Cost-Share Proposal Form for NorthWestern Energy (NWE) Project 2188 TAC Funds

Project Title: Establishing and maintaining nest box colonies to enhance secondary cavity nesting species' breeding habitat in the Upper Missouri River

Date: 20241113

Explain how this Project addresses a specific Project 2188 License Article(s):

This project addresses Project 2188 License Article 423 (Wildlife Habitat Monitoring and Enhancement Plan) by supplementing natural tree cavities with artificial nest boxes to increase secondary cavity nesting avian species density and reproductive success. Specifically, this project will enhance riparian bird habitat and provide a systematic sampling methodology for long-term monitoring of secondary cavity nesting species by establishing and maintaining a network of nest box colonies in lentic and lotic riparian habitats throughout the Missouri River. The establishment and maintenance of these nest box colonies will facilitate future assessments of potential change in secondary cavity nesting bird species demographics associated with habitat and environmental parameters.

Provide justification for Priority 1, 2 or 3 (above) that you selected:

This proposed research addresses criteria for a Priority 2 2188 License Project based upon the study area being within the Missouri River (Hauser Reservoir to Fort Peck Reservoir). During 2023-2024, the study area was focused on Hauser Reservoir to the tailwaters below Holter Reservoir. However, for 2025-2026, the proposed study area will extend from Hauser Reservoir to below Black Eagle Dam in Great Falls.

Project Sponsor (submitted by):

University of Montana

Location of Proposed Project:

The study area for 2023-2024 included approximately 75 km of lentic and lotic waterways, extending from Hauser Reservoir to the tailwaters of the Missouri River below Holter Reservoir (Fig. 1A). Additional next box colonies (10-20 boxes at 1-2 sites) are proposed for 2024-2025, approximately 100 km downriver of Holter Reservoir, below Black Eagle Dam (Fig. 1B).

Narrative

Geocode (in decimal degrees ex 46.89743):
Proposed Study Area: Lat: 46.739143 – 47.022951 Long: -111.880714 – -112.003585

Total Project Cost: $64,718

TAC Funds (Cost-Share) Requested for Project: $42,718

I. Introduction; brief statement of project to be completed with pertinent background information.

Over the past 75 years, construction of dams and reservoirs on the Missouri River has resulted in significant changes to riparian ecosystems (*e.g.,* shifts in flow, geomorphic processes, and species diversity/richness), resulting in alterations to the floodplain above dams and landscape level effects in the tailwaters below (Poff et al. 2007). Infrastructure for bank stabilization and flood control have caused reduced connectivity of the river to the floodplain, and permitted land use changes in riparian habitat towards agriculture and residential/commercial development (reviewed in Dixon et al. 2012).

The riparian forests surrounding the Missouri River are primarily composed of hydric, pioneer species, including cottonwoods (*Populus spp.*) and willows (*Salix spp.*) (Kudray et al. 2004). The health of these species and the surrounding riparian habitat is dependent on flooding that promotes soil moisture, transport of nutrients and sediments, dispersal of seeds, and establishment of sediment banks/islands (NRC 2002). The majority of cottonwood stands in the Missouri River are > 50 years old (67%), with a limited number of stands < 25 years old (10%), which suggests that there are significant challenges post-dam installation to maintaining the complex dynamics of this riparian ecosystem (Dixon et al. 2012). In cottonwood-dominated habitats, approximately 30 – 40% of the breeding avian species are cavity nesting birds (Sedgwick and Knopf 1986), and the reduction in recruitment of cottonwood stands along the Missouri River poses a major threat to cavity nesting bird populations in this region. From 2004 – 2021, there was a significant decline in both cottonwood density (1.27 – 2.50% per year) and riparian dependent bird species (0.59% per year) along the Missouri River (Noson et al. 2021). Cavity nesting species had high rates of decline (*e.g.,* red-naped sapsucker, *Sphyrapicus nuchalis*; 0.71% per year), and secondary cavity nesting species, which are those that rely on pre-existing holes for breeding, had some of the highest decreases among all avian species observed (*e.g.,* tree swallow, *Tachycineta bicolor*; 2.03% per year) (Noson et al. 2021). European starlings (*Sturnus vulgaris*), which are a non-native species that outcompetes secondary cavity nesters, were observed to have increasing density trends (1.47% per year), suggesting an additional stressor to native species along the Missouri River (Noson et al. 2021).

The reduction in avian densities observed along the Missouri River are also being identified throughout North America with up to 40% declines in cavity nesting populations as a result of cumulative anthropogenic stressors, including contaminants, decreased prey quality/quantity, disease, habitat loss/modification at breeding and wintering grounds, and phenological alterations due to warming climate (reviewed in Cockle et al. 2011, Shutler et al. 2012, Spiller and Dettmers 2019). Secondary cavity nesting species are at an increased risk as these species are heavily reliant on excavators to establish pre-existing holes for nesting and are also outcompeted for breeding habitat by non-native species. The provisioning of artificial cavities (*i.e.,* nest boxes) in habitats with low densities of old growth trees and excavating avian species has been a valuable methodology to increase population sizes of secondary cavity nesting species (Aitken and Martin 2012, Dale et al. 2021). For example, in a managed cottonwood forest in Mississippi, the supplementation of natural cavities with nest boxes resulted in a 35% increase in secondary cavity nesting species density (Twedt and Henne-Kerr 2001). In addition, studies have identified that nest boxes may be more optimal breeding habitat than natural cavities. Norris et al., (2018) determined that tree swallow populations in British Columbia, Canada had 40% larger clutch sizes and two times higher fledgling success in nest boxes than tree cavities. A literature review of 46 nest box provision studies across various habitat types also identified that in 96% of these studies breeding density of at least one cavity nesting species increased and overall density across studies ranged from a two- to twenty-fold increase (Newton 2007).

Since the inception of this project in 2023, we have installed and maintained a total of 100 nest boxes across 10 colonies from Hauser Reservoir to below Holter Dam. We have monitored tree swallows and other cavity-nesting species during the breeding season and documented nesting attempts, clutch size, hatching success, fledging success, and occupancy rate, at all colonies. The documented decline of avian populations along the Missouri River can be attenuated by the installation and use of these boxes by secondary cavity-nesting species. Occupancy of boxes at these established colonies has generally been very high (>75%), suggesting the importance of artificial nest habitat for species experiencing limited potential nesting sites, as well as high competition, in riparian habitats.

II. Objectives; explicit statement(s) of what is intended to be accomplished.

The long-term monitoring of breeding birds and habitat in the Missouri River (Noson et al. 2021) has provided a framework for assessing fine-scale trends in avian populations and riparian habitat conditions. The results of this ongoing, comprehensive study suggest that additional management actions would be of value to improve habitat for avian species of concern that are experiencing significant decreases in density within this region. The supplementation of natural cavities with artificial nest boxes has been an effective methodology across a wide range of habitat types to augment reproduction for secondary cavity nesting species. In addition, the establishment of nest box colonies permits reliable data collection, at geographic sites of interest, to address specific management needs.

The objectives of the proposed study are to:

1) Enhance secondary cavity nesting species breeding habitat by establishing and maintaining nest box colonies in lentic (reservoirs) and lotic (tailwaters) riparian habitats along the Missouri River.

2) Collect ongoing demographic data (*e.g.,* nest box occupancy, clutch size, and hatching success) to assess the effectiveness of supplementing natural cavities with artificial nest boxes for secondary cavity nesting species.

III. Methods; description of how Project objectives will be accomplished.

Nest box installation

In addition to the existing 100 nest boxes (2023-2024), across 10 sites from Hauser Reservoir to the tailwaters below Holter Dam (Fig. 1A), 10-20 new nest boxes will be installed at 1-2 sites below Black Eagle Dam (Fig. 1B). This section of the Missouri River is an area with more urbanized land-use around the city of Great Falls. Installation of nest boxes here will continue to enhance secondary cavity nesting species habitat and provide demographic comparisons to other Missouri River nest box sites that are upriver in more rural land-use classifications.

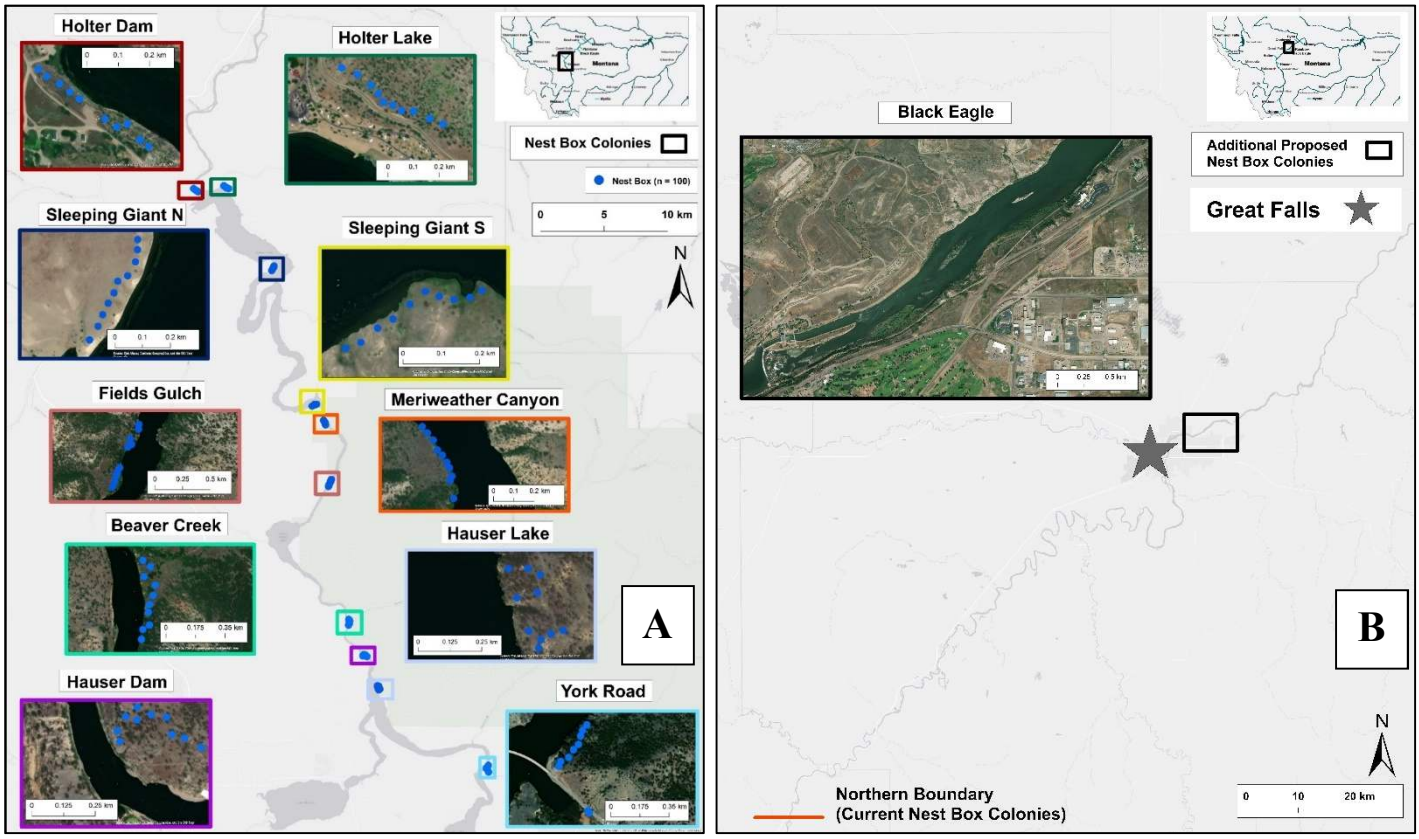

Figure 1. (A) Current study area and nest box colonies (n = 10 colonies, n = 100 nest boxes) extending from Hauser Reservoir to the tailwaters of the Missouri River below Holter Dam. (B) Additional proposed extension of study area to include Missouri River waters below Black Eagle Dam, Great Falls, Montana (n = 1-2 colonies, n = 10-20 nest boxes).

Nest box maintenance

Each year in the spring, technicians and project leads will visit nest boxes to ensure boxes are upright and in good condition. Boxes damaged by weather, wild animals, or humans will be repaired or replaced. Tree swallows are one of the first migratory, secondary cavity-nesting species to arrive in the spring, so we will plan to remove nesting materials from the previous year's attempts in late March/early April in anticipation of returning birds.

Nest box monitoring

Nest boxes will be monitored throughout the breeding season (April to August) approximately weekly and up to three times per week to identify species using boxes and assess total number of nests occupied (occupancy rate), clutch initiation date, clutch size, hatching success, and nest fate (fledge or fail). Nestling birds will also be banded with USGS-issued aluminum bands, processed and measured using standard MAPS (Monitoring Avian Productivity and

Survivorship) practices, and returned safely to nest boxes (Fig. 2). We will also band and process adult female birds in the case they remain on the nest during nest checks. Adult males are unlikely to be captured as they spend less time on the nest and more time outside the cavity defending the territory. The practice of 'banding' marks birds with a unique 9-digit number band so that survival and re-encounter with individuals can be tracked, both on the breeding grounds and anywhere else along the migratory path where they may be captured by other researchers. In future years, we will focus on a high-resolution assessment of long-term demographics among nest box colonies across spatial and temporal scales.

Figure 2. An approximately 13-day old Tree Swallow nestling.

Tissue Sampling

As matching support from other funders for this project are available, we are also interested in collecting tissue samples (egg, blood, feather, feces) from nestling birds to assess secondary cavity nesting species' diet and health. Similar work is being conducted in other watersheds (*e.g.,* Clark Fork, Bitterroot, and Kootenai River Basins) so the data collected from the Missouri River Basin will enhance our understanding of population status of secondary cavity nesting species throughout Montana and potentially overall riparian ecosystem health.

IV. Schedule; when the Project work will begin and end.

The timeline for this proposed study will include nest box installation and subsequent monitoring to collect initial (Black Eagle Dam) and ongoing (Hauser Reservoir to below Holter Dam) data on species use, occupancy, clutch initiation date, clutch size, hatching success, site fidelity, and survival. During April, tree swallows arrive on breeding habitats in Montana from their wintering grounds in the southern U.S., Mexico, Caribbean, and Central America (Winkler et al. 2020, eBird 2023). Males arrive on site earlier than females to defend territories, with subsequent nest construction in May, and egg laying between May and June (Winkler et al. 2020). Mean incubation period is 13 – 14 days (Stocek 1970), and nestlings depart nests between 18 and 22 days old (Burtt 1977). Comprehensive data collection will occur (*i.e.,* species use, occupancy rates, clutch initiation date, clutch size, hatching success, and banding) across all current and proposed nest box colonies.

The specific schedule for the proposed project includes nest box installation and maintenance during March/April with subsequent monitoring (1-3x per week) of nest boxes from April through August (Fig. 3). Upon the completion of field work, yearly technical reports will be prepared to summarize the project findings. Data analyses, manuscript preparations and permit reporting will take place during the winter season.

	Year 1 (2025)				Year 2 (2026)			
Task Description	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Nest box installation/maintenance	■	■			■	■		
Nest monitoring & data collection		■	■			■	■	
Data analyses, manuscript preparations, report writing & presentation to WildTAC			■	■			■	■
Maintain permits & permit reporting	■			■	■			■

Figure 3. Projected timeline for proposed field work during 2025 - 2026 in the Missouri River study area.

V. Personnel; who will do the work? Identify Project leader or principal investigator.

This project will be a collaboration between the University of Montana Bird Ecology Lab (UMBEL) and the U.S. Fish and Wildlife Service (USFWS). Megan Fylling (UMBEL) will be the Principal Investigator, Anna Noson (UMBEL) will be co-principal investigator, and Dr. Brian Balmer (USFWS) will be an additional investigator. Brian Balmer, who is based near the proposed study area in Helena, will be the point-of-contact for field logistics. Megan will manage the overall project, including budget, permitting, and technical support for the study. Anna will provide site-specific expertise on riparian bird monitoring. All investigators will be involved with the core components of the field work, data collection/analyses, and report preparations.

VI. Project budget

2025	TAC Funds Requested	In-kind Contributions	Total Project Cost
Direct Labor	$8,491	$5,000	$13,491
Travel and Living	$9,082	$0	$9,082
Equipment	$0	$6,000	$6,000
Materials and Supplies	$1,000	$0	$1,000
Direct Overhead (15%)	$2,786	$0	$2,786
Total	$21,359	$11,000	$32,359

2026	TAC Funds Requested	In-kind Contributions	Total Project Cost
Direct Labor	$8,491	$5,000	$13,491
Travel and Living	$9,082	$0	$9,082
Equipment	$0	$6,000	$6,000
Materials and Supplies	$1,000	$0	$1,000
Direct Overhead (15%)	$2,786	$0	$2,786
Total	$21,359	$11,000	$32,359
Total (2025-2026)	**$42,718**	**$22,000**	**$64,718**

Cost-share sources and amounts, including estimation of "in-kind" contributions:

2025

-Brian Balmer will provide in-kind support for three weeks of salary ($5,000) for his time with project design and implementation, data collection, and dissemination of results into presentations and reports. FWS vessel use at a rate of $600/day for 10 days ($6,000) will also be provided in-kind.

2026

-Brian Balmer will provide in-kind support for three weeks of salary ($5,000) for his time with project design and implementation, data collection, and dissemination of results into presentations and reports. FWS vessel use at a rate of $600/day for 10 days ($6,000) will also be provided in-kind.

VII. Deliverables; describe work product (reports, habitat restoration, etc.) which will result from this Project. How will "success" for this project be monitored or demonstrated?

The results of this project will be disseminated into a Final Technical Report at the end of the two-year contract that will include:

1) Summary of installed nest box colony locations.
2) Preliminary and ongoing data on species use, occupancy, clutch initiation date, clutch size, hatching success, site fidelity and survival.

In addition, the data collected in this study will be incorporated into peer-reviewed manuscript(s) to ensure that the results are accessible to the broader scientific community.

The criteria for this project's success will include the establishment of the new nest box colonies (Black Eagle Dam) and ongoing long-term monitoring at existing colonies in which secondary cavity nesting species have already established breeding residency. In addition, this dataset will be critical in assessing the effectiveness of supplementing natural cavities with artificial nest boxes to increase secondary cavity nesting species density in dam-mitigated systems.

VIII. Cultural Resources. Cultural Resource Management (CRM) requirements for any activity related to this Project must be completed and documented to NWE as a condition of any TAC grant. TAC funds may not be used for any land-disturbing activity, or the modification, renovation, or removal of any buildings or structures until the CRM consultation process has been completed. Agency applicants must submit a copy of the proposed project to a designated Cultural Resource Specialist for their agency. Private parties or non-governmental organizations are encouraged to submit a copy of their proposed project to a CRM consultant they may have employed. Private parties and non-governmental organizations may also contact the NWE representative for further information or assistance. Applications submitted without this section completed, will be held by the TAC, without any action, until the information has been submitted.

Summarize here how you will complete requirements for Cultural Resource Management:

No land-disturbing activity or modification, renovation, or removal of any buildings or structures are part of the proposed project.

IX. Water Rights. For projects that involve development, restoration or enhancement of wetlands, please describe how the project will comply with the Montana DNRC's "Guidance for Landowners and Practitioners Engaged in Stream and Wetland Restoration Activities", issued by the Water Resources Division on 9 March 2016.

Summarize here how you will comply with Montana water rights laws, policies and guidelines:

Although artificial nest boxes enhance riparian habitats for avian species, these structures do not appear to be specific techniques discussed in the "Wetland Enhancement" guidelines by Montana DNRC (*i.e.,* excavations, diversion, impoundments, removal of drains, and wetland vegetation planting, seeding, and establishment). Thus, this section is not applicable to the proposed project.

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