Extension Science Plan

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PRRIP Science Lead

- EXECUTIVE SUMMARY
- ATTACHMENT #1: FIRST INCREMENT BIG QUESTION STATUS
- ATTACHMENT #2: CEMs & PRIORITY HYPOTHESES
- ATTACHMENT #3: IMPLEMENTATION ACTIVITIES & TIMELINE
- ATTACHMENT #4: ANALYSIS, SYNTHESIS, & DECISION-MAKING

PLATTE RIVER
RECOVERY IMPLEMENTATION PROGRAM

Executive Summary

Purpose

Objectives & Key Questions

Extension "Big Questions"

Extension Science Uncertainty "Parking Lot"

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Executive Summary – Extension Big Questions

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PRRIP Extension Big Questions (EBQ)
Extension Science Priority – Active Learning
EBQ #1 – How effective is it to use Program water to maintain suitable whooping crane roosting habitat?
EBQ #2 – How effective is Program management of Phragmites for maintaining suitable whooping crane roosting habitat?
EBQ #3 – Is sediment augmentation necessary to create and/or maintain suitable whooping crane habitat?
EBQ #4 – Does flow influence WC decision to stop or fly over the AHR?
EBQ #5 – Does flow influence WC stopover length within the AHR?
EBQ #6 – Why is spring WC use of the AHR greater than fall WC use?
EBQ #7 – What effect do Program flow management actions have on pallid sturgeon use of the lower Platte River?
Extension Science Priority – Maintenance Learning
EBQ #8 – How much of an effect does predation have on PP productivity?
EBQ #9 – How effective is Program management at mitigating losses of PP productivity due to predation?
EBQ #10 – Wet meadows research *(NOTE: this is a carryover task from the First Increment)*

Executive Summary – Uncertainties Parking Lot

Extension Science Uncertainties Parking Lot
What is the AHR contribution to overall WC fitness?
What is the importance of the AHR to WC survival in the fall migration versus the spring migration?
What are the effects of J2 hydro-stepping on WC use of the AHR?
What is the contribution of Program water management to wet meadow hydrology?
How important is it to WC to use Program water to avoid fish kills?
How does the impact of predation on PP productivity change as nesting sites age?
Are there enough forage resources at off-channel nesting sites to maintain PP productivity?

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Attachment 1: First Increment Big Questions Status

PRRIP Big Question	2019 Assessment	Reassessment Triggers
<u>Implementation</u> – Program Management Actions and Habitat		
1. Will implementation of SDHF produce suitable tern and plover riverine nesting habitat on an annual or near-annual basis?		On-channel nesting on natural sandbar habitat following peak flow event(s)
2. Will implementation of SDHF produce and/or maintain suitable whooping crane riverine roosting habitat on an annual or near-annual basis?		Relationship between flow and whooping crane habitat is an Extension focus – will be addressed directly.
3. Is sediment augmentation necessary for the creation and/or maintenance of suitable riverine tern, plover, and whooping crane habitat?		Big Question carried forward into Extension – will be addressed directly.
4. Are mechanical channel alterations (channel widening and flow consolidation) necessary for the creation and/or maintenance of suitable riverine tern, plover, and whooping crane habitat?		Relationship between mechanical management actions and whooping crane habitat is an Extension focus – will be addressed directly.
<u>Effectiveness</u> – Habitat and Target Species Response		
5. Do whooping cranes select suitable riverine roosting habitat in proportions equal to its availability?		Whooping crane habitat selection analysis will be rerun on a five-year interval to identify changes in selection.
6. Does availability of suitable nesting habitat limit tern and plover use and reproductive success on the central Platte River?		Greater than ??% drop in piping plover breeding pairs per acre of suitable OCSW habitat over XX? years.
7. Are both suitable in-channel and off-channel nesting habitats required to maintain central Platte River tern and plover populations?		Increase in on-channel nesting with corresponding decrease in off-channel nesting.
8. Does forage availability limit tern and plover productivity on the central Platte River?		Observations of emaciated adults/chicks and/or drop in productivity that is not attributable to weather or predation.
9. Do Program flow management actions in the central Platte River avoid adverse impacts to pallid sturgeon in the lower Platte River?		Pallid sturgeon questions will be directly addressed during the Extension as part of genetics and habitat research projects.
10. Do Program management actions in the central Platte River cumulatively 1) produce detectable changes in the physical environment (i.e. habitat) and 2) result in a detectable increase in tern, plover, and whooping crane use of the Associated Habitats?	**<u>LTPP Off-Channel</u>** Habitat:  Species Response:  **<u>WC On-Channel</u>** Habitat:  Species Response: 	• LTPP Off-Channel: Greater than ??% drop in piping plover breeding pairs per acre of suitable OCSW habitat over XX? years. • WC On-Channel: Decreasing trend in proportion of the population using the AHR over XX? Years.

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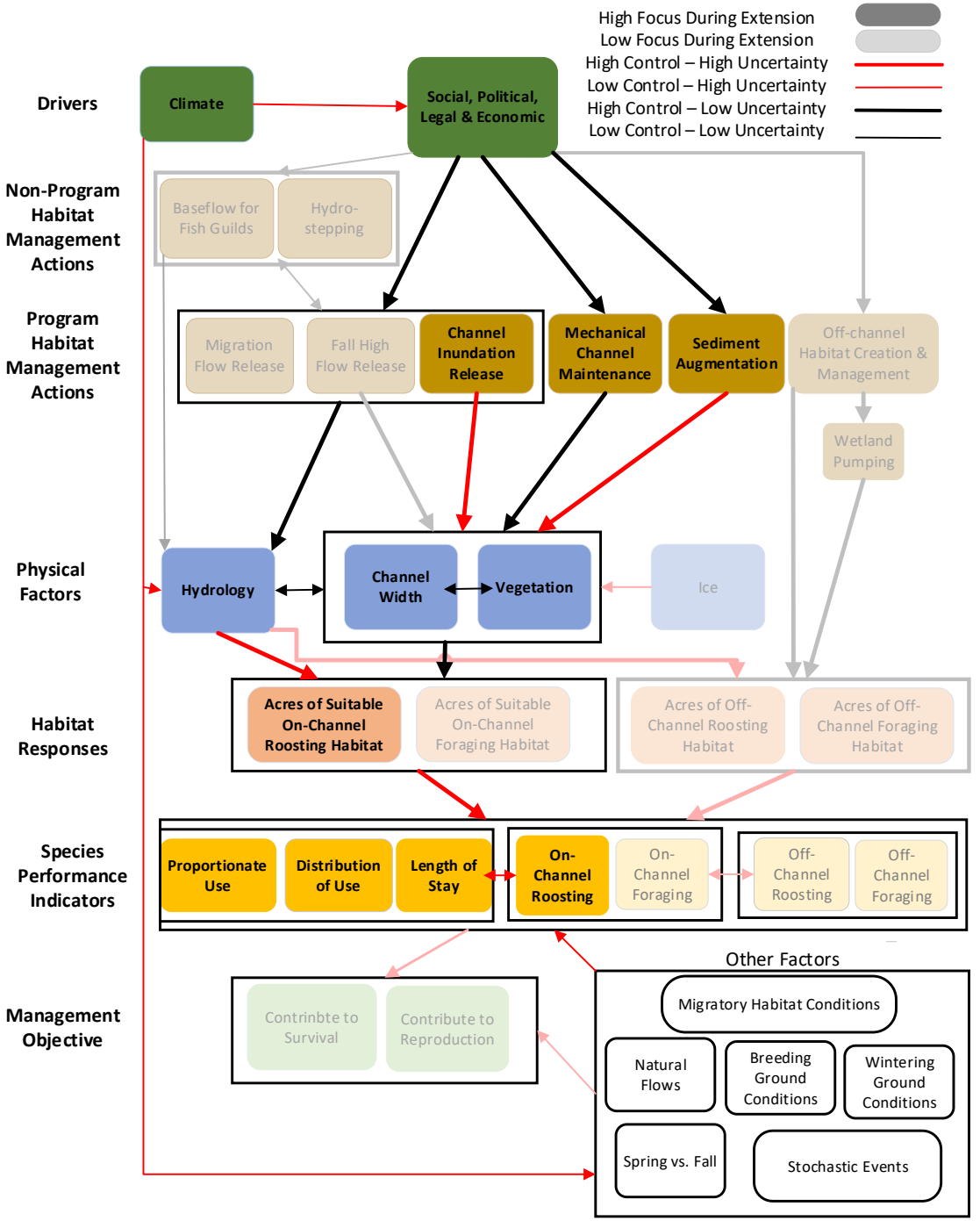
Attachment 2: Conceptual Ecological Models & Priority Hypotheses



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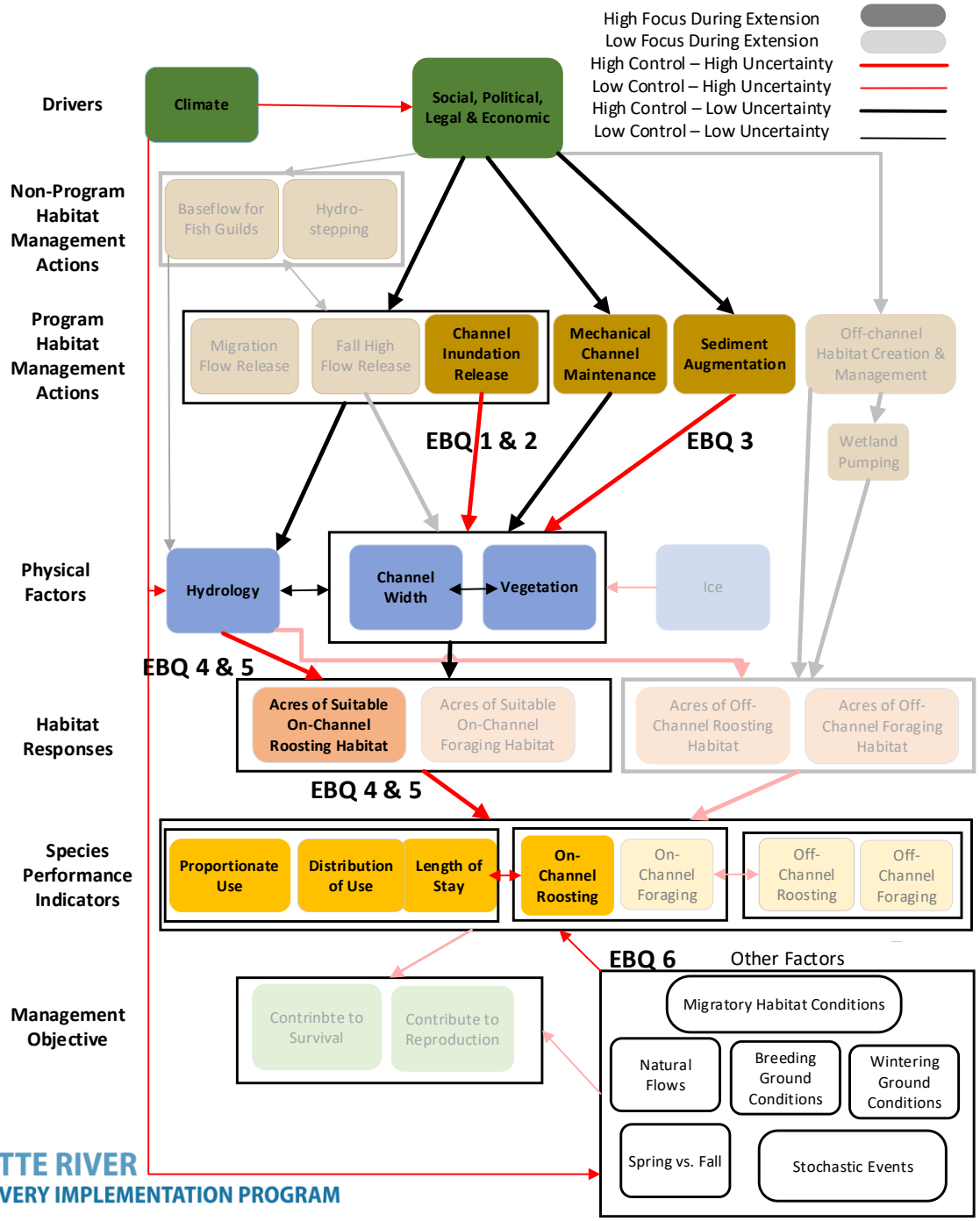

PRRIP Extension Big Questions (EBQ) & Priority Hypotheses (H)
Extension Science Priority – Active Learning
EBQ #1 – How effective is it to use Program water to maintain suitable whooping crane roosting habitat?
Management H: During drought periods, 30-day minimum germination suppression releases (2,000 cfs target between June 1-July 15) will slow vegetation expansion into the channel and increase the percent of AHR channel that remains highly suitable for whooping crane roosting.
EBQ #2 – How effective is Program management of Phragmites for maintaining suitable whooping crane roosting habitat?
Management H: During drought periods, 30-day minimum channel inundating flow releases (2,000 cfs target between June 1-July 15) in combination with continued herbicide spraying will slow *Phragmites* rhizome/stolon expansion into the channel and increase the percent of AHR channel that remains highly suitable for whooping crane roosting.
EBQ #3 – Is sediment augmentation necessary to create and/or maintain suitable whooping crane habitat?
Management H: Full scale sediment augmentation (60,000 – 80,000 tons annually in south channel below J2 Return) is necessary to offset the sediment deficit and halt narrowing and incision.
EBQ #4 – Does flow influence WC decision to stop or fly over the AHR?
Management H: Probability of a whooping crane stopping and roosting within the AHR (vs. flying over) is a function of discharge.
EBQ #5 – Does flow influence WC stopover length within the AHR?
Management H: Length of WC stopover within the AHR is a function of discharge.
EBQ #6 – Why is spring WC use of the AHR greater than fall WC use?
Management H: WC use of the AHR in the Spring vs. the Fall is a function of discharge, with higher use occurring in the Spring concurrently with higher discharge.

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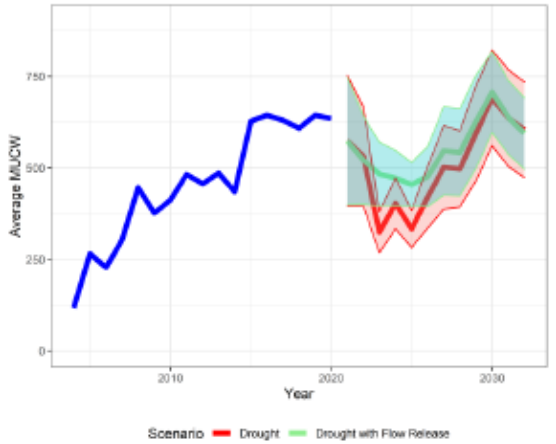
Extension Big Question #1: How effective is it to use Program water to maintain suitable* whooping crane roosting habitat?

**Channels with ≥ 650 ft maximum width unobstructed by dense vegetation (MUCW) are highly suitable for whooping crane roosting.*

Management Hypothesis: During drought periods, 30-day minimum germination suppression releases (2,000 cfs target between June 1-July 15) will slow vegetation expansion into the channel and increase the percent of AHR channel that remains highly suitable for whooping crane roosting. *Assumes ongoing Phragmites spraying. Program science strongly indicates that natural peak flow events exceeding 13,000 cfs or mechanical vegetation clearing are necessary to remove vegetation and increase MUCW. Germination suppression releases are only hypothesized to maintain unvegetated width.*

X-Y Graph



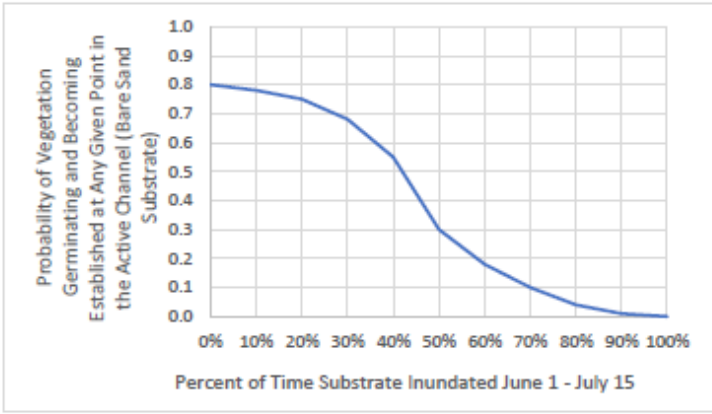
Based upon the Program's machine learning model, it is hypothesized that channel-inundating flow releases for at least 30 days (June 1-July 15; target 2,000 cfs) will suppress seed germination and slow loss of MUCW during drought periods absent natural peak flows of sufficient magnitude (>13,000 cfs) to naturally maintain and/or increase MUCW.

Alternative Hypotheses:

- 30-day inundation between June 1 – July 15 is insufficient – must maintain release throughout growing season
- The 2,000 cfs target is too much or too little to maintain suitable MUCWs.
- Hydrocycling increases/decreases effectiveness of germination suppression release
- Insufficient water and/or conveyance capacity to implement release.
- Ongoing *Phragmites* spraying (herbicide application) is primarily responsible for channel width maintenance by controlling rate of vegetation establishment. Herbicide kills vegetation and flow subsequently removes islands/dead standing biomass via lateral erosion.
- Mechanical vegetation clearing is necessary to maintain suitable MUCWs.
- Fall SDHF will scour < 1 year old seedlings and maintain suitable MUCWs.

Underlying Physical Process Hypothesis: Vegetation germination and establishment is a function of percent of time bare sand substrate is inundated (30-day period between June 1 – July 15).

X-Y Graph



Probability of seed germination at any given point in the active channel decreases with increasing percent of time bare sand substrate is inundated by > 0.1 ft during the period of June 1 – July 15. Preventing seed germination eliminates colonization by species such as cottonwoods, willows and reed canarygrass that become visual obstructions and initiate transition from unvegetated sandbar to vegetated island.

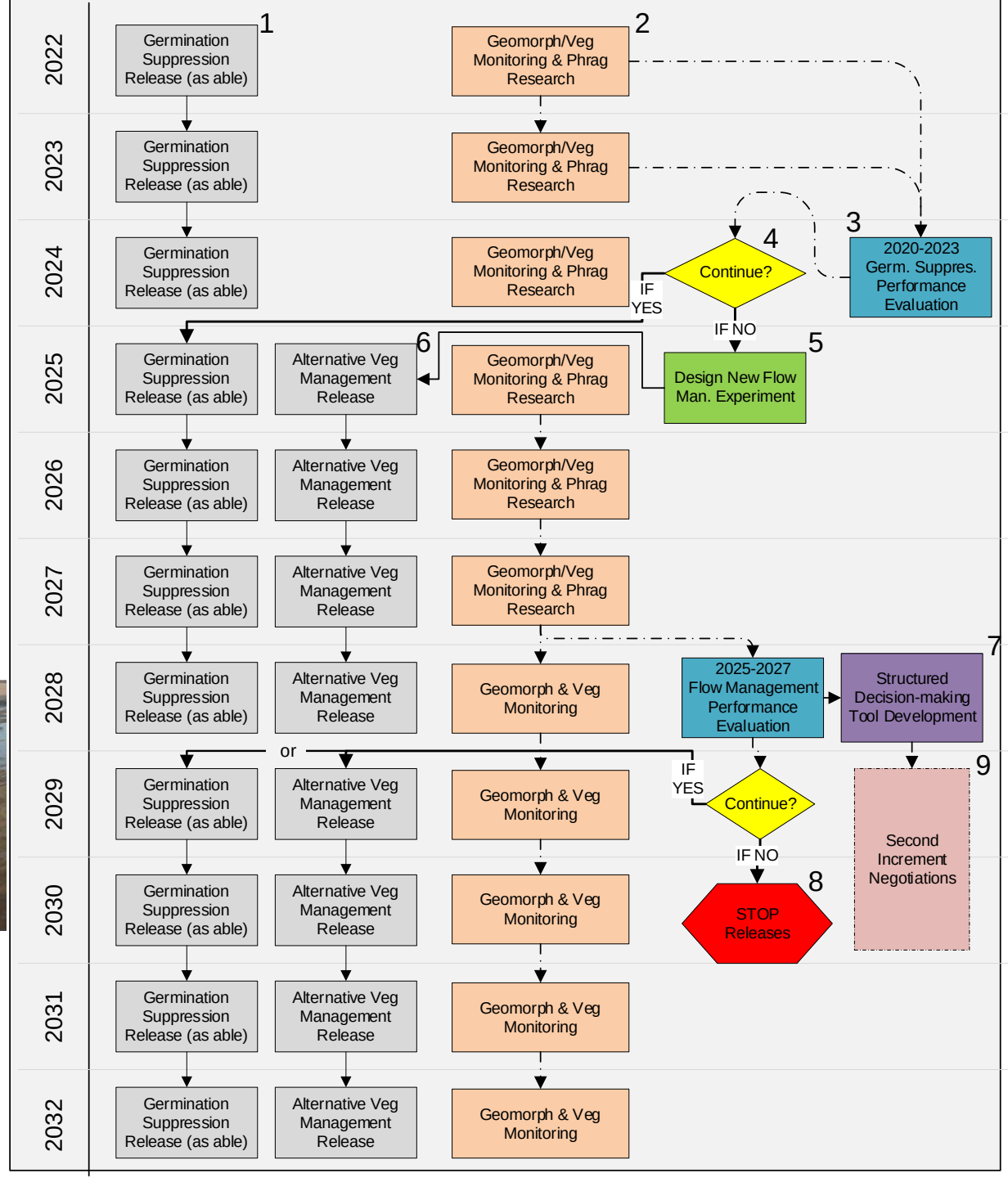
Alternative Hypotheses:

- 30-day inundation (2,000 cfs target) between June 1 – July 15 is insufficient. Seedlings that germinate during July – September sufficient to initiate the transition to vegetated island.
- Seedlings germinate in May. June inundation insufficient to kill newly established seedlings and prevent transition to vegetated island.
- Vegetation establishment not important – herbicide application prevents transition to vegetated islands.
- Vegetation establishment not important - mechanical vegetation removal prevents transition to vegetated islands.
- Spring to summer vegetation establishment not important – fall SDHF prevents transition to vegetated island.

Implementation Notes:

Implement germination suppression flow release annually for 2 – 5 years and monitor to determine effectiveness. Effectiveness will be assessed via annual geomorphology and in-channel vegetation monitoring to determine relationship between inundation and vegetation establishment as well as by comparison of observed and predicted MUCW changes from machine learning model. During this period, portions of Program habitat complexes may be "reset" by spraying and mechanical removal of newly vegetated islands.

Attachment 3: Implementation Activities & Timeline



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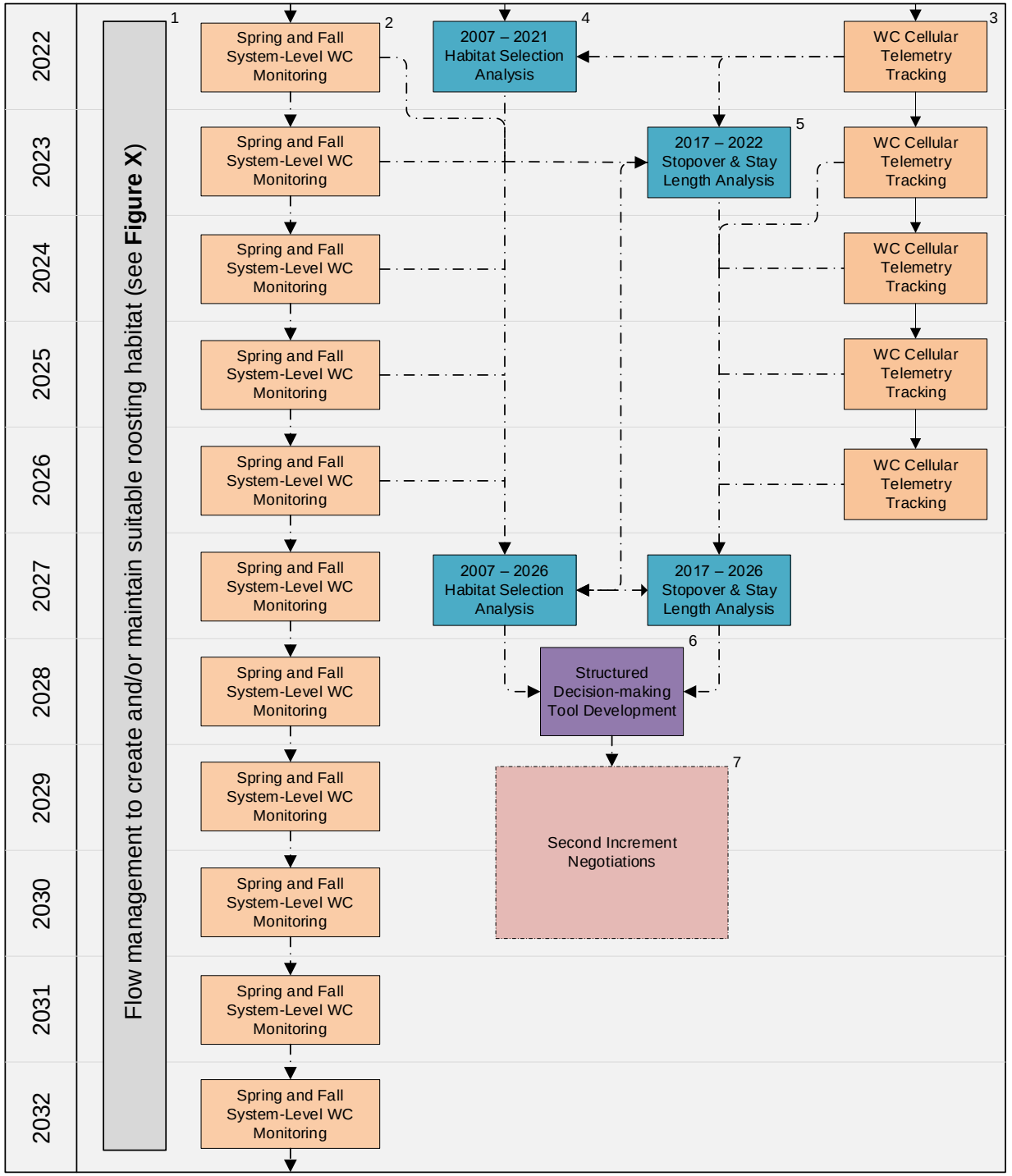

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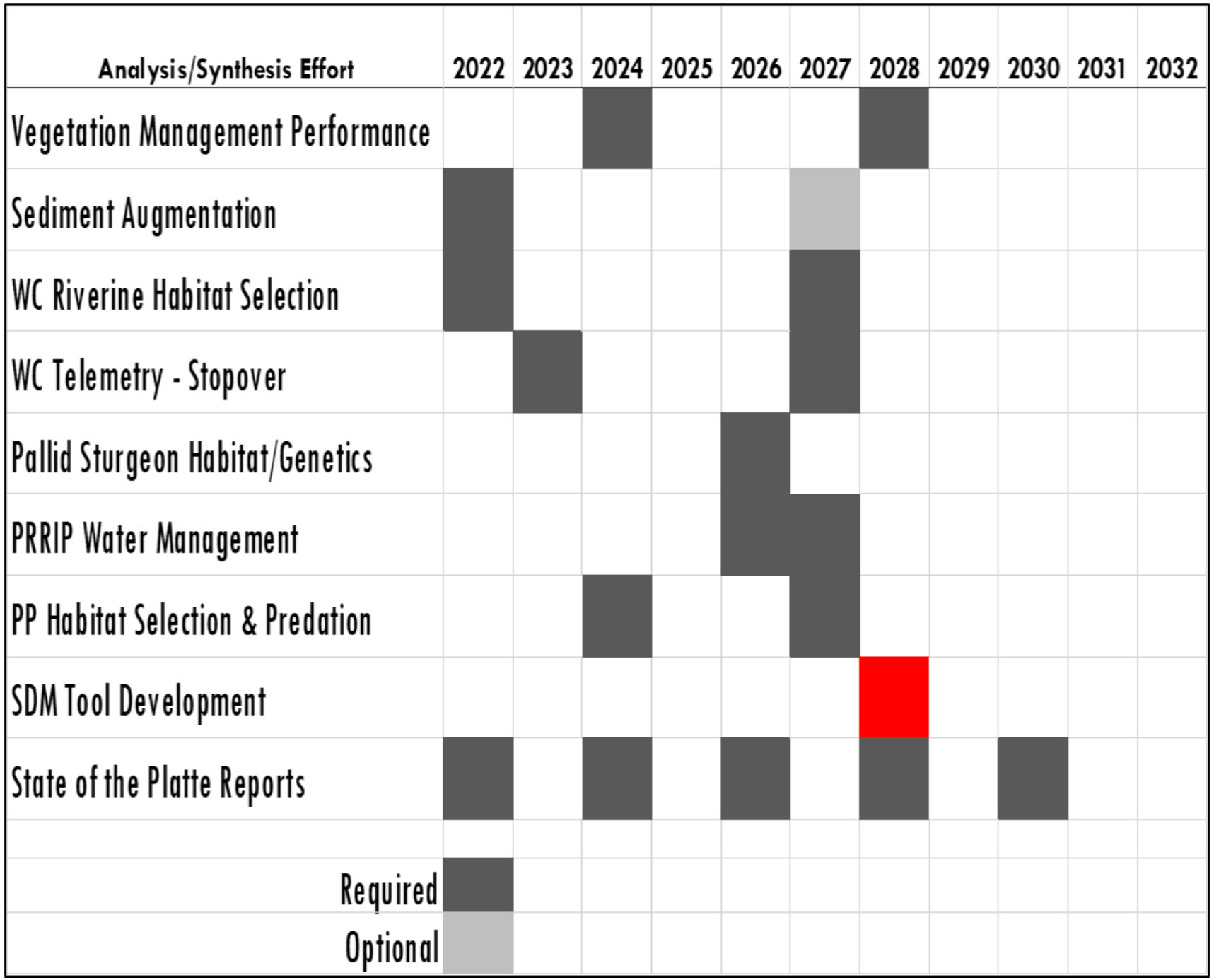

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