

CVPIA SIT Call-in Meeting September 25, 2019



Agenda

- Update on watershed expert meetings (Mike U.)
- A review and discussion of the CPAR list (All)
- Update on Scenario Strategy Builder group (Rod)
- Update on habitat change (Jim and Adam)
- Update on state-dependent Chinook strategies (Jim and Adam)
- Timeline moving forward
- New Business

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A review and discussion of the CPAR list

Received some updates on ongoing efforts

General comments:

- The DSM isn't really set up to evaluate all of the CPAR actions at this time. In some cases we probably could (e.g., spring pulse flows on the Moke). However, more often than not the CPAR actions are too specific and/or tailored to a spatial/temporal resolution that isn't currently modeled.
- We would need greater specificity in amounts and timing.
- For actions not in Tech Memo: Per the CVPIA Fish Program process, actions that are not consistent with SIT Tech Memo priorities have zero or a near zero chance of being funded. Carrying forward CPAR actions that do not have supporting scientific rationale seems unwarranted.

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Habitat change through time

John Hannon

- Spawning habitat loss over 5 year period
 - Upper Sacramento 0-20%
 - American River 0-15%
 - Stanislaus River 0-10% (faster decay rate if projects are implemented in the canyon).
 - All other tributaries 0-35%

Matt Brown

- Clear Creek spawning: mean loss 27%, max 50% over 5 years

Rearing habitat half of spawning habitat

Habitat Change Tributaries

Dam regulated (habitat changes)	Not dam regulated (no habitat changes)
Upper Sacramento River	Antelope Creek
Battle Creek	Bear Creek
Clear Creek	Big Chico Creek
Stony Creek	Butte Creek
Upper-mid Sacramento River	Cottonwood Creek
Feather River	Cow Creek
Yuba River	Deer Creek
Lower-mid Sacramento River	Elder Creek
American River	Mill Creek
Lower Sacramento River	Paynes Creek
Calaveras River	Thomes Creek
Mokelumne River	Cosumnes River
Merced River	
Stanislaus River	
Tuolumne River	
San Joaquin River	

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Scenario Evaluation

Simulate every combination of actions for each tributary to find optimal *sequence* of actions

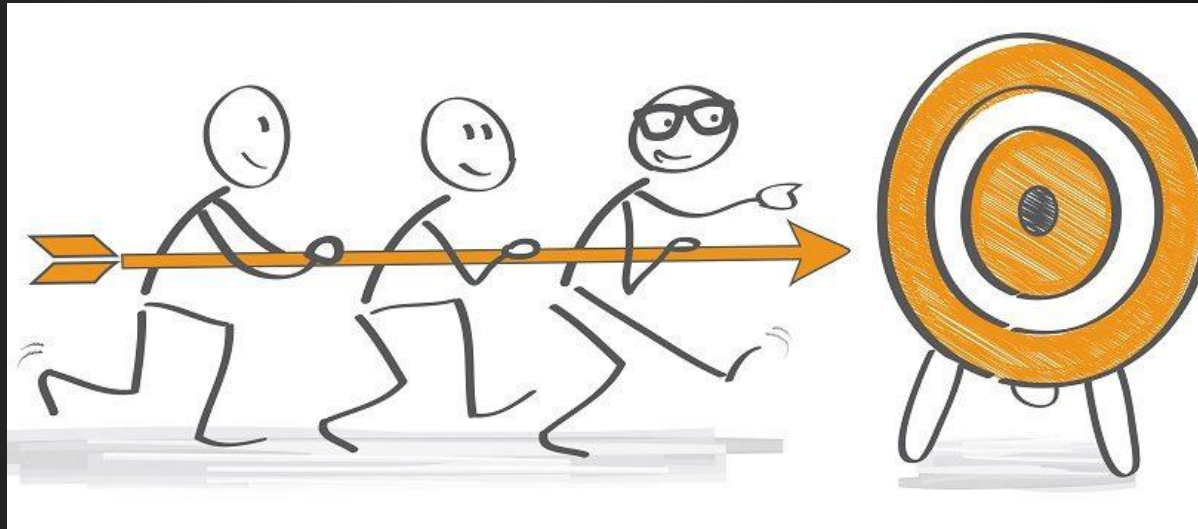
Assume 4 potential actions per tributary

20 years = $4^{20} = 1.09 \times 10^{12}$
combinations x 25 natal
tributaries...



Objective

Develop an efficient approach to evaluate all combinations of actions

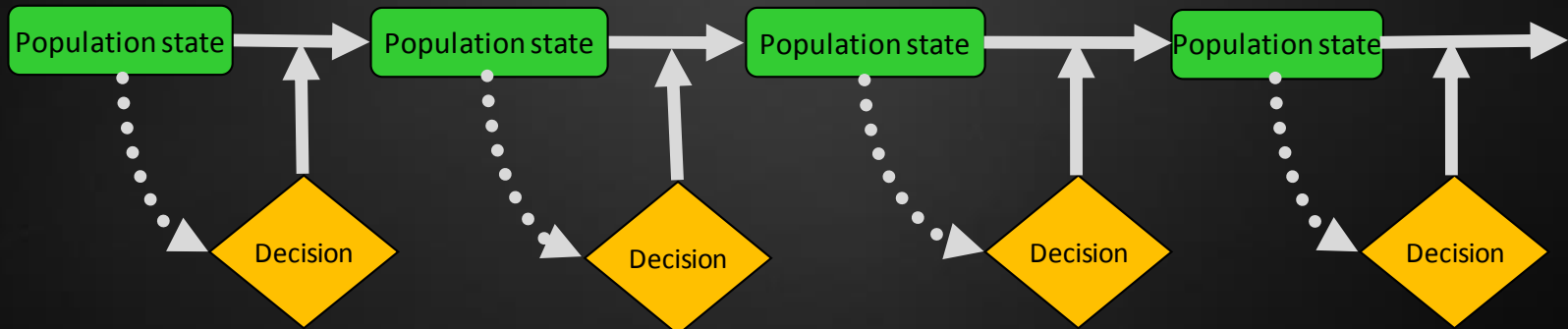


Markov Decision Process (MDP)

Need

- Recurrent decision
- Objective
- Current system state
- Decision alternatives
- Model

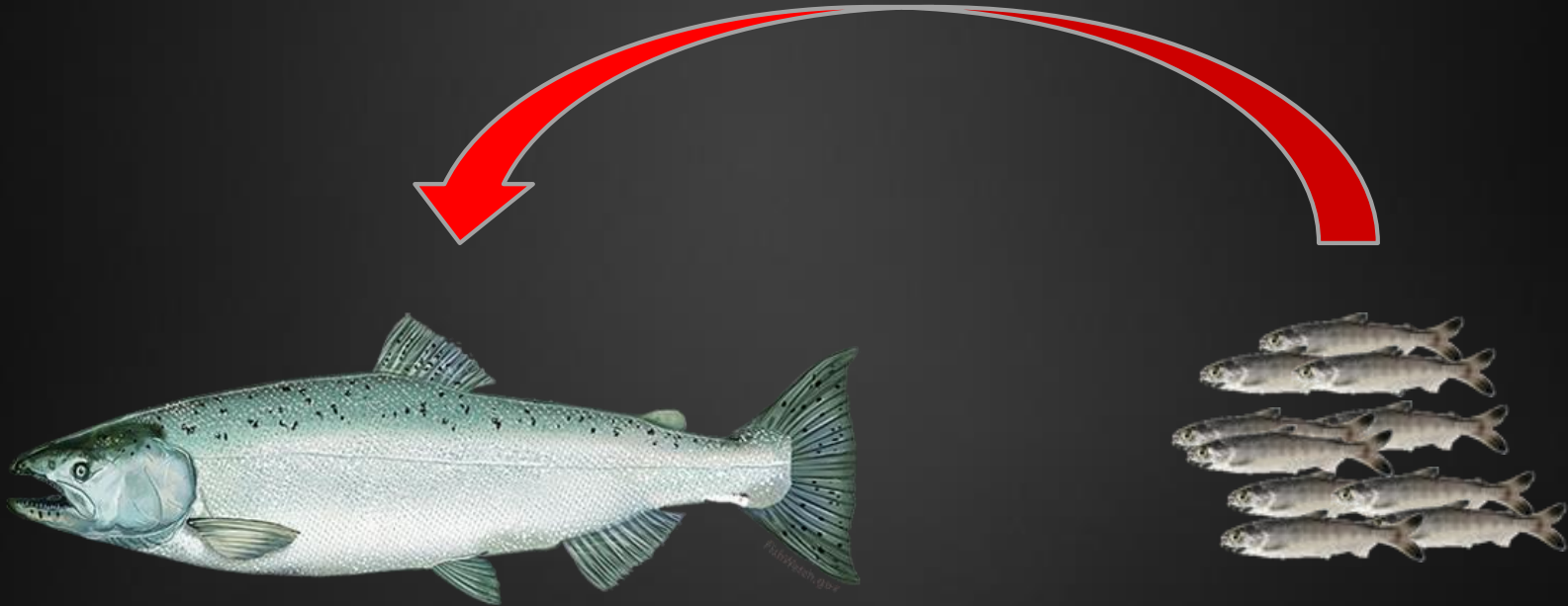
Through time



Focus On What Really Matters

Objective

Maximize the number of adult equivalents



Focus On What Really Matters

Decision Alternatives



Spawning habitat (1 ac)



In-channel habitat (2 ac)



Floodplain habitat (2 ac)



Survival of juveniles (0.5%)

Partial controllability: 50 – 150%

Focus On What Really Matters

State variables



**In-channel habitat per
spawner**



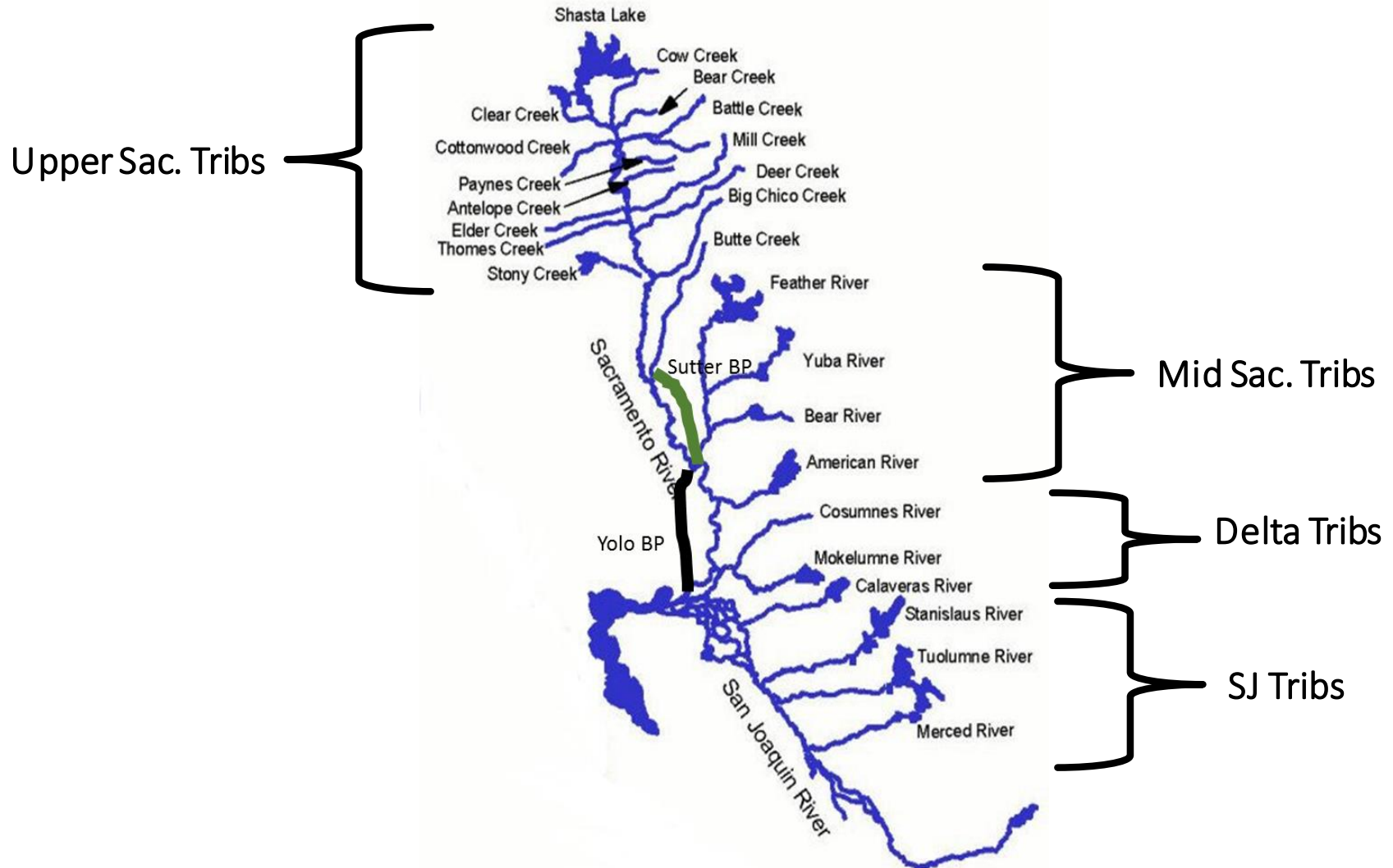
**Spawning habitat per
spawner**



Survival within a tributary

Focus On What Really Matters

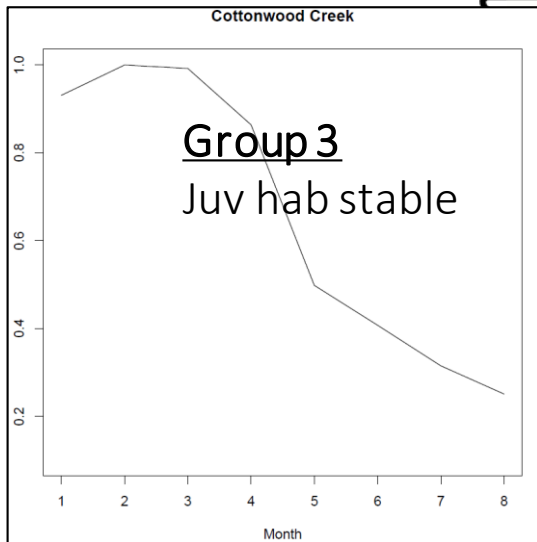
What tributaries should be treated as different systems?



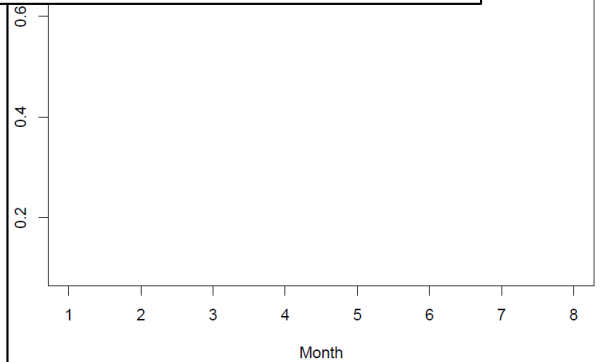
Focus On What Really Matters

What tributaries should be treated as different systems?

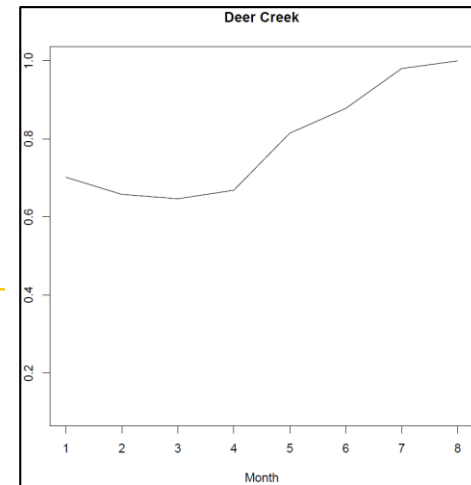
Group 1
Juv hab decl



Group 3
Juv hab stable



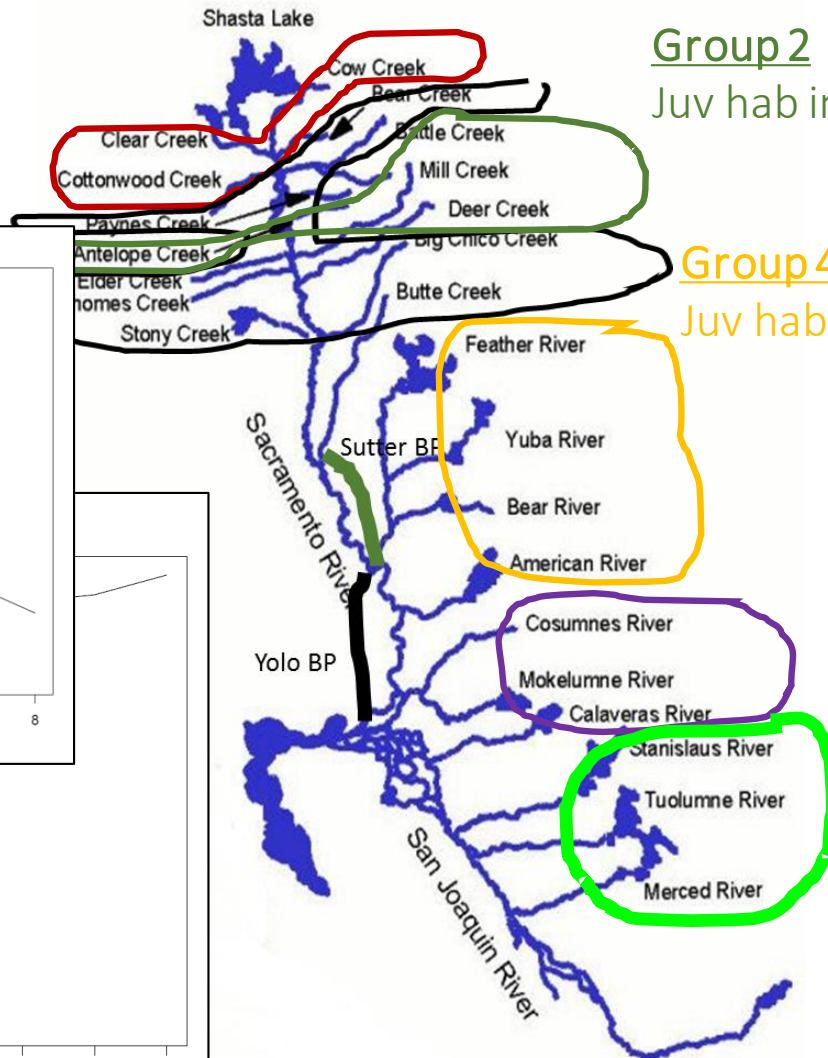
Group 2
Juv hab incr



Group 4
Juv hab incr

Group 5
Juv hab stable

Group 6
Juv hab stable



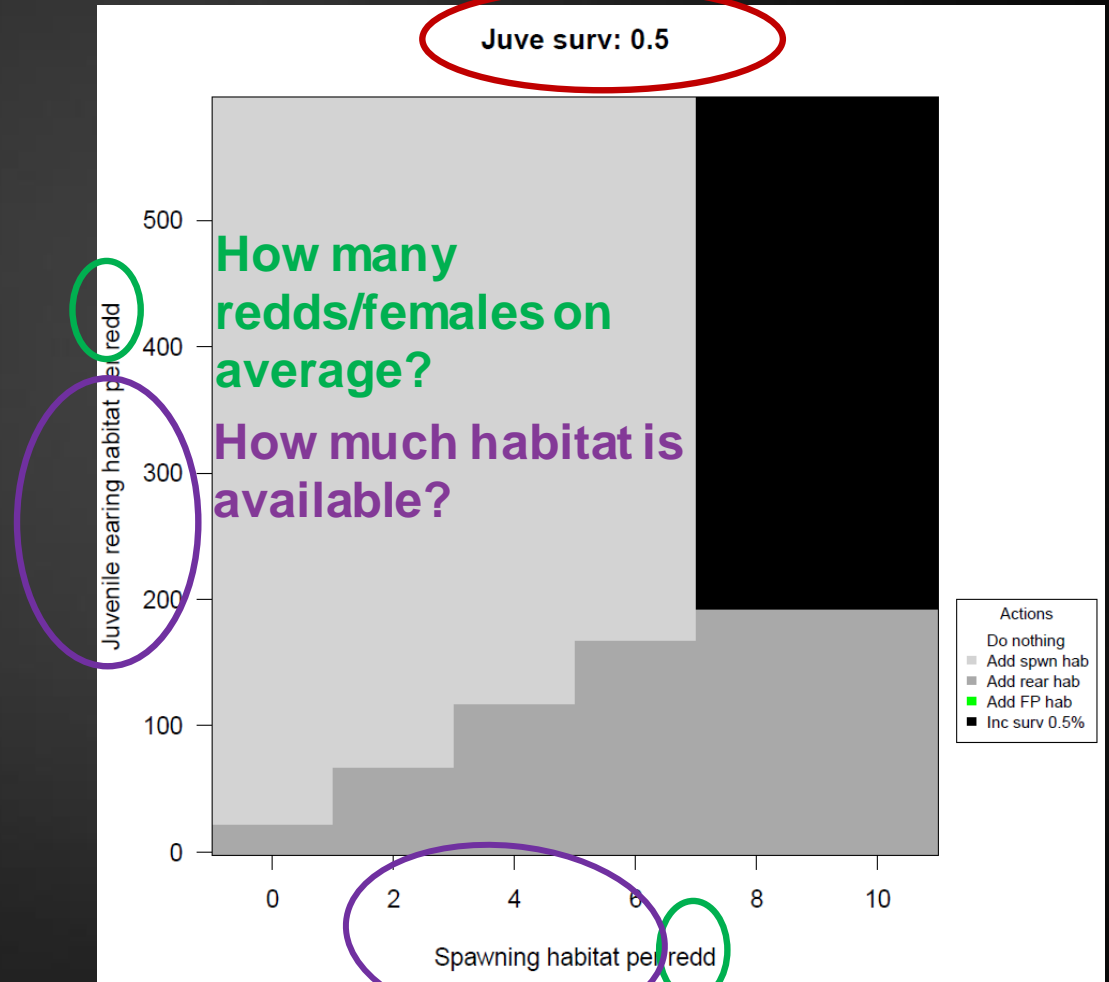
State-Dependent Policy Development

Use decision-support model to develop transition probability matrices for each group/tributary type

Use stochastic dynamic programming to derive a set of optimal policies

- Finds actions that maximize the cumulative utility value through time

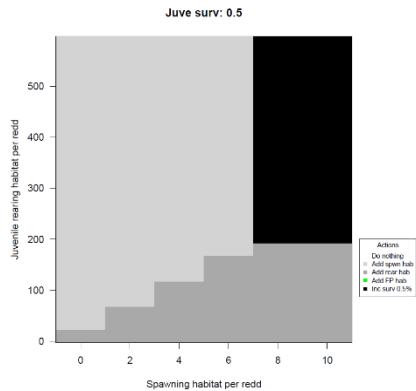
What is juvenile < 45 mm survival on average?



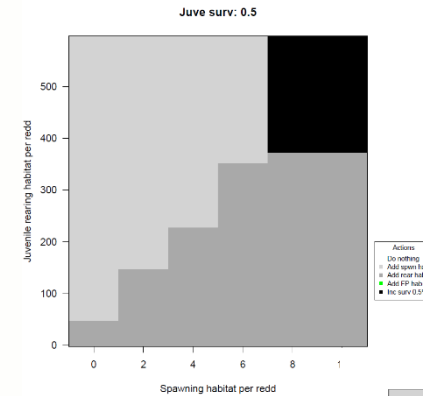
Provisional results subject to revision

State-Dependent Policy Development

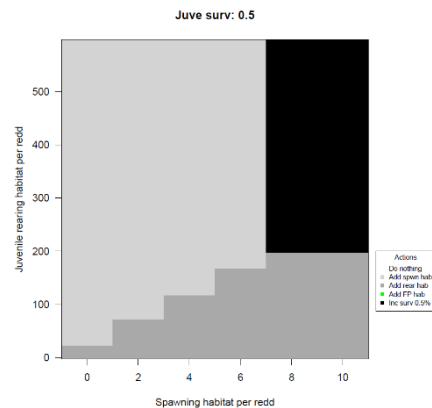
Group 1



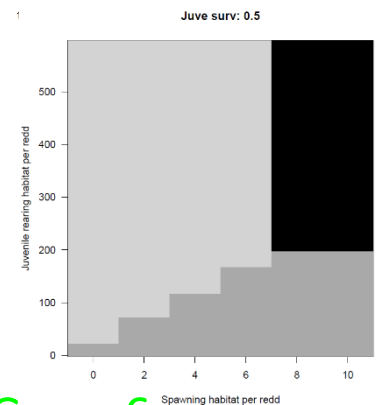
Group 2



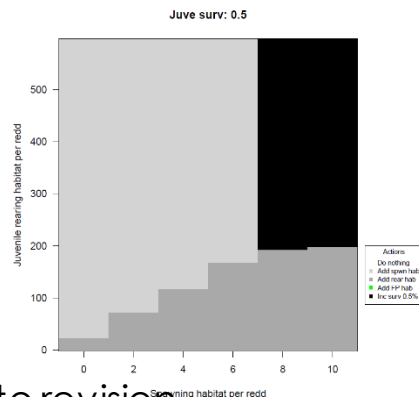
Group 3



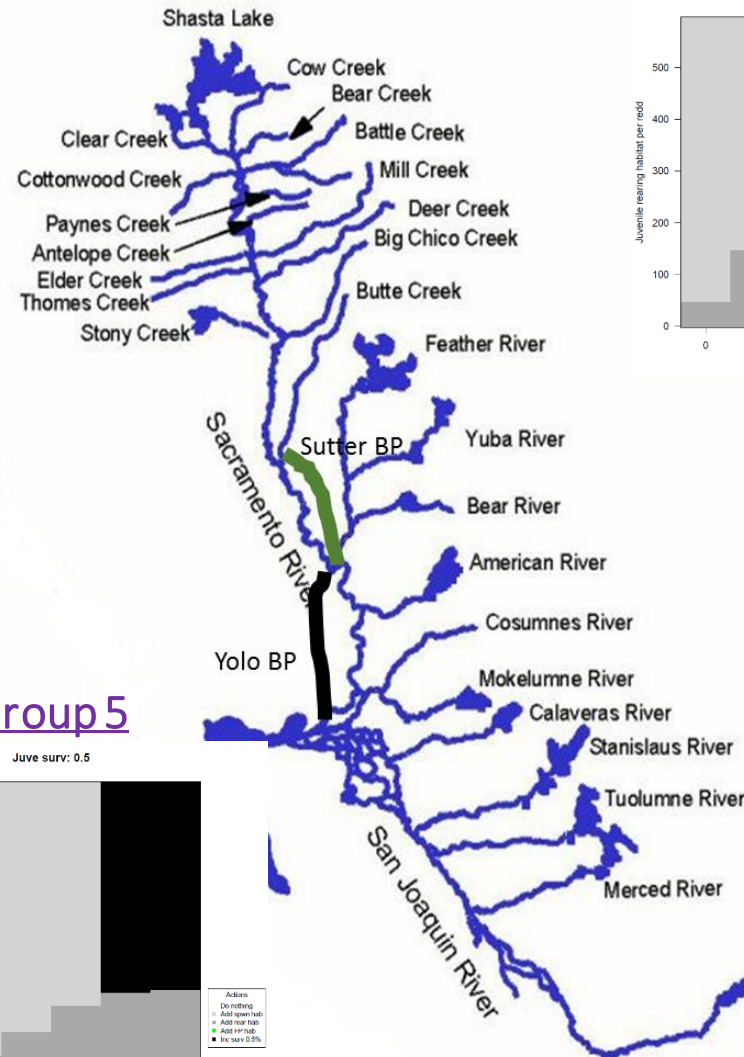
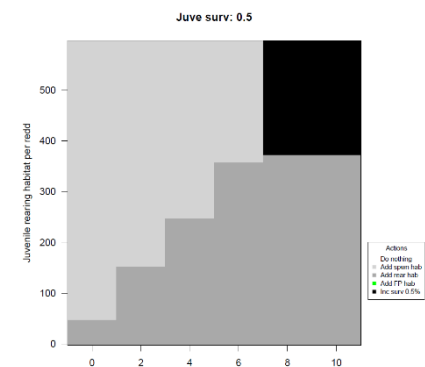
Group 4



Group 5



Group 6



Forward Simulation

What strategy results in the highest cumulative utility?

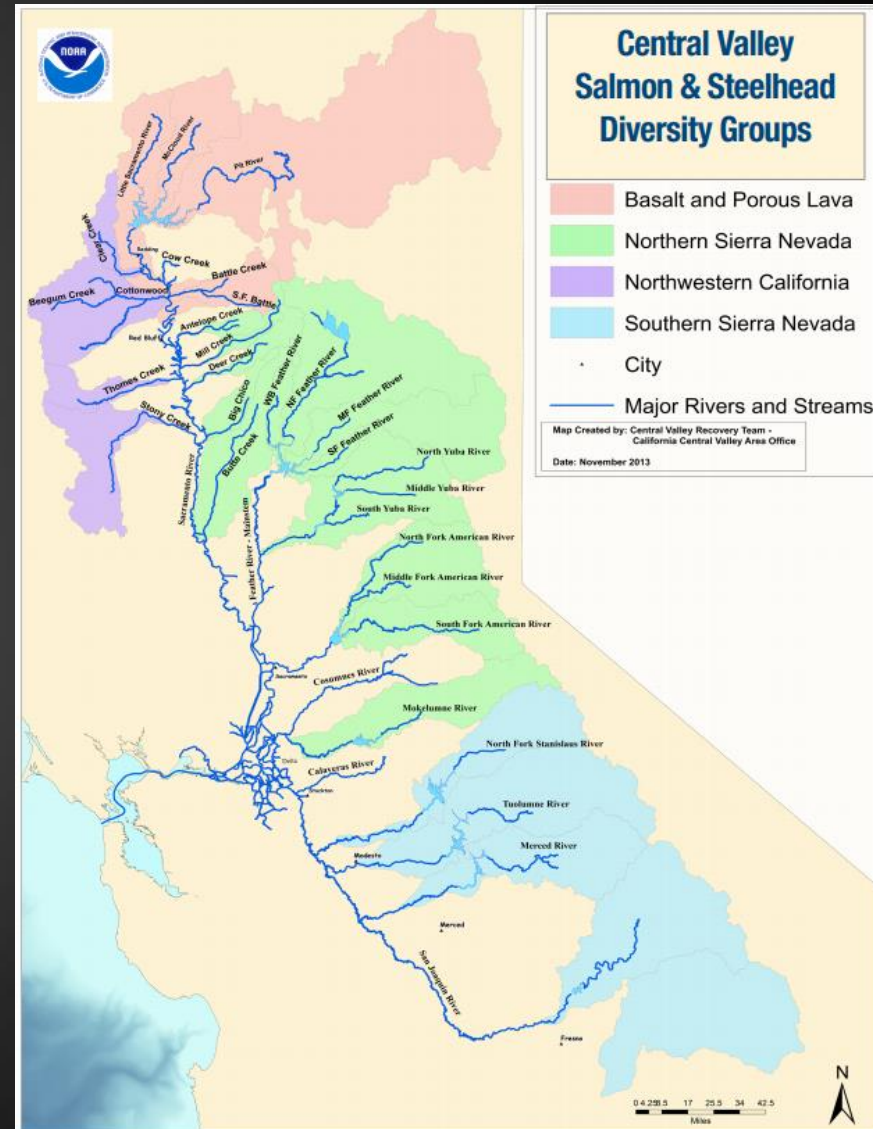
Simulated 20 years

Five actions implemented per year

Evaluate two alternative rulesets

1. Pick actions that maximize fish returns
2. Pick actions that maximize fish returns in each diversity group

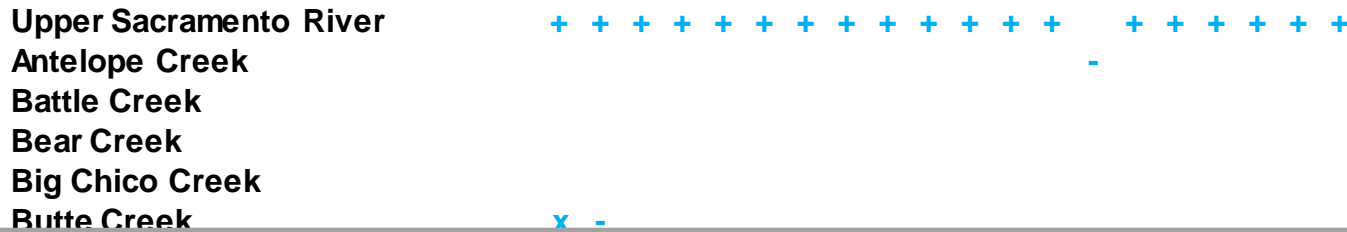
Only looking at the 25 tributaries right now



Forward Simulation

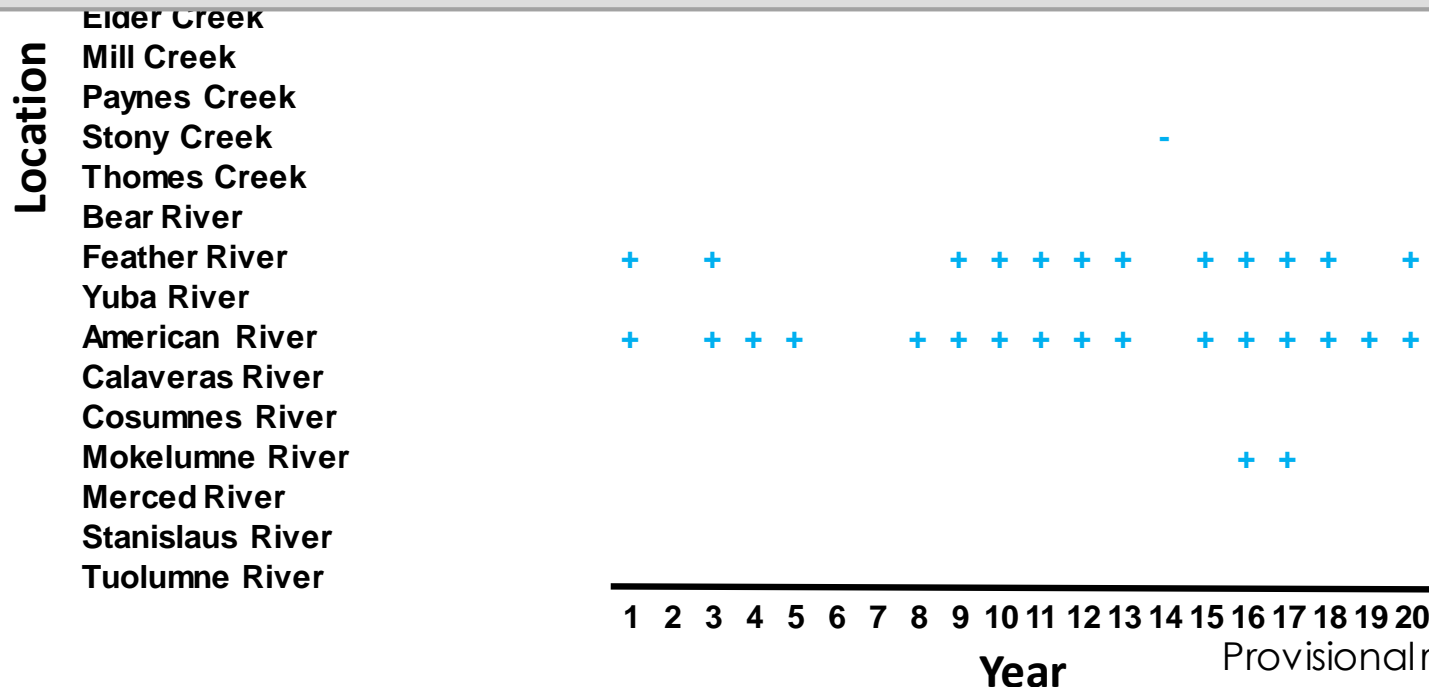
What strategy results in the highest cumulative utility?

Pick actions that maximize fish returns



- x - Spawning
- +
- Survival
- 0 - Floodplain

Mainstem Sacramento NOT INTEGRATED YET!!!

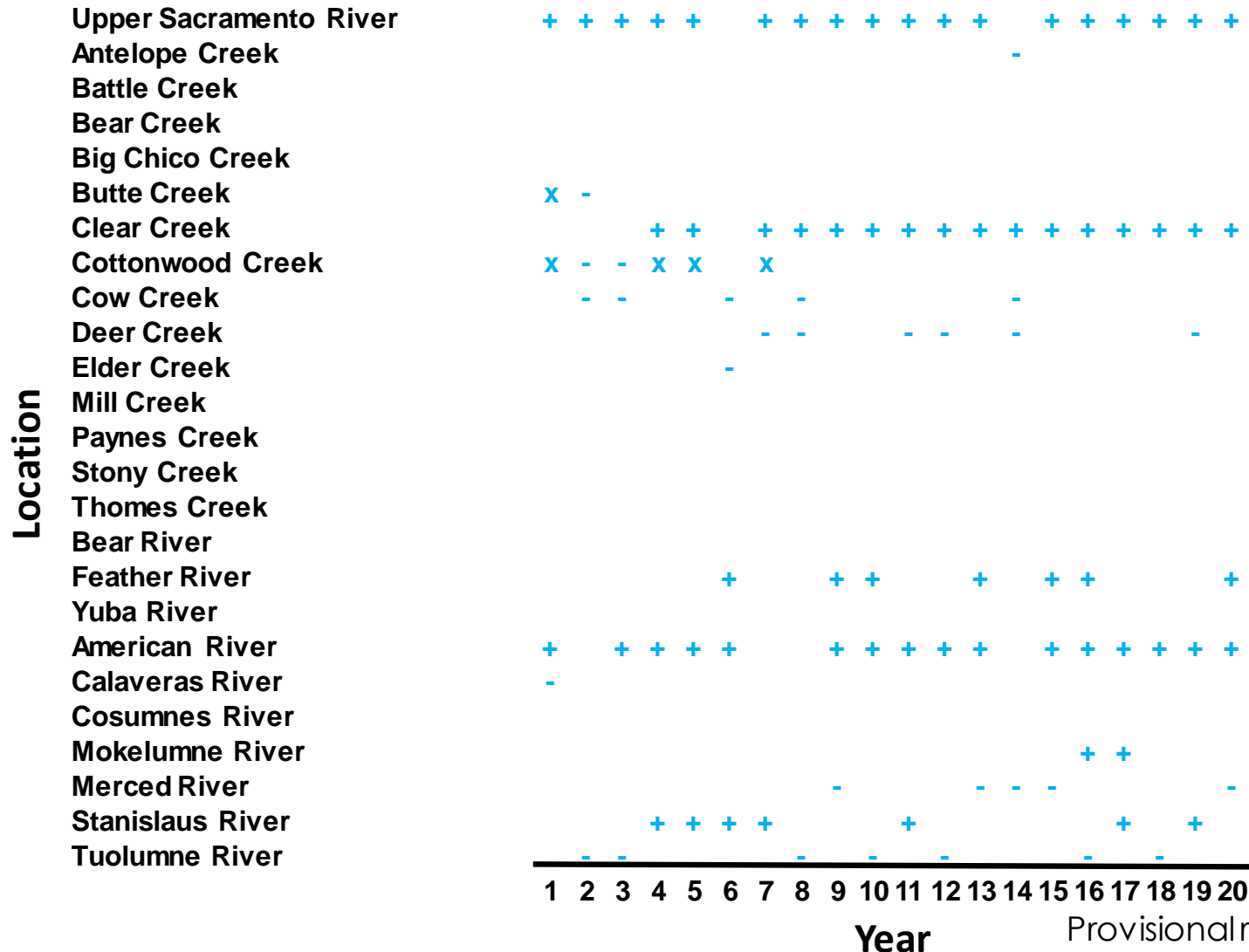


Provisional results subject to revision

Forward Simulation

What strategy results in the highest cumulative utility?

Pick actions that maximize fish returns in each diversity group

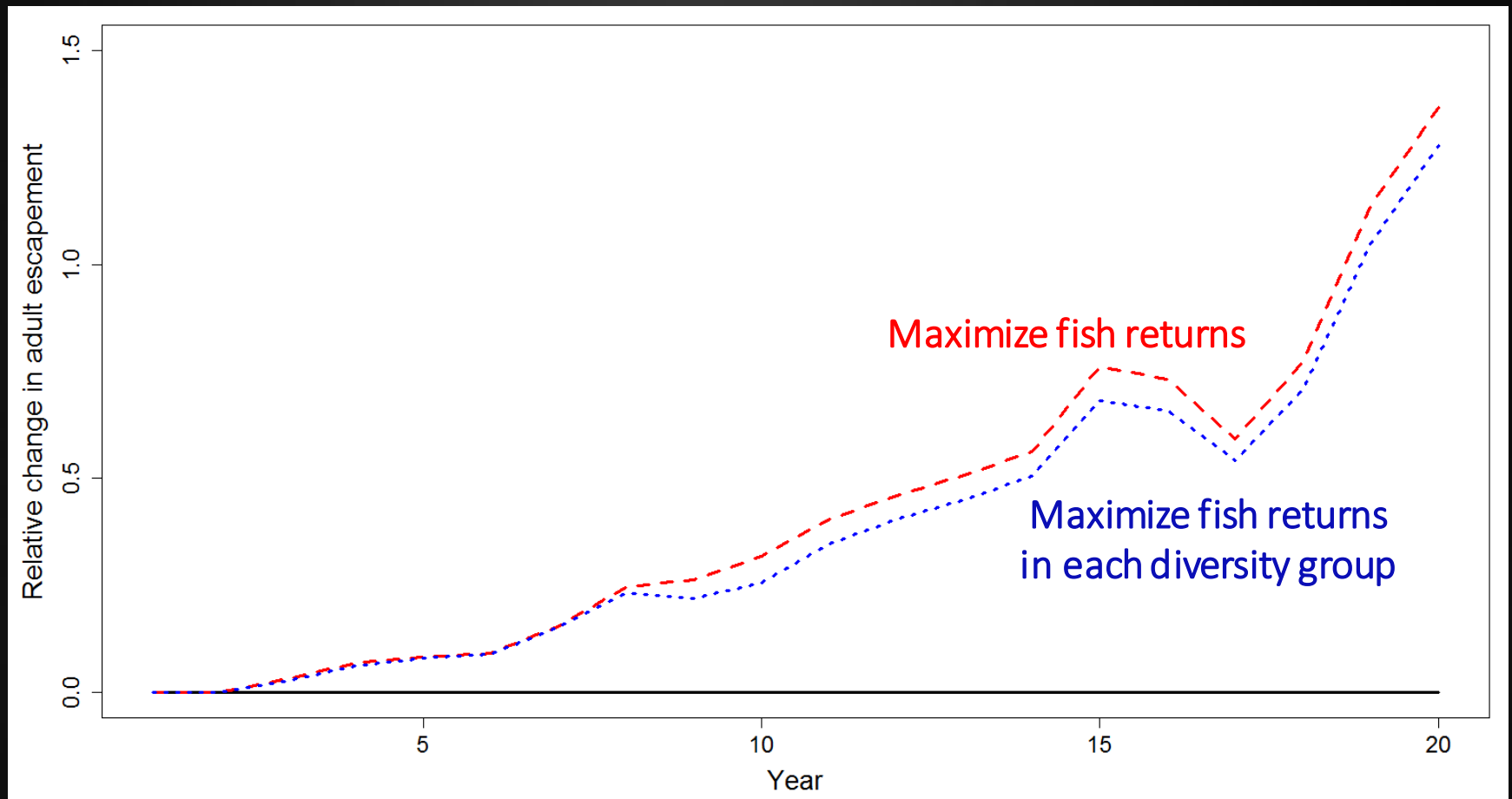


- x - Spawning
- +
- - Survival
- 0 - Floodplain

Provisional results subject to revision

Forward Simulation

What strategy results in the highest cumulative utility?



Provisional results subject to revision

State dependent policy development

Next steps

Fall Run

- Update habitat decay rates
- Include possibility for habitat restoration actions in the mainstem sections

Spring and Winter run

- Complete policies
- Simulation to create candidate strategies

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Timeline moving forward

Time period	Task
<u>October</u>	
Week 1	SIT gets optimal strategy from solving the Chinook DSMs
Weeks 2-3	Individual SIT members reviews Chinook strategies and identifies those to include for final simulation evaluation (this includes those not identified by optimization)
Week 4, meeting 24-25th	SIT in person meeting
	Identify strategies to evaluate
	Finalize list of Chinook strategies
	Discuss O mykiss and sturgeon strategies
After meeting	Adam simulates candidate Chinook strategies
<u>November</u>	
Week 1	SIT provided with results from stochastic simulations of candidate strategies
	Individual SIT members review simulation results
Week 3, meeting Nov 20-21	SIT chooses Chinook Strategies and identifies list of O mykiss and sturgeon strategies
<u>December</u>	
Week 1	Final selection of all anadromous strategies
Weeks 2-4	Near term restoration strategy drafted (author?) SIT provided with draft of strategy
<u>January</u>	
Weeks 1-2	SIT reviews draft strategy and provides feedback
Week 3-4	Draft Strategy revised and sent to SIT
<u>February</u>	
Weeks 1-2	SIT provides comments for strategy addendum

After the Restoration Strategy

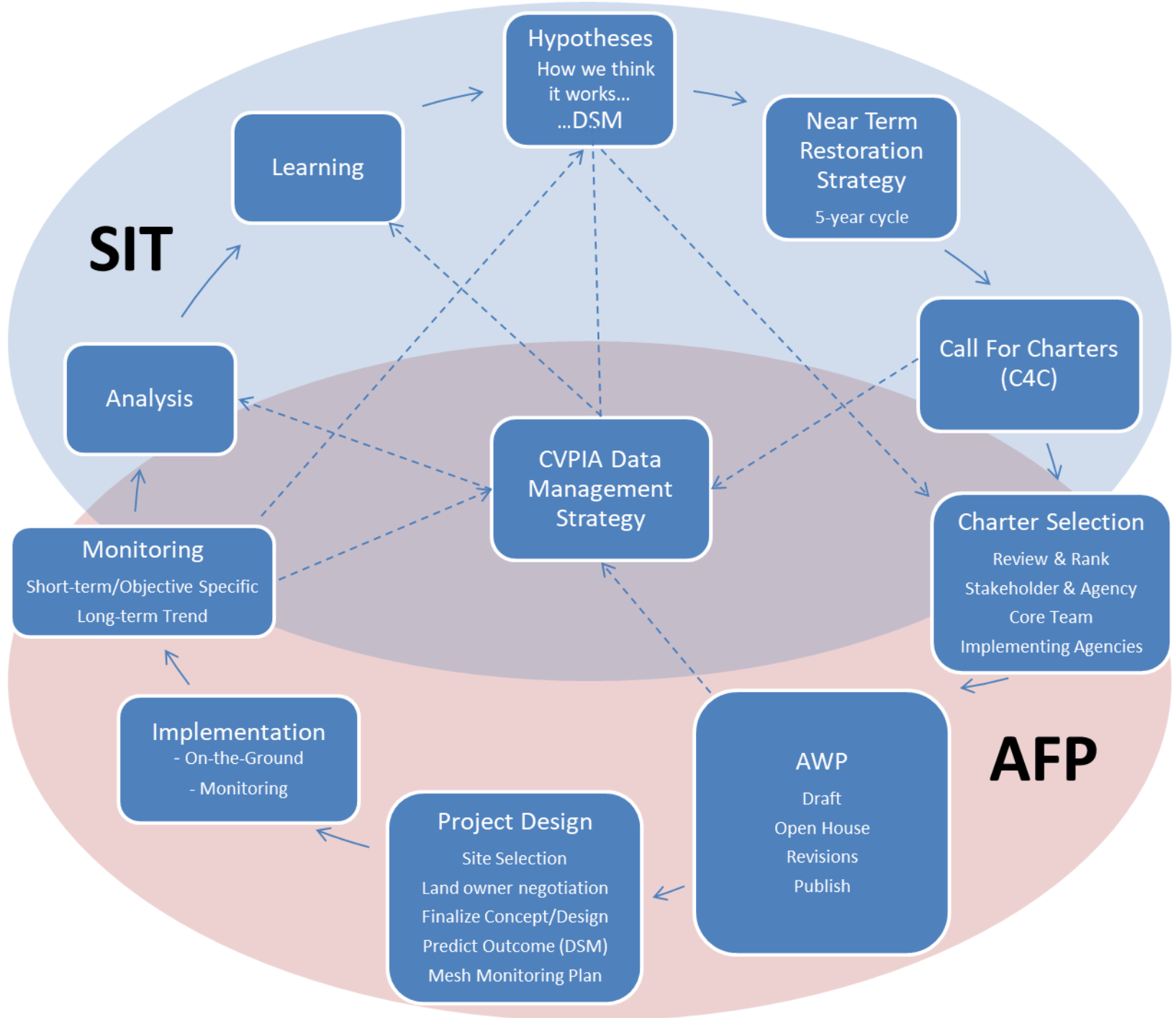
What's next?

- Continued involvement and support from the SIT will be essential to the success of the program
- SIT will continue to meet
 - Update meetings
 - Quarterly phone calls
 - Semi-annual in person meetings
 - Review progress on requested refinements to DSM inputs and rulesets.
 - Annual meeting
 - Review:
 - 5-year priorities
 - Monitoring results
 - DSM improvements
 - Results from new DSM simulations and sensitivity analyses
 - Any recent information (i.e., publications, reports, etc.) relevant to the SIT activities
 - Grade the state of the DSMs and inputs
 - Request refinements to the DSM inputs and rulesets via the established SIT proposal process
 - Make recommendations for modifications to the Near Term Restoration Strategy priorities, if necessary via the Tech Memo

After the Restoration Strategy

What's next?

- Annual process will be documented in an annual technical memorandum that will be attached to the AFP Restoration Strategy as an additional addendum
- Year 4 in the 5-year process
 - Comprehensive review of DSMs and monitoring data
 - Science Coordinator will be tasked with conducting the review and recruiting outside experts to aid in the review
 - Results of the review will be made available to the SIT and Core Team
 - Science Coordinator will meet with regional watershed experts to identify changes (if any) relevant to the development of a new near-term restoration strategy



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 - Update on predator contact point study next call

Reminders



Next meeting: Call-in Meeting on Wednesday October 9

Join Zoom Meeting

<https://oregonstate.zoom.us/j/3571021423>

One tap mobile

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+19292056099,,3571021423# US (New York)

Dial by your location

+1 669 900 6833 US (San Jose)

+1 929 205 6099 US (New York)

Meeting ID: 357 102 1423

Find your local number: <https://zoom.us/j/3571021423>

Join by SIP

[3571021423@10.130.0.54](https://zoom.us/j/3571021423)

Join by H.323

10.130.0.54

Meeting ID: 357 102 1423

Following meeting- IN PERSON MEETING Thursday–Friday October 24-25
2800 Cottage Way C-1003, Sacramento, CA