



PLATTE RIVER RECOVERY IMPLEMENTATION PROGRAM (PRRIP -or- Program)

August 2021 ISAC Quarterly Meeting Discussion Questions/Topics

Editorial Disclaimer: This document currently serves as a PRRIP Executive Director's Office (EDO) Working Draft summary of two potential Big Questions identified together with the Adaptive Management Working Group (AMWG) as priorities for the WC in development of the Extension Science Plan. These two Big Questions were selected for inclusion in this document as they are relevant to today's discussion with the ISAC on data analysis tools developed by the EDO to address these questions. *The entirety of the language below does not, at this time, represent full AMWG consensus and will be the topic of continued discussion and revision during development of the Extension Science Plan in 2021.* However, some or all of the text below (as-is or as subsequently revised) may be integrated into that Science Plan.

BIG QUESTIONS = things we do not know but want to learn

1) What are the conditions that influence whether a WC will stop or flyover the CPR?

During the First Increment (2007-2019), the Program designed and conducted research to identify a suite of on and off-channel characteristics associated with roosting sites and diurnal use locations.

Uncertainty Factor = Landscape-Level Cues

The AMWG identified remaining uncertainty focused on landscape-level cues that WC may be using upon initial encounter with the AHR during each seasonal migration to select the AHR as a stopover location during migration.

Question of interest: What are the factors associated with stopovers vs. flyovers of WC as they encounter the Associated Habitat Reach (AHR) during migration?

Using first AHR-associated location data points obtained from individual telemetry birds as they encountered the AHR each migratory season, the initial dataset analyzed by the EDO including data from 49 individual birds with 8 stopovers and 89 flyovers as they encountered the AHR during 6 migratory events from Fall 2017 - Spring 2020. Potential explanatory variables explored by the EDO included:

- a) Time of day – Initial analyses suggest time of day to be important in predicting stopovers, with all 8 stopovers occurring after 3:00 PM.
- b) Flow
- c) Maximum Unobstructed Channel Width (MUCW)

Neither flow nor MUCW add significant explanatory power to the current logistic regression model predicting WC stopovers over and above what can be predicted initially from including only time of day. These preliminary results were presented at the Feb 2021 AMP Reporting session.

The AMWG has hypothesized several variables that may be associated with stopover initiation including those related to unobstructed channel width, river flow, time of day, distance traveled since previous stopover, weather conditions encountered, and proportion of the landscape occupied by various types of landcover. Many of these variables are out of Program control but are likely very important cues for



WC decision-making. The EDO would like to discuss with the ISAC ways to incorporate these variables into future modeling efforts given the limitations inherent to the dataset.

ISAC Discussion Questions/Topics

- 1) How much data do we need to have statistical confidence? Preliminary analyses indicated time of day is highly important, but inference is based on 8 stopovers as of Fall 2020. Given the original dataset has locational data within 100 km of the Associated Habitat Reach, how do we best utilize that information to answer our research question? Do we ask the question in a different way?
- 2) The WC dataset is small and will grow slowly over time, but the dataset will always contain more flyovers than stopovers which make up on average only 8% of the dataset. How many years (stopovers) would we likely need to answer the question posed for even a single variable (flow)? Can we realistically get an answer during the Extension (2020-2032)?
- 3) The number of explanatory variables is limited by the small dataset, so hypothesis testing must be limited to those items that are priority and that the Program can manage. Is there a way to parse out the effects of things that are out of Program control (time of day) to quantify effect size of those items the Program can control (flow, channel width)? Is there a statistical threshold under which these small effects are biologically meaningless?
- 4) A Program priority may be to answer the following questions: How much water do we need in the channel for stopovers? Where are the limits of WC tolerance to flow, flows above or below which WC do not stop along the AHR?
- 5) The range of available flows for which we have WC response do not include very low flows. Is the Program willing to allow low flows during WC migration for science learning during the Extension?

2) Can we use water to maintain unobstructed channel width (UOCW) for WC use?

Uncertainty Factor = Use of Program water to maintain/create WC habitat

The AMWG identified remaining uncertainties related to the cost/benefit of using Program water to maintain/create habitat for WC. One of the expected outcomes of Program science during the Extension is to provide the data necessary to inform a Structured Decision-Making process to set Program water operations priorities for effective and efficient use of Program water in the Second Increment.

Questions of interest:

- a) Can we use germination suppression flows in the spring and/or summer to maintain UOCW?
- b) Can we use a fall short-duration high flow (SDHF) to maintain UOCW? The AMWG assigned a lower priority to this question to that of (a) above, but the GC Second Increment Framing Document lists this as a priority for learning.

The EDO developed a Random Forest statistical model designed to help answer these questions. The model utilized historic data to capture a variety of conditions and management actions that could be experienced during the Extension including peak flows, germination suppression flows, herbicide application, and disking to predict channel width relationships into the future. This model demonstrated the large impact of existing main channel total channel width on future predictions, with peak flows,



disking, germination suppression flows, and late summer peak flows providing lesser but still important explanatory ability. The current effort incorporates suggestions for improvement made by the ISAC during the AMP Reporting Session as well as suggestions by AMWG members, including utilizing annual change in channel width as the response variable. The EDO would like to discuss changes to this modelling effort with the ISAC, receiving feedback on the appropriateness of the model, explanatory variables, and potential ways to improve its predictive power.

ISAC Discussion Questions/Topics

- 1) Are we missing other key hydrologic or geomorphic variables typically responsible for channel width?
- 2) Is using a historic dataset to develop a random forest model to predict future outcomes appropriate?
- 3) June germination suppression metric and management action could be a kind of hydrologic “hack” in that (under natural variability) higher June flows occur during wet years. We are uncertain if just increasing flow in June during dry years would be sufficient to suppress germination. 2021 provided an example of flow release practicality with a 2,000 cfs flow target (Figure 9).
- 4) Since peak flows widened the channel in the recent past, we have not experienced low flow for extended periods of time. Do we need data under low flow conditions with widened channels (a set of conditions likely to occur naturally in the Extension, if we allow it) to be able to predict how channel widths will respond?
- 5) The Program currently lacks information on the impacts of very low flows on channel width maintenance as well as WC decision-making. How important is this information to inform Second Increment water operations?

PRRIP SCIENCE PLAN FOR PROGRAM WATER IN THE EXTENSION

Importance of flow during WC migration vs. flow to maintain unobstructed channel widths for WC

The two Big Questions above represent competing uses of an annually limited supply of Program water. Priority hypotheses to be tested during the Extension following from these questions could be:

- 1) Test the effect of flow (secondarily UOCW) on WC decision to stopover vs. flyover the AHR.
- 2) Test ability to maintain wide unobstructed channels for WC habitat using Program water.

ISAC Discussion Questions/Topics

- 1) How important is it to keep water in the channel for WC during migration vs. using water later in the season to keep the channel clear in the spring and summer? What are the experimental management alternatives, and how does the Program prioritize these AM experiments during the Extension?
- 2) How do we address the gap in Program learning on low flows during both WC migration and under existing wide channel conditions?