Ft. Peck Reach Adaptive Management Framework

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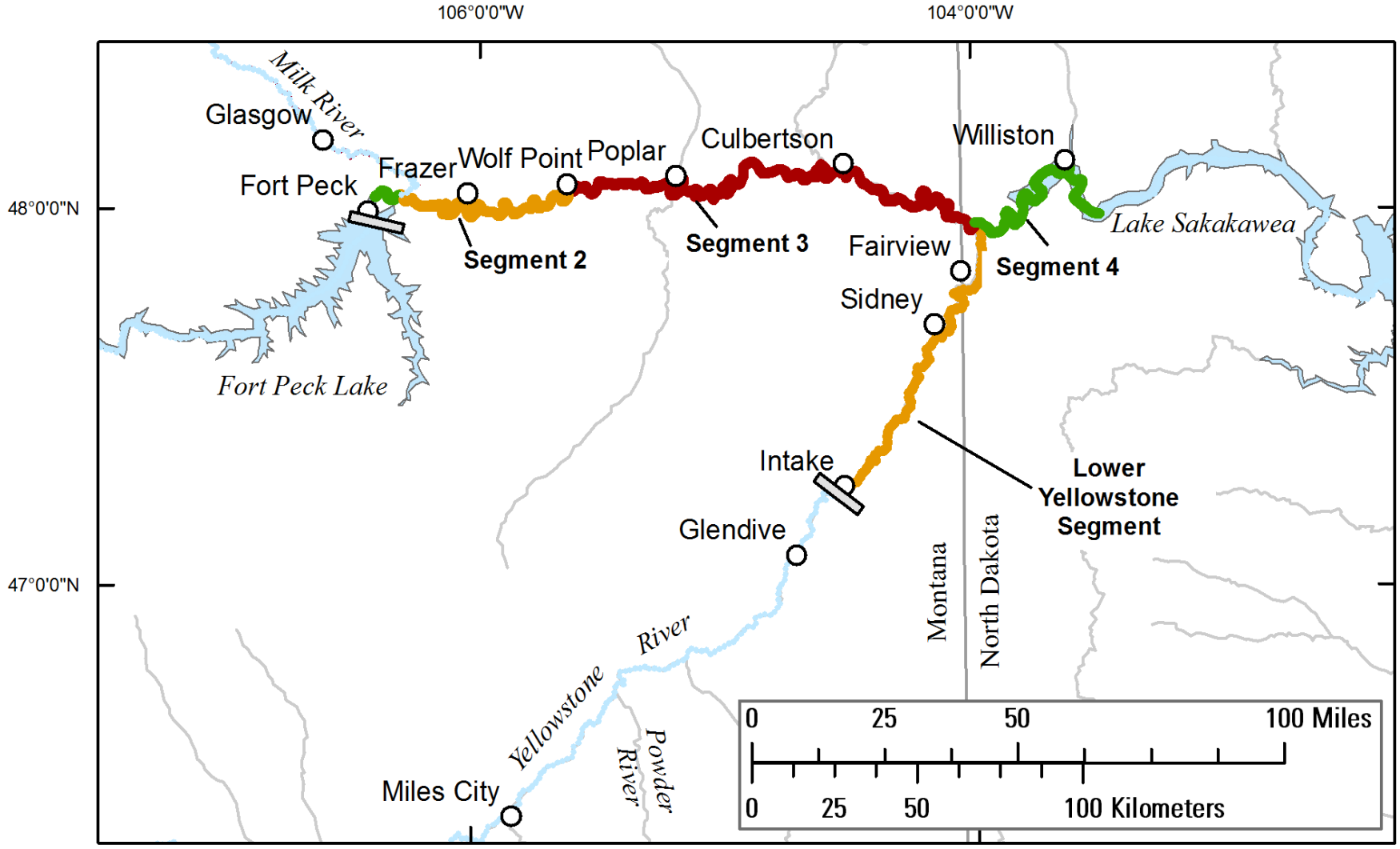


Source: U.S.G.S. digital basemap data
Universal Transverse Mercator, Zone 15

Context and rationale

Requirements for the UPPER RIVER based on Corps' amendment to BA and USFWS 2018 BiOP include:

Review previous information

Formulation of test flows and an Adaptive Management Framework for Implementation

L1 - studies
L2 - identified hydrograph(s)

After Fall Science Meeting, update the AM Plan to incorporate the framework

Initiate a new NEPA process and public processes if any actions are outside the existing EIS

Development Timeline

January 2018	Amended BA
February 2018	AM Workshop – 2 hydrographs for discussion
May 2018	Fish & HC Work Group - 2 hydrographs for discussion
June – October 2018	Activities covered in this document
November 2018	Finalizing draft AM Framework Document

This document is a **starting point for discussion with agencies**, MRRIC, Tribes and stakeholders, and **no management decisions have been made**.

Purpose of Framework and Relationship to the SAMP

- Establishes logical and systematic series of scientific investigations and experiments to identify implementation activities that may be needed to meet objectives.
- Describes how criteria and mechanisms gained from studies and experimentation could guide decisions about what implementation activities (if any) are warranted, and how they should be structured.
- USACE would make a determination as to whether actions need NEPA analysis or any other public involvement prior to implementation.

Framework Development Principles

- Build on what we have
  - Effects analysis, AM Plan, ongoing research
  - Focus on science and technical issues
- Build an approach that can integrate human considerations seamlessly
- Meet near-term needs, but build for the long term
- Keep a broad scope – consider ALL actions to benefit the Upper River pallid population, accounting for both the Yellowstone and Missouri Rivers
- Design for transparency and ongoing engagement – no value judgments about issues of concern to stakeholders are made by technical people during the development of the framework

Approach

Activity	Rationale and Deliverables
1. Design and analysis of two conceptual hydrographs.	• Identify a biologically-based hydrological sequence that could serve to test key hypotheses about recruitment on the Upper Missouri River
2. Design and population of Effect Pathway Diagrams.	• Organize what is known and what is uncertain about certain cause-effect relationships
3. Expert survey to review technical priorities and opportunities for studies and actions.	• Survey broad array of experts on weight of current evidence (state of knowledge) on limiting factors and biological needs; seek diverse opinions on and ideas for studies.
4. Consolidation of expert views and proposed modification of Level 1 and Level 2 studies.	• Aggregate above learning into a revised initial proposed set of studies
5. Design of a proposed adaptive management implementation framework for Level 1 and Level 2 studies.	• Consider a implementation method for the studies that is sensitive to policy considerations and system conditions

Framework Scope

Framework Does Contain:

- A generalized proposed approach to identifying and tracking high priority hypotheses for now and in future AM cycles;
- Building on the SAMP, a refined list of suggested Level 1 and Level 2 pallid sturgeon studies to be considered for implementation
- Two example conceptual hydrographs and brief discussion of their origin and significance for future planning;
- Descriptions of situations in which managers may take advantage of system conditions to optimize actions for MRRP objectives.

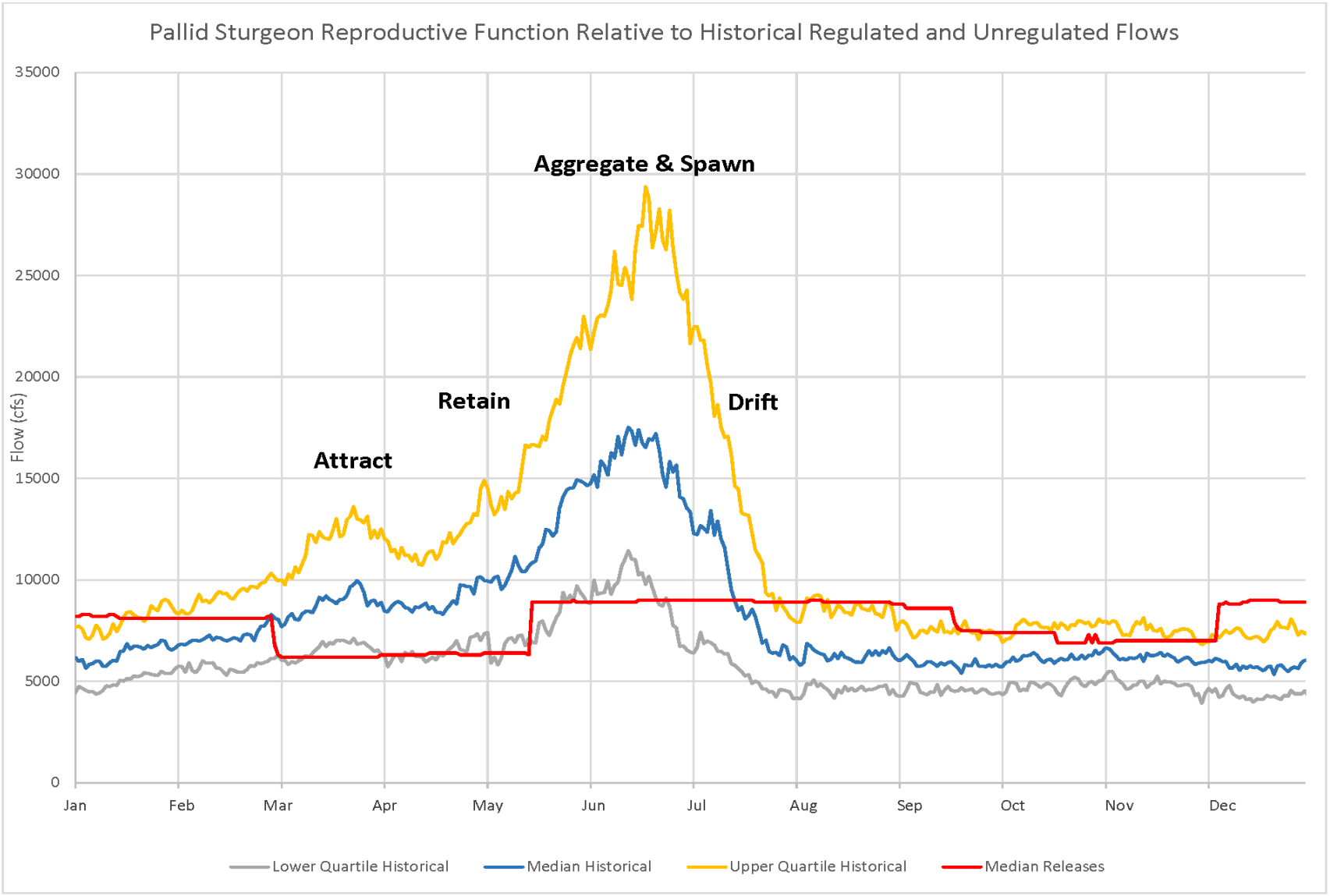
Framework Scope

Framework Does NOT Contain:

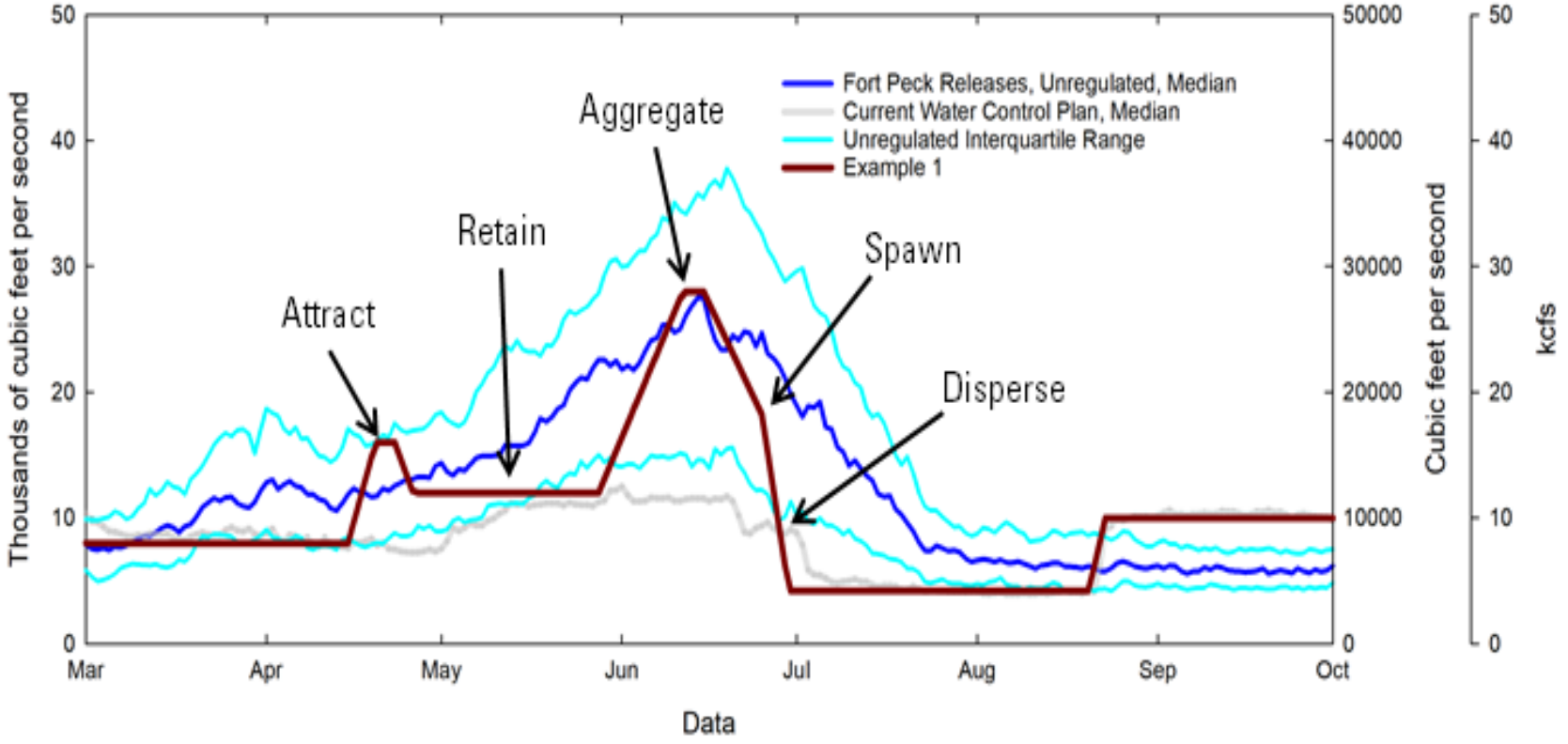
- Specific test flow hydrographs that are ready to implement.
  - Rationale: Further modelling may be required to examine the potential for refinement hydrographs to meet Level 2 learning goals.
- Fully-specified Level 1 and Level 2 studies
  - Rationale: The study tables presented in this document are high-level characterizations. Further work is required to design / specify them to a sufficient level of detail for implementation.
- Proposals on HC monitoring needs.
  - Rationale: Specific needs for HC monitoring, if any, cannot be predicted without first specifying the precise nature of the actions to be examined.

Overview

- Hydrograph components



Test hydrographs



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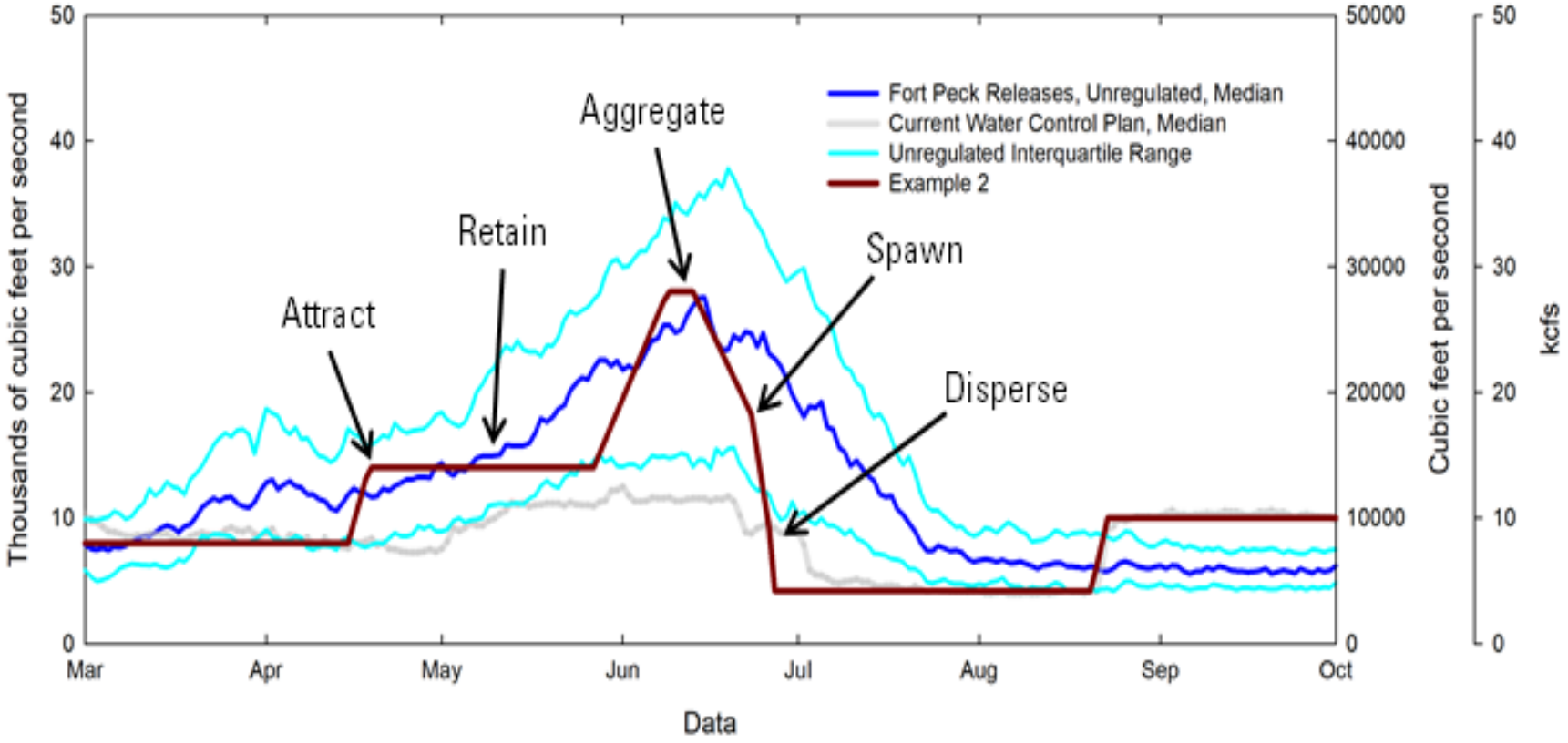


Test hydrographs - summary

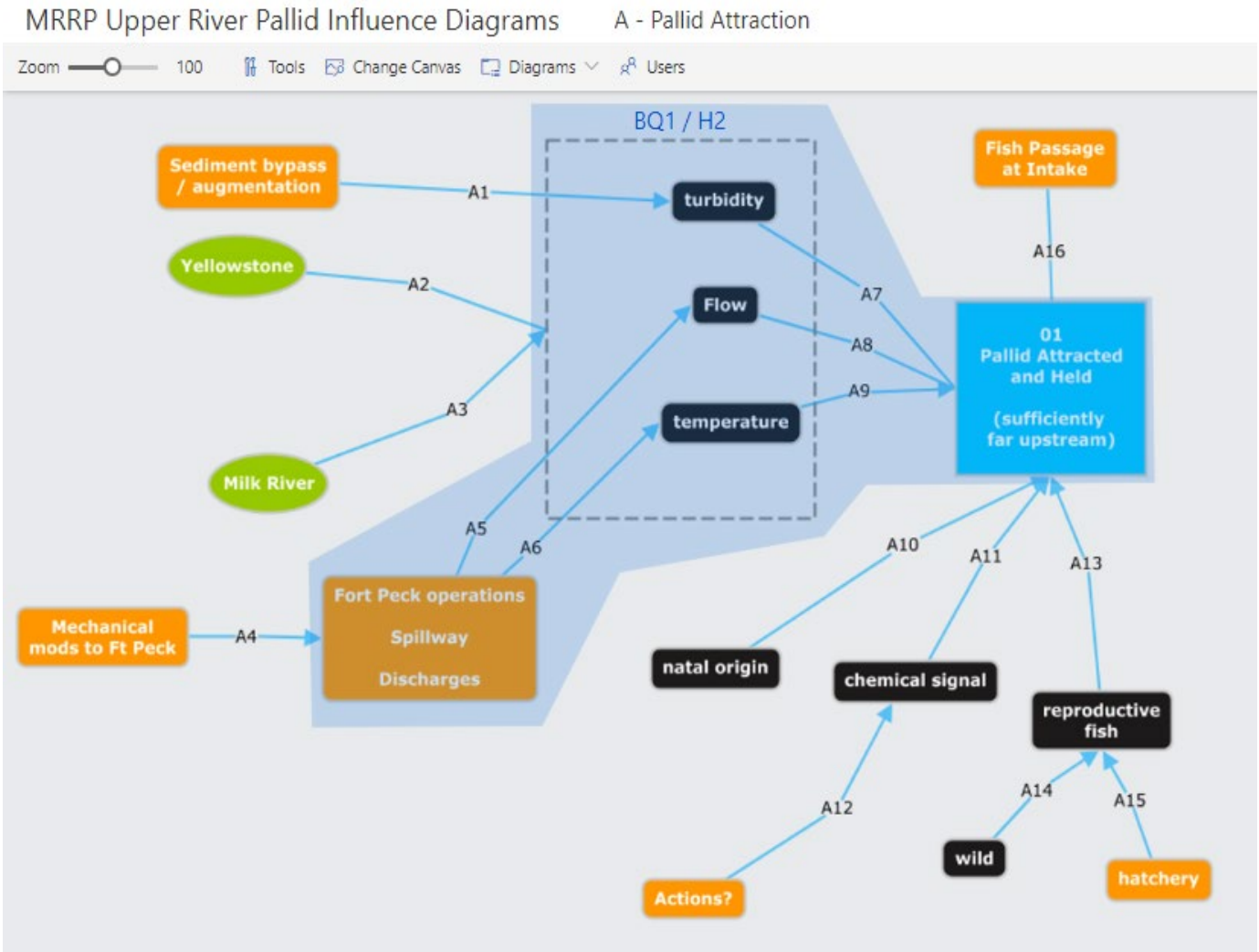
- Based on objectives for parts of hydrograph hypothesized to support reproductive functions for the pallid sturgeon.
- Two conceptual hydrographs serve as proof of concept and either could serve as a starting point.
- It is possible to design alternative conceptual hydrographs:
  - reflect other hypotheses about the hydrograph characteristics,
  - either to support biological functions or to minimize potential socio-economic impacts.

Goals and management objectives

- The objectives for Upper River pallid sturgeon (plus metrics and targets) are discussed in section 4.1.1 of the SAMP.
- Logical (and consistent with the Recovery Plan) to manage pallid sturgeon in the Yellowstone and Upper Missouri River as one population.
- Actions may be investigated or implemented in either or both of these two sub-regions.

Key insights from Activities 2 and 3 - Assessing Factors Potentially Limiting Recruitment to Age 1

- Effects Pathway diagrams focus discussions on possible cause-effect relationships; used in expert survey



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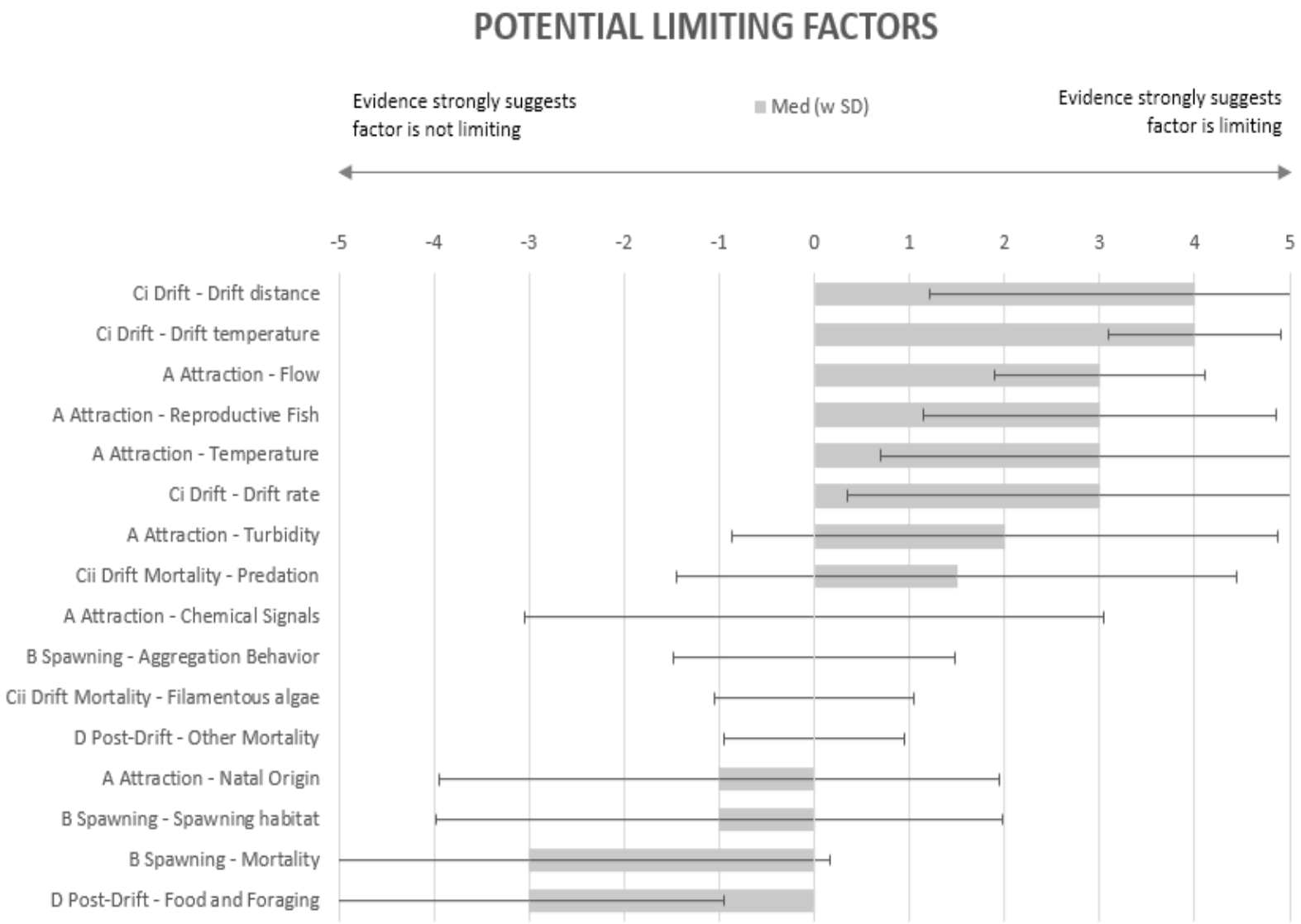


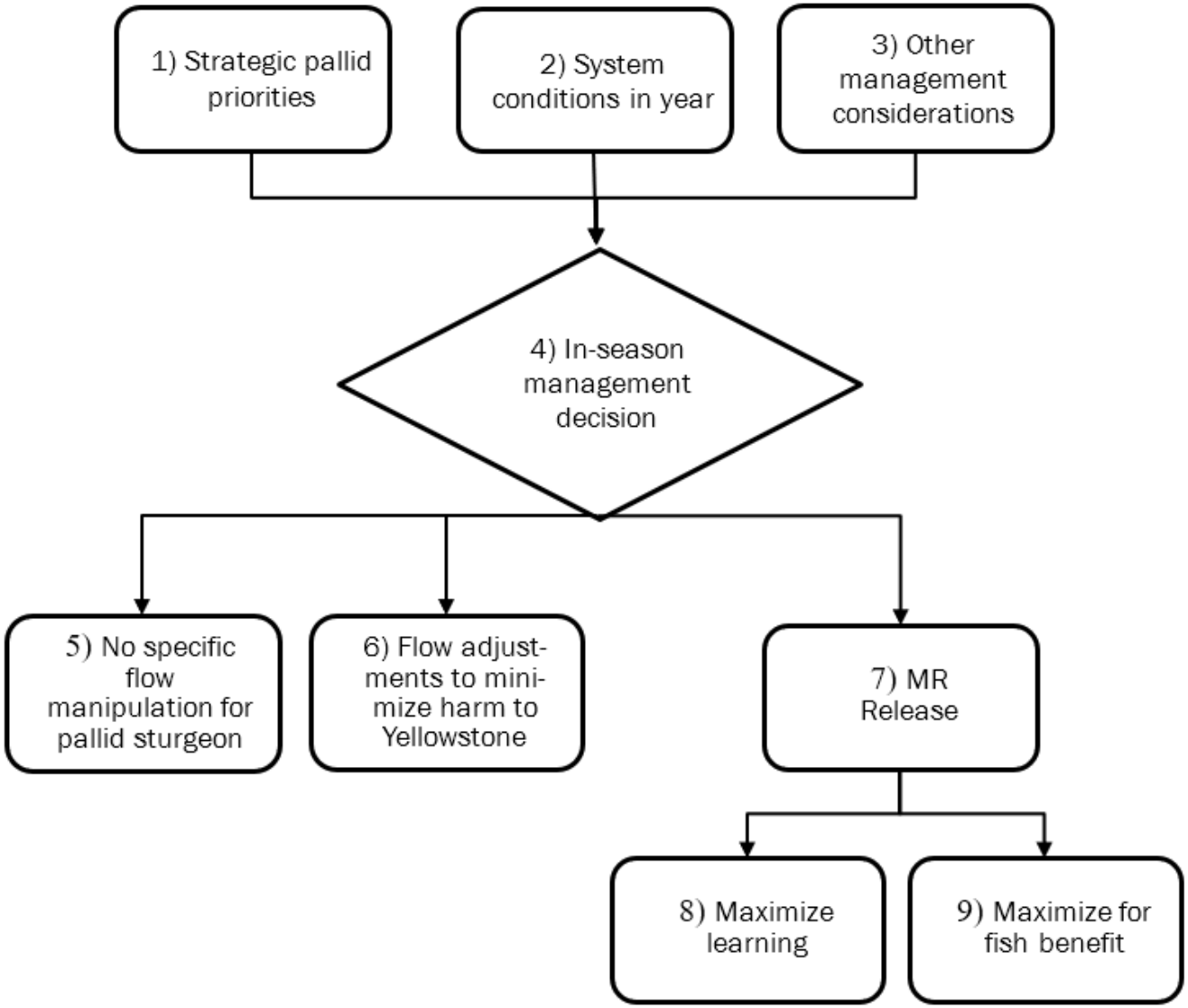
Proposed revised draft tables of L1 and L2 studies

- Tables are largely the same as are already in the SAMP
- Various proposed modifications based on survey findings
- Includes some studies not previously identified

Table 5. Summary of Level 1 studies in the framework including metrics and decision criteria, presented in order of the Big Questions.

Question, Level and Study Components	Key Metrics / Rationale	Simplified IF - THEN Decision Criteria	Concurrent / Dependent Components
Studies already in-progress			
BQ1/L1/C1–Design study: complementary passive telemetry network	Detectability of telemetry tags by network receivers, variation of tag detectability with discharge-related characteristics, tag cost, tag reliability.	IF fish movements past strategic locations are successfully detected, THEN deploy a larger network of telemetry receivers to help evaluate sturgeon response to flow.	C1-C2 all concurrent. Also with design of lower basin telemetry network (Table 39 - BQ1/L1/C1)
BQ1/L1/C2 – Field study: opportunistic tracking of reproductive behaviors	Degree of association of reproductive behaviors and successful spawning with monitored hydrologic characteristics.	IF there are moderate to strong associations between hydrologic characteristics and reproductive behavior, THEN this provides stronger evidence for L2 studies. However, IF successful reproductive behavior is observed in the absence of the hypothesized hydrologic characteristics AND is sufficient to have a population-level effect THEN this provides evidence against hypothesis H2.	C1-C2 concurrent
BQ2/L1/C2 - Screening: field monitoring of age-0 fish condition and diets: limitations of food or forage habitats	Indicators of starvation or impending death of age-0 sturgeon based on stomach contents (empty/full) or physiological indicators (lipid content).	IF results indicate bioenergetic constraints, THEN this provides stronger evidence for Level 2 experiments.	[in progress]
BQ3/L1/C0– Field tracking of telemetered pallid sturgeon - part of BQ1, C2	Degree of association of reproductive behaviors and successful spawning with monitored temperature characteristics.	IF there are moderate to strong associations between temperature characteristics and reproductive behavior, THEN this provides stronger evidence for L2 studies. However, IF successful reproductive behavior is observed in the absence of the hypothesized temperature characteristics AND is sufficient to have a population-level effect THEN this provides evidence against hypothesis H2.	C0, C1, C2b, C3b, 4b all concurrent
BQ3/L1/C2a- a) food limitation to age-1 - Same as BQ2/L1/C2	Indicators of food availability to age-0 sturgeon based on stomach contents (empty/full/diet inventory) or physiological indicators (lipid content).	IF results indicate that Lake Sakakawea is not limiting, THEN this provides more support for Level 2 experiments.	CA
BQ3/L1/C2b - b) lethality of Lake Sakakawea to age-0	Spacial and temporal extent and variability of conditions lethal to benthic larval fish in Lake Sakakawea.	IF results indicate that Lake Sakakawea is not limiting, THEN this provides more support for Level 2 experiments.	C0, C1, C2b, C3b, 4b all concurrent
BQ3/L1/C3b - Field studies: validating advection / dispersion model (studies of age-0 larval distribution)	Spacial and temporal distributions of larvae and surrogate flow tracers to determine larval retention.	IF results indicate that free embryos can be retained in the Fort Peck segment THEN this provides more support for Level 2 experiments.	C0, C1, C2b, C3b, 4b all concurrent
BQ3/L1/C4b - Mesocosm studies: developing quantitative temperature-recruitment relationships	Temperature-dependence of pallid sturgeon developmental rates.	IF there are moderate to strong and reliable associations between temperature variation and productivity, growth, and survival, AND drift/dispersal is not limiting, THEN this provides more support for Level 2 temperature experiments.	C0, C1, C2b, C3b, 4b indicate strong temperature dependencies

Flow diagram for Level 2 flow releases in Missouri River

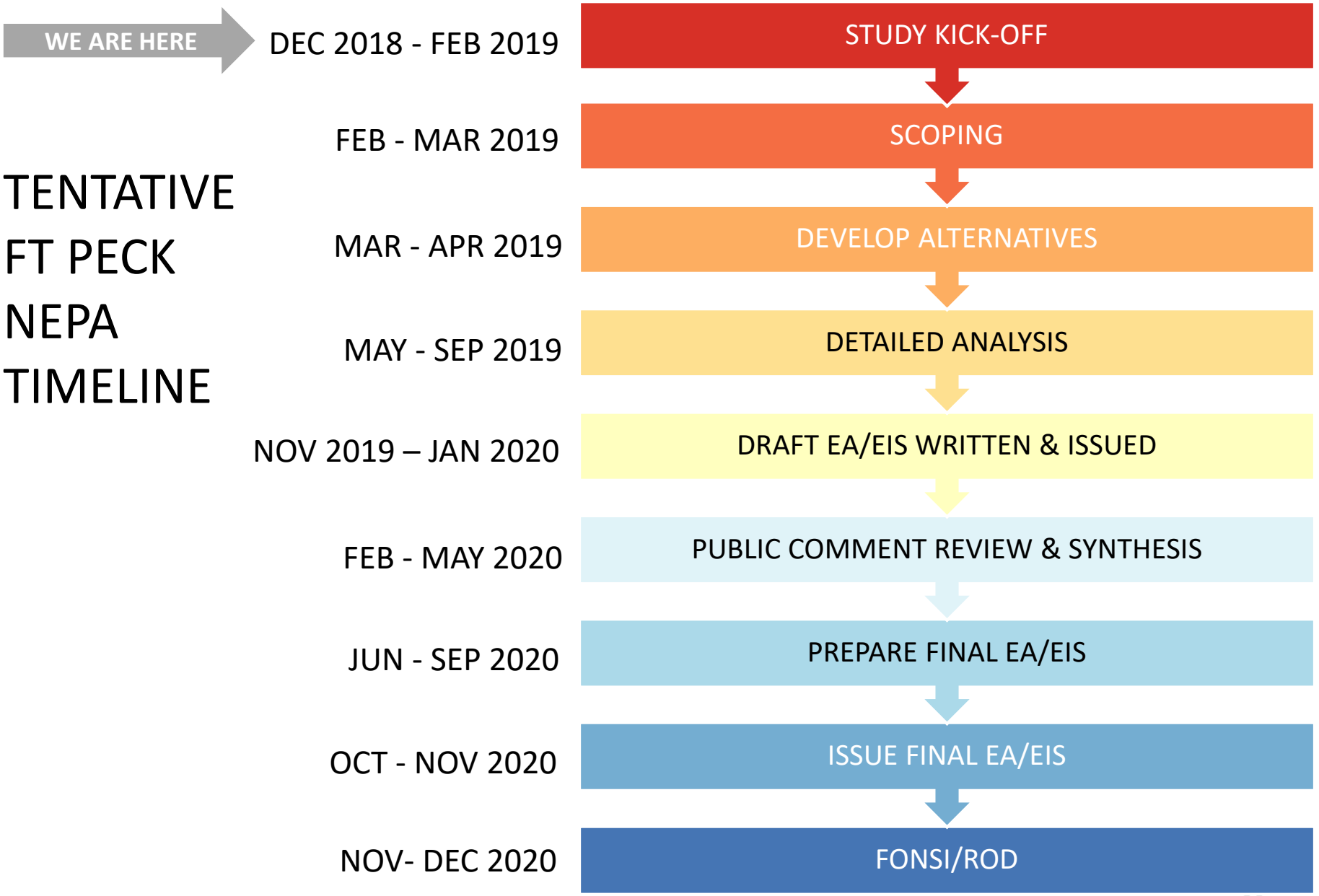


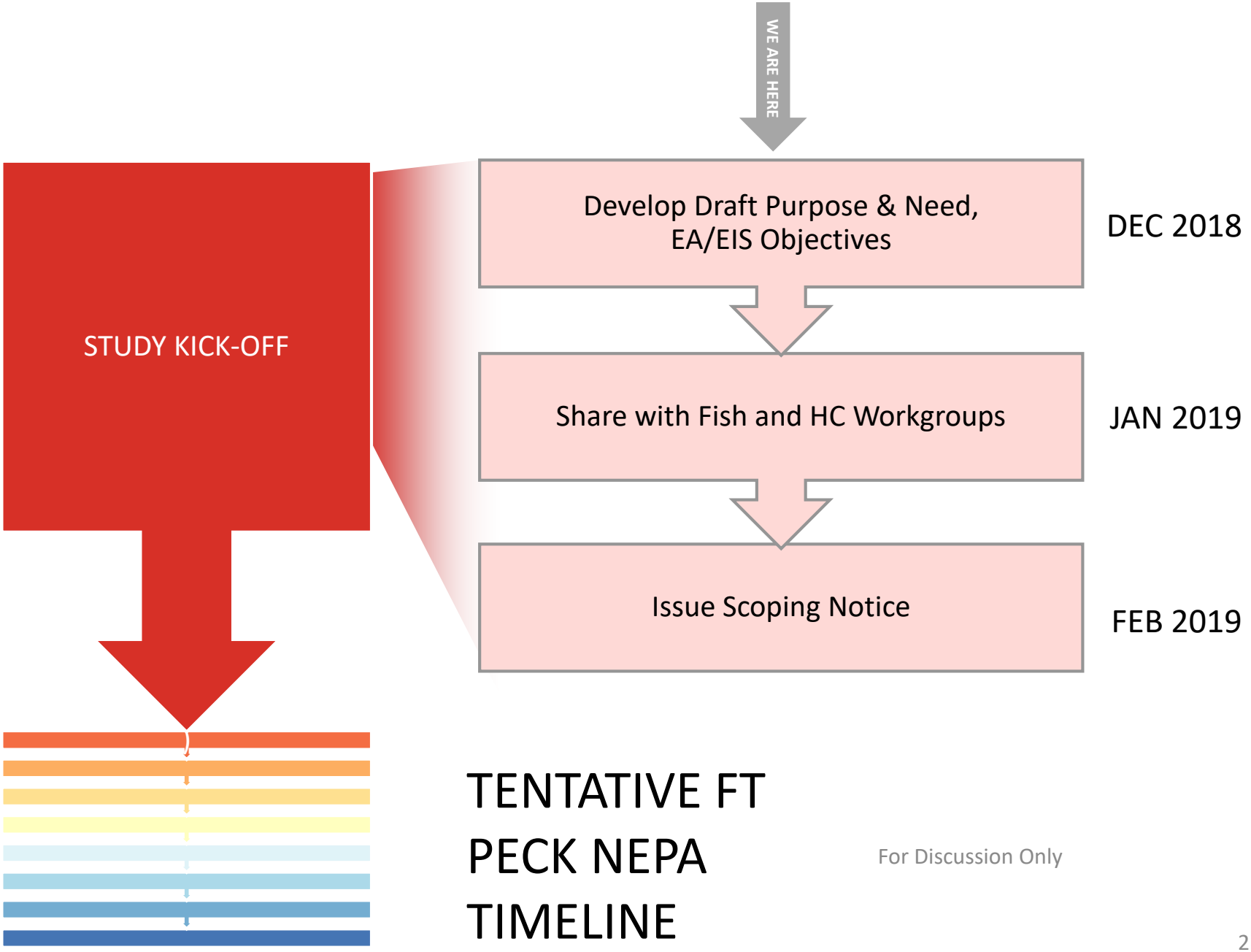
4. Conclusions

The Fort Peck AM Framework:

- Reconfirms the areas of greatest scientific interest
- Builds on the foundational work in the Effects Analysis
- Utilizes the processes outlined in the SAMP
  - provide logical parallel pathways of Level 1 studies and Level 2 experiments that *could* lead to Level 3 and Level 4 actions in the future *if the evidence shows these actions may be warranted.*
- Proposes a conceptual implementation framework
- Does not make prescriptions on actions
- Provides proposed actions for further public engagement and MRRIC discussions

TENTATIVE FT PECK NEPA TIMELINE

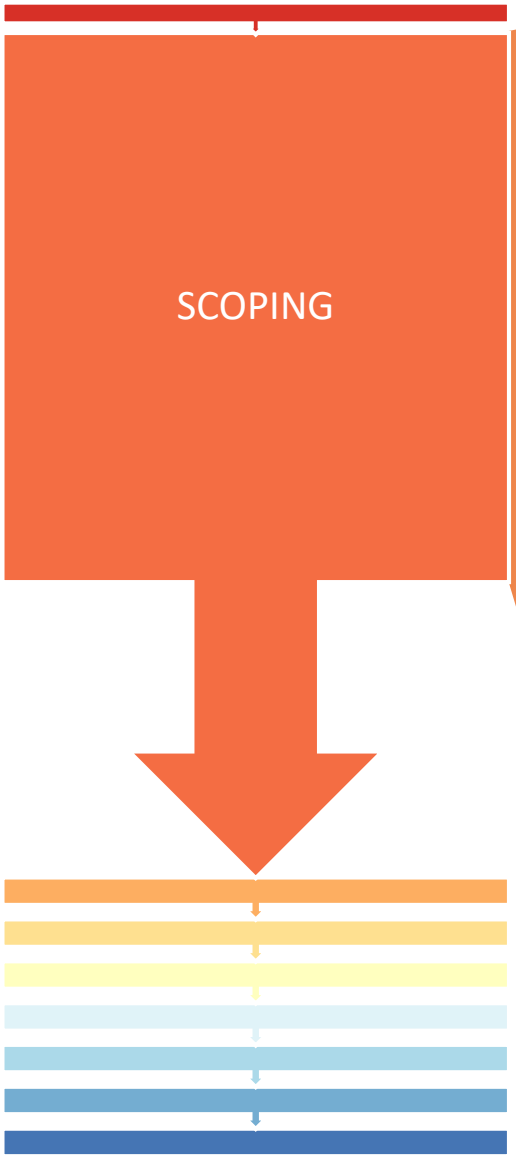




TENTATIVE FT PECK NEPA TIMELINE

For Discussion Only

TENTATIVE FT PECK NEPA TIMELINE



- Identify some potential measures to meet objectives
- Identify some important resources and potential impacts — JAN 2019
- Identify potential methodologies to assess benefits and impacts
- Begin Public Scoping Period — FEB 2019
- Public/Tribal/Agency meetings — FEB/MAR 2019
- Complete Public Scoping — MAR 2019
- Prepare Public Scoping Report — APR 2019

Report to MRRIC