Extension Science Plan
AMWG Review of Progress

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Interior Least Tern and Piping Plover –

- What are the impacts of predation on productivity?
- What are impacts of site age and potential reduction of wetted shoreline forage resources on plover productivity?

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Whooping Cranes -

- Water maintenance of unobstructed channel width?
- Conditions associated with stopovers vs. flyovers?
- Are WC that stop along AHR more fit?
- Conditions influencing length of stay?
- Impact of hydro-stepping on WC use of AHR?
- Importance of AHR in Spring and Fall?

Additional Uncertainties -

Phragmites

- How effective have previous Program control efforts (flow, spraying) been?
- How much do growing season flows influence Phragmites expansion/control?

Wet Meadows

- How do Program flow releases influence wet meadow hydrology?
    - Where does it work and where doesn't it? Why?

Knezevic et al. 2008

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Other Species of Concern -

- How does Program management influence other species of concern?
  - Program needs USFWS and GC formal guidance on how to proceed with this question.

Notes: Regal Fritillary Female (left), image from Great Pains Nature Center. Regal Fritillary Male (right), image from Iowa State University.

Bergren Tract – Chapman Complex, 2020

Adapted from "Butterfly Garden.net.

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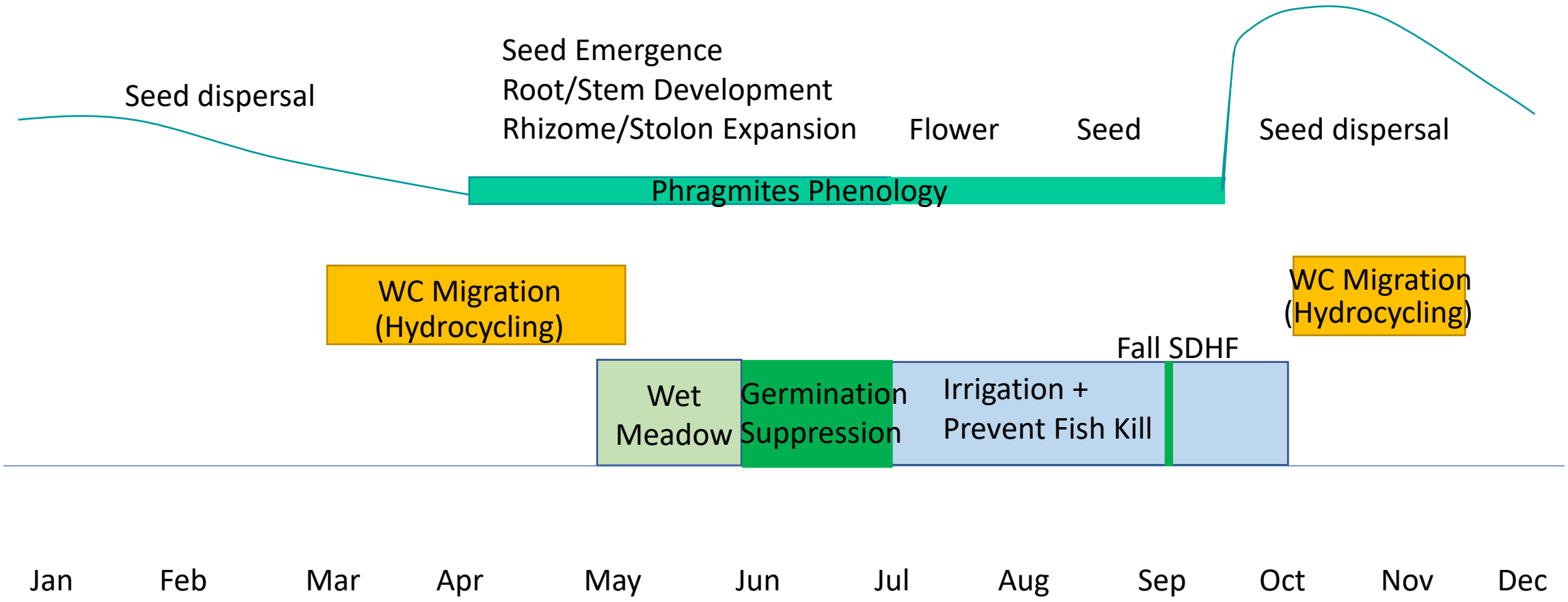
Alternative Uses for Water



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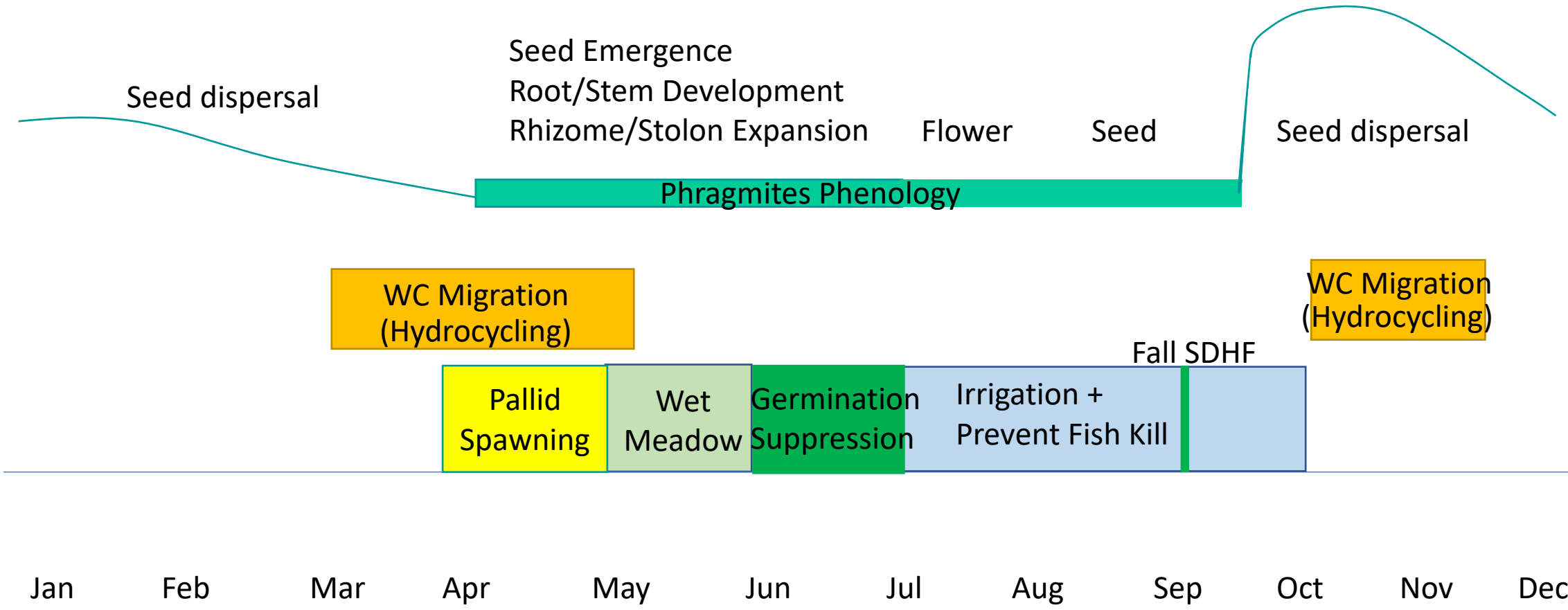

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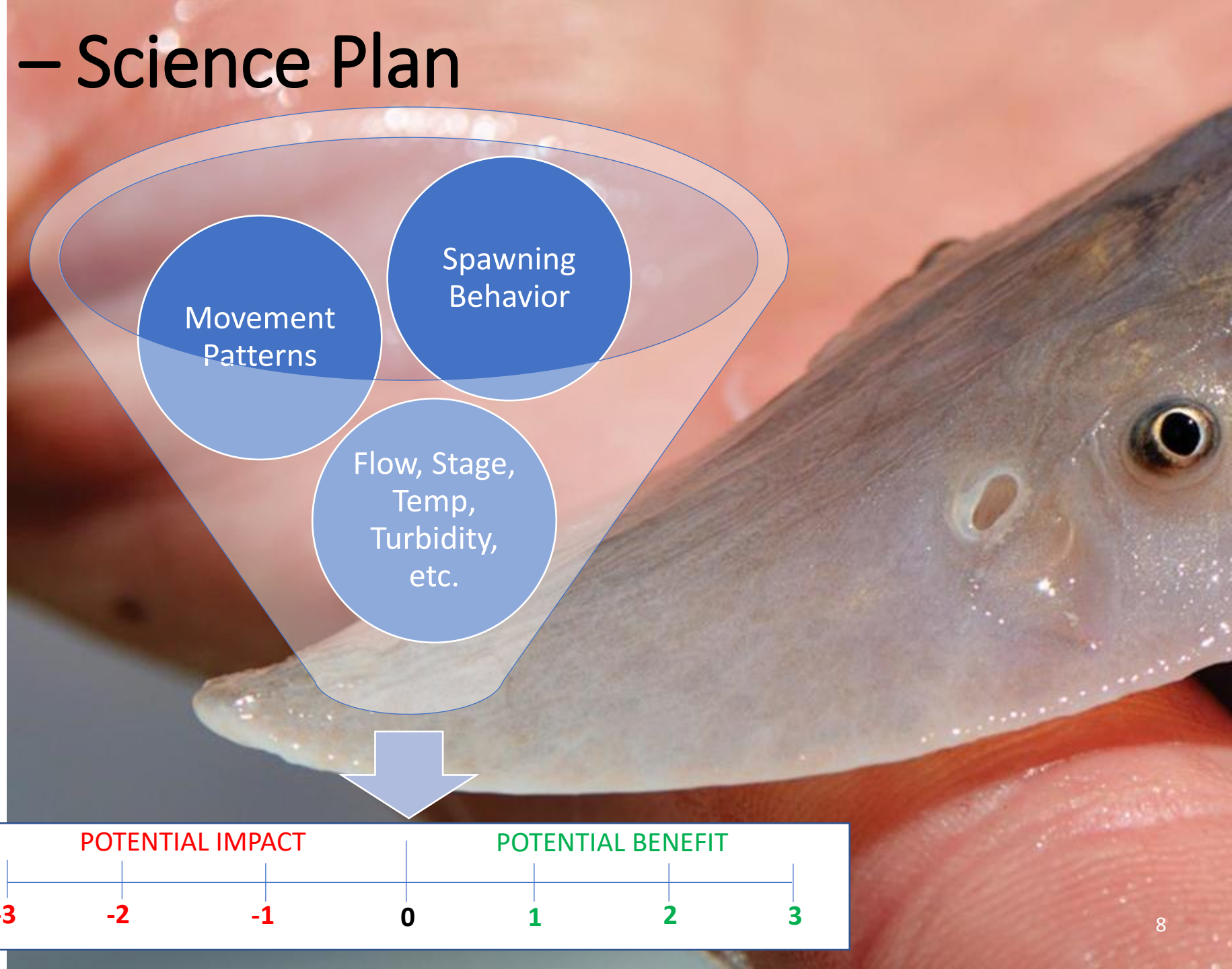
Pallid Sturgeon – Science Plan

Step 1: Habitat, Spawning, & Genetic Research

Step 2: PRRIP Water Management Study

Step 3: PRRIP Water Management



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First Draft Extension Science Plan

- CEMs and supporting materials
- General & Management Hypotheses
  - Alternatives
  - Predicted relationships

Not included:

Pallid sturgeon

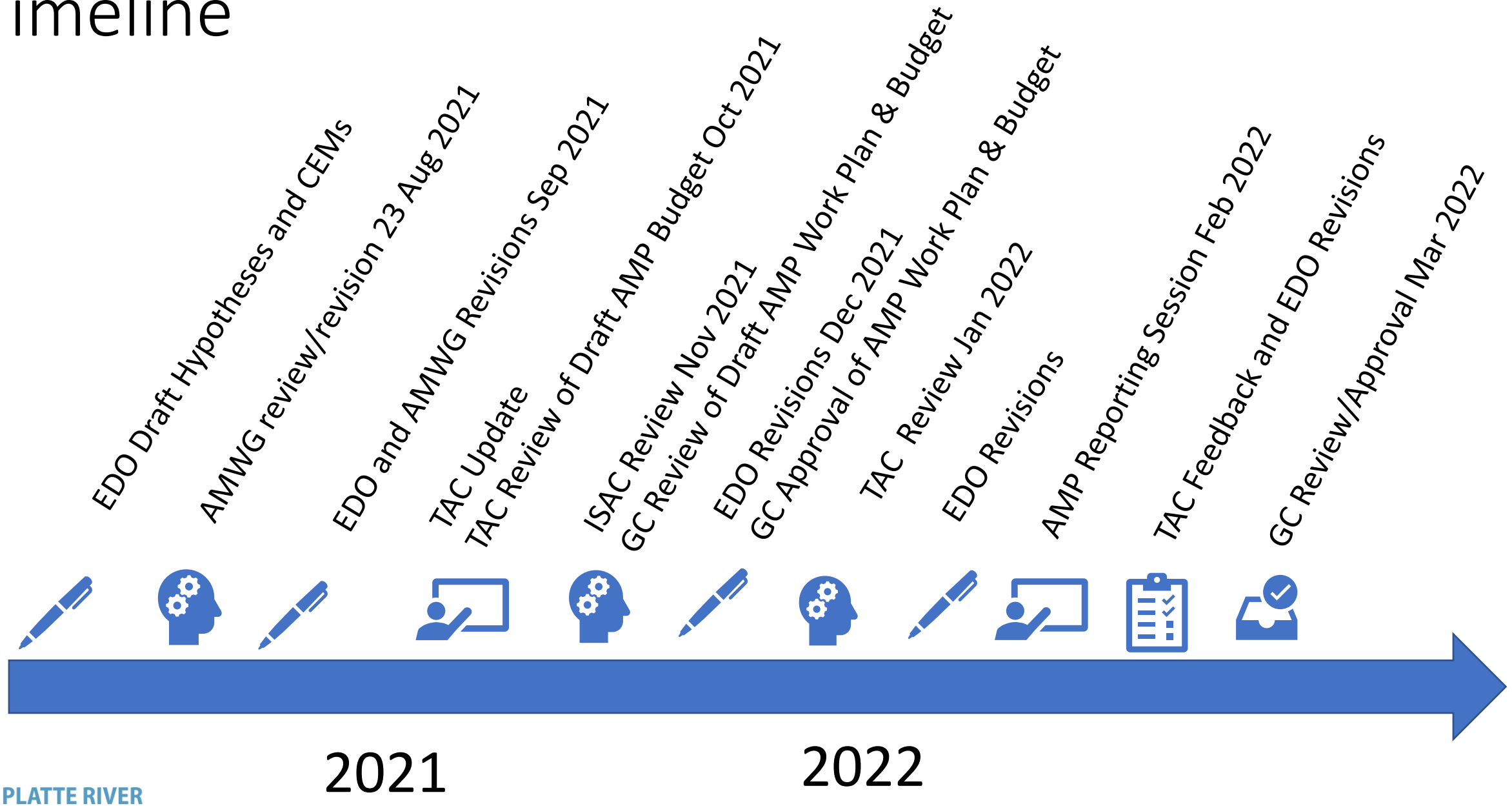
Maintenance of fish guilds for WC forage

Objective: Prioritization

- Need to know (1-3)
- Nice to know (Put in the back)
- Already know

Please rank hypotheses in order of importance (1 – Highest, 22 – Lowest) for learning during the Extension.
Uncertainty: How much of an effect does predation have on PP productivity?
General Hypothesis **PP1:** Predation is responsible for significant reductions in plover productivity and poses a significant threat to sustaining sufficient long-term plover productivity within the AHR.
Management Hypothesis: **PPM2:** Predator fencing enclosing nesting sites and/or predator deterrent lights are necessary for sustaining sufficient long-term plover productivity within the AHR.
General Hypothesis **PP3:** Predation increases as sites age.
Management Hypothesis **PPM4**: Allowing OCSW sites to "rest" intermittently is necessary to reduce losses to predation and sustain sufficient long-term plover productivity within the AHR.
Uncertainty: Are there enough forage resources at off-channel nesting sites to maintain PP productivity?
General Hypothesis **PP5:** Additional forage resources are needed along wetted OCSW shorelines to sustain sufficient long-term plover productivity within the AHR.
General Hypothesis **PP6:** Site age reduces forage availability along wetted shorelines at OCSW nesting sites.
Management Hypothesis **PPM7**: Allowing OCSW sites to "rest" intermittently is necessary to allow for replenishment of shoreline forage availability and to sustain sufficient long-term plover productivity within the AHR.
Uncertainty: Can we use Program water to maintain suitable WC roosting habitat?
Management Hypothesis: **WCM1:** Low-magnitude, long-duration flow releases of 1,200 – 2,400 cfs during the germination period can be used to maintain suitable unobstructed channel width for WC roosting when large natural peak flows do not occur?
Management Hypothesis **WCM2**: Late summer short-duration high flow releases of 5,000 – 8,000 cfs for 3 days can be used to create and/or maintain suitable unobstructed channel width for WC roosting?
Uncertainty: Management of *Phragmites*.
Management Hypothesis **WCM3**: Annual spraying of *Phragmites* is necessary to create and/or maintain suitable unobstructed channel widths for WC roosting.
Uncertainty: What conditions influence whether a WC will stop or fly over the AHR?
General Hypothesis **WC4**: Time of day is the primary driver of WC stopovers with probability of use increasing with decreasing time until dark.
Management Hypothesis **WCM5**: Probability of WC stopping within the AHR increases with increasing flow until flow reaches 1,800 cfs and declines with increasing flow above 2,000 cfs.
Uncertainty: What conditions influence how long a WC will stop on the AHR?
General Hypothesis **WC6**: Length of stay at previous stopover is primary driver of WC stopover length with length of stay increasing with decreasing length of stay at previous stopover.
Management Hypothesis **WCM7**: Length of WC stopover within the AHR increases with increasing flow until flow reaches 1,800 cfs and declines with increasing flow above 2,000 cfs.
Uncertainty: AHR contributions to WC fitness.
General Hypothesis **WC8**: WC that stop within the AHR are more likely to successfully complete migration (spring and fall), have higher survival rates, and reproduce more successfully than those that fly over the AHR.
General Hypothesis **WC9**: WC with longer stopovers within the AHR are more likely to successfully complete migration (spring and fall), have higher survival rates, and reproduce more successfully than those with shorter stopovers.
Uncertainty: What is the importance of the AHR to WC survival in the fall vs. the spring?
General Hypothesis **WC10**: Survival rates differ between WC that stop over in the fall vs. spring.
Management Hypothesis **WCM11**: Prioritizing flow releases during the fall WC migration will increase survival more than flow releases during the spring migration.
Uncertainty: What is the impact of hydro-stepping on WC use of the AHR?
General Hypothesis **WC12**: WC length of stay and/or roost locations are influenced by daily flow variability.
Management Hypothesis **WCM13:** Reducing or eliminating hydro-stepping by maintaining flows at 1500 cfs during spring and fall WC migration will increase the length of WC stopovers and/or increase use of the western segments of the AHR for WC roosting.
Uncertainty: Program management of river flow to maintain wet meadow hydrology.
General Hypothesis **WC14**: Natural peak flows from March 1 – June 30 have the largest effect on wet meadow hydrology.
Uncertainty: How do Program management actions affect non-target listed and non-listed species of concern (species to be identified by USFWS and NGPC)?
General Hypothesis **NT/NL1**: Program water and land management actions provide benefits to non-target listed and non-listed species of concern.

Timeline



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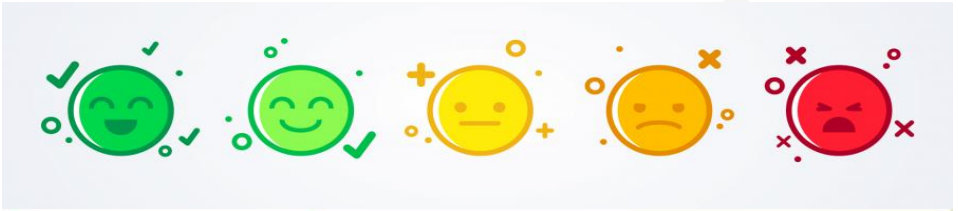
Meeting Review and Wrap-Up

- Meeting Feedback
- Action Items

<u>Upcoming meetings</u>:

- GC *In-Person* Quarterly Meeting – **September 14-15, 2021** @ Kearney, NE
- TAC *In-Person* Quarterly Meeting - **October 13, 2021**, @ Kearney, NE
- ISAC Virtual Quarterly Meeting – **November (TBD), 2021**
- GC Special Session – **November 10, 2021**
- GC Quarterly Meeting – **December 7-8, 2021** @ Denver, CO



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