# Platte River Pallid Sturgeon Kick-Off Meeting Read Ahead Information from UNL

Meeting Date – 12/16/21

This document contains overview information for two items – 1) Fish sampling and telemetry data collection prioritization and 2) a summary of our range detection tests to date.

## ITEM I: Fish sampling and telemetry prioritization

*Fish sampling location prioritization:*

Historical catch data indicate Pallid Sturgeon are found throughout the lower Platte River (Figure 1). However, river reaches within the first 10 km of the confluence with the Missouri River and another reach upstream 30-40 km (downstream of I-80 bridge to Hwy 50 bridge area). Therefore, we will focus initial capture efforts during 2022 in these two locations to increase the probability of capturing Pallid Sturgeon (Figure 2).

Sample prioritization:

1- Initiate sampling in the confluence area as top priority.
   a. Coordinated sampling with NGPC Missouri River staff to complement sampling in both rivers.
      i. Close proximity to trained staff and resources
      ii. Facilitate training of technicians and other crew as appropriate.
   b. Pallid Sturgeon are known to be in this area based on concurrent telemetry and other sampling in the Missouri River portion of the confluence area.

2- Split sample effort between the two target reaches.
   a. One crew will sample at confluence while the second crew samples upstream.

3- Adjust location(s) as needed to seek out Pallid Sturgeon.
   a. Additional locations will be sampled should one or both locations fail to produce Pallid Sturgeon for transmitter installation.
   b. New sites will be determined based reaches with the next greatest captures within the Platte River.

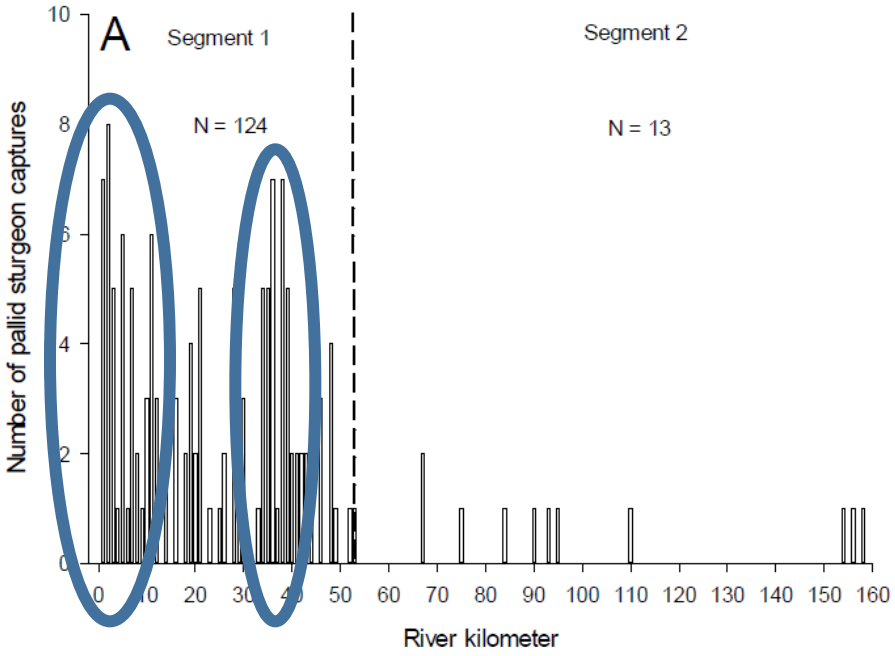


Figure 1. Pallid Sturgeon captures from locations along the Platte River, 2009-2012. Segment 1 extends from the mouth to the confluence with the Elkhorn River. Segment 2 extends from the Elkhorn River confluence to the Loup River confluence. Circled areas indicate reaches with most captures during previous field sampling. Figure from Hamel (2013) dissertation.

*Fish collection initiation:*

Many factors dictate when we can and cannot attempt to collect Pallid Sturgeon. Full details of those restrictions are included in the Pallid Sturgeon Handling Protocol under which we will operate. We will primarily use trotlines to collect fish for transmitter installation. Trotlines have been proven as an effective gear to catch Pallid Sturgeon while reducing by-catch (capture of unintended species) when sampled during conditions allowable under the protocol. Generally, we will use the following criteria to start and stop fish collection each year:

1- Initiate fish collection efforts
    a. Transition from winter to spring will dictate exact start dates as conditions allow
    b. Early spring (~March)
        i. Ice flows are no longer present.
        ii. Water levels and discharge are generally free from seasonal snowmelt or other extreme precipitation events.
            1. Discharge will dictate boat usage and access to the river

a. Airboat < 18,000 - 20,000 cfs (preferably much, much lower)
b. Outboard boats may sample at greater discharges if safety concerns are mitigated.

2. Debris loads (e.g., trees and other floating debris) should also be low.

iii. Water temperatures < 18°C (per protocol for overnight sets)

2- Cease fish collection efforts

a. Spring fish collection will cease when water temperatures preclude overnight sets (18°C for 24 hour sets/21°C for < 18 hour sets).
b. Fish collection may also be temporarily paused leading up to, through, and following extreme weather events as needed to ensure protocol requirements are met.

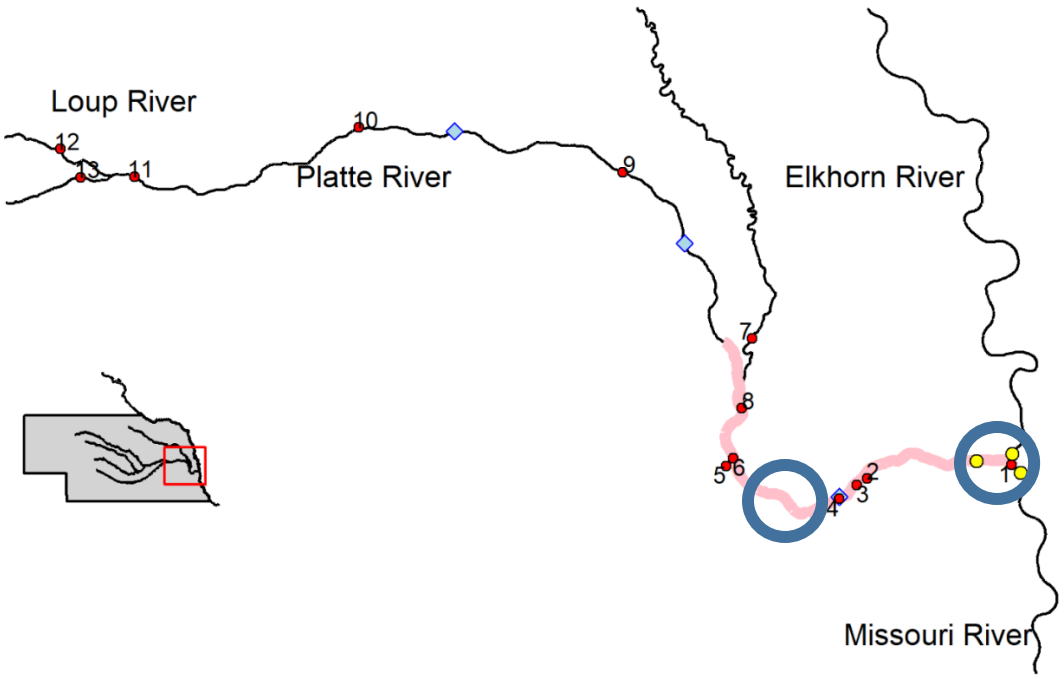


Figure 2. Platte River fish collection emphasis area (circles) for initial 2022 sampling.

*Telemetry search prioritization:*

Each search event (i.e., active tracking) will generally follow a systematic approach where the field crew will search for fish in the Platte River and then radiate into the tributaries as needed or as the passive tracking network indicates. We anticipate most fish will initially remain in the Platte River near where we focus our fish collection efforts and then disperse upstream or downstream accordingly. It seems reasonable to start extensive searches in this area until we observe dispersal events. We will develop the most efficient search approach based on fish behaviors observed from our tracking data collection efforts. We will use the passive listening network to bolster our ability to locate fish and determine whether or not they remain in our study area as described in the passive telemetry section. This is especially true for fish whose last known location was near one of the tributaries or the upstream and downstream extents of our network.

Should we capture a gravid adult (determined during transmitter implant procedure) over the course of our sampling to implant transmitters in 2022, we will divert one sample crew to actively follow the fish while in the Platte River system in an attempt to identify spawning behavior. Likewise, if gravid adult(s) enters that Platte River system from the Missouri River (coordinated with NGPC), we will initiate active tracking for those individuals as well.

A more clear delineation of prioritization in which fish to follow and how intensively will be an ongoing evolutionary process where the ages (i.e., juvenile vs. adult) and their reproductive status will be weighed to optimize accomplishment of project objectives. We will use information gained in 2022 to inform future field activities and planning.

**ITEM 2: Transmitter Range Detection Assessment**

Range tests were conducted on the Platte River (Louisville, Nebraska) on six different days between 10/14/2021 and 12/02/2021. These tests were intended to help us better understand the performance of acoustic telemetry within the river. We used V-16 & V-13 Range Test Transmitters, VRTx receivers, and a VR-100 with a VHTx omnidirectional transponding hydrophone by Innovasea. The range test transmitters are programmed to broadcast a high and low power signal at a fixed delay. The VRTx receivers listen for transmitted signals from the tags and store the information internally, while also collecting information on receiver temperature, depth, & acoustic noise. Receiver performance is largely dependent on the amount of ambient acoustic noise and the ability to maintain an unobstructed line-of-sight with the transmitter. The VR100 & VHTx Transponding Hydrophone are used together as a mobile receiving device that listens to transmitted signals from all directions.

The tests we conducted were designed to evaluate the effective range of this equipment within the Platte River. Though we were faced with some equipment & environmental limitations, we were still able to collect some data that produced useful results. We attempted to test the detection range of the equipment by doing mobile drift tests. During mobile drift tests, a weighted transmitter was drifted downstream in proximity to an anchored receiver, to determine at what distances and positions signal transmission would be successful.

We are intending to also do stationed drift tests and a pseudo-tracking experiment to provide further insight into detection distances and probabilities within the river system. During stationary drift tests, transmitters will be anchored at different positions for 3-minute intervals to ensure the tag will be able to broadcast a full transmission series before drifting out of range. During our pseudo tracking experiment, a transmitter will be anchored at a known location and we will test our ability to manually track the tag with the VR100 and hydrophone. Pending weather conditions, we hope to do these assessments prior to the December 16, 2021 kick-off meeting for further discussion at that time.

**Results**

We attempted to conduct detection tests on several occasions. Here, we generally present information from the dates we successfully completed the drift tests. Unsuccessful test dates were typically characterized as equipment familiarization efforts or suffered from demonic intervention (e.g., boat motor issues, greater than expected wind events that precluded controlled drifts, etc.) rather than telemetry equipment function concerns.

We had detection ranges of approximately 73 - 143 m during the October 14 drift tests evaluating the v13 tag and the v16 tag. Two additional detection range tests that day had very few detections due to river current pushing the receiver mooring on its side (pushing receiver in the substrate) that created line of sight issues.


Figure 3. Locations of range tests performed on October 14, 2021. The dots and squares depict high and low power pulses. Detection range was approximately 143 m for the v13 tag (purple) and 73 m for the v16 tag (red). Green and blue shapes are not data points.

Modifications to the mooring design facilitated maintaining an upright receiver orientation that facilitated additional drift tests on 15 November and 2 December. The stationary receiver was able to achieve maximum detection distances of approximately 62 m and 77 m (average of 69.5 m). These distances are an estimate of the radius of detection. Therefore, we anticipate a detection diameter of about 150 m (i.e., ~75 m on either side of the receiver assuming line of site) under these conditions when the receivers are used to create a gate to detect movement past a given location. Conversations with InnovaSea have provided some insights on possible modifications we could implement to improve detection distances. We are currently evaluating our proposed receiver locations, numbers of receivers needed, deployment configuration, etc. and will provide additional comments during the meeting.

Our tests using an active tracking approach (using the VR-100 to detect a transmitter from the boat) suggests a better detection range. We were able to achieve positive detections for the

V16 tag up to 128.5 m and 142.4 m for the V13 tag. Further evaluation is ongoing and in collaboration with InnovaSea to maximize detections in the Platte River.

When conducting drift tests, we observed that the receivers were able to detect pings and positive identifications when the receiver was deployed closer to the bank (Figures 3 & 4). When the receiver was deployed in the middle of the river, noise levels were approximately 899.0 mV and the receiver had 0 detections and 12 pings indicating the receiver did hear the tag but could not decode the signal completely. Further explanation of these implications will be discussed at the meeting.

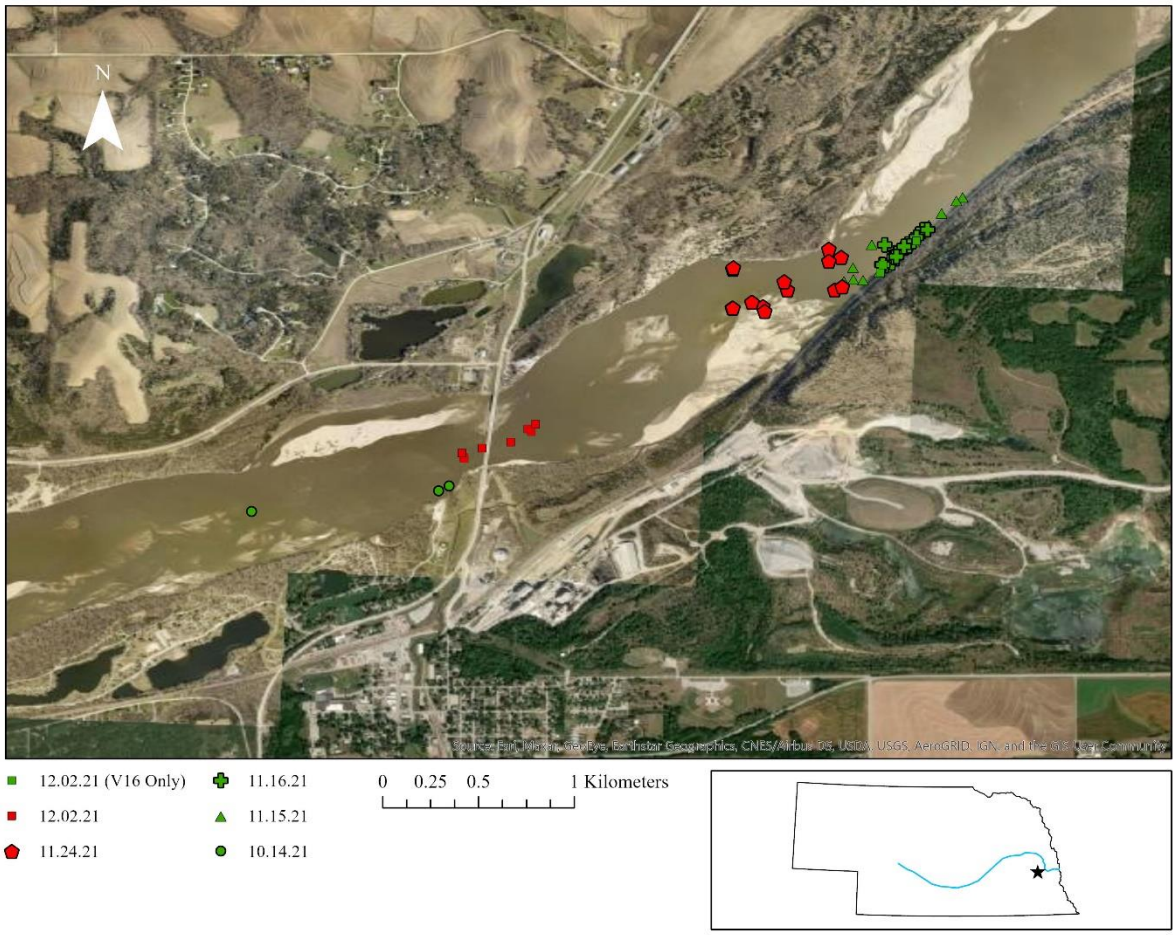


Figure 4. Map depicting the different dates range testing occurred (circle – October 14, 2021; triangle - November 15, 2021; cross – November 16, 2021; pentagon – November 24, 2021; square – December 2, 2021) as well as whether tests were successful (green) or not (red). S*uccessful* means receivers were able to detect pings and positive detections of the test tags.

**Detection test summary – to date**

The detection distances are lower than we had anticipated so far. Certainly, water levels and water quality will influence our detection ability and we will continue to evaluate the capacity of the equipment as seasonal conditions change over the course of the next few years. We are currently working on exactly how that may impact the number of receivers needed in addition to other options that might increase our ability to keep close contact with Pallid Sturgeon throughout the Platte River network and beyond, yet maintain connectivity to the systemic telemetry effort within the Missouri River. We may have a low cost option (likely no additional cost to the project) to use radio tags in concert with the acoustic tags in at least some instances. We will provide further discussion at the meeting.