2024 Proposal Form for NorthWestern Energy (NWE) Project 2188 TAC Funds

Project 2188 (Madison-Missouri River) License Protection, Mitigation and Enhancement (PM&E) projects are required to offset impacts to river resources from the continued operation of one or more of NWE's nine hydro developments (Hebgen, Madison, Hauser, Holter, Black Eagle, Rainbow, Cochrane, Ryan and Morony Dams). PM&E projects need to be prioritized toward in-river or on-the-ground measures that directly benefit fisheries and/or wildlife populations and their habitats:

Priority 1: 2188 License projects which meet License Article requirements and PM&E for fisheries or wildlife populations or their habitats within the main stem Madison River (Hebgen Reservoir to Three Forks) or Missouri River (Hauser Reservoir to Fort Peck Reservoir)

Priority 2: 2188 License projects which meet License Article requirements and PM&E for fisheries or wildlife populations or their habitats in primary tributaries or on adjacent lands and, in doing so, provide PM&E for Madison River (Hebgen Reservoir to Three Forks) or Missouri River (Hauser Reservoir to Fort Peck Reservoir) resources.

Priority 3: 2188 License PM&E projects which meet License Article requirements by providing scientific or other tangible PM&E benefits to Madison-Missouri River fisheries or wildlife populations or their habitats. These projects must be located in the greater Missouri River drainage upstream from Fort Peck Reservoir, but not necessarily located on the main stem Madison River or Missouri River or their adjacent lands or primary tributaries.

All TAC project proposals must include the following information:

Project Title: Effects of snag and release on survival and reproductive success of paddlefish in the upper Missouri River, Montana

Date: November 12, 2024

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

Article 417: 1) Protect and provide for the recovery of Threatened and Endangered species and other species of special concern in the Missouri River downstream of Morony Dam. 2) Monitor the relative abundance of the most common fish species in the Missouri River downstream of Morony Dam. 3) Provide assistance to FWP for ongoing evaluation of pallid sturgeon recovery in the Missouri River downstream of Morony Dam.

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

This project will collect information that will be used to refine and enhance the sustainable management of a species of special concern (paddlefish) in the Missouri River (Priority 1).

Project Sponsor (submitted by): Steve Dalbey, Fisheries Manager, MFWP and Cody Nagel, Fisheries Biologist MFWP

Location of Proposed Project:
Narrative; Missouri River from Morony Dam to Fort Peck Reservoir with the study focus area centered around Fred Robinson Bridge.

Geocode (in decimal degrees ex 46.89743)

Site: Woodhawk bottom	Lat: 47.74204	Lon: -108.94793
Site: Fred Robinson Bridge	Lat: 47.63075	Lon: -108.68495
Site: Fort Peck Headwaters	Lat: 47.57624	Lon: -108.36343

Total Project Cost: $348,047

Cost share

- $124,799 by FWP (2023 and 2024) see attached spreadsheet

TAC Funds Requested for Project**: $223,248**

I. Introduction and Need

Paddlefish (*Polyodon spathula)* are native to the Missouri River in Montana and classified as a species of special concern. Although populations remain stable, populations are intensively managed to ensure that recreational harvest is sustainable. Population monitoring has been ongoing since the 1990s and the data collected is used to generate population estimates, age structure of the spawning stock, age and sex distribution of harvest, angler catch rates, harvest details, fish movement, habitat use, spawning, and recruitment dynamics. Exploitation rates for this population have been shown to be low (Glassic et al. 2020); however, the snag and release component of this fishery continues to grow in popularity. Studies indicate that mortality associated with the snag and release event is low under relatively controlled field conditions (Scarnecchia and Stewart 1997). However, due to growing interest in snag and release and the relative uncontrolled nature of this activity in the upper Missouri River system, additional investigation is necessary to address the question of mortality associated with snag and release. As the popularity of the fishery increases the use of boats increases. Thus, a subcomponent of this study will be to quantify incidence and mortality associated with boat propeller strikes on paddlefish. Results will be used to guide paddlefish management and provide important information relative to regulation and or season structure changes. Additionally, information collected will be used to educate anglers on proper handling and care of paddlefish to minimize mortality on snagged and released paddlefish.

Background

In 2016, FWP adopted new regulations implementing a lottery draw for harvest tags on the Fort Peck population, which is capped at 1,000. Anglers that are unsuccessful in drawing a harvest tag automatically are issued a snag and release license. Anglers also have the option to purchase an over-the-counter snag and release license during the season. Excluding 2020 data (COVID pandemic related restrictions were instituted), average annual license sales have increased by 59% (~3,000 licenses) since 2016. The estimated total number of paddlefish being caught annually has also increased by 42% on average with the majority (86%) being released. Since 2016, the average annual number of paddlefish snagged and released by anglers is 2,437.

The Fort Peck and Yellowstone-Sakakawea populations are managed under an Interstate Plan designed to provide a stable recreational fishery while maintaining a self-sustaining population size and historical age structure of the spawning stock. Regulations on the upper Missouri River allow anglers to snag and release paddlefish during the entire 46-day season and harvest tag holders to high-grade if they chose (no mandatory retention). Because of season structure differences between the Yellowstone-Sakakawea and the Fort Peck stock, a higher percentage of paddlefish are snagged and released in the Fort Peck fishery.

As of 2021, the population estimate of sexually mature adults in the Fort Peck population is 18,000 paddlefish (95% CI 12,000 – 20,000). Based on recruitment models for this population, a three-year running average for total annual mortality should not exceed 10% (Glassic et al. 2020). This includes mortality from a variety of sources including harvest, snag and release, and prop strikes. Currently, MFWP maintains highly accurate direct angler harvest numbers but lacks data on other potential sources of mortality including snag and release and prop strike. Paddlefish are highly susceptible to being struck by propellers from fast-moving motorboats (Rosen and Hales 1980). In addition, there is no information on the effects of snag and release on disrupting reproduction. That is, does a female that is snagged and released abandon a spawning attempt. Thus, snag and release could influence realized spawning stock biomass and recruitment potential for the upper Missouri River paddlefish population. Increasing interest in the Fort Peck fishery combined with increased use of boats to access this fishery elevate concerns over the cumulative effects snag and release mortality and prop strikes have on the population. Since 2016, postseason phone creels implemented by FWP indicate approximately 41% of all paddlefish anglers use a boat on the upper Missouri River to access snagging locations, in some years this number has exceeded 50%.

For effective long-term management of the Fort Peck paddlefish population, data on snag and release and prop strike related mortality is crucial to estimate total annual mortality more accurately. Recent trends show an increase in angling interest to this fishery and an increase in the number of paddlefish being snagged, handled, and released. It is important to obtain accurate estimates on mortality because long-lived, late maturing species such as paddlefish are easily overharvested at low levels of exploitation (e.g., $\geq$15%). The data obtained from this study will refine paddlefish mortality estimates by partitioning total mortality into natural mortality and mortality from snag and release, which will refine mortality estimates, and guide paddlefish regulations and season structure to ensure this fishery is sustainable for future generations. Furthermore, this research will begin to quantify the effects of boat strikes on paddlefish. Finally, we will describe the indirect effects of snag and release on reproductive success, which has potential ramifications for recruitment failure. We are unaware of any studies on paddlefish that have evaluated the effects of snag and release on reproductive success.

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

1. Determine short-term (30-days) and extended-term (3-months) paddlefish snag and release mortality rates for the upper Missouri River paddlefish population (Fort Peck stock).
2. Estimate the effects of snag and release on paddlefish reproduction.
3. Determine mortality rates of paddlefish that are injured from boat propeller strikes.
    a. Document boat use on the upper Missouri River during the paddlefish season and when paddlefish may be vulnerable to propeller strikes.

b. Document percentage of jet and propeller motor use of the river.
c. Work with postseason phone creel questionnaire to address propeller boat use.

4. Update survival and abundance models from Glassic et al. (2020) including results on mortality from snag-and-release and prop strikes from this study.

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

1. Data collection, tagging (30 individuals), and tracking will occur during the 2024 and 2026 paddlefish seasons (1 May – 15 June) and for a period of up to three months post capture. Tagging of angler snagged paddlefish (biologists and technicians will snag paddlefish in order to control the angling treatment) and released fish will occur throughout the paddlefish season to capture various stages of reproductive readiness of female paddlefish. We will conduct a pilot study in 2024 using 17 tags that remain from 2023. The pilot study will focus on the movement and ability to recapture female paddlefish that were snagged and released.
    a. Snag, attach an external radio tag and release up to 30 paddlefish in 2025 and 2026. Attempt to tag 10 male and 20 female fish, each year. (In 2024 [pilot study], tag 10 female fish that were snagged and released).
    b. In 2024 [pilot study], attach external tags to seven paddlefish caught during annual population monitoring (drift netting). These fish will be used as "controls" to determine if their behaviors (movements and fate) are different from paddlefish captured by snagging.
    c. Variables documented with each snag and release event will include; water temperature, snag location on fish, tissue status at hook location, bleeding observed, time played, hook removal time, handling details, landing location (e.g., steep bank, gravel), and disposition of fish at time of release.
    d. Each fish will receive a jaw tag, externally attached radio tag (spaghetti tag), and a photograph following methods outlined in Runde et al. (2022) and Kerns et al. (2009). All snagged paddlefish that do not receive a radio transmitter will be jaw tagged and released.
    e. Tagged fish will be monitored via manual tracking and existing base stations. Radio tags would have a life expectancy of up to three months to allow for monitoring throughout the entire spawning run and migration back into Fort Peck Reservoir.
    f. Track survival through the movement and behavior of tagged individuals. Recapture fish before they out-migrate from the Missouri River to assess reproductive status using body weight and ultrasound.
    g. The pilot study will focus on tagging methods, tag retention, external trauma, recapture methods, and functionality of radio tags with base stations and manual tracking. We anticipate the recapture of downstream moving paddlefish will be difficult and will warrant exploration during the pilot study.

2. Recapture females, using drifting gill nets, that are making rapid downstream movements after snag and release. Reproductive status and success of female paddlefish will be measured by change in body weight and ultrasound. Given that paddlefish exhibit sexual dimorphism during the spawning season and the majority of fish that enter the river are spawning capable, we will identify spawning success in females using both loss in body weight (>15%) and the absence of ovarian follicles as assessed by ultrasonography. Females that will or have initiated ovarian follicular atresia will have no to low loss in body weight (<10%) and ovarian follicles that are visible by ultrasonography.

3. Conduct data review of fish documented as having some level of boat propeller related injury.
    a. Develop question for annual phone creel survey that asks if boater is using a prop or jet boat while paddle fishing.
    b. Use remote cameras to quantify boat traffic.
    c. Conduct boat ramp surveys to determine proportion of jet versus propeller boats using the upper Missouri River.
    d. Conduct literature review to determine if there are seasonal periods when paddlefish are more surface oriented and therefore potentially more susceptible to boat propeller strikes.

4. Rerun population models that Glassic et al. (2019) developed with data up to 2025 and include adjustments for snag and release mortality from this study.

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

- 2023 and 2024 – Pilot study to collect preliminary data on study feasibility, tagging methods, tag retention, acute erythema and edema associated with tag, and tag functionality on <30 adult paddlefish.
    - Additional base station will be installed near Ft Peck Reservoir headwaters

    - Adult paddlefish will be collected using trammel nets during spawing period, radio tagged and tracked to develop "control" group.
- 2025 and 2026 – Incorporate data and results obtained from pilot study to develop and implement a larger scale snag and release mortality research project. The larger scale project will include more fish tagged and increased tracking and recapture effort. In addition, the models developed by Glassic et al. (2020) will be updated with the knowledge regrading mortality from snag and release.

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

2023 and 2024 – MFWP funded Fisheries Manager, Fisheries Biologist and Fisheries Technicians
2024 through 2026 – MSU Graduate research assistant (MS) and Technician with assistance from MFWP staff

VI. Project budget must include amounts for the following:

MS: Paddlefish catch and release	Calander Year			
	2024	2025	2026	**Total**
Salaries and Wages				
Graduate research assistant (MS)	$14,200	$27,400	$28,496	**$70,096**
Technician (4 months; 704 hours @ 15/hr for 2 yrs)	$0	$10,560	$10,560	**$21,120**
Graduate student fringe (5%)	$710	$1,370	$1,425	**$3,505**
Technician Fringe (5 months @13% for 2 yrs)	$0	$1,373	$1,373	**$2,746**
TOTAL	**$14,910**	**$40,703**	**$41,854**	**$97,466**
Contracted Services				
Glassic salary (80 hours at $61/hour)	$0	$0	$4,880	**$4,880**
USGS NoROCK indirect (42%)	$0	$0	$2,050	**$2,050**
TOTAL	**$0**	**$0**	**$6,930**	**$6,930**
Travel				
Research travel (per diem; $100/month; 2 staff)	$0	$600	$600	**$1,200**
days)	$0	$5,000	$5,000	**$10,000**
Boat Use ($50/day * 60 days)	$0	$3,000	$3,000	**$6,000**
Vehicle use (5,824 miles at 0.655 per mile; 12 round trips/year [452 miles round trip from Bozeman]) + local travel (100 miles per month*4 months)	$0	$3,815	$3,815	**$7,630**
Professional meeting travel	$0	$1,500	$2,000	**$3,500**
TOTAL	**$0**	**$13,915**	**$14,415**	**$28,330**
Materials and Supplies				
Field supplies (nets, floats, rain gear, etc.)	$2,000	$2,000	$0	**$4,000**
Computer	$3,000	$0	$0	**$3,000**
Publication costs	$0	$0	$2,000	**$2,000**
TOTAL	**$5,000**	**$2,000**	**$2,000**	**$9,000**
Other				
Insurance	$2,325	$4,650	$4,836	**$11,811**
Tuition	$2,500	$5,000	$5,200	**$12,700**
TOTAL	**$4,825**	**$9,650**	**$10,036**	**$24,511**
TOTAL	$24,735	$66,268	$75,234	$166,237
MSU IDC (17.5%)	$4,329	$11,597	$13,166	$29,091
TOTAL TO MSU	**$29,064**	**$77,865**	**$88,400**	**$195,328**
NorthWestern Energy Purchases				
Phillips Lumify Ultrasound	$7,000	$0	$0	**$7,000**
Transmitters (30 tags @ $210/tag)	$0	$6,300	$6,300	**$12,600**
Garmin LiveScope (2)	$2,500	$2,500		**$5,000**
Reconyx remote cameras (4 HyperFire 2)	$3,320	$0	$0	**$3,320**
NorthWestern Energy Purchases TOTAL	**$12,820**	**$8,800**	**$6,300**	**$27,920**

Project Cost……..…….. $166,237
MSU Overhead (17.5%)……...……$29,091
NWE Direct Equipment Purchase……...……$27,920
TOTAL NWE FUNDING REQUESTED…….…..... $223,248

VII. Deliverables: Technical Presentation at NWE MoTAC Meeting and Annual Report submitted September 2024

How will "success" for this project be monitored or demonstrated?

- Summary report submitted to NWE MoTAC 9/2024

- Summary report submitted to NWE MoTAC 9/2025
- Summary report submitted to NWE MoTAC 9/2026
- Submission of MS thesis for peer reviewed publication 2026
- Presentation of work at professional meetings (MTAFS, Dakota Chapter AFS, Great Plains Fishery Worker Association) throughout project
- The findings of this study could influence management actions for this species. These could include:
    - Limitation on the number of snag and release permits issued
    - Education to anglers on proper handling of snag and released paddlefish
    - Seasonal boat propeller limitations on the Missouri River during paddlefish spawing season

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 ground disturbance is associated with this 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 9March2016.

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

-No wetland development associated with this project.

All TAC Project proposals should be 7 pages or less and emailed (as a WORD file) to each of:

- Andrew.Welch@Northwestern.com
- Jon.Hanson@Northwestern.com
- Grant.Grisak@Northwestern.com

Further questions about TAC proposals or Project 2188 license requirements or related issues may be addressed to: Andy Welch, Leader Hydro License Compliance, NorthWestern Energy, 1315 N Last Chance Gulch, Helena, MT 59601; 406-444-8115 (office); 406-565-7549 (cell); Andrew.Welch@northwestern.com.