restoration efforts* | *January 2023* |
| *4. Scenario modeling predicting bird response to future restoration efforts* | *January 2023* |

 **Activity 2 Title:** Determine response of bottomland forest birds to habitat restoration**Description:**We will follow a Before After analysis, implementing bird surveys following the Knutson et al. (2016) protocol at restoration and control sites both before and after restoration. Bird-habitat relationships will be modeled as described in Activity 1, with the addition of two predictors: year and management strategy. This design enables managers to evaluate species-specific response to restoration action, and can be used in scenario modeling to predict bird response to management. **ENRTF BUDGET: $295,336** |  |

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| **Outcome** | **Completion Date** |
| *1. Completion of all survey bird points bird.* | *July 2022* |
| *2. Analysis of habitat used data.* | *January 2023* |
| *3. Evaluation of species-specific bird response to implemented restoration efforts* | *January 2023* |
| *4. Scenario modeling predicting bird response to future restoration efforts* | *January 2023* |

**III. PROJECT PARTNERS AND COLLABORATORS:**

United States Army Corps of Engineers

United States Fish and Wildlife Service

Minnesota Department of Natural Resources

**IV. LONG-TERM IMPLEMENTATION AND FUNDING:**

The aim of this project is to inform bird habitat conservation efforts across the Upper Mississippi River region and significantly increase the understanding of the impact that the different bottomland forest management strategies have on promoting wildlife habitat. The project team will be able to increase the impact that Outdoor Heritage and other funds have already had along these important forest habitats. Audubon and other partners are committed to improve the restoration and bird conservation efforts along the Mississippi River and tributaries, and this work will help to understand what conservation practices are more effective to promote wildlife habitat. The outcomes of this project will help to guide the investment of funds on the restoration and management of bottomland forest along the upper Mississippi River.