

Adaptive Management
Working Group Meeting
9 March 2021

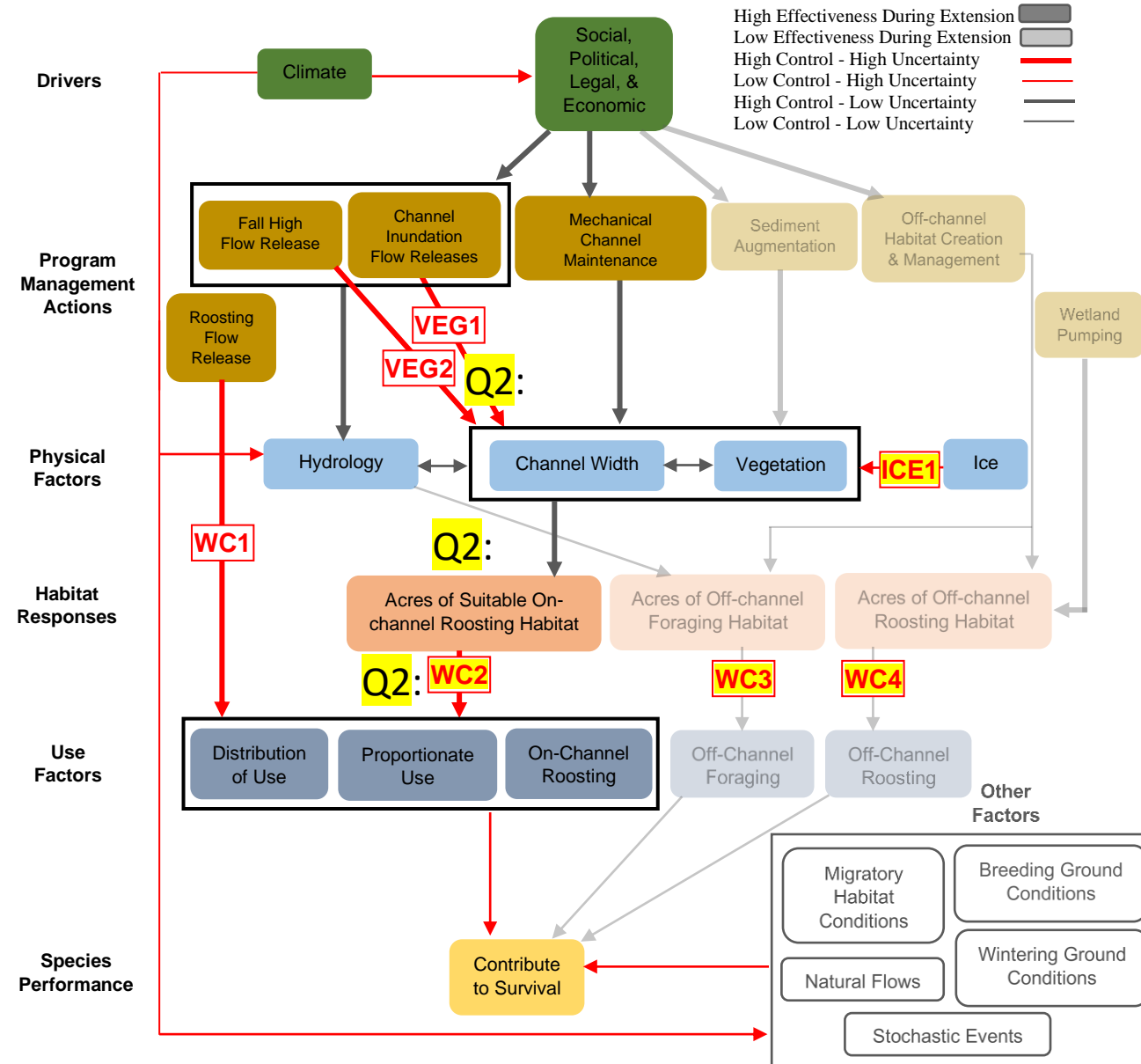
Platte River Recovery
Implementation Program



Whooping Cranes – Potential BIG QUESTIONS

- Q1: What are the conditions that influence whether a WC will stop or flyover the CPR?
- Q2: Can we use water to make UOCW for WC use?
 - a) Can we use SDHF (Fall) to maintain UOCW?
Does anyone still want to test SDHF? If so, need to pose the specific question.
 - b) Can we use germination suppression flows (Spring/Summer) to maintain UOCW?
- Q4: Are WC that stop on the CPR more fit?
- Q3: What are the conditions that influence length of stay on the CPR?

Figure 2. Whooping Crane Conceptual Ecological Model



Whooping Cranes – Potential BIG QUESTIONS

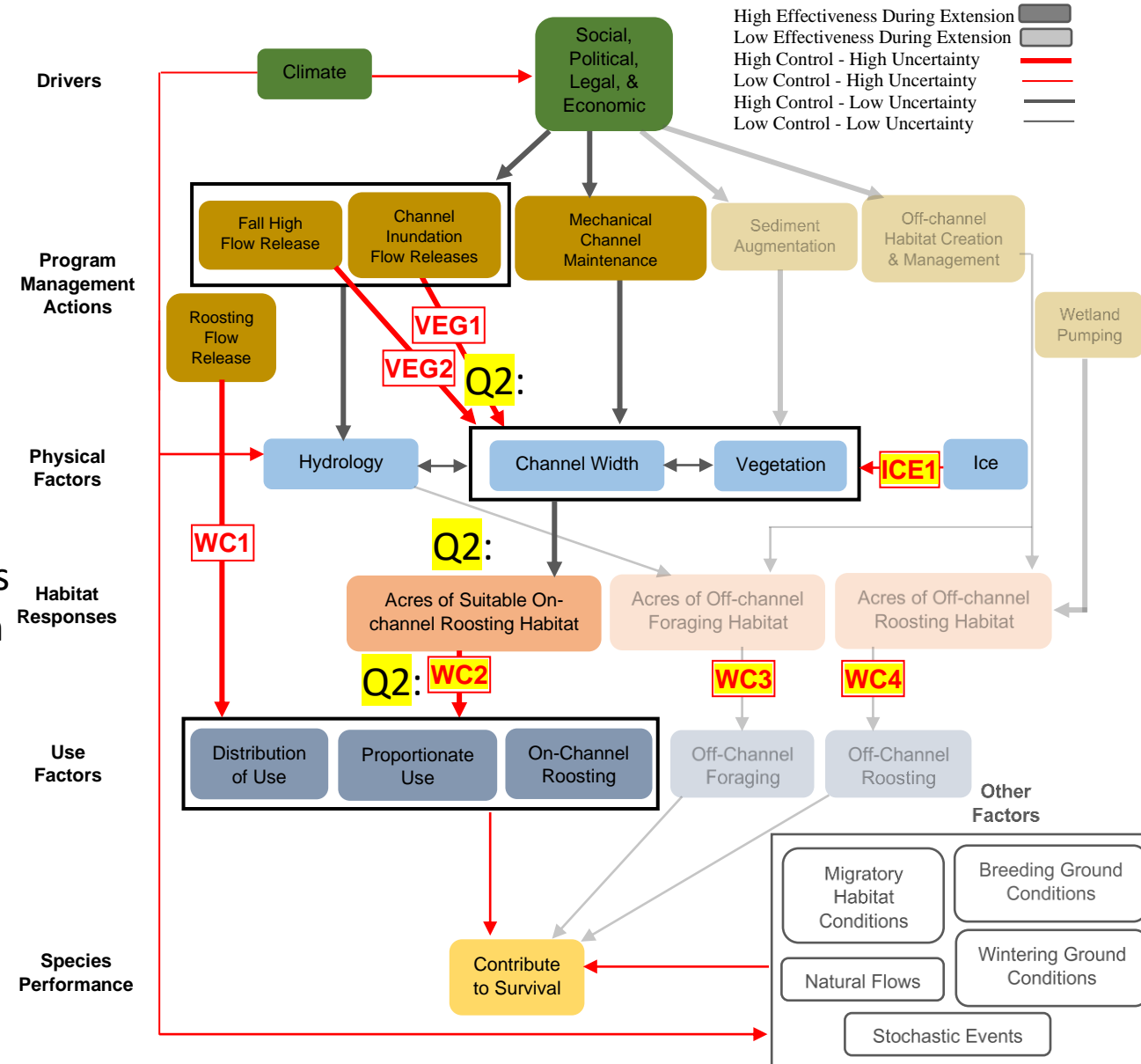
- **Q2: Can we use channel inundation to suppress germination and maintain UOCW?**
 - What do we already know?
 - What else could be important?
 - What hypotheses to test?
 - How to test these hypotheses?

Whooping Cranes – Potential BIG QUESTIONS

Q2: Can we use channel inundation to suppress germination and maintain UOCW?

- **Target species**
- **Duration – For how long?**
- **Timing – When? Frequency?**
- **Magnitude – How much water do we need? Depth? Volume?**
- **Can we do it? Do we have the volume/operations capacity to do it even through drought?**

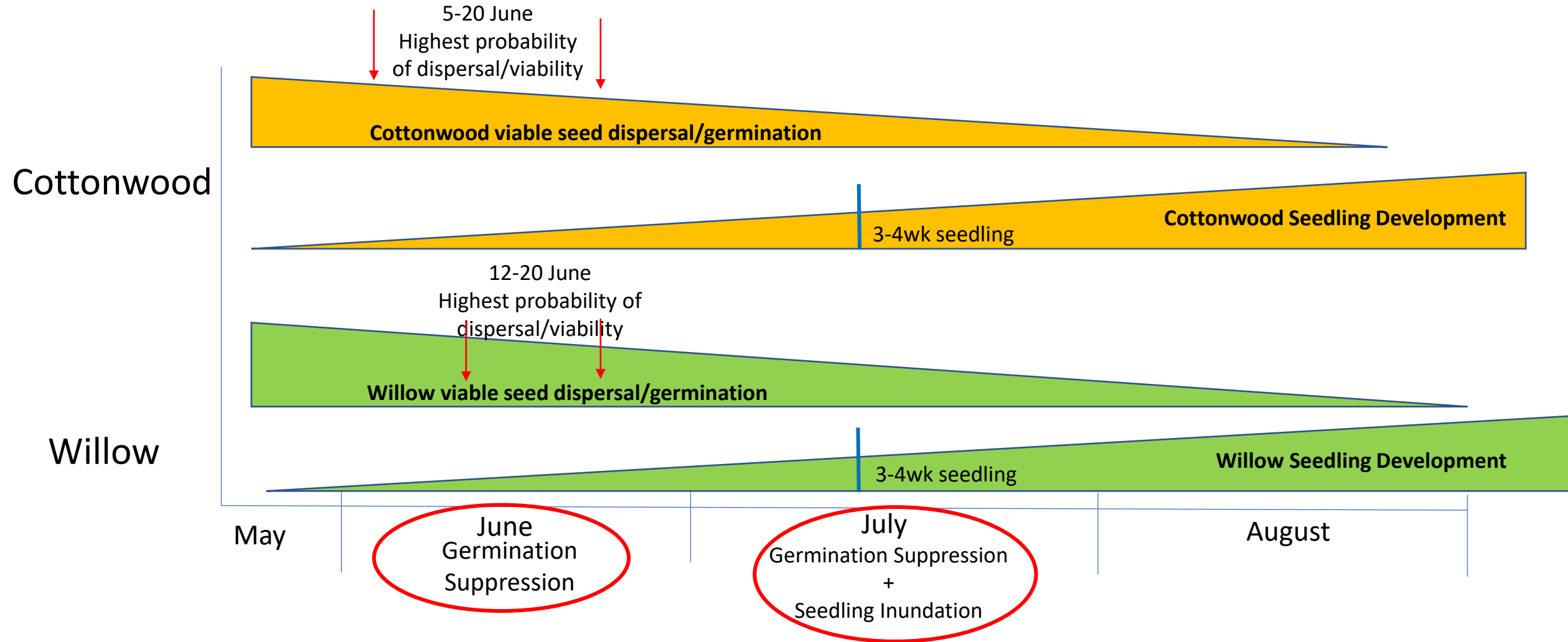
Figure 2. Whooping Crane Conceptual Ecological Model



Utilize modeling
Representative reaches
Develop testable hypotheses
Reflect stepwise progression
Program Actions to Results

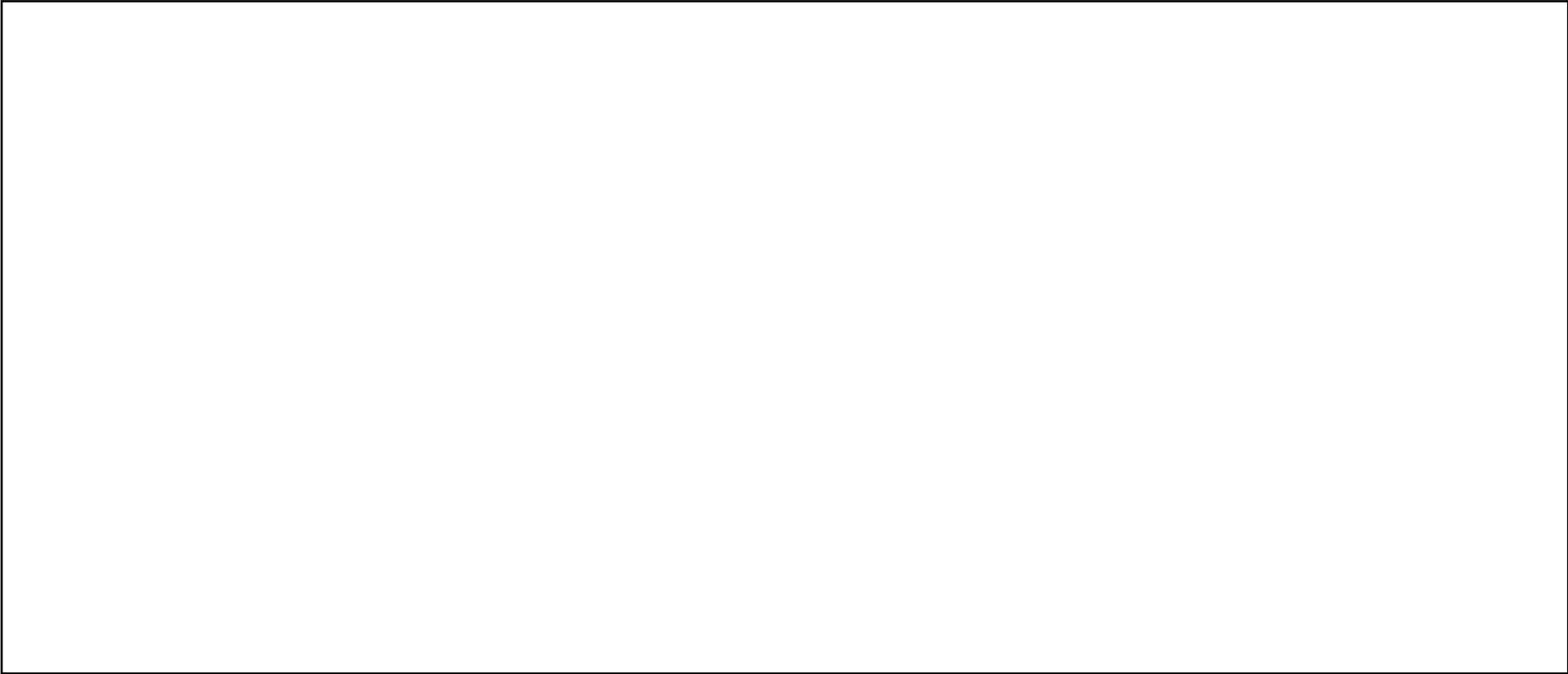
Timing

Germination Suppression vs. Seedling Inundation



Hypothesis: Introduce your hypothesis, independent and dependent variables on each axis.
What data support this hypothesis? What are the mechanisms that connect independent variables to the response you predict?

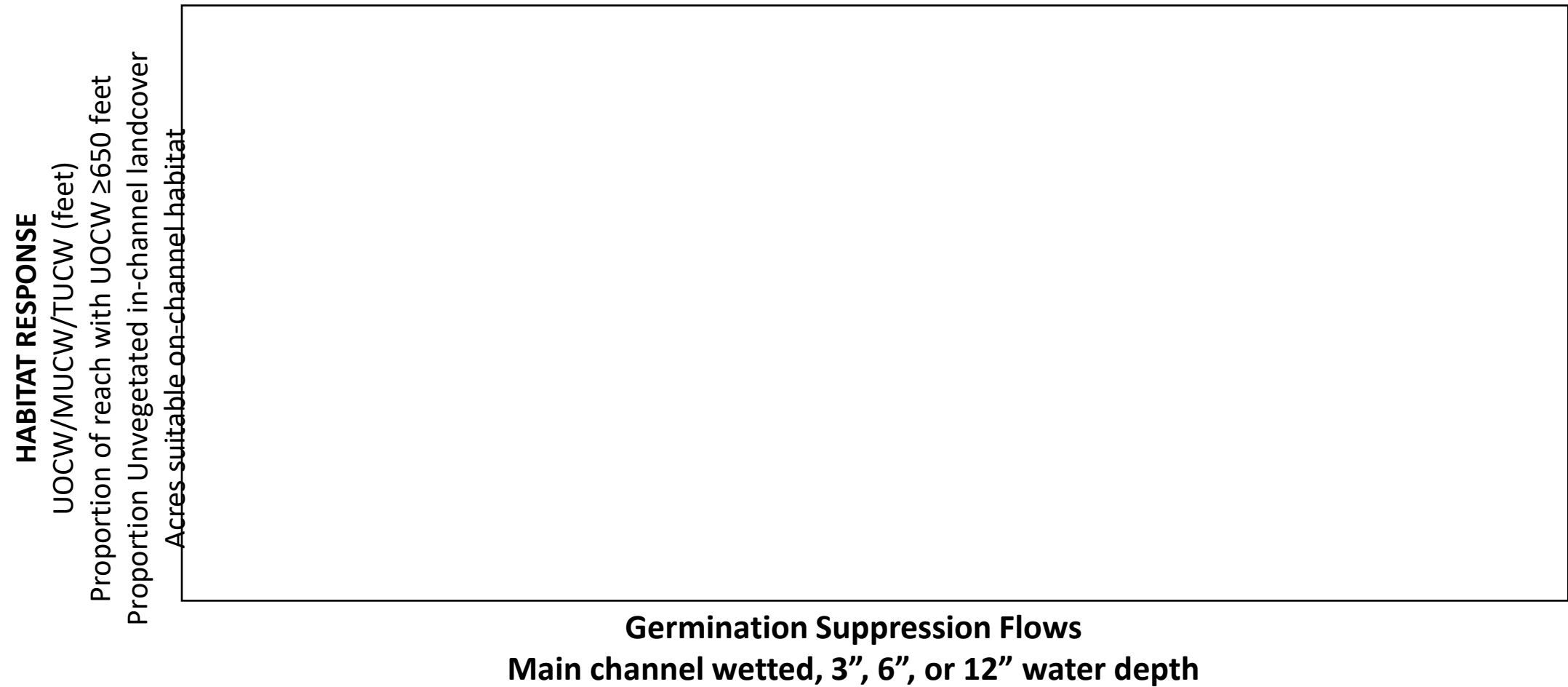
Proportion of main channel wetted,
3", 6" and 12" water depth



Germination Suppression Flow

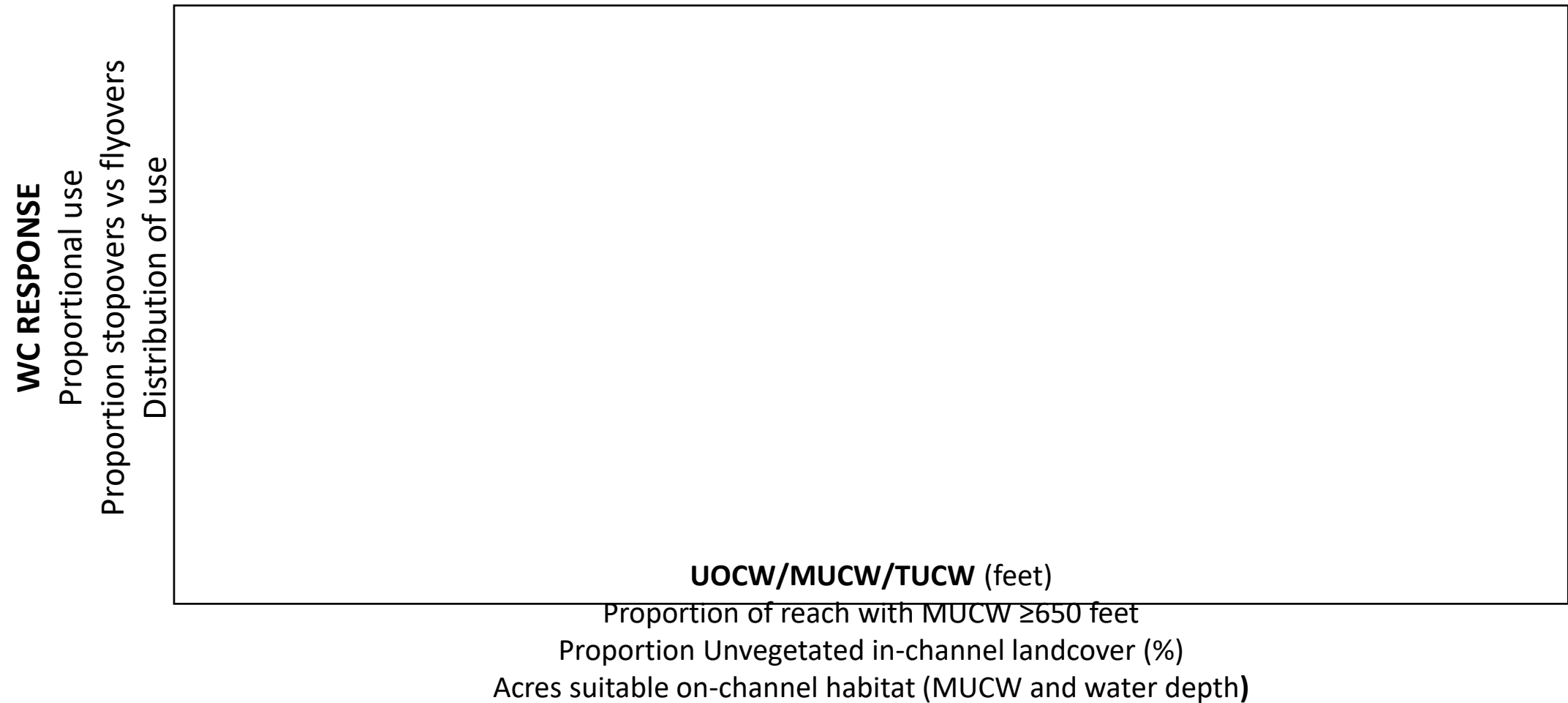
Description/Link to Program Management:
How is this hypothesis linked to Program management?

Hypothesis: Introduce your hypothesis, independent and dependent variables on each axis.
What data support this hypothesis? What are the mechanisms that connect independent variables to the response you predict?



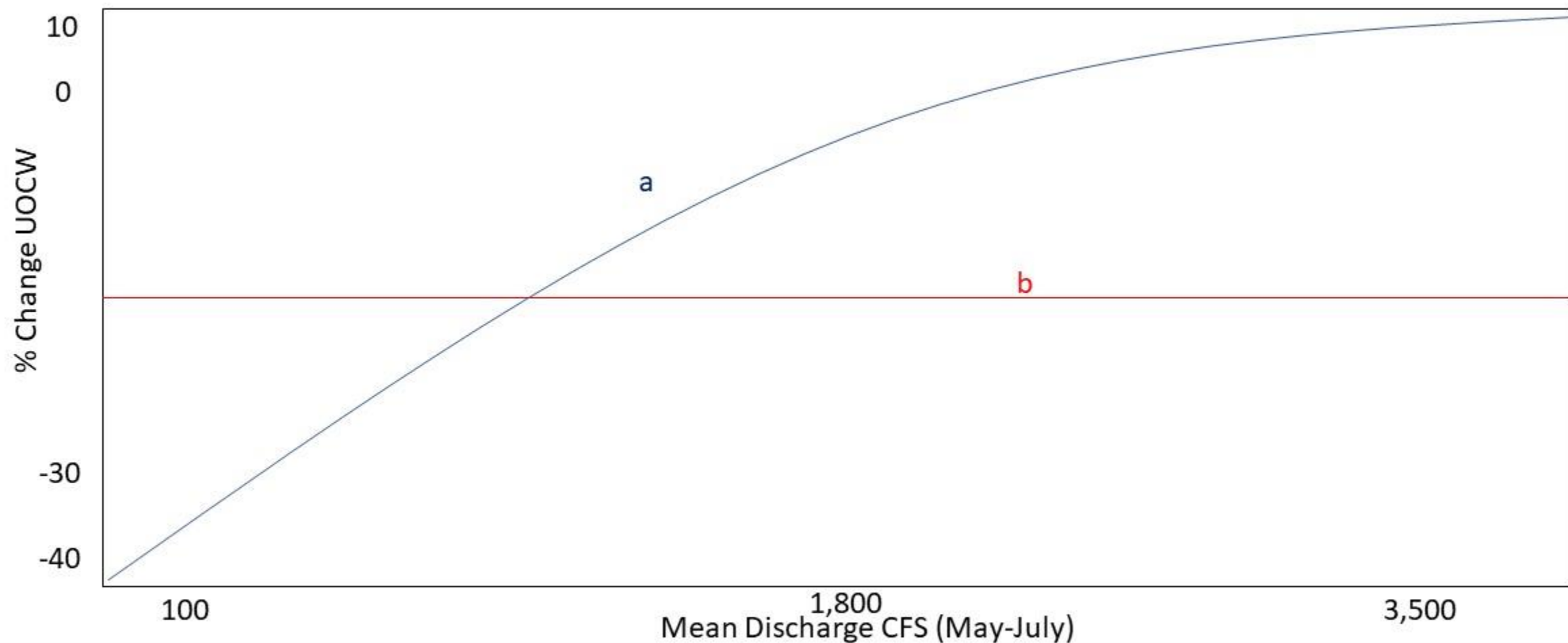
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Description/Link to Program Management:
How is this hypothesis linked to Program management?

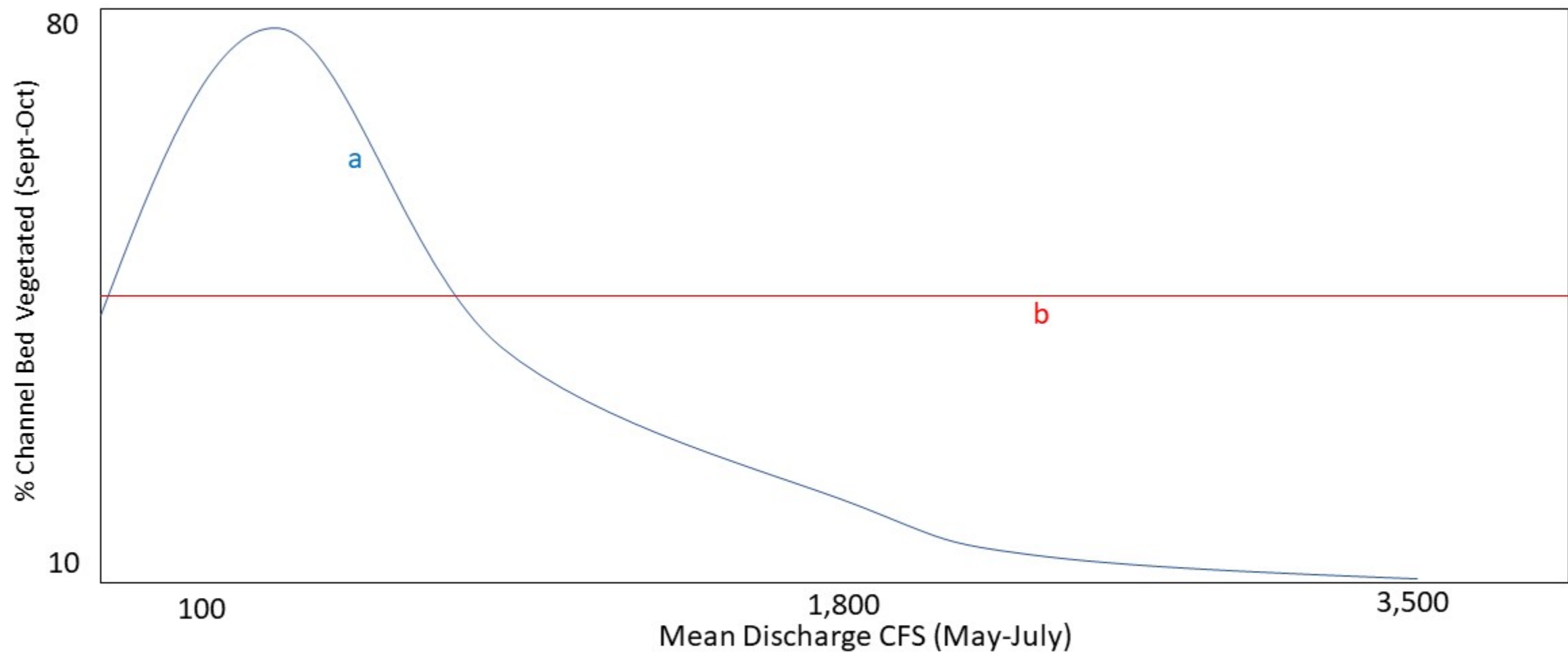
Hypotheses: Mean discharge from 15 May to 15 July has a positive and non-linear relationship with percent change in unobstructed channel width as measured in the fall (October) compared to the previous year holding all else constant (e.g., diking effort).



Description/Link to Program Management:

- a) Increased flows during this period would limit losses in unobstructed channel widths and the PRRIP could act accordingly to maintain UOCWs appropriate for WHCRs.
- b) There is no relationship between germination prevention flows and unobstructed channel width.

Hypothesis: The percent of the active channel in which vegetation becomes established during the growing season (measured at end of growing season: Sept.-Oct.) demonstrates a generally inverse but non-linear relationship to mean discharge from 15 May and 15 July holding all else constant (e.g., diking effort).



Description/Link to Program Management:

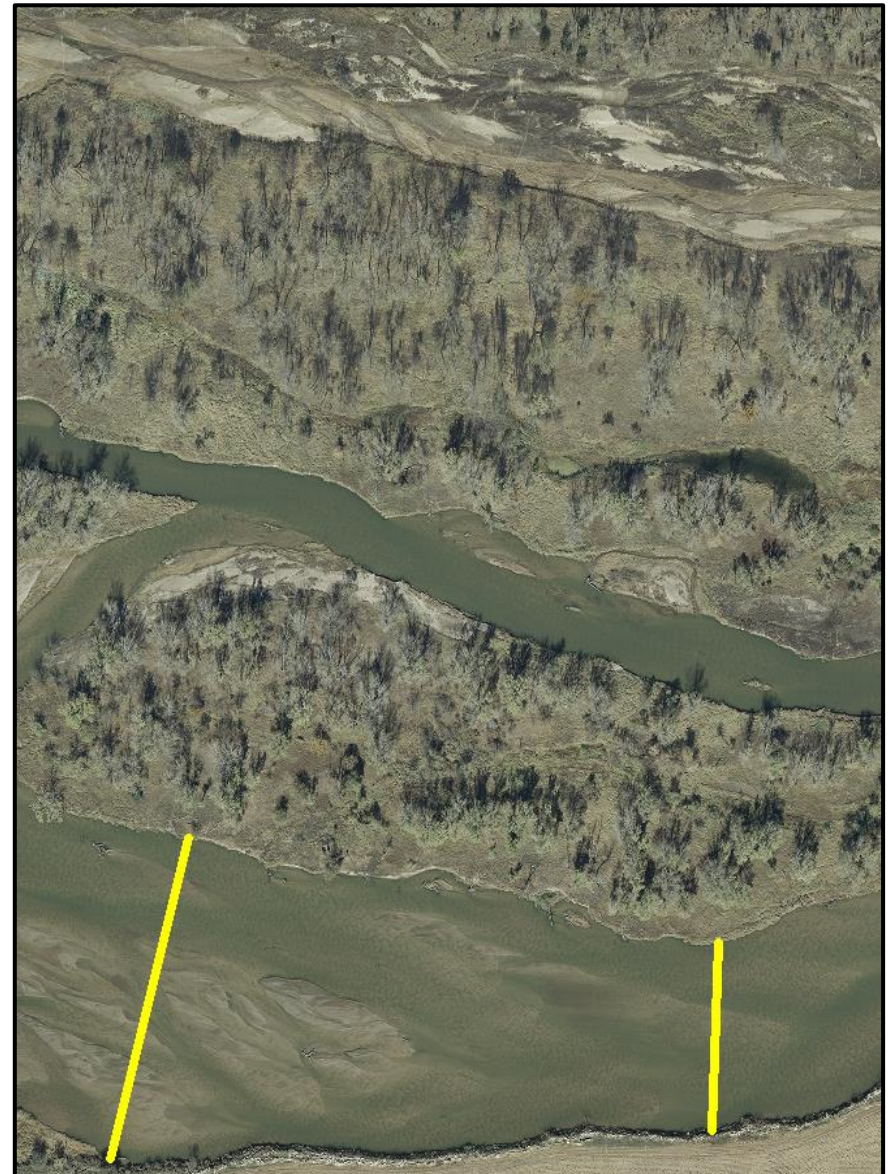
- a) Vegetation is more likely to become established when “wet sand” conditions predominate from 15 May to 15 July than when the river is very dry or when annual mean discharge is exceeded during this period. Over a certain threshold (e.g., >300 cfs) there is an inverse relationship between vegetation establishment and mean seasonal discharge. The PRRIP can use water to maintain UOCWs appropriate for WHCRs.
- b) There is no relationship between May-July river discharge and vegetation establishment within the active channel bed at the end of the growing season (Sept.-Oct.)

Main Channel

Total Unobstructed Channel Width = TUCW

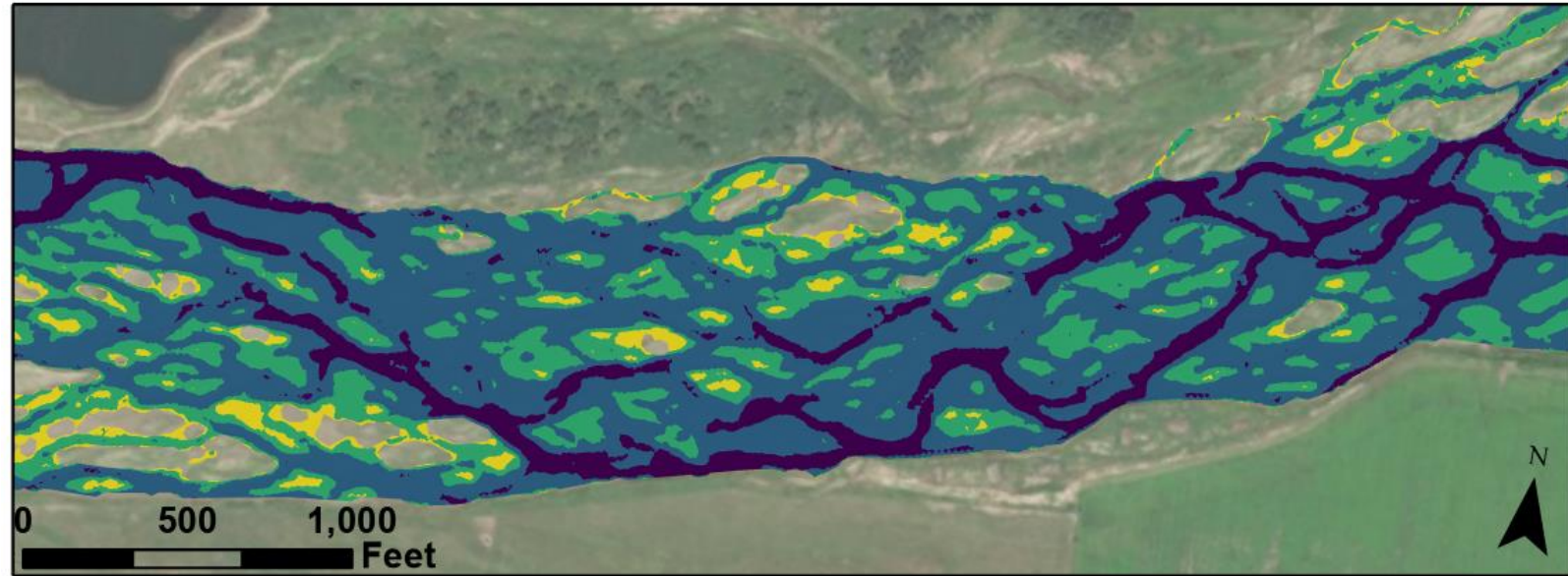


Maximum Unobstructed Channel Width = MUCW

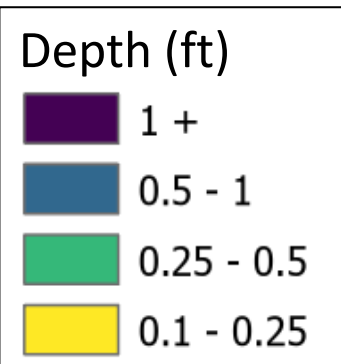
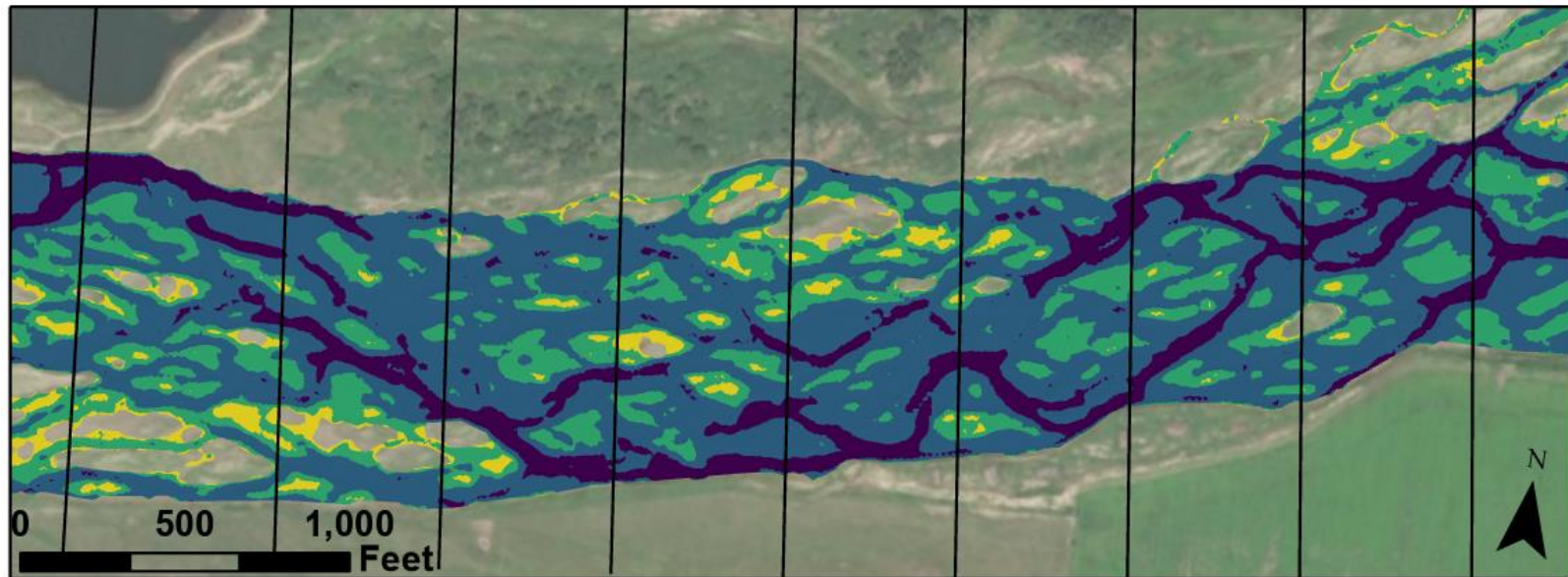


Rowe Sanctuary
1500 cfs TIN

+

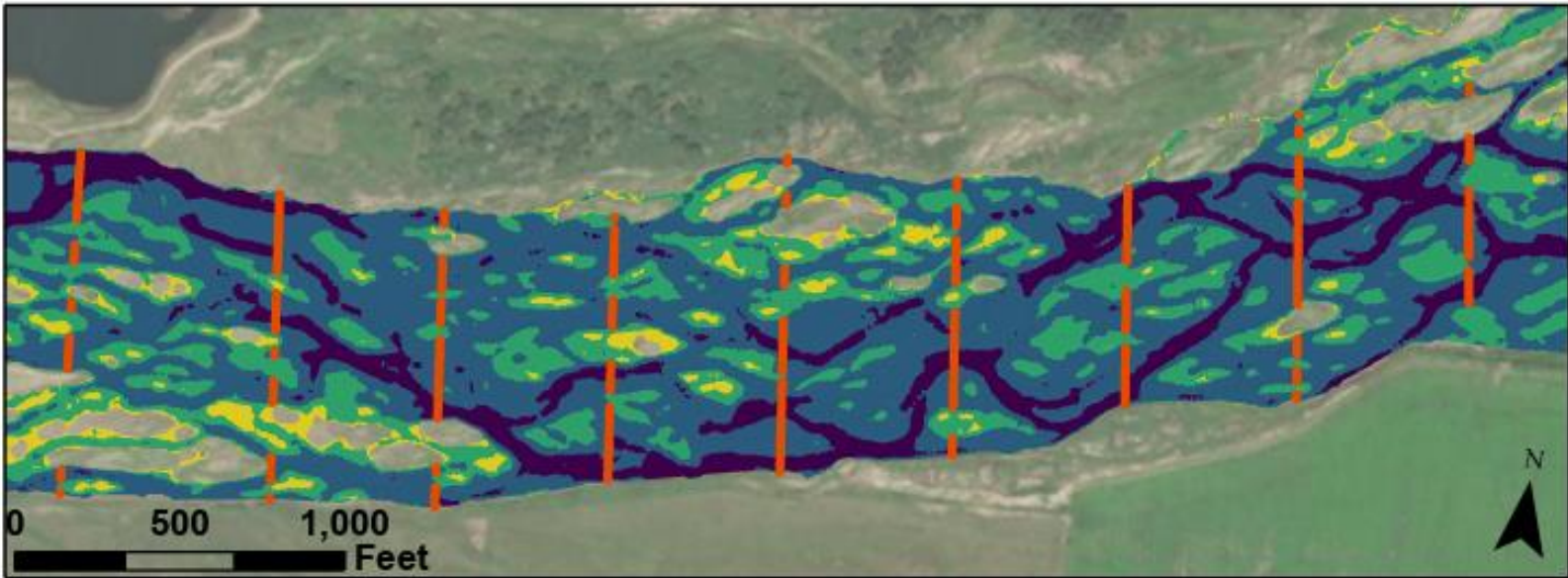


Cross-station
lines

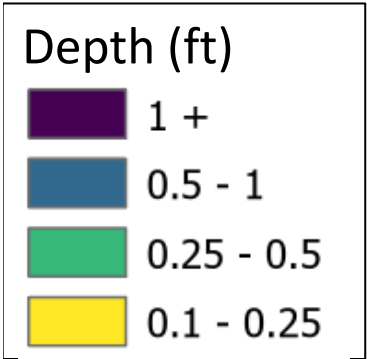
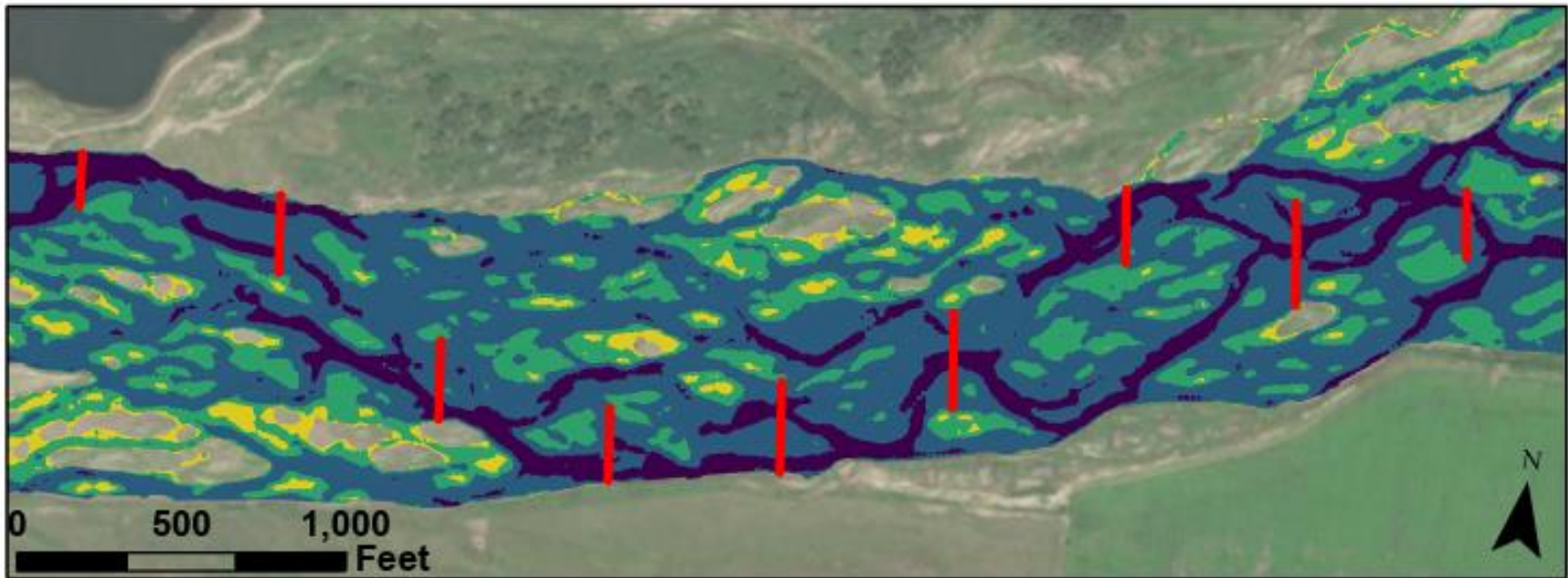


Rowe Sanctuary 1500 cfs, at 0.5 ft inundation

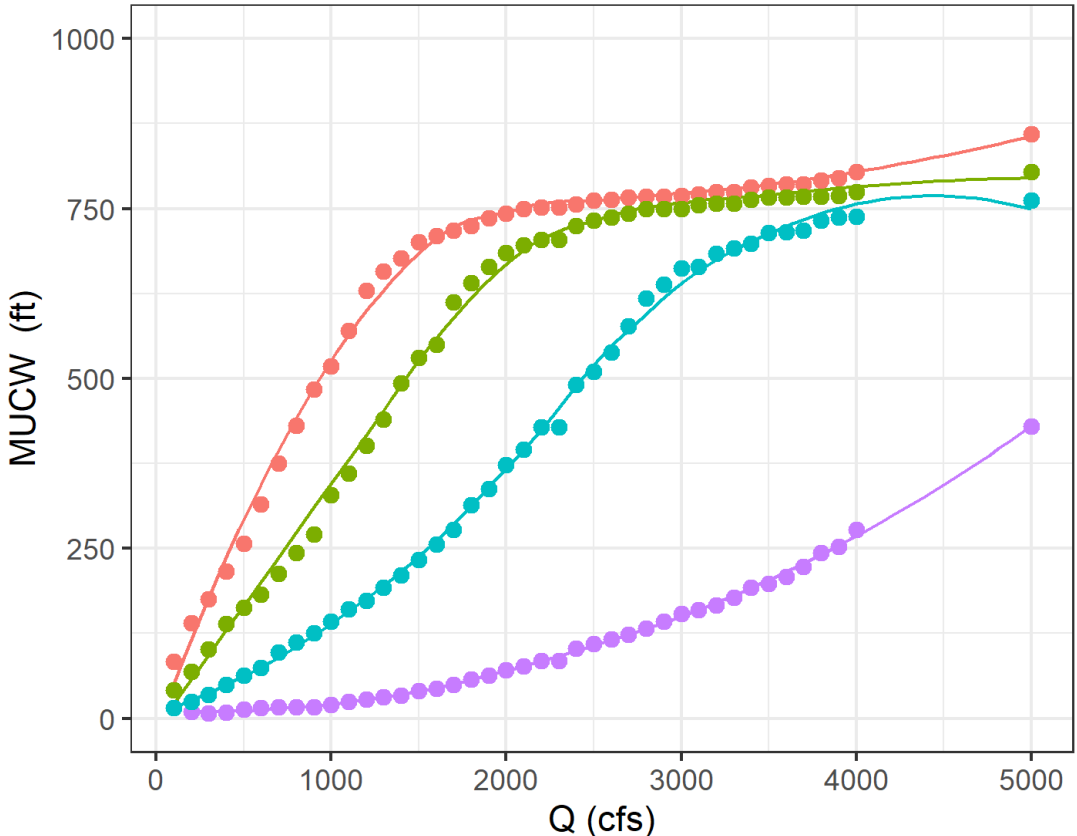
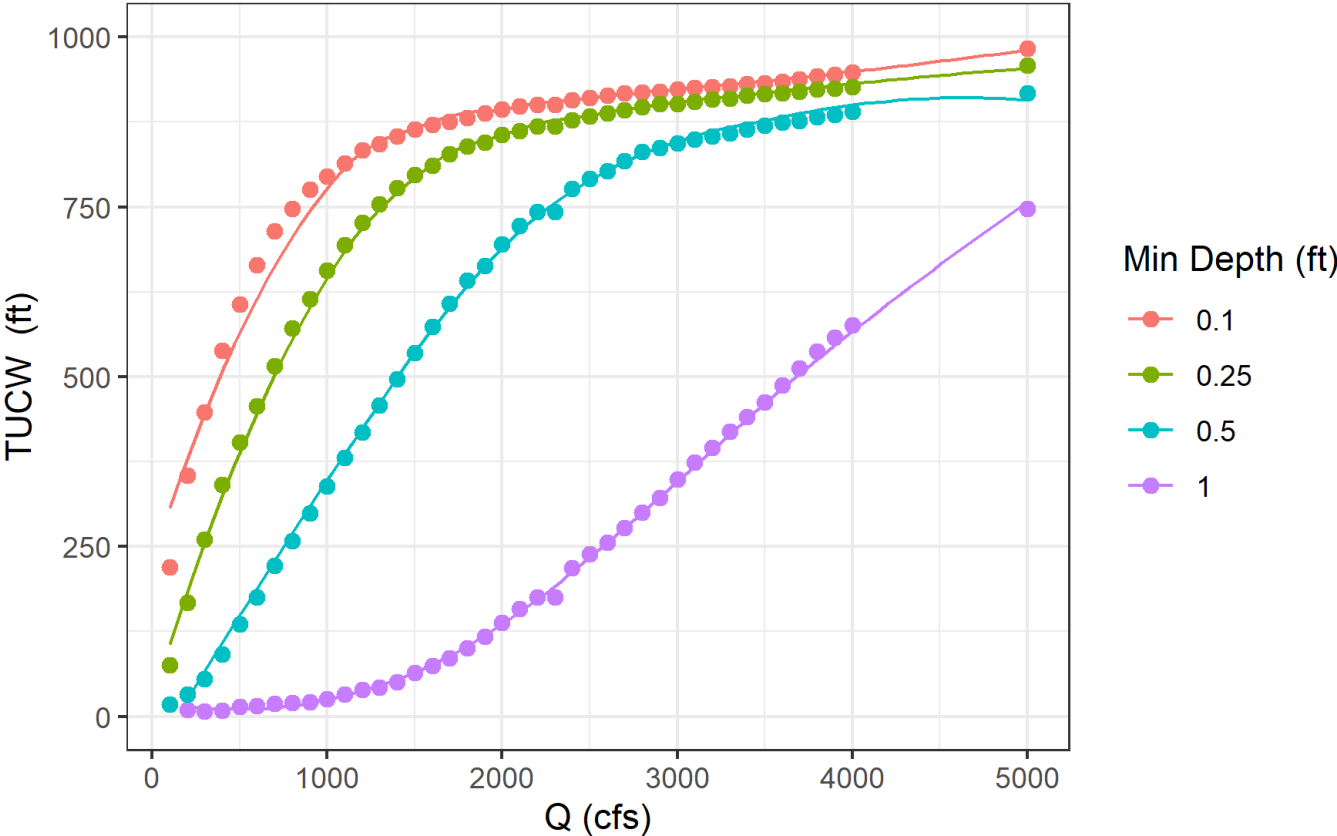
TUCW



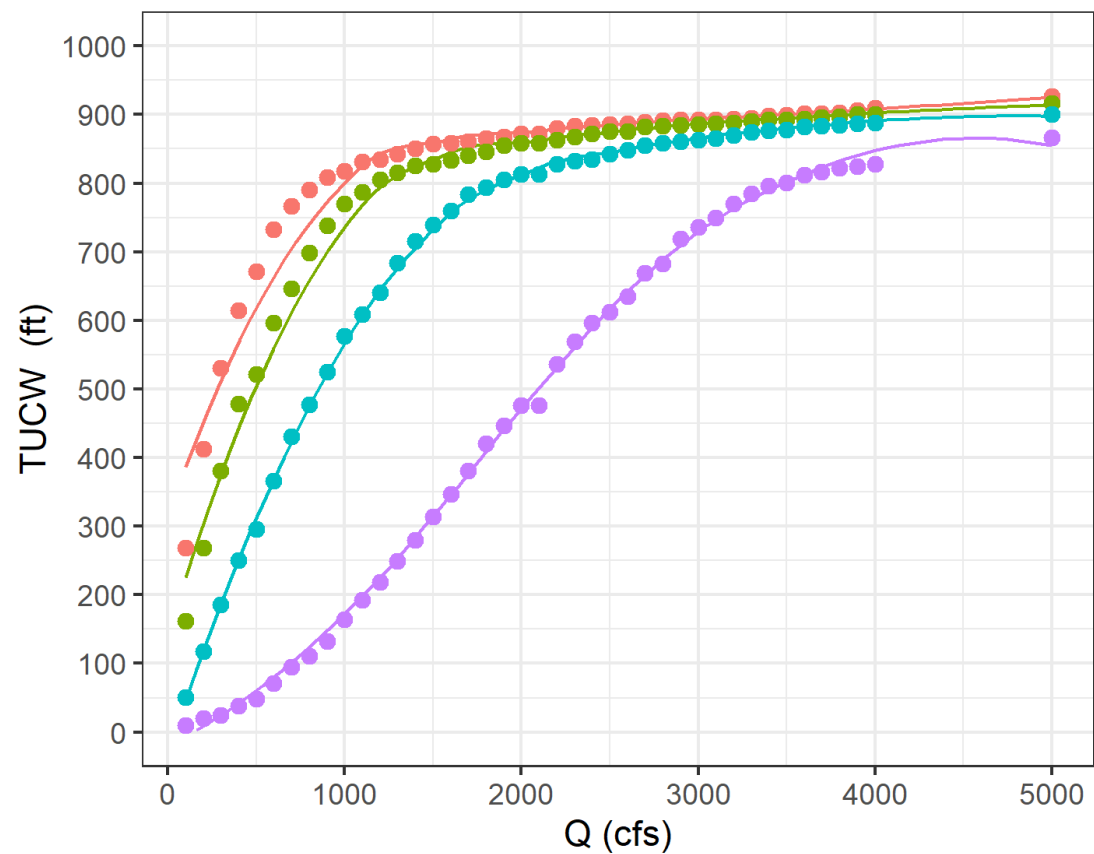
MUCW



Rowe Sanctuary

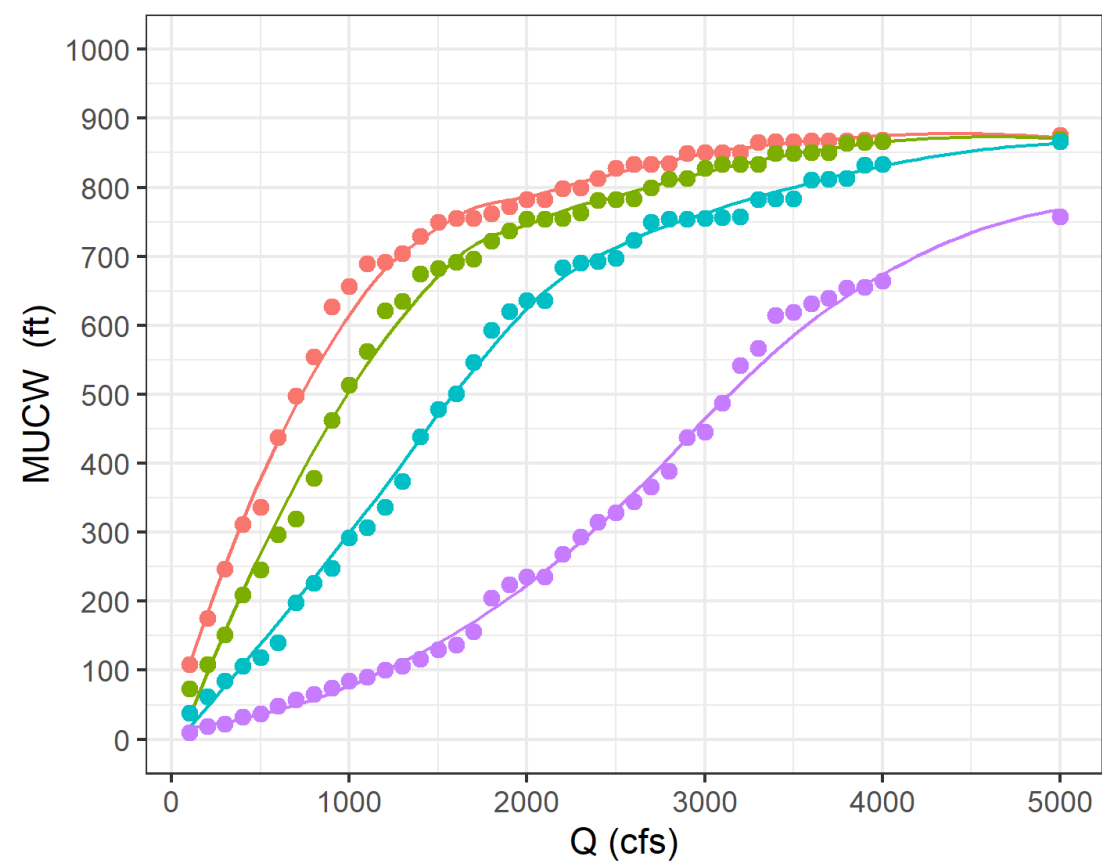


Elm Creek

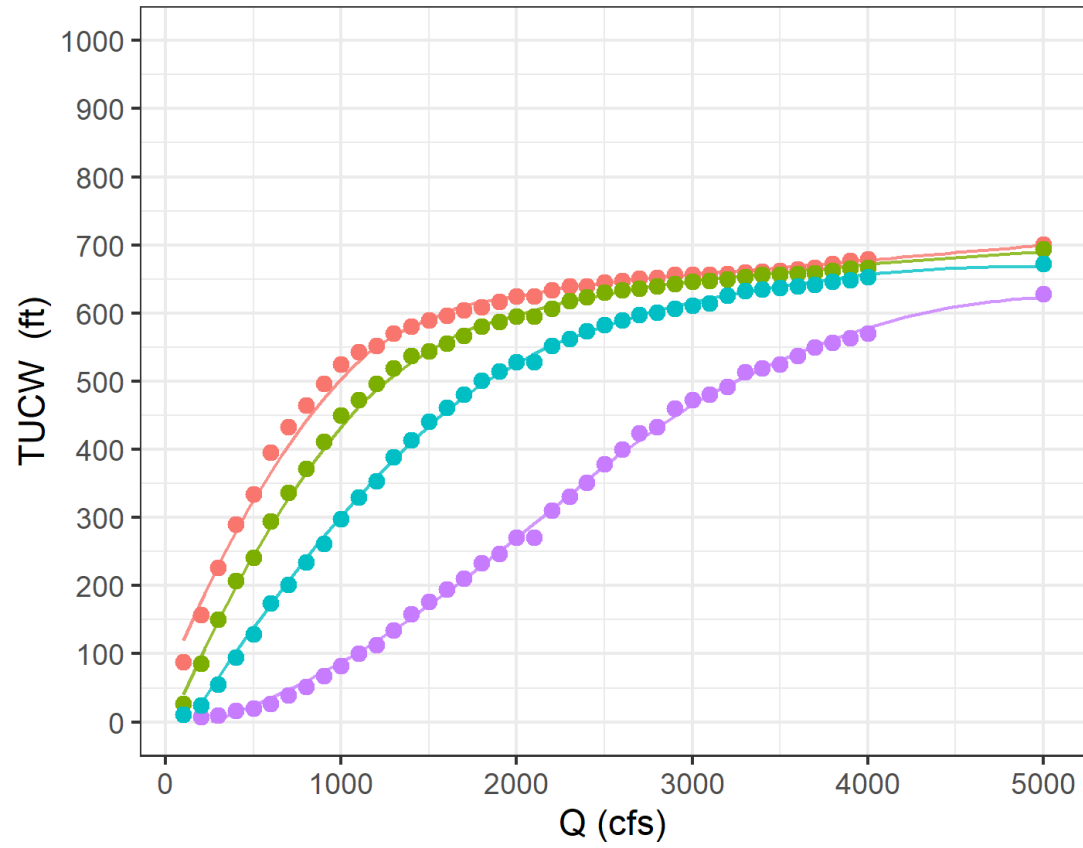


Min Depth (ft)

- 0.1
- 0.25
- 0.5
- 1

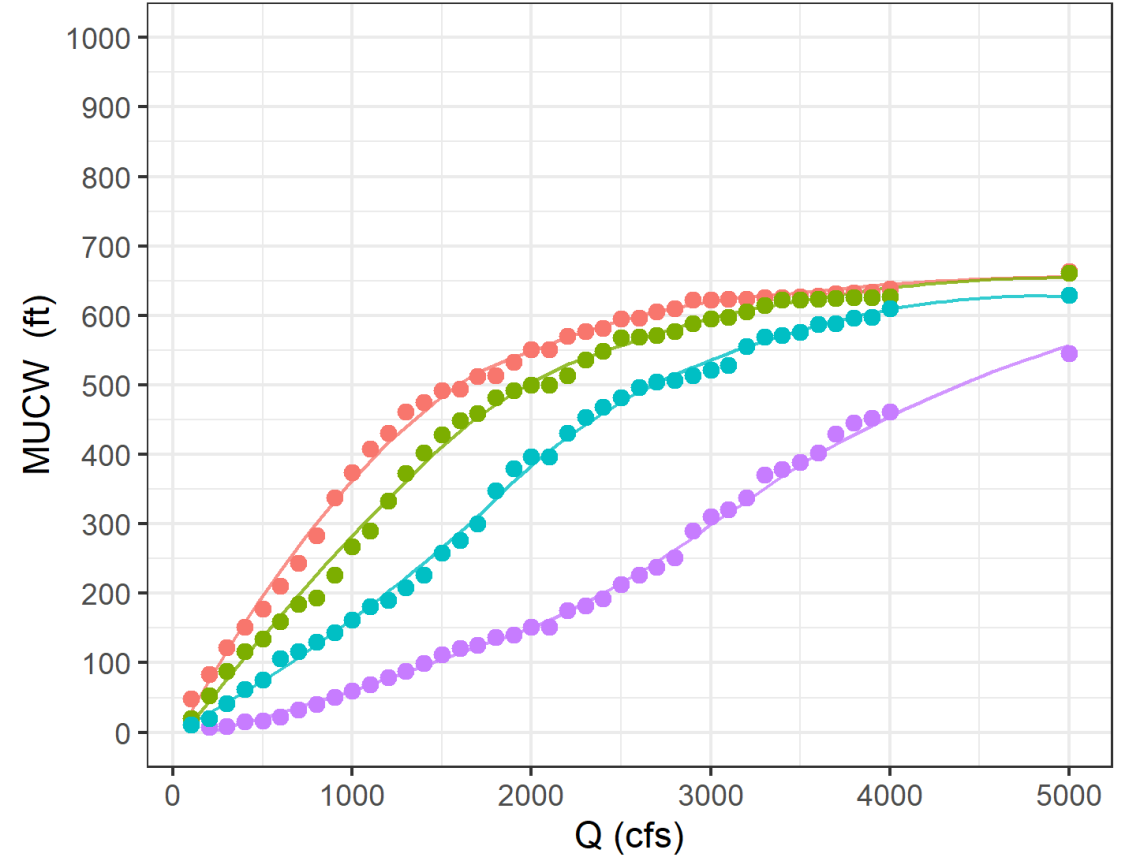


Cottonwood

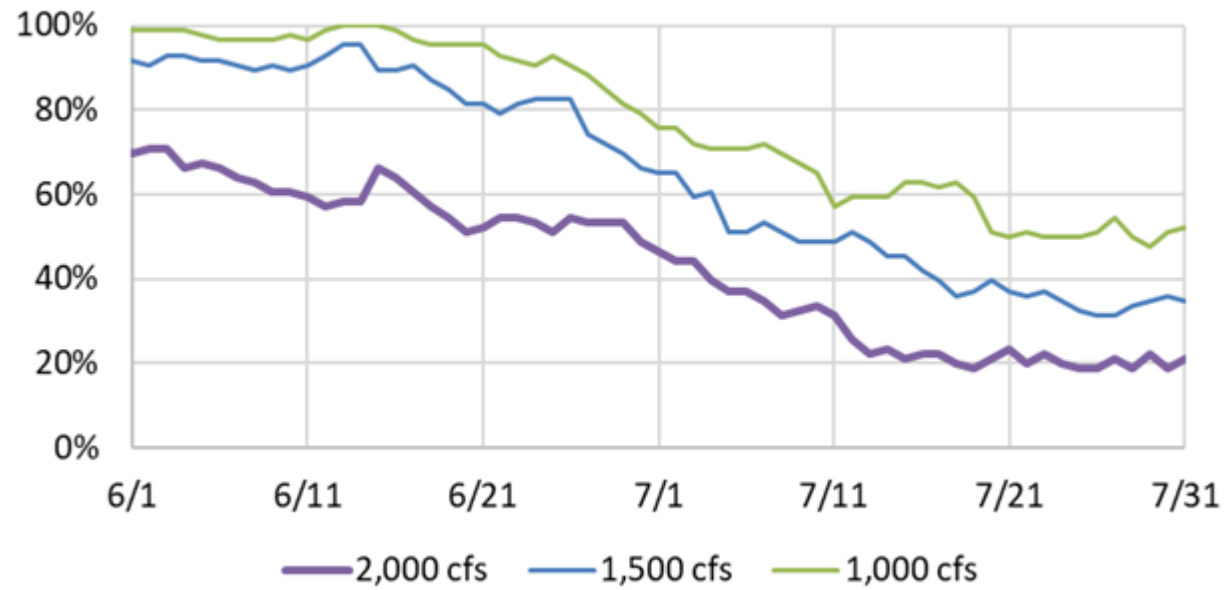


Min Depth (ft)

- 0.1
- 0.25
- 0.5
- 1



Likelihood of Maintaining GI Flow, 1,930 cfs CP capacity



Likelihood of Maintaining GI Flow, 2,770 cfs CP capacity

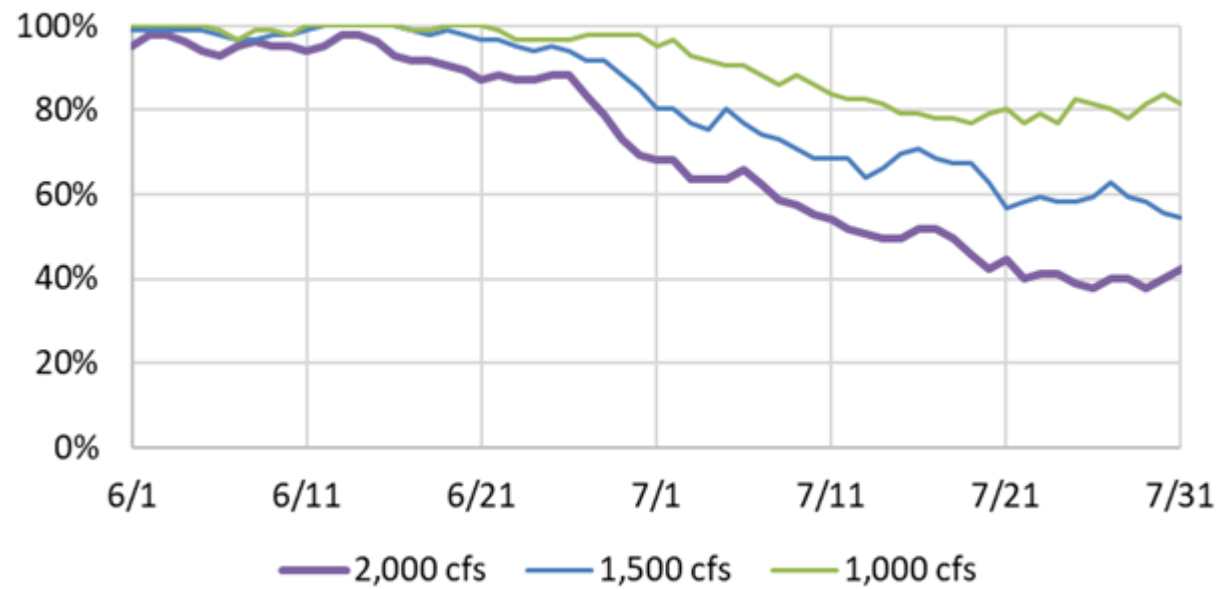
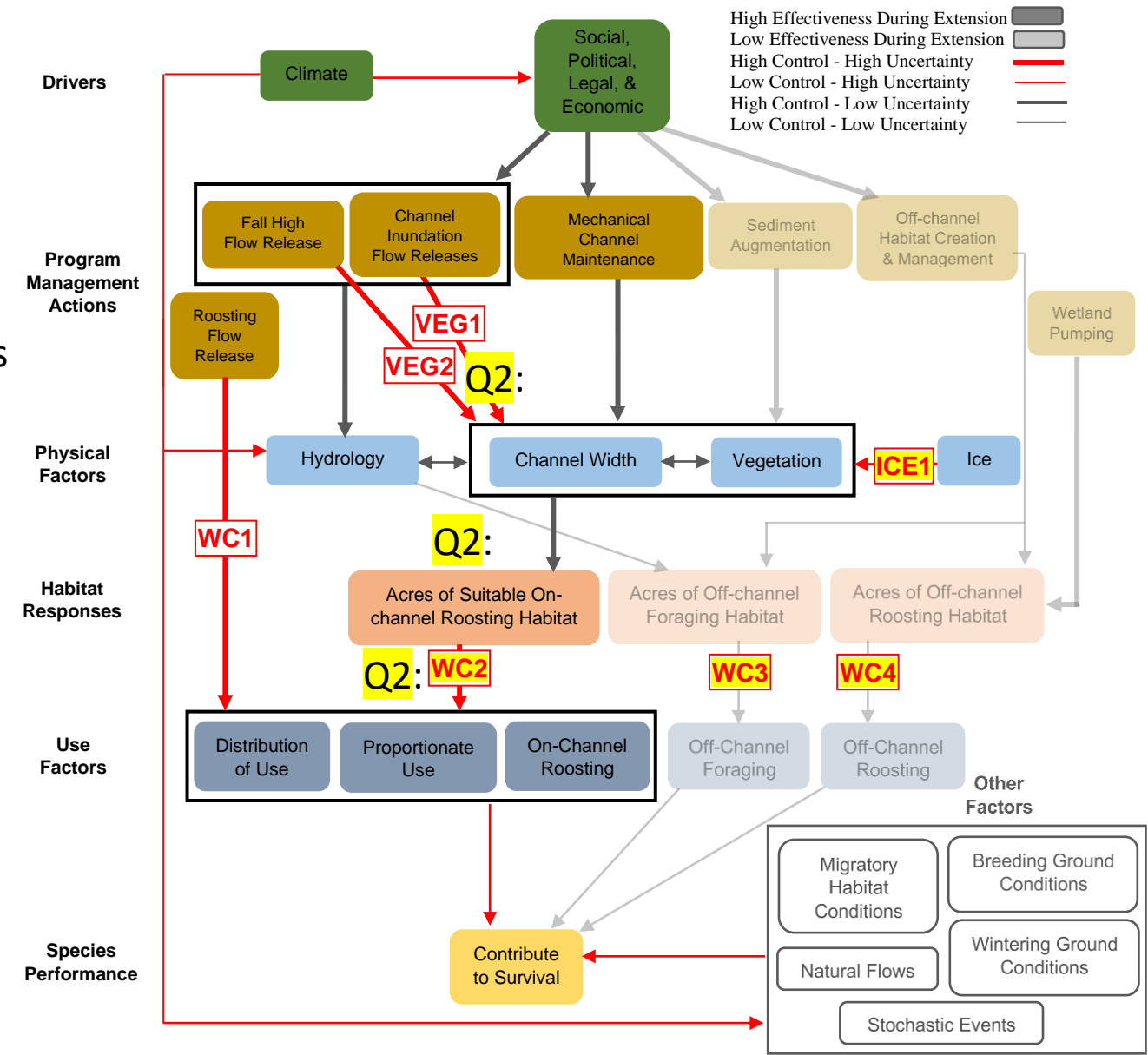
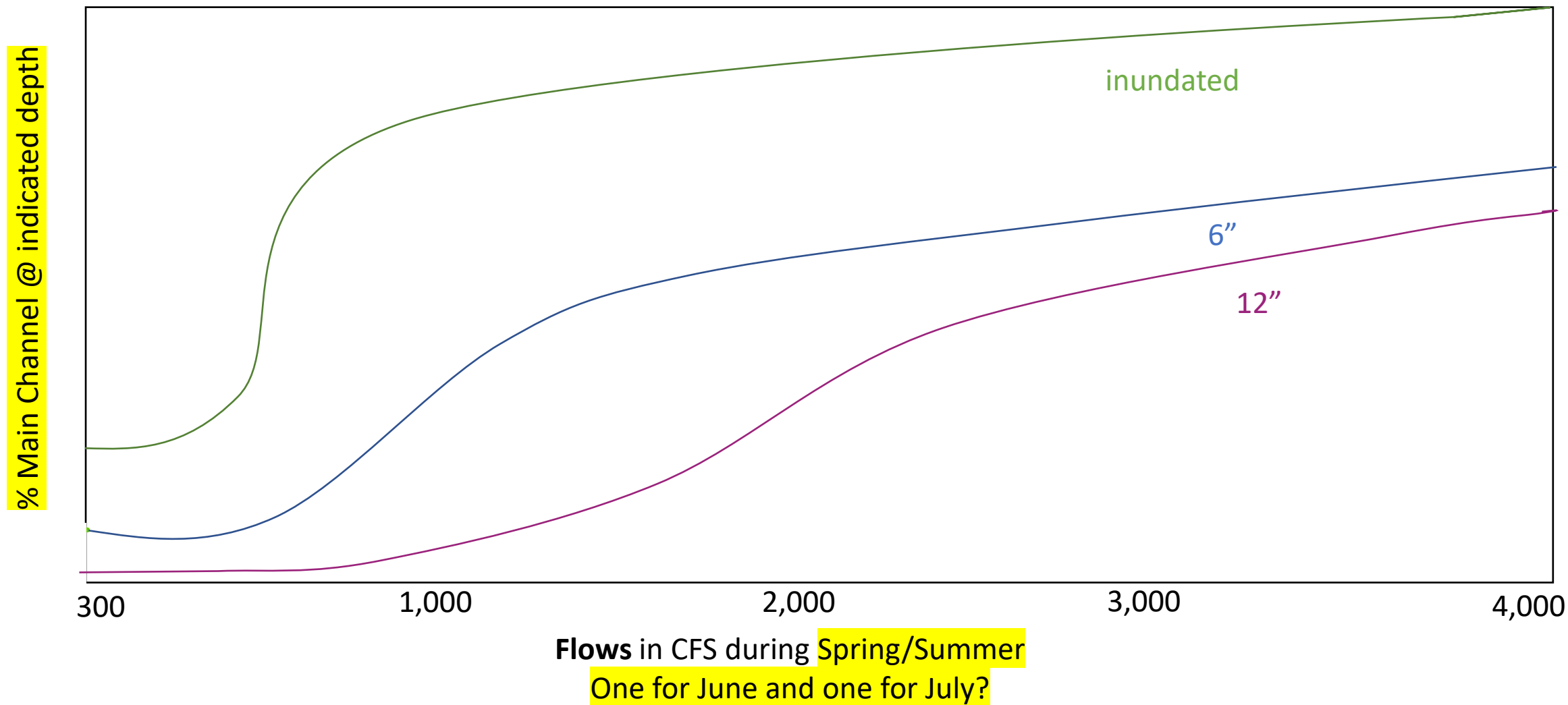


Figure 2. Whooping Crane Conceptual Ecological Model



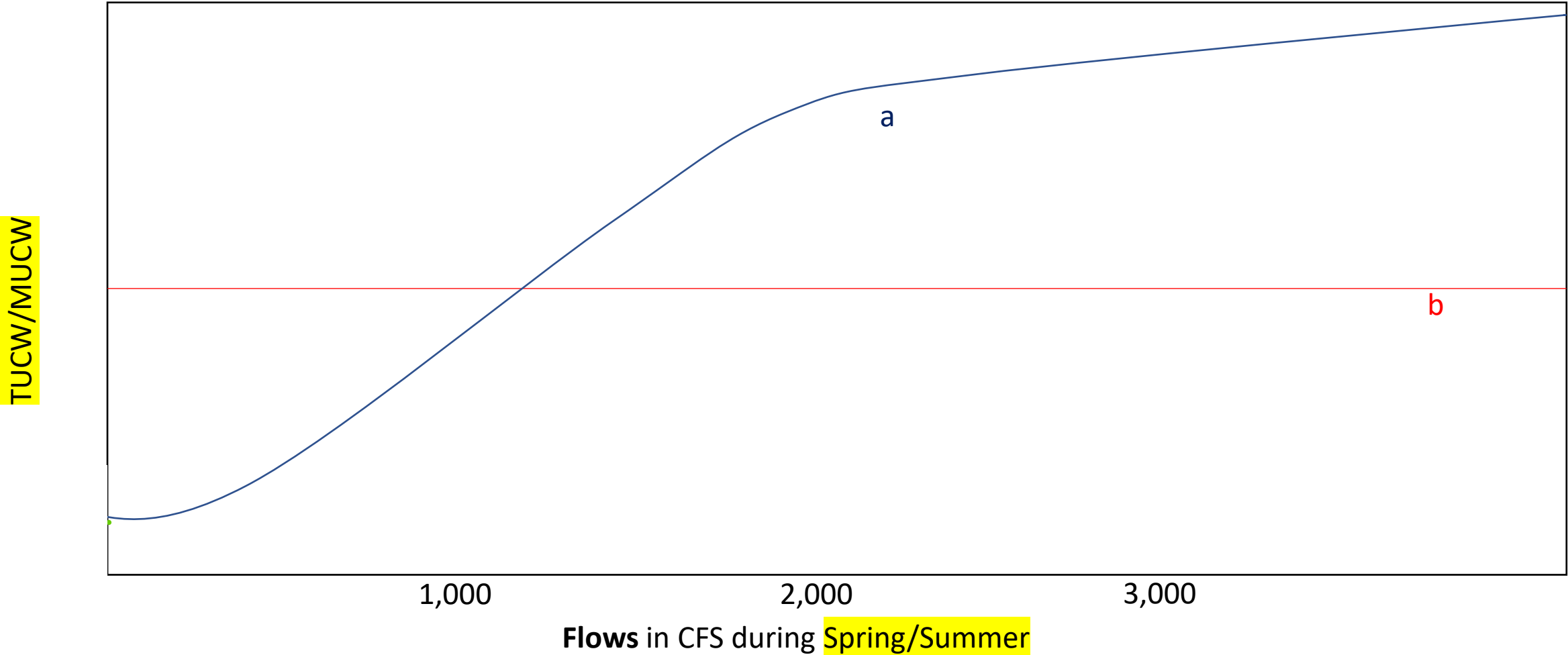
Series of testable hypotheses
Reflect the stepwise process
Based on modeling efforts

Hypothesis:



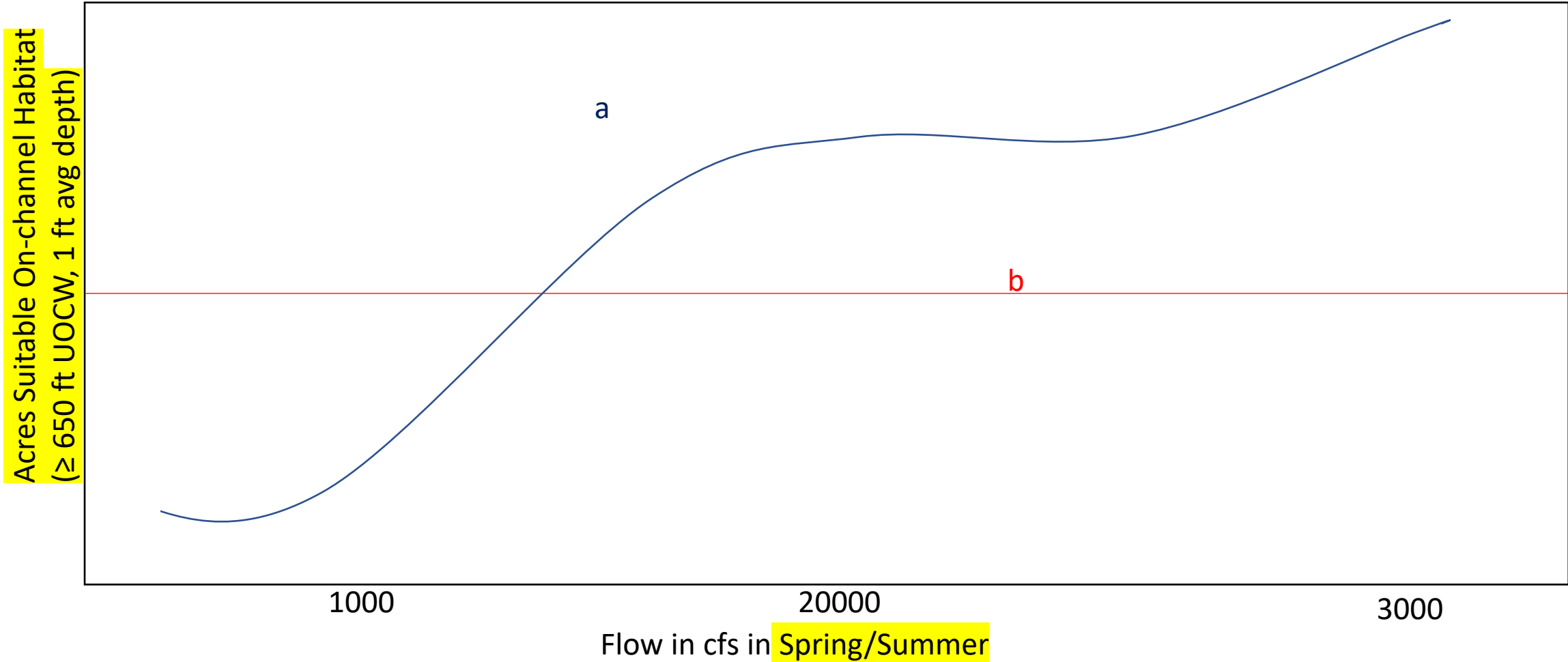
Description/Link to Program Management:

Hypothesis:



Description/Link to Program Management:

Hypotheses:



Description/Link to Program Management:

WC RESPONSE

TARGET WIDTH for WC roosting?

MUCW \geq 650 feet

TUCW

Which measure?

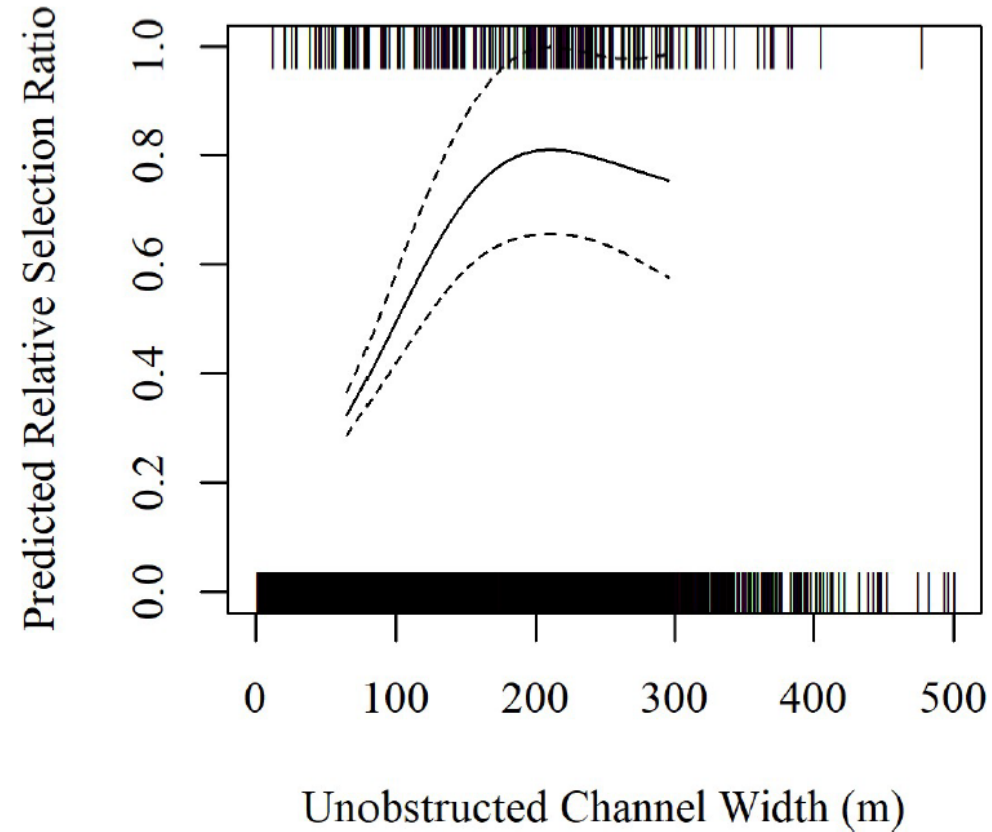
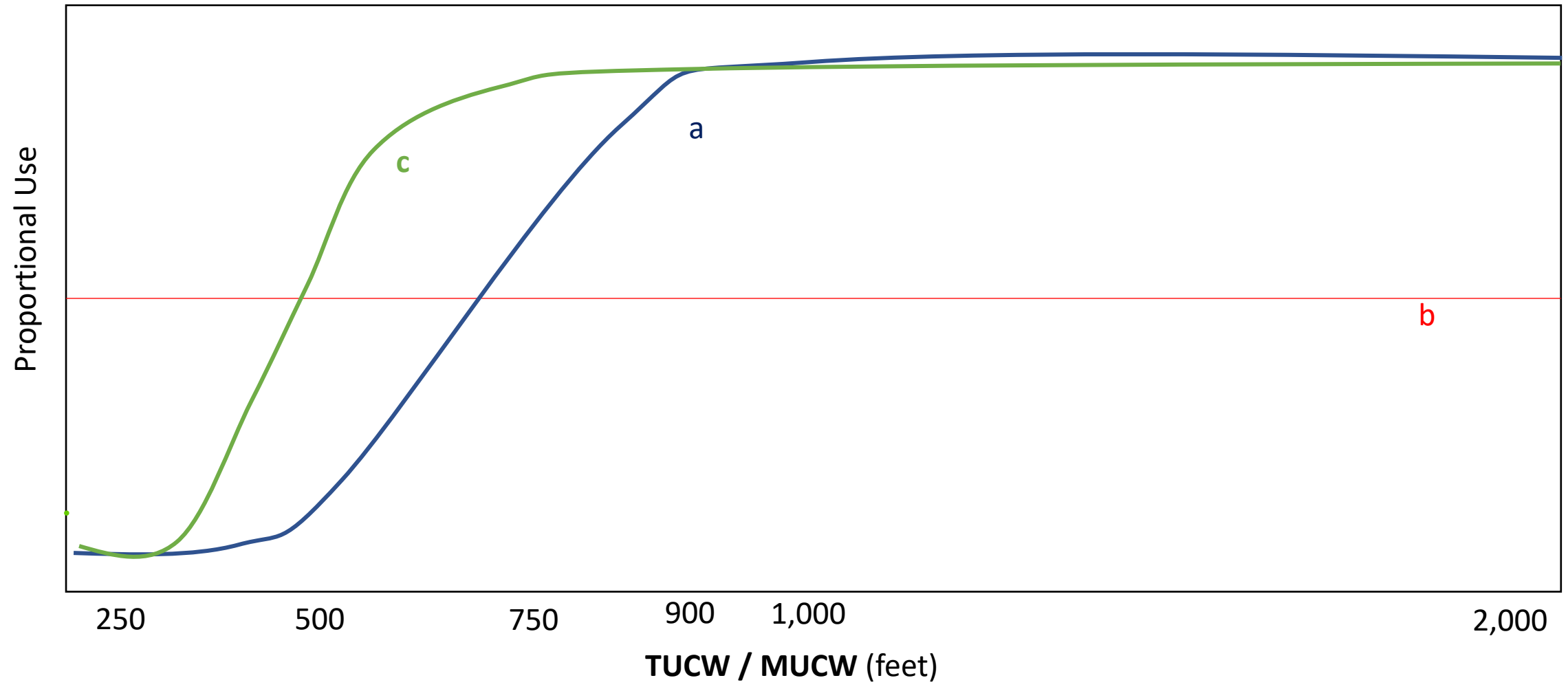


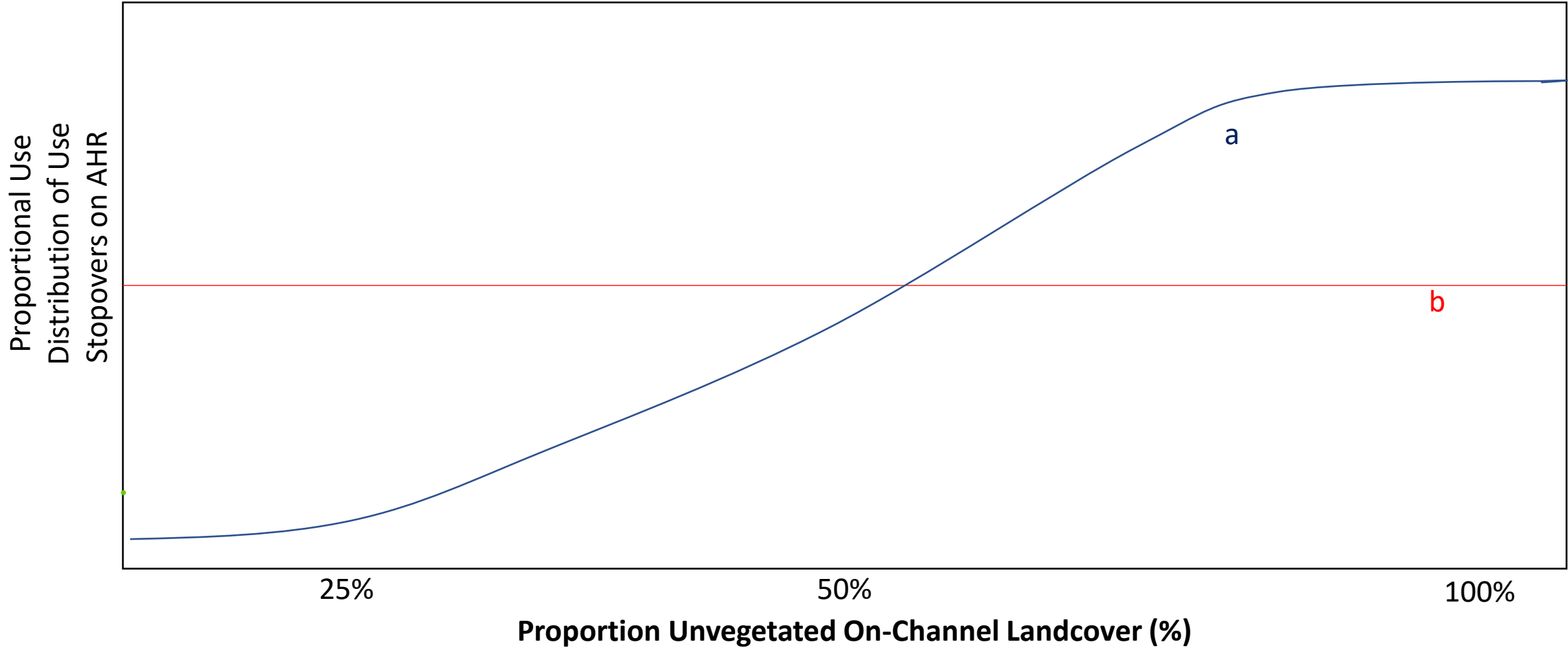
Fig 4. Predicted, relative selection ratio of unobstructed channel width (UOCW) based on all systematically collected whooping crane ($n = 235$). Tick marks indicate actual data (use points are presented at $y = 1$ and available points are presented at $y = 0$). Data is displayed from the 10th to the 90th percentile of use locations with 90% confidence intervals.

<https://doi.org/10.1371/journal.pone.0209612.g004>

Hypothesis:

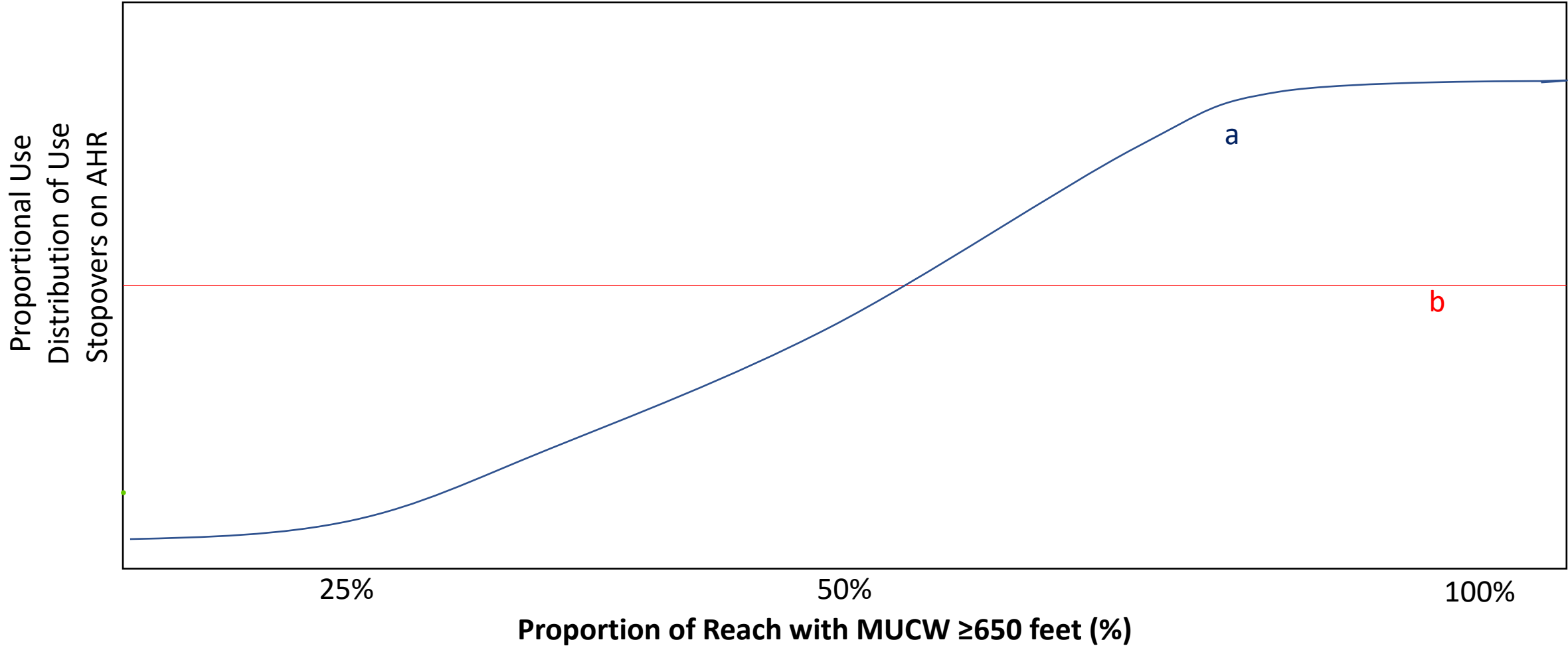


Hypothesis:



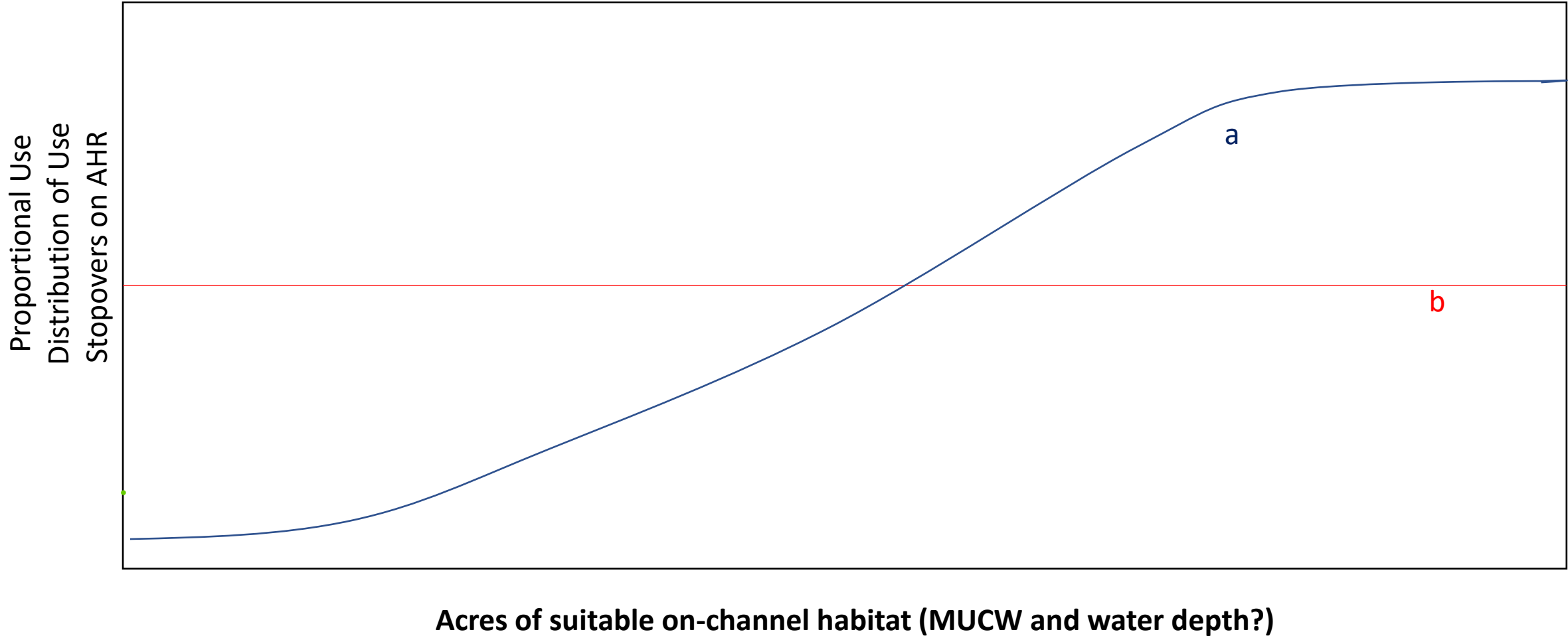
Description/Link to Program Management:

Hypothesis:



Description/Link to Program Management:

Hypothesis:



Description/Link to Program Management:

Items to consider:

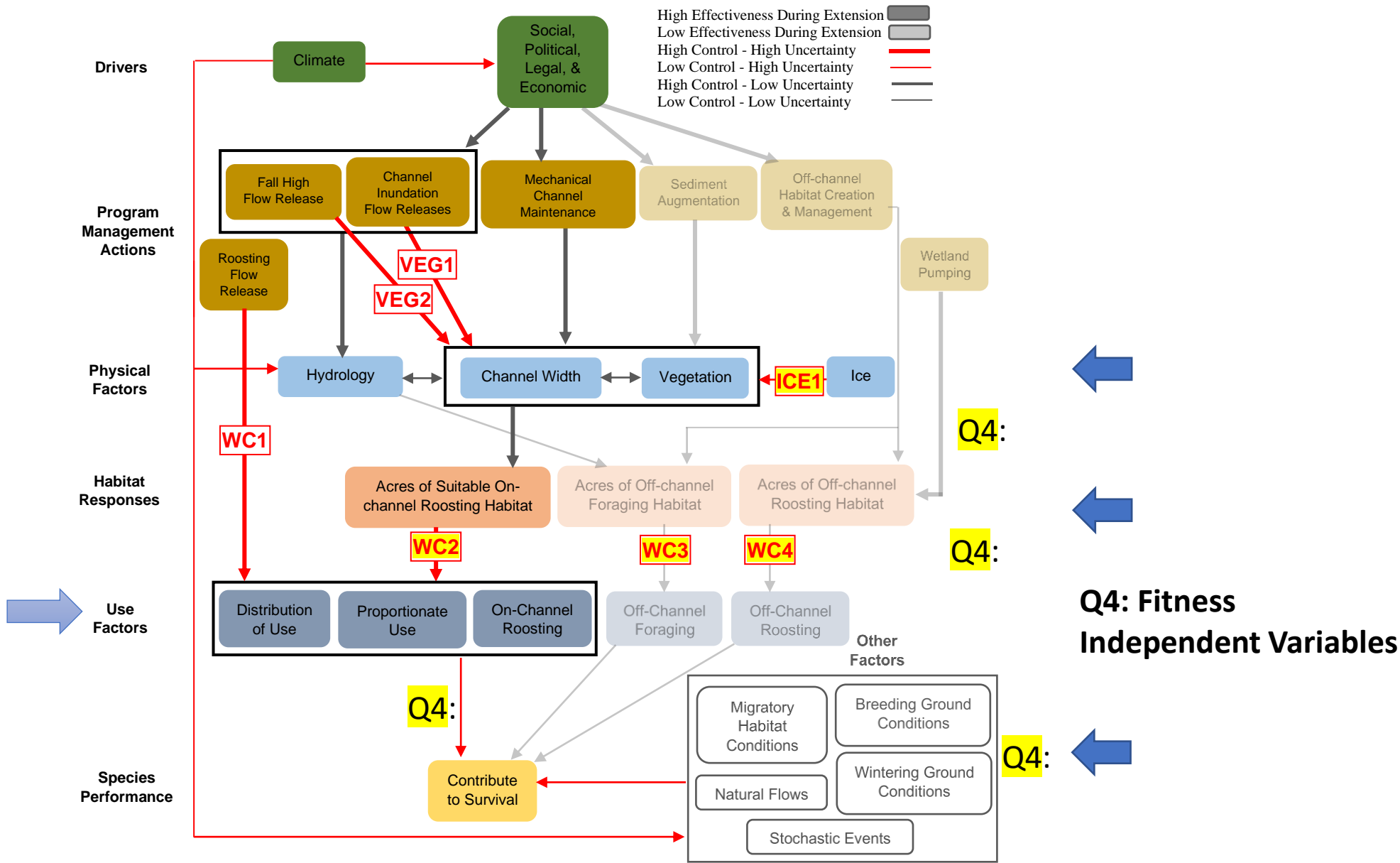
Can we use water to suppress vegetation to maintain UOCW for WC?

- How long do we hold off on mechanical maintenance of portions of the reach where water was not effective?
- Spraying for Phragmites together with water?

Whooping Cranes – Potential BIG QUESTIONS

- Q4: Are WC that stop on the CPR more fit?
- Q3: What are the conditions that influence length of stay on the CPR?

Figure 2. Whooping Crane Conceptual Ecological Model



Are WC that stop along the AHR more fit?

Independent variables that may impact differential body condition, survival, reproduction

Suitable On- and Off-channel Habitat

- Water (wetted width, depth, velocity)
- Water quality
- Unobstructed Views
- Safety from predators
- Food availability
 - Opportunistic and very wide range of consumed sources including: frogs, fish, tubers, crayfish, insects, and agricultural grains.
- Protection from human disturbance, increased community awareness, monitoring

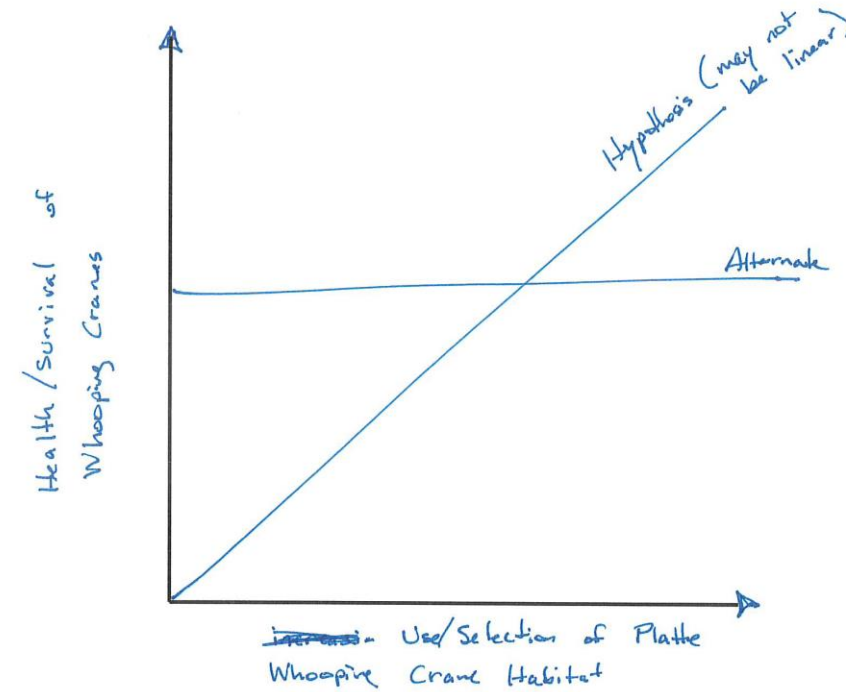
Out of Program control

- Winter and breeding ground conditions
- Migratory habitat conditions
- Arrival body condition
- Energetic costs of migration
- Mortality outside AHR

Hypothesis and Alternative Hypotheses

Hypothesis: Increased selection/use of Platte habitat by cranes improves health/survival of cranes
Alternate: Increased selection/use of habitat does not result in improved health/survival

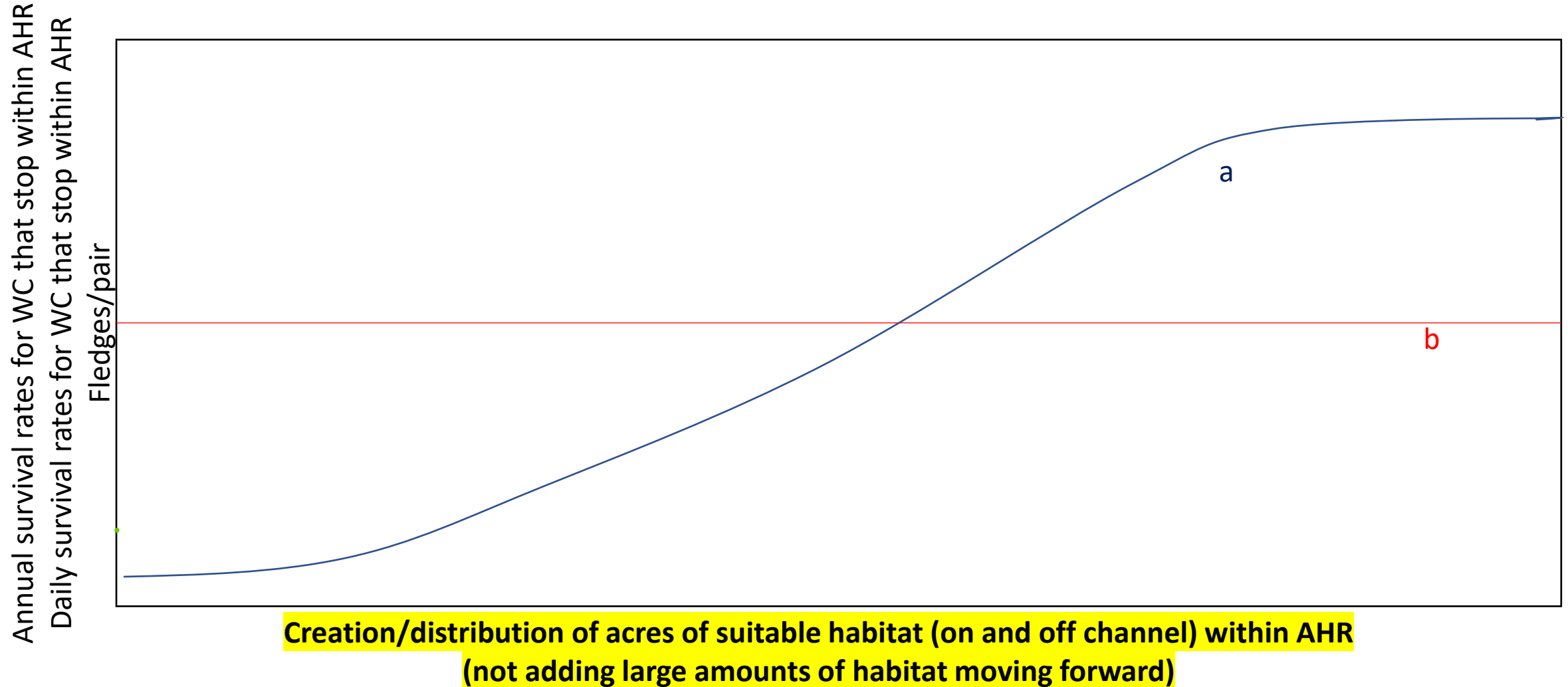
X-Y Graph



Description/Link to Program Management

Even if our activities result in increased Whooping Crane use, how do we know whether or not that actually matters for survival and recovery? What is the basis for concluding use equals need?

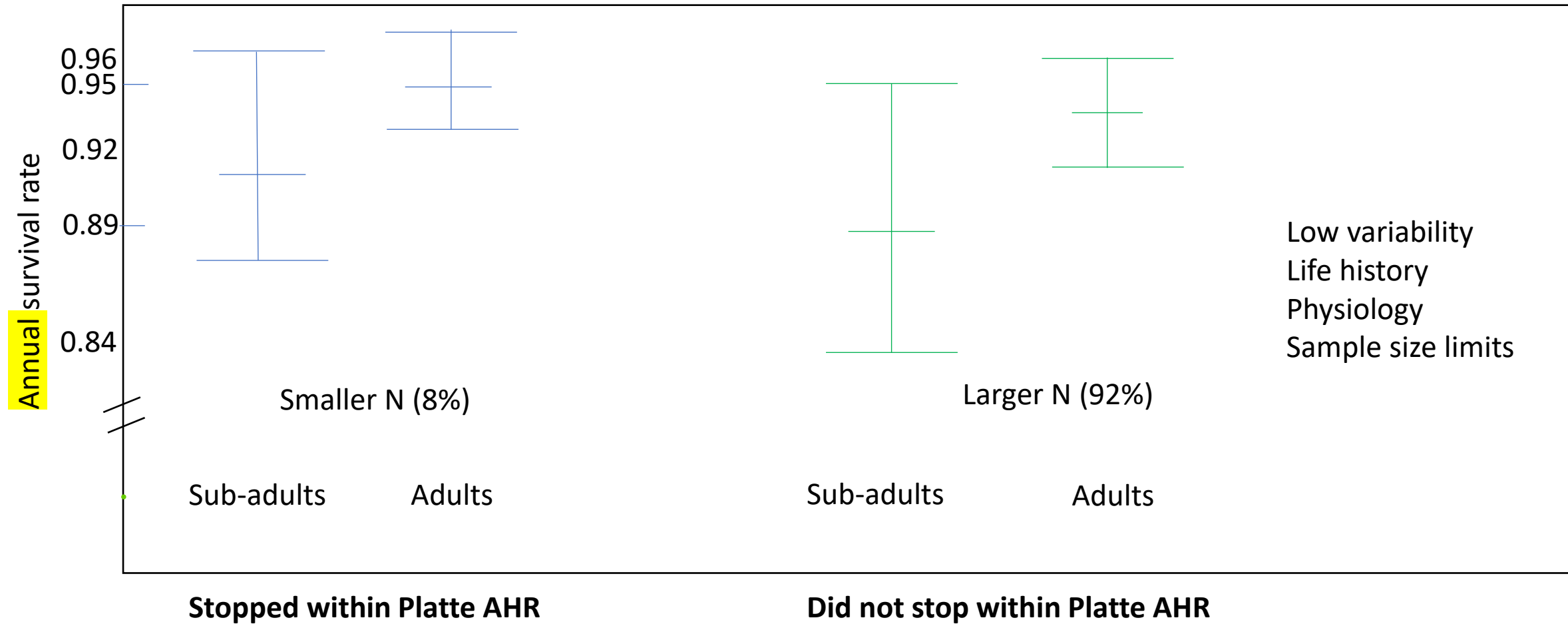
Hypothesis:



Description/Link to Program Management:

Does the creation of new acres of WC habitat or the distribution of these acres across the AHR increase WC survival or reproductive success?

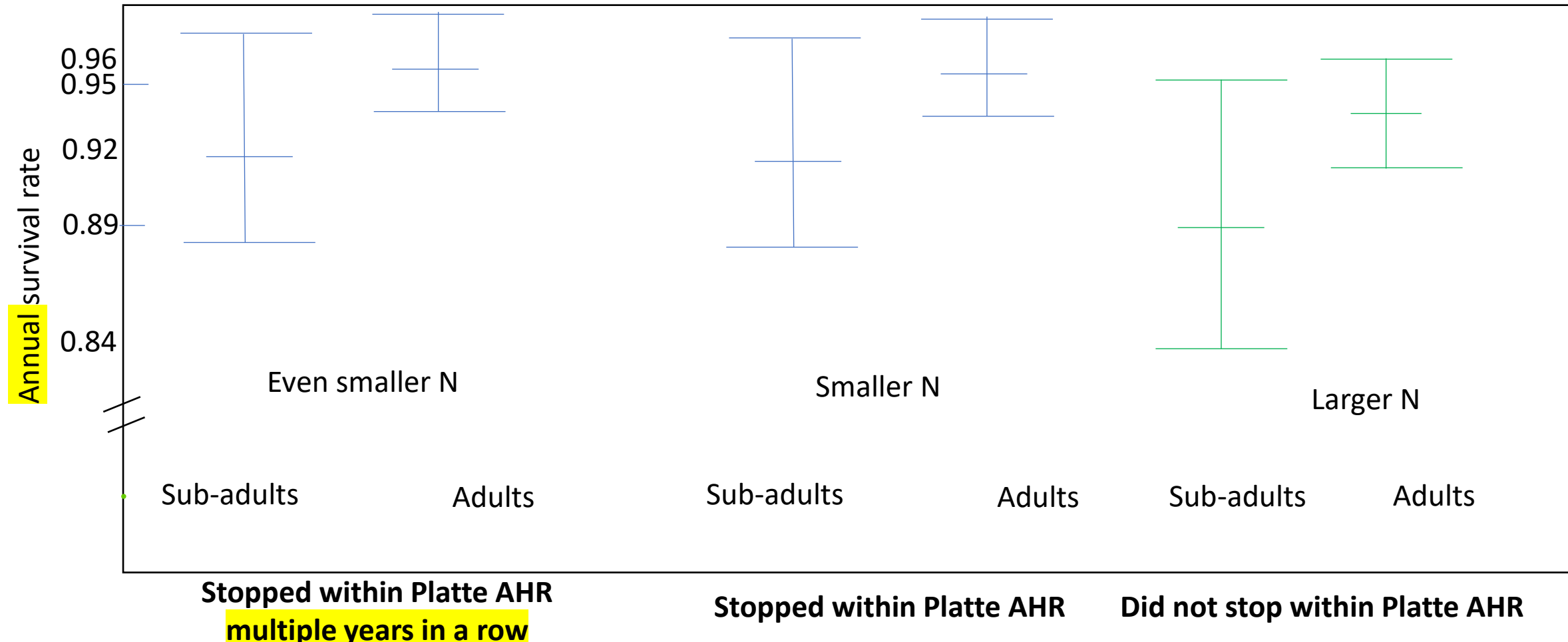
Hypothesis: WC that stop within the Platte AHR have higher annual survival than those that do not stop within the Platte AHR.



*Based upon telemetry marked birds with bias toward younger, non-reproductive birds.
7% mortality w/in 2 wks of marking in Pease et al. 2019

Description/Link to Program Management:

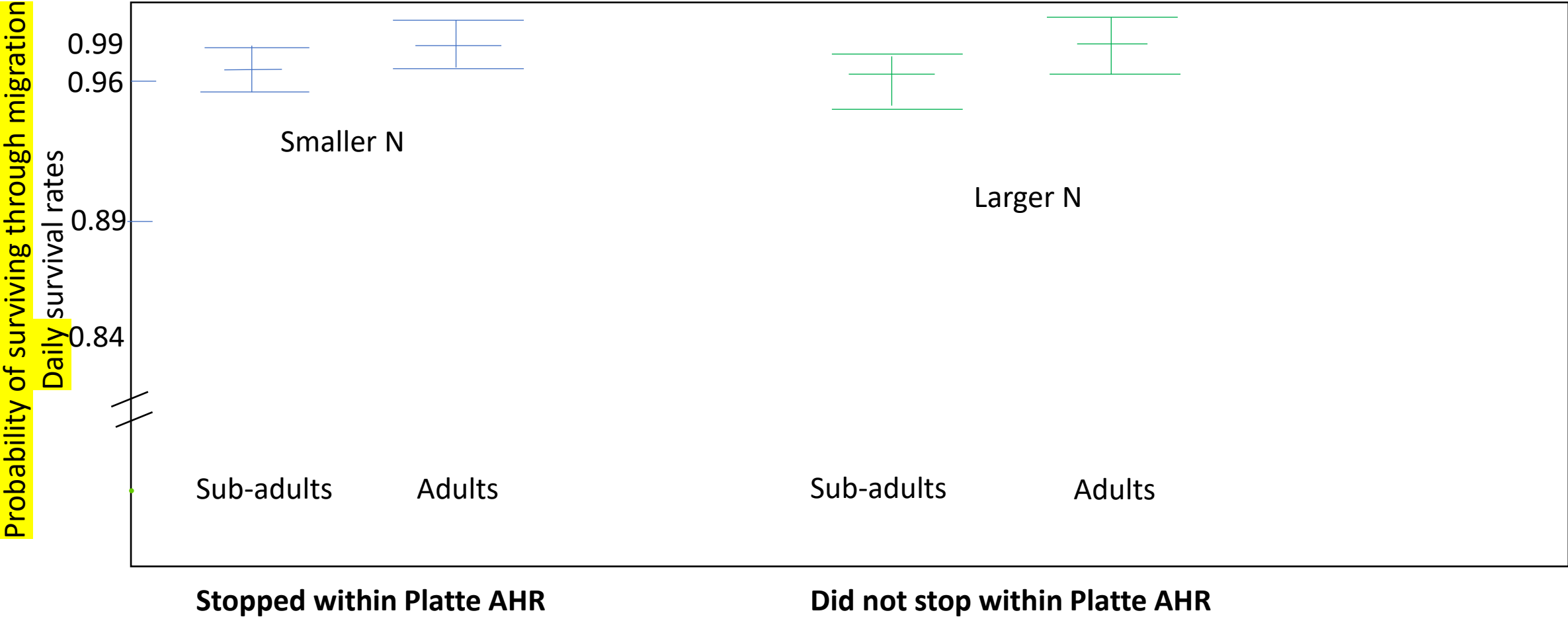
Hypothesis: WC that stop multiple years in a row within the Platte AHR have higher annual survival than those that do not stop within the Platte AHR.



*Based upon telemetry marked birds with bias toward younger, non-reproductive birds.
7% mortality w/in 2 wks of marking in Pease et al. 2019

Description/Link to Program Management:

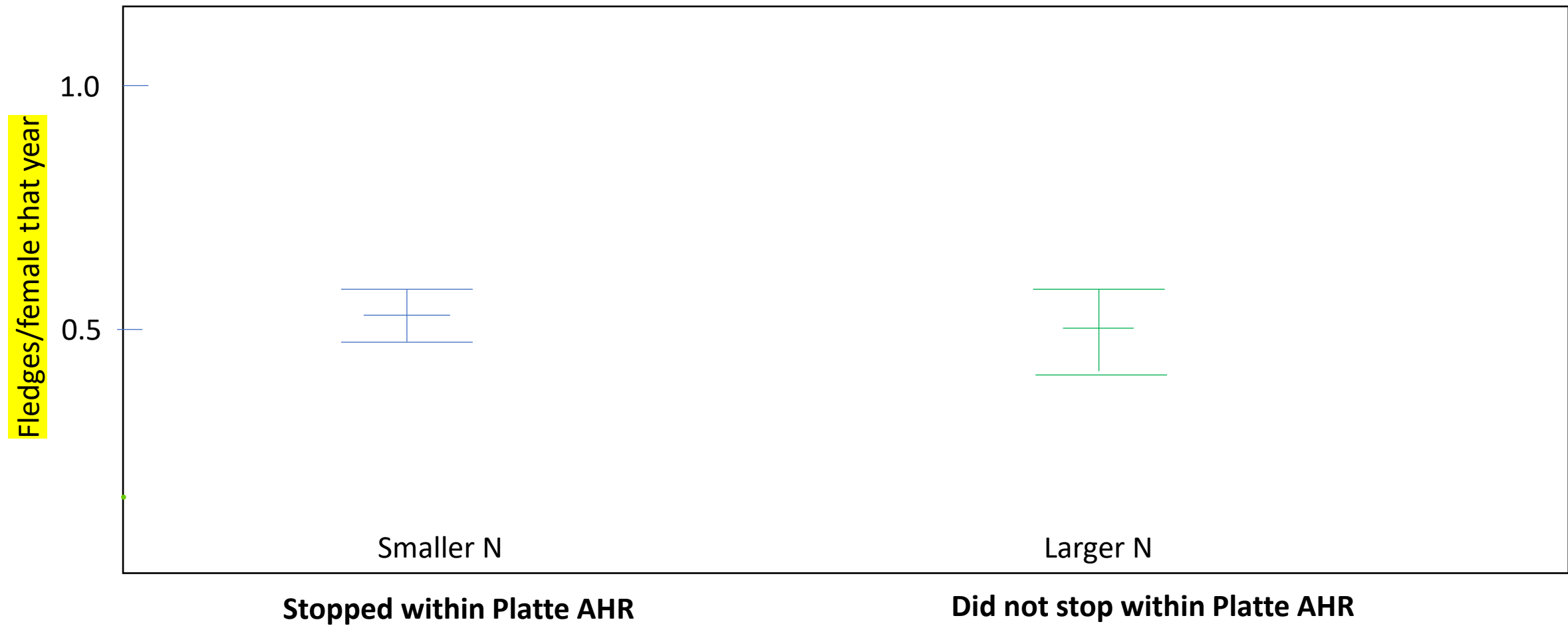
Hypothesis: WC that stop within the Platte AHR have higher daily survival than those that do not stop within the Platte AHR.



*Based upon telemetry marked birds with bias toward younger, non-reproductive birds.
7% mortality w/in 2 wks of marking in Pease et al. 2019

Description/Link to Program Management:

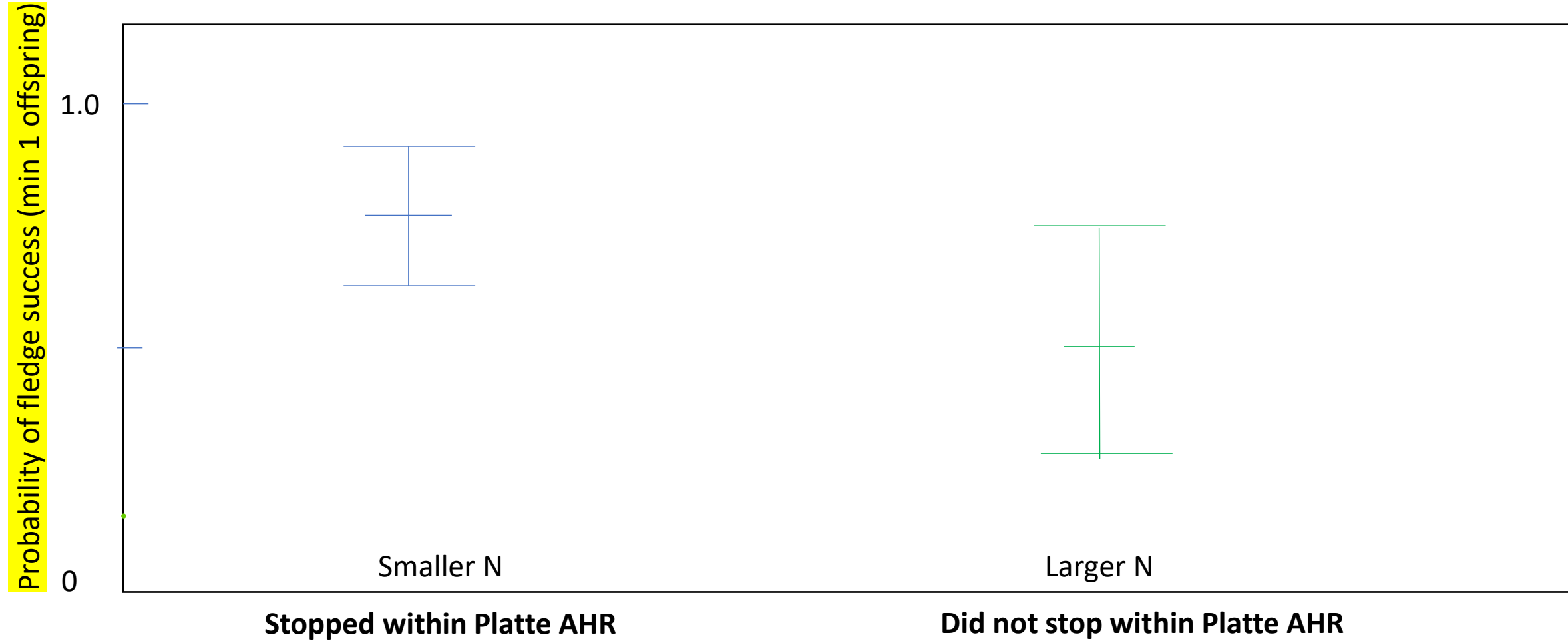
Hypothesis: WC that stop within the Platte AHR have higher fledge ratios than those that do not stop within the Platte AHR.



*Based upon telemetry marked birds with bias toward younger, **non-reproductive birds**.

Description/Link to Program Management:

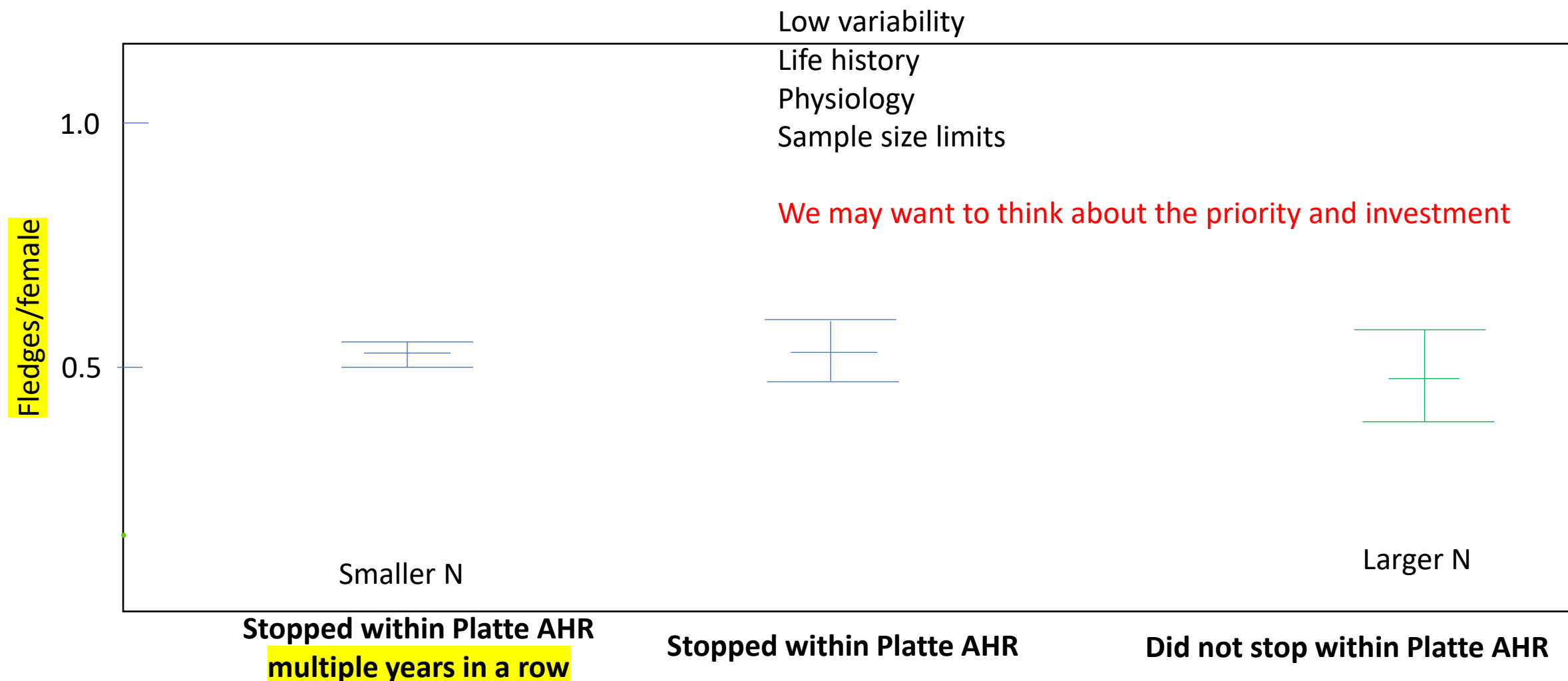
Hypothesis: WC that stop within the Platte AHR have higher probability of having at least 1 fledged offspring per year than those that do not stop within the Platte AHR.



*Based upon telemetry marked birds with bias toward younger, **non-reproductive birds**.

Description/Link to Program Management:

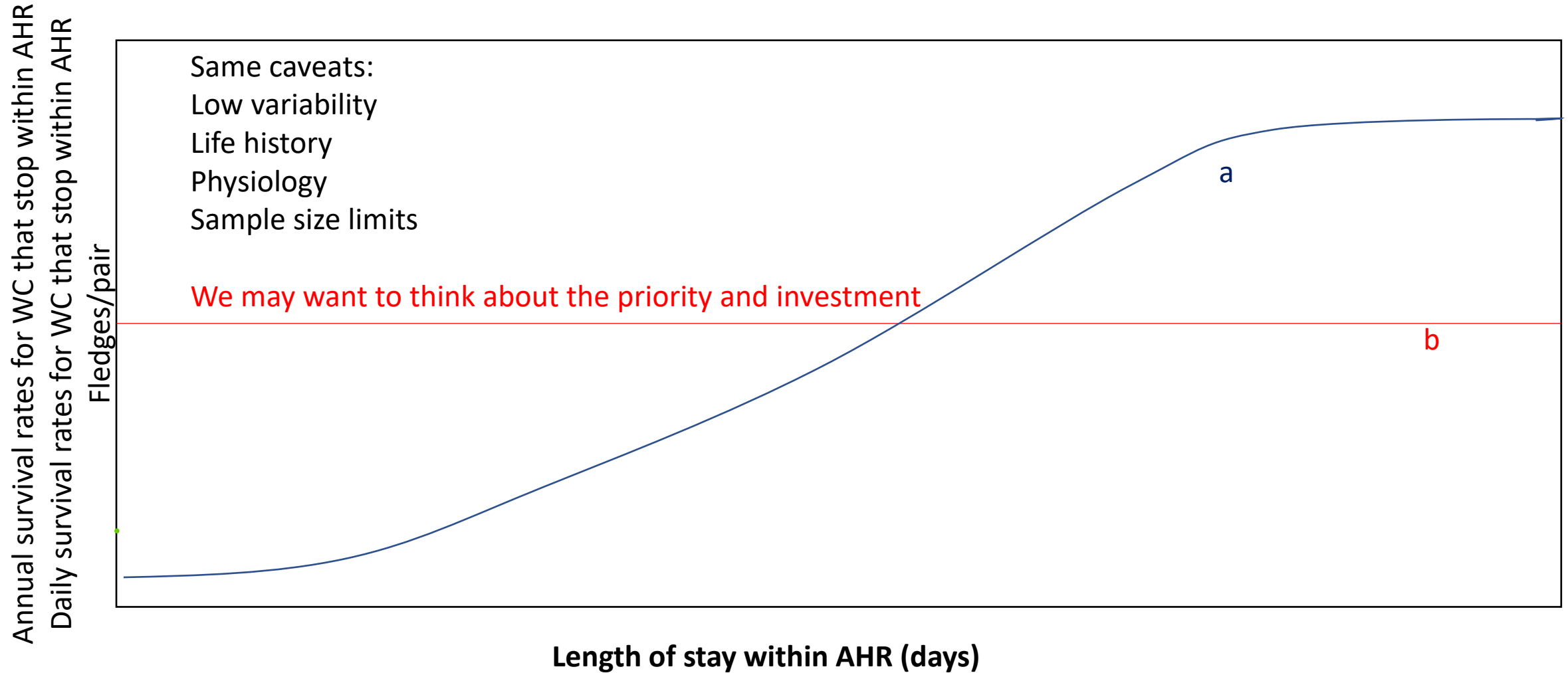
Hypothesis: WC that stop multiple years in a row within the Platte AHR have fledged ratios than those that do not stop within the Platte AHR.



*Based upon telemetry marked birds with bias toward younger, **non-reproductive birds**.

Description/Link to Program Management:

Hypothesis: WC that **stay longer** within the AHR have increased survival and/or reproductive success



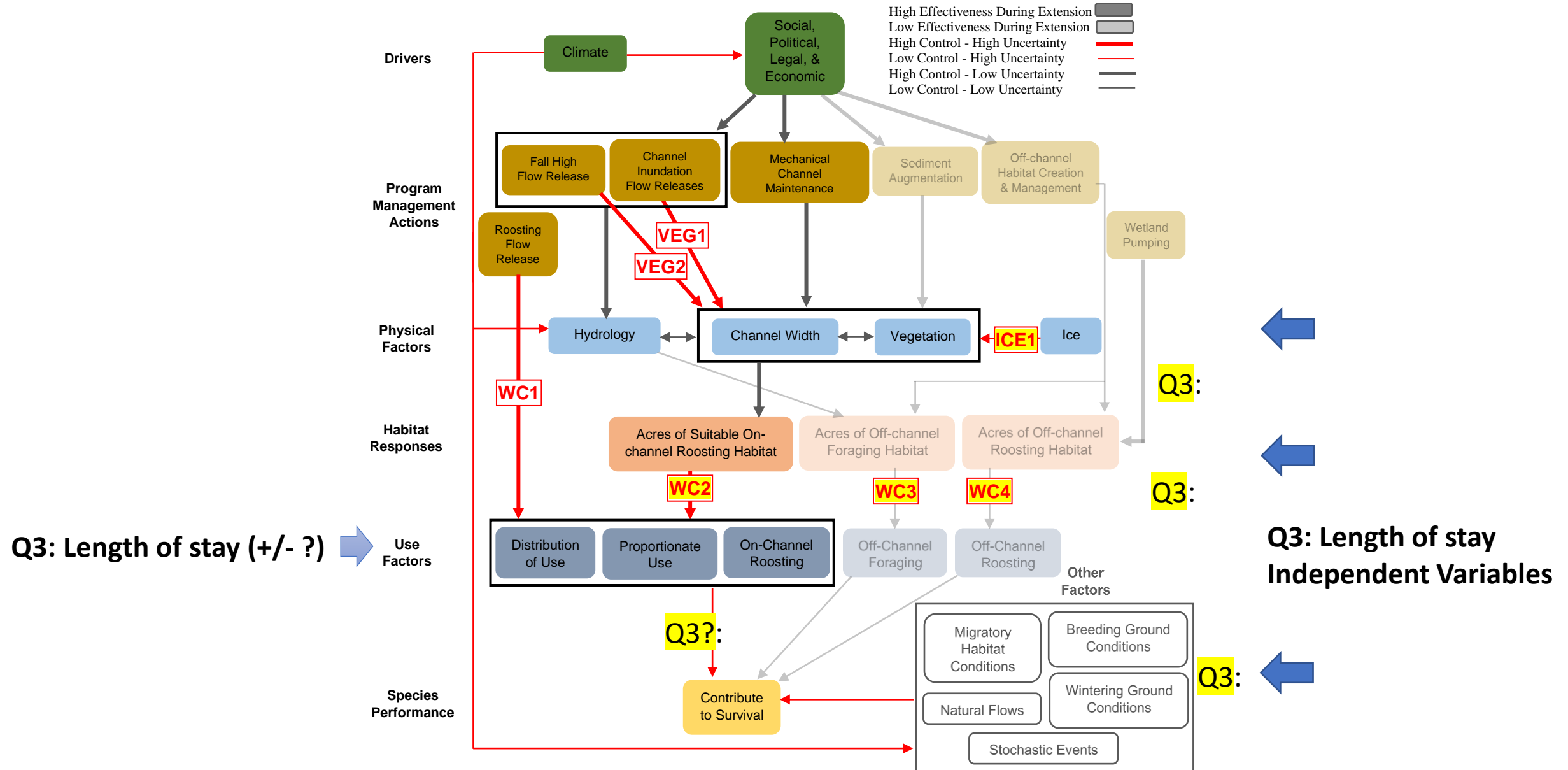
Description/Link to Program Management:

If longer stays provide benefits, then PRRIP should further investigate those factors associated with longer stays and manage in a way that encourages longer stopovers. If not, why try to recapitulate factors involved with longer stays?

Whooping Cranes – Potential BIG QUESTIONS

- Q4: Are WC that stop on the CPR more fit?
- Q3: What are the conditions that influence length of stay on the CPR?

Figure 2. Whooping Crane Conceptual Ecological Model



Independent variables that may influence length of stay?

Suitable On and Off-channel Habitat

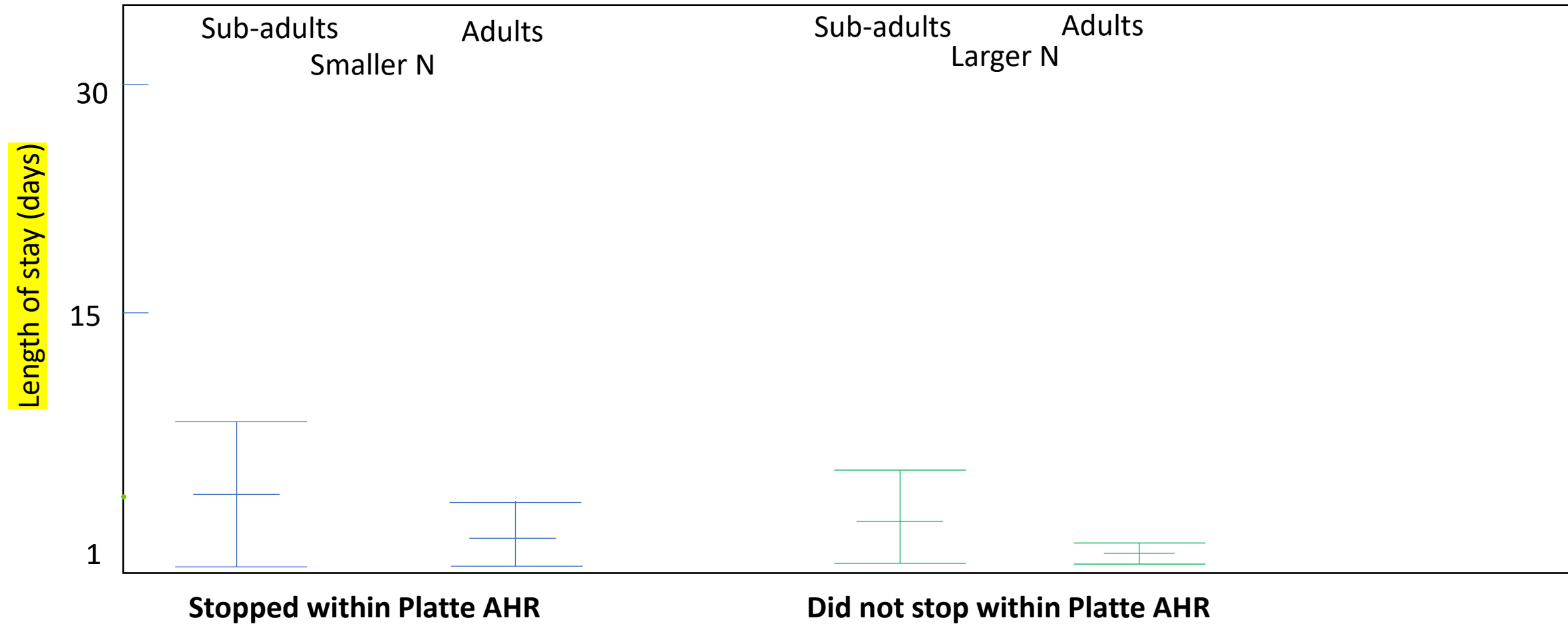
- Water (wetted width, depth, velocity, flow)
- Water quality
- Unobstructed Views (UOCW, nearest forest, proportional short vegetation landcover)
- Safety from predators
- Wet meadows vs upland grasslands vs ag land
- Food availability
 - Opportunistic and very wide range of consumed sources including: frogs, fish, tubers, crayfish, insects, and agricultural grains.
- Protection from human disturbance (increased community awareness, monitoring)

Out of Program control

- **Adult/Juvenile**
- **Body condition upon arrival**
- **Conditions in other migratory habitat**
- **Conditions at Breeding or Wintering grounds**
- **Sandhills present**
- **Fall/Spring**
- **Weather**

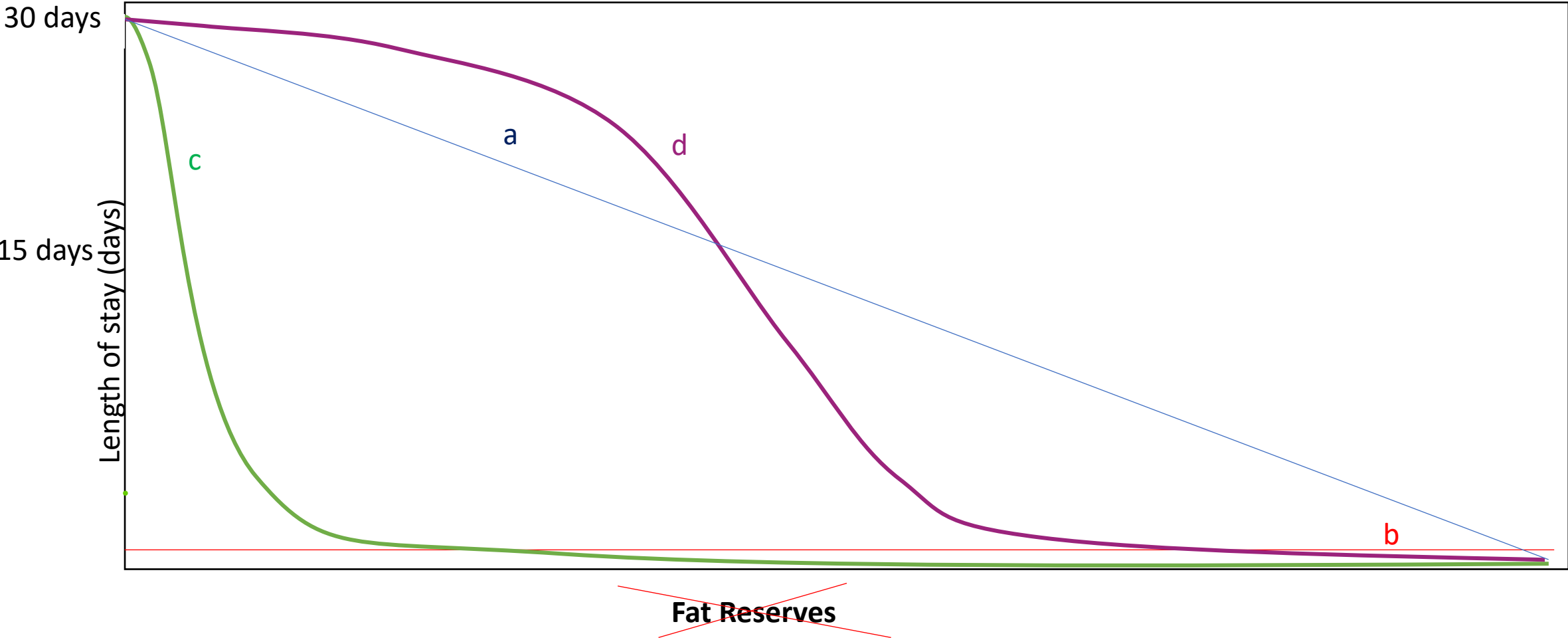
Are WC that stay longer representative?

Hypothesis: WC that stop within the Platte AHR have longer stopovers than those that do not stop within the Platte AHR.



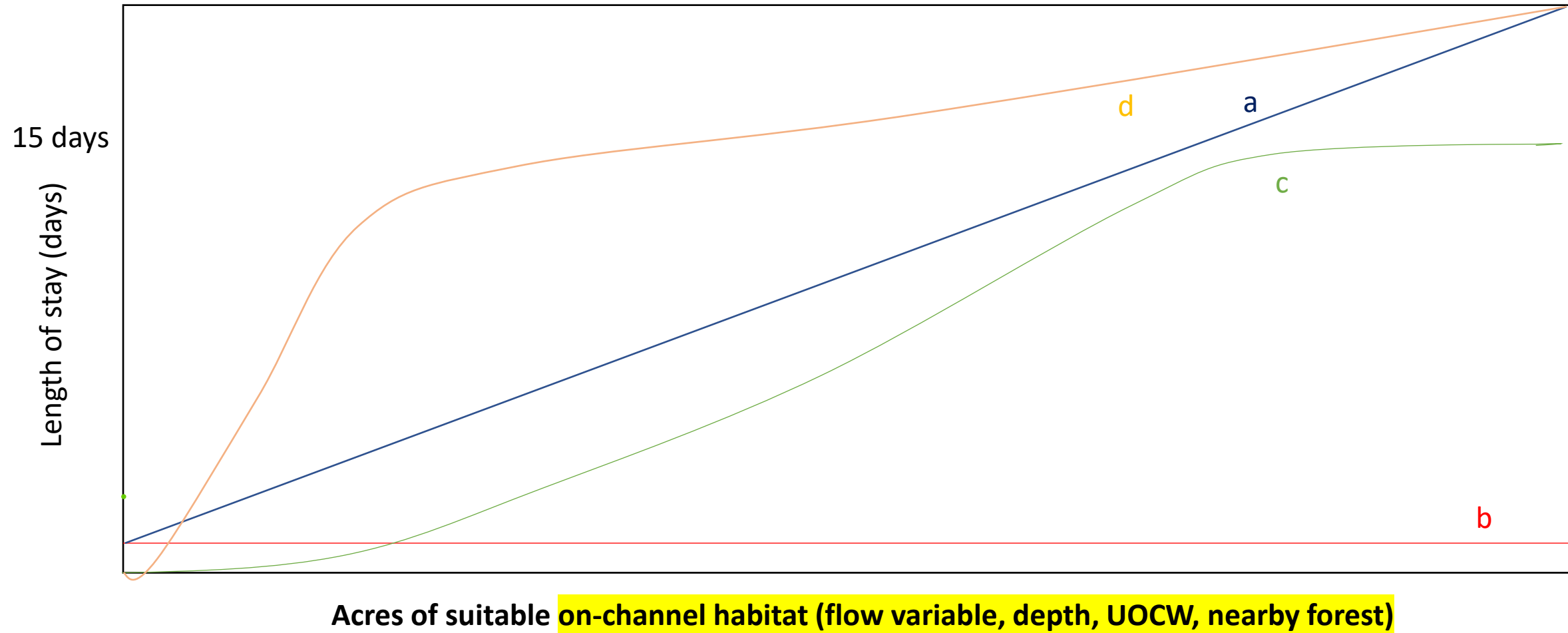
Description/Link to Program Management:

Hypothesis:



Description/Link to Program Management:

Hypothesis:

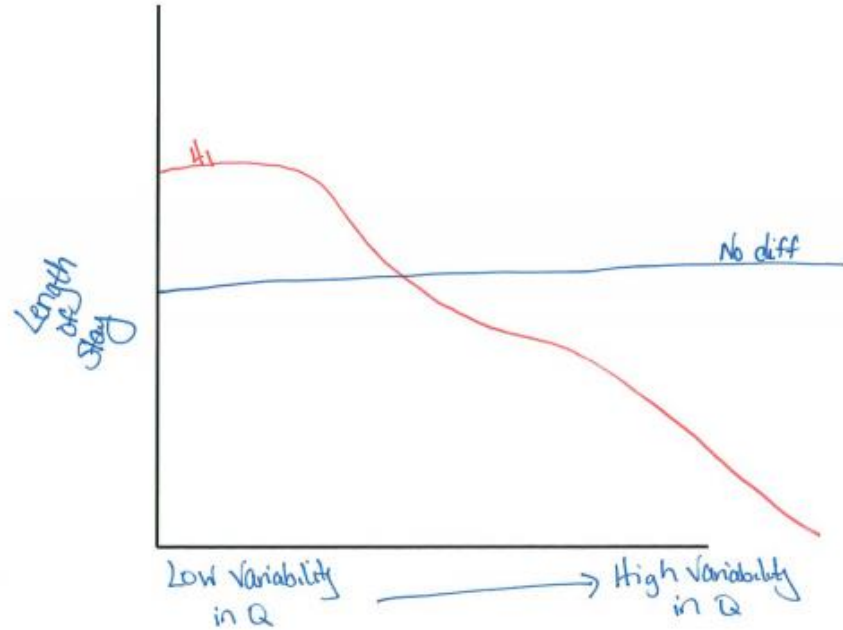


Description/Link to Program Management:

Hypothesis and Alternative Hypotheses

H₀: No difference between low/high daily/weekly flow rates + length of stay
H₁: Diff. in the variability of flow rates influences stay length

X-Y Graph



Is there enough **variability in flows** encountered by WC over the years/seasons as they intersect with the Platte to detect selection for this variable?

Description/Link to Program Management

If flow ~~variability~~ variability has an impact, may want to release H₂O.

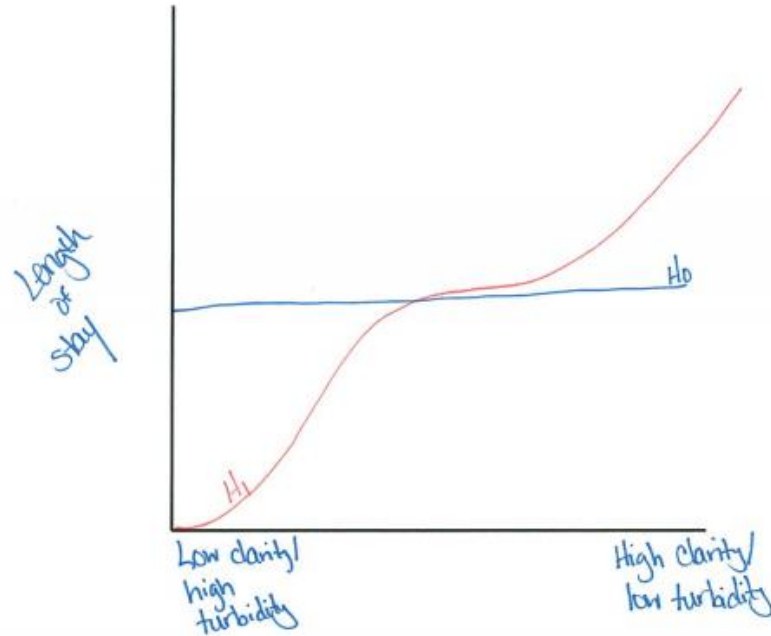
Do hourly/daily flow rates vary much during spring/fall whooping crane season to even consider this?

Turbidity

Hypothesis and Alternative Hypotheses

H_0 : H_2O clarity/turbidity has no correlation/impact on whooping crane length of stay
 H_1 : H_2O clarity/turbidity is correlated to whooping crane stay length

X-Y Graph

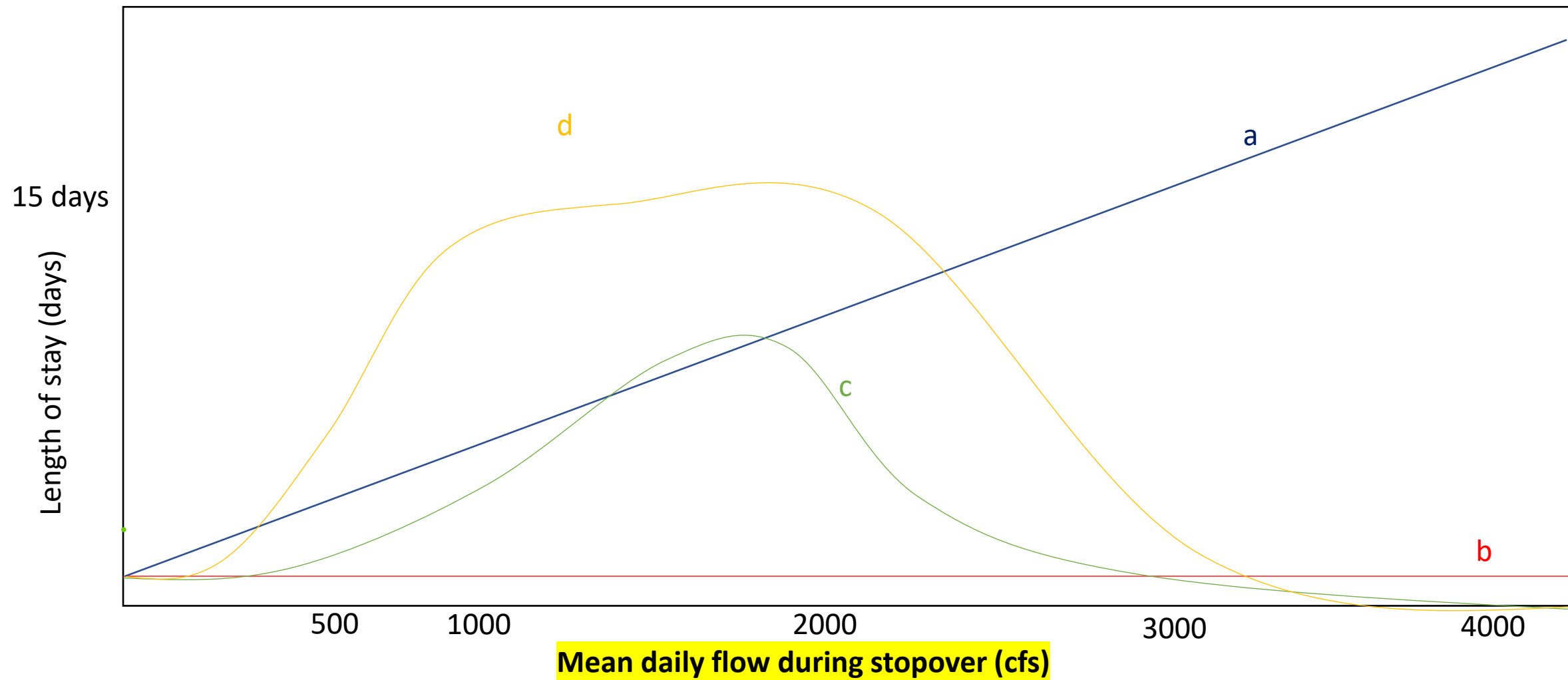


Description/Link to Program Management

Good to know if determining factor is out of our control

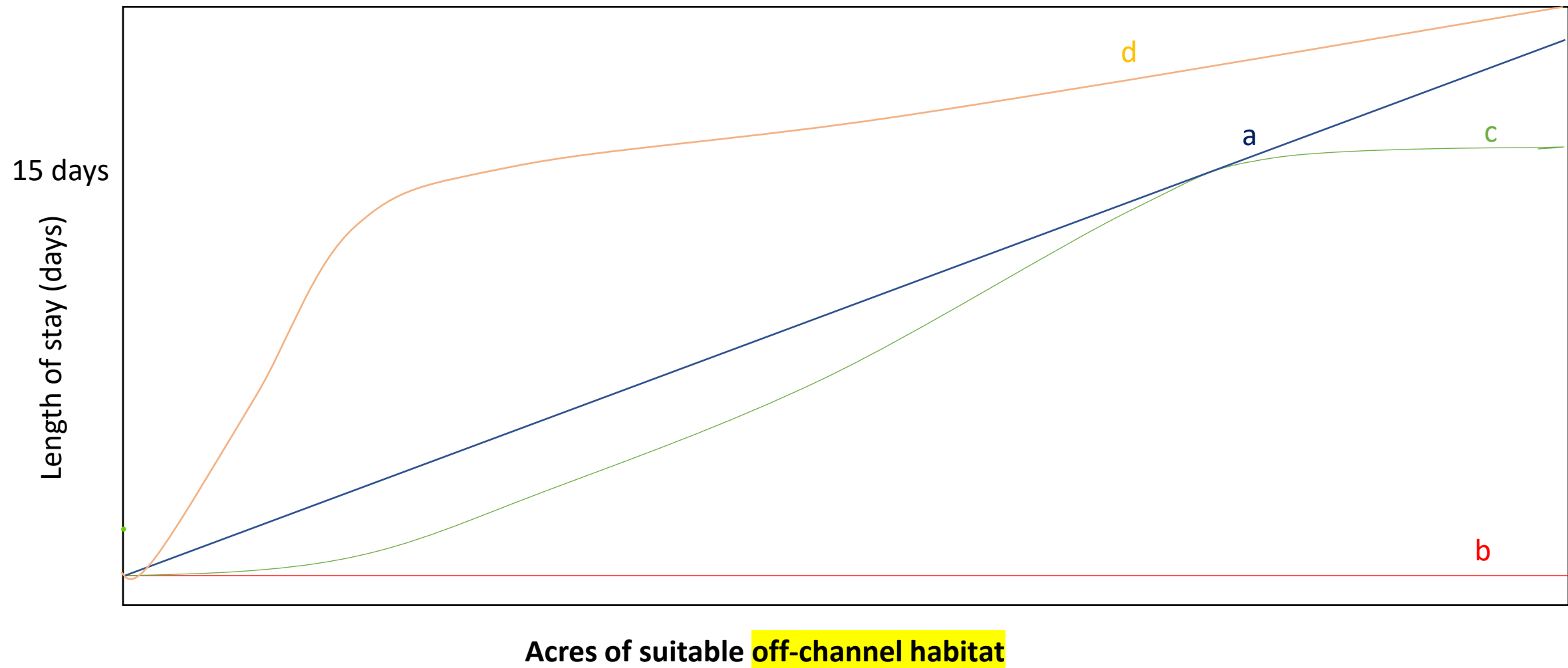
- 1) Is turbidity in the Platte so tightly correlated to Q that this is irrelevant?
- 2) During the spring/fall seasons does turbidity vary so little that this is irrelevant?

Hypothesis:



Description/Link to Program Management:

Hypothesis:

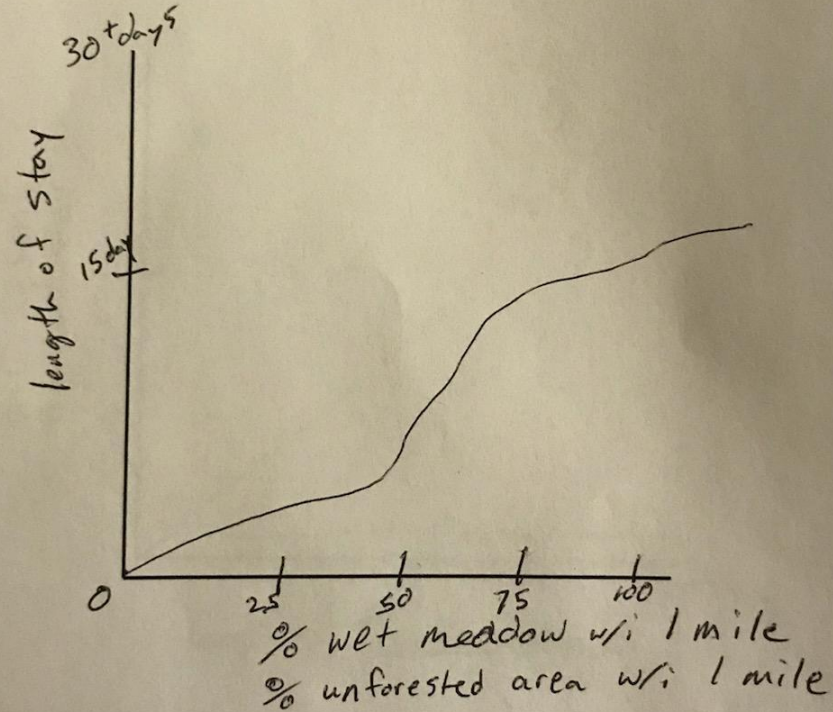


Description/Link to Program Management:

Hypothesis and Alternative Hypotheses

Length of stay is/is not ~~proportionate~~ proportionate to % of wet meadow land cover w/ 1 mile (could choose diff #)
- Could do same analysis w/ proportion non-forest land cover

X-Y Graph



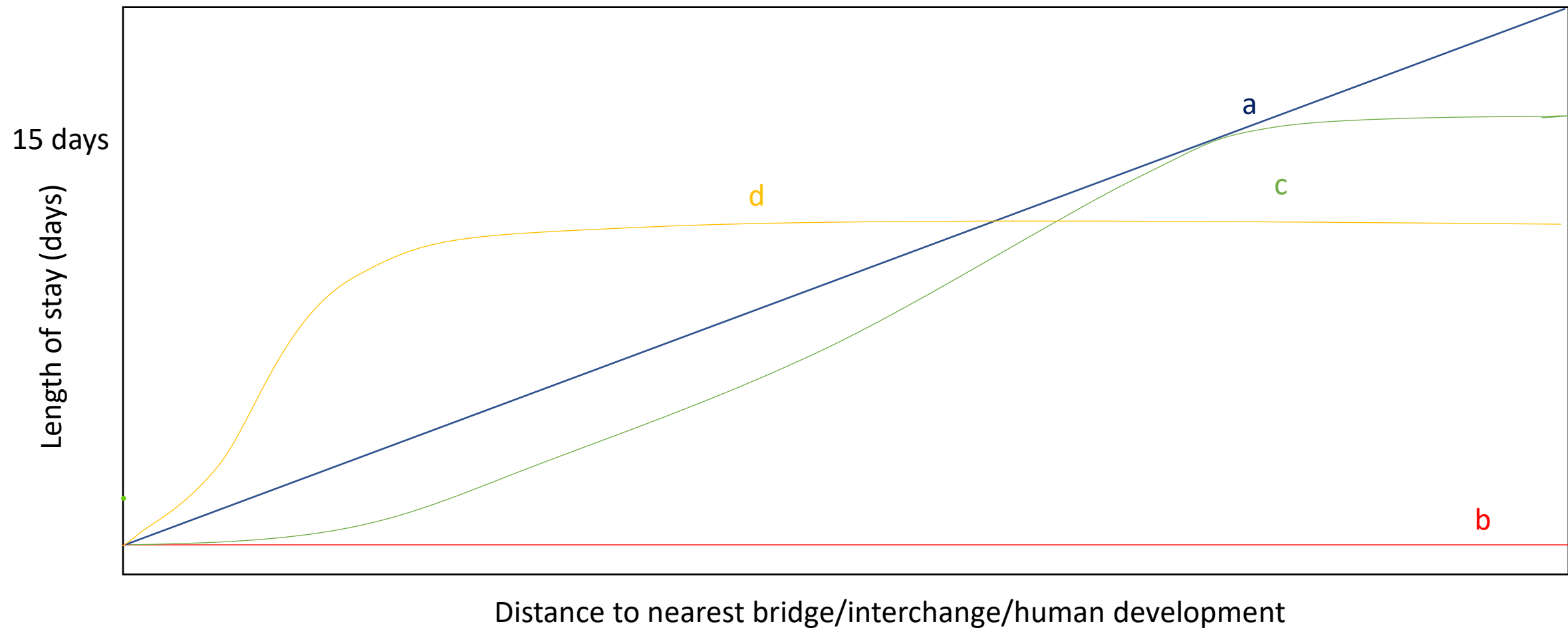
Description/Link to Program Management

Hypothesis:



Description/Link to Program Management:

Hypothesis:



Description/Link to Program Management:

Hypothesis:



Mosaic of low-lying terrestrial and wetland landcover types within 1 mile
(riverine, wetland, ag, grassland, non-developed mosaic)

Description/Link to Program Management:

Whooping Cranes – Potential BIG QUESTIONS

- Q1: What are the conditions that influence whether a WC will stop or flyover the CPR?
- Q2: Can we use water to make UOCW for WC use?
 - a) Can we use SDHF (Fall) to maintain UOCW?
 - b) Can we use germination suppression flows (Spring/Summer) to maintain UOCW?
- Q4: Are WC that stop on the CPR more fit?
- Q3: What are the conditions that influence length of stay on the CPR?

Meeting Review and Wrap-Up

- Meeting Feedback
- Action Items
- Agenda suggestions for next meeting
 - Additional WC Questions?
 - Phragmites
 - Species of concern
 - Wet meadows
- Upcoming Meetings:
 - GC Meeting March 10th, 9:30 AM - 4:00 PM
 - AMWG Meeting March 23rd, 1-5 PM

