

Analytical Tools and Approaches for Adaptive Management, Flood Plain Restoration Planning, and Reservoir Re-Operation



Presentation of John Cain to State Water Resources Control Board
November 13, 2012

Analytical Tools and Approaches

Adaptive management

- Logic Chain
- DRERIP Conceptual Models and Decision Making Framework

Flood Plain Restoration Analysis

- Hydraulic Model for Lower San Joaquin River
- Area Duration Frequency (ADF) Analysis

Reservoir Reoperation Analysis

- Process for developing environmental hydrographs that minimize impacts on reservoir operations.

Adaptive Management is a cyclical process



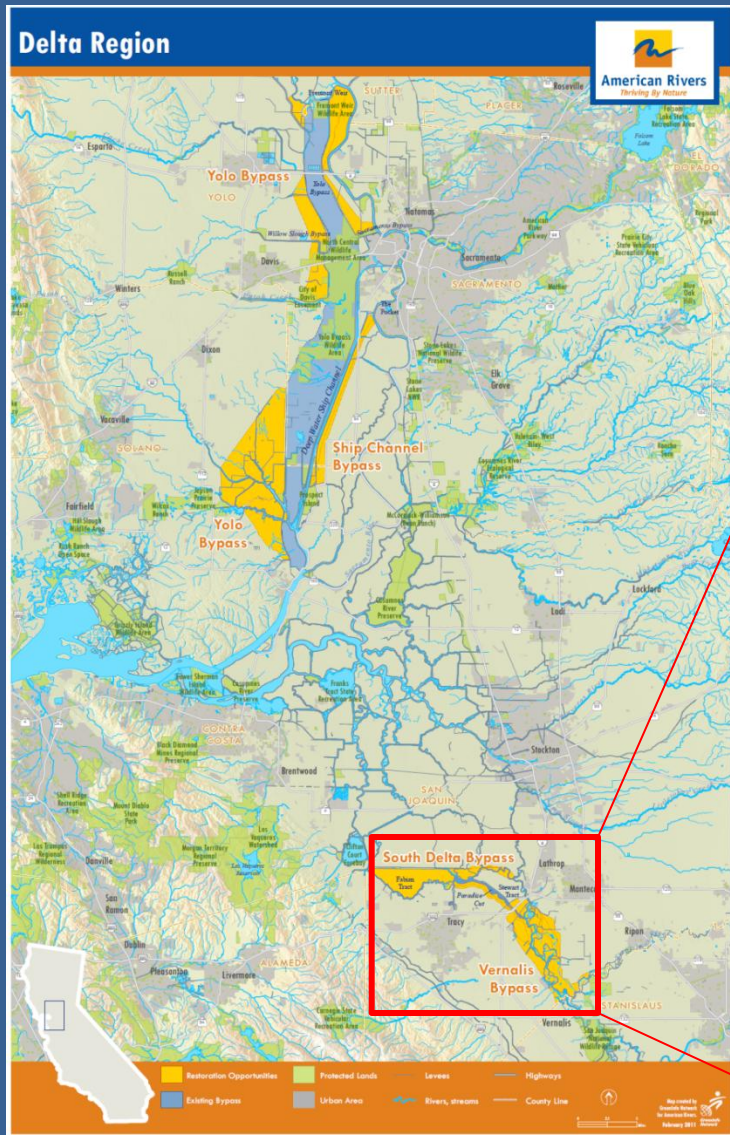
Tools for Implementation of Adaptive Management

- Logic Chain
 - Developed for BDCP process
 - Reviewed by Delta Science Program
- DRERIP (Delta Regional Ecosystem Restoration Implementation Plan)
 - Conceptual models and approach developed over years to evaluate potential restoration actions for the Delta
 - Extensively reviewed by Delta Science Program

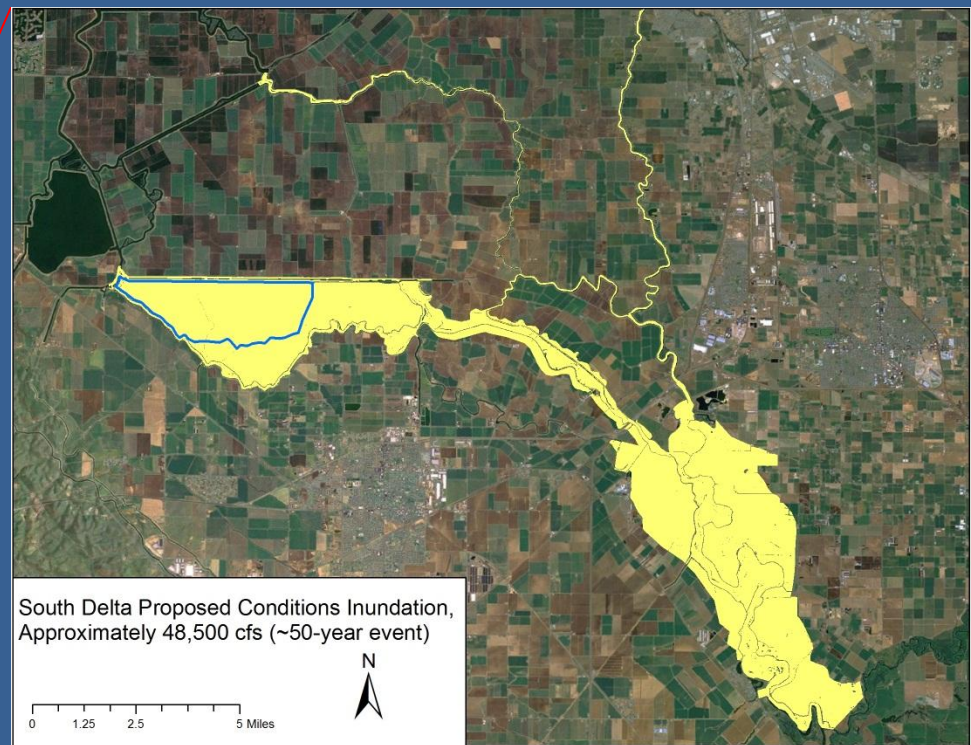
Logic Chain

- Structured decision making framework for implementing adaptive management.
- Logical process for linking objectives, conservation measures, and performance metrics.
- Objectives are SMART: Specific, Measureable, Achievable, Relevant to goal, and Time Bound
- Objectives express desired outcome and should not be co-mingled with strategies for achieving the desired outcome.

Hydraulic Model for Lower San Joaquin River

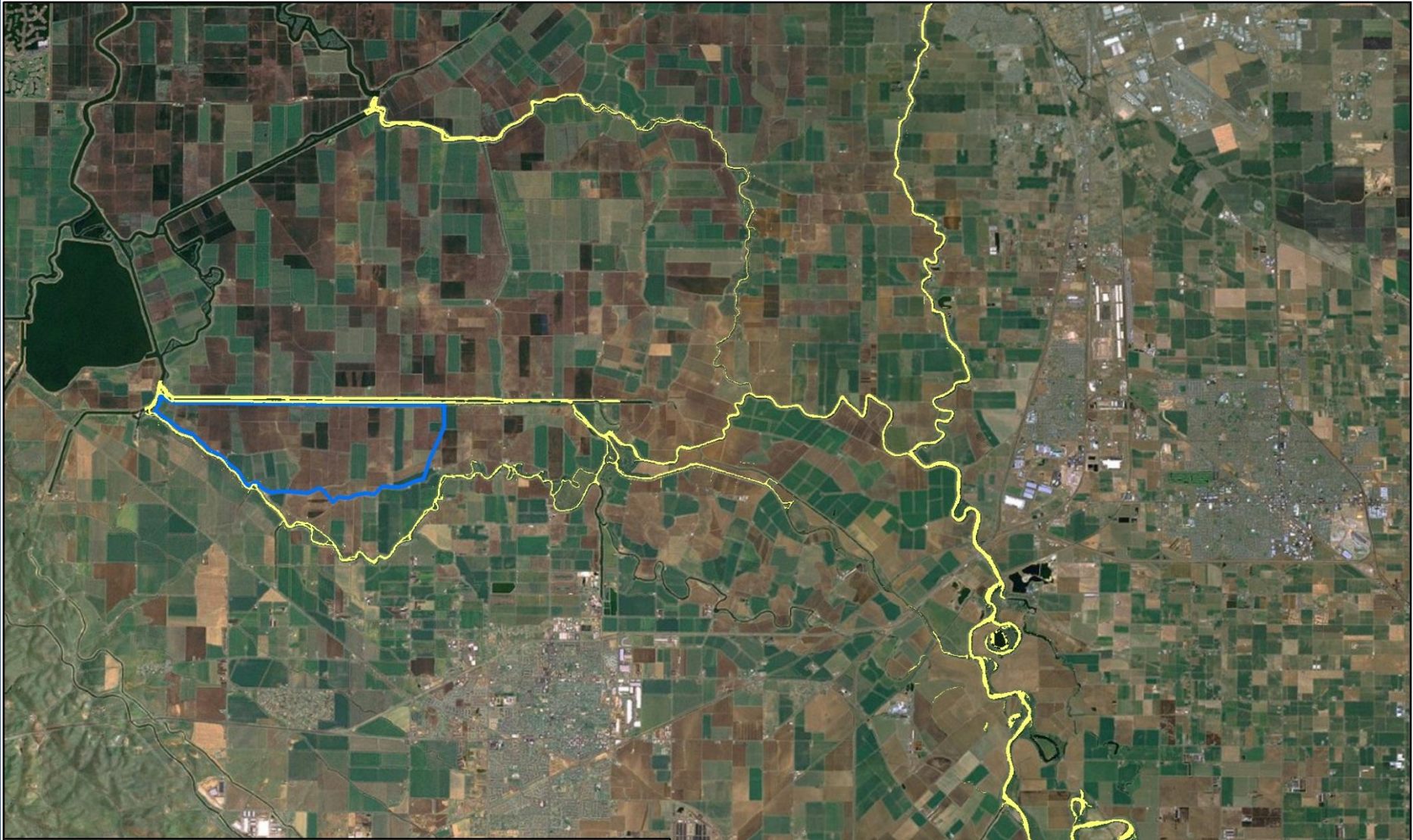


Floodplain expansion scenario evaluated by American Rivers:
Includes expansion of Paradise Cut.

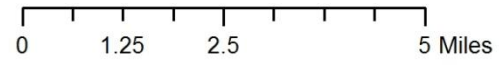


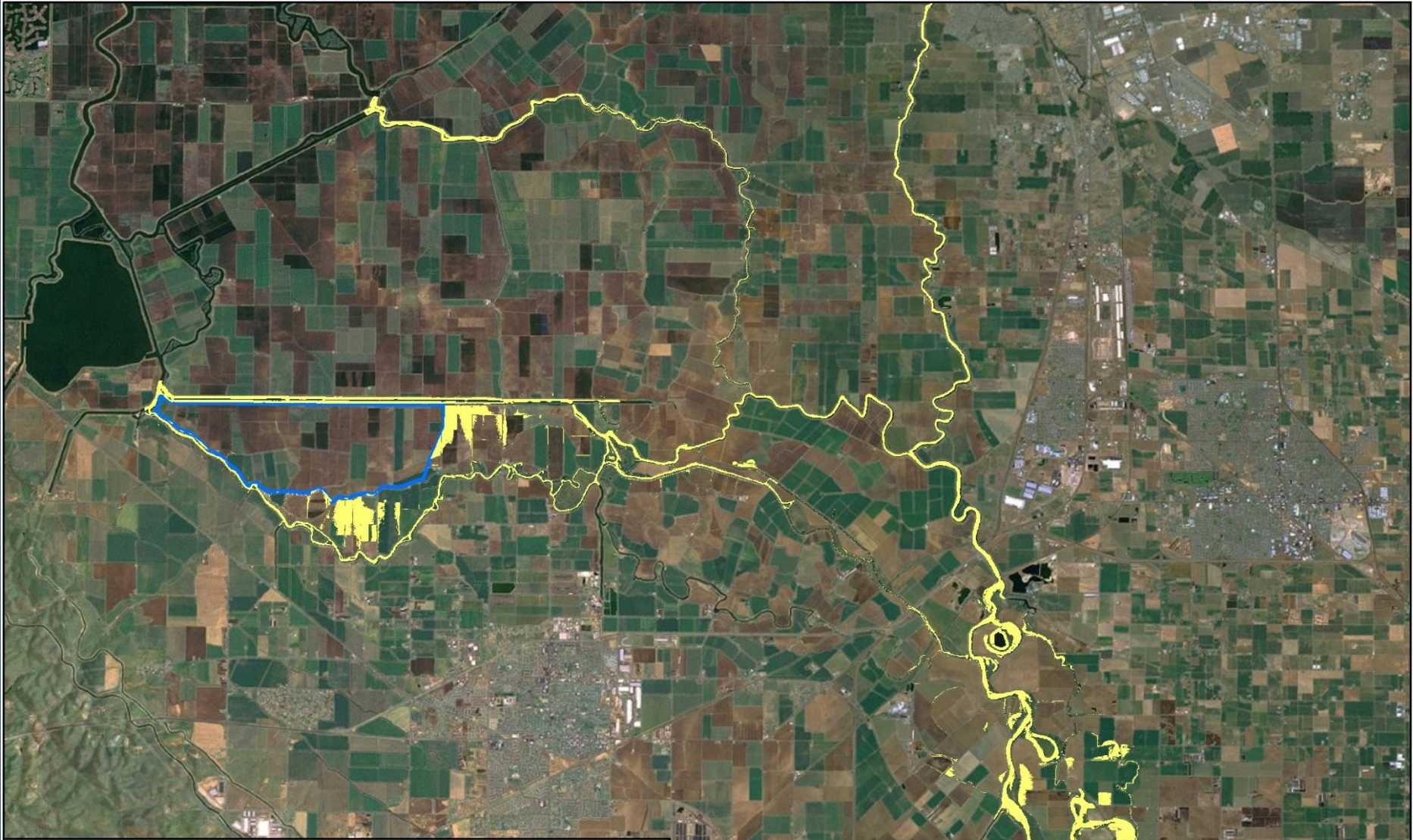
Reservoir Reoperation Scenarios

Scenario	Description
Current Rules	No changes to reservoir operations
Reservoir Reoperation	<ul style="list-style-type: none">• Modify reservoir rule curves (New Melones, Don Pedro, McLure)<ol style="list-style-type: none">1. Additional fall drawdown: Combined 221 TAF in Nov and 152 TAF in Dec for three reservoirs2. Reduced flood reservation: Combined -121 TAF (-11%) in Feb, -323 TAF (-32%) in Mar, -569 TAF (-82%) in April, -123 TAF (-98%) in May for three reservoirs• Groundwater banking: Added 333 TAF storage capacity each for Stanislaus, Tuolumne, and Merced River riparian water users.
Prescribed Hydrology	<ul style="list-style-type: none">• Modify rule curves as above• Groundwater banking as above• 2 weeks of floodplain inundation between Feb-May in 80% of years.



South Delta Proposed Conditions Inundation,
Approximately 5,000 cfs

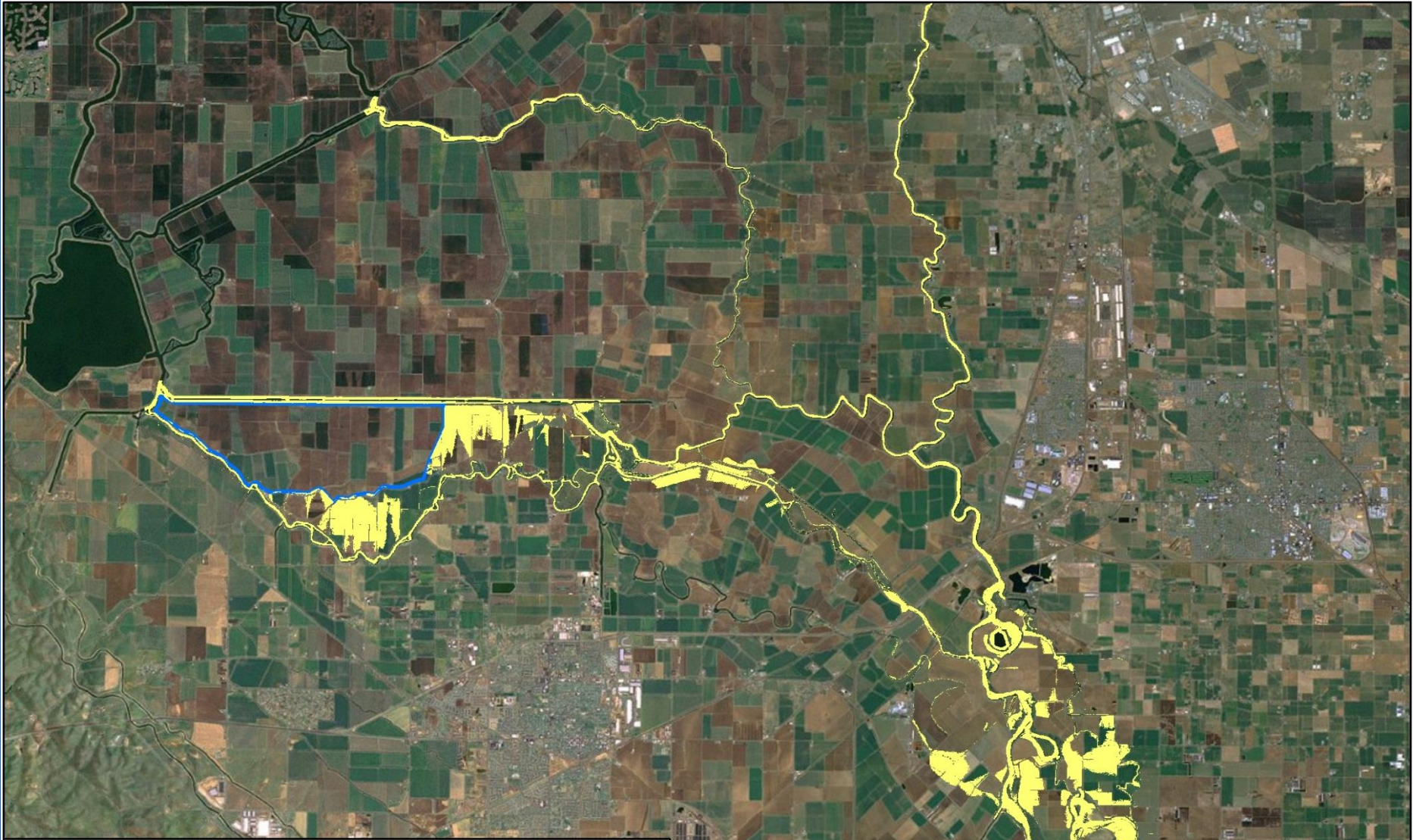




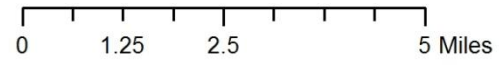
South Delta Proposed Conditions Inundation,
Approximately 10,000 cfs

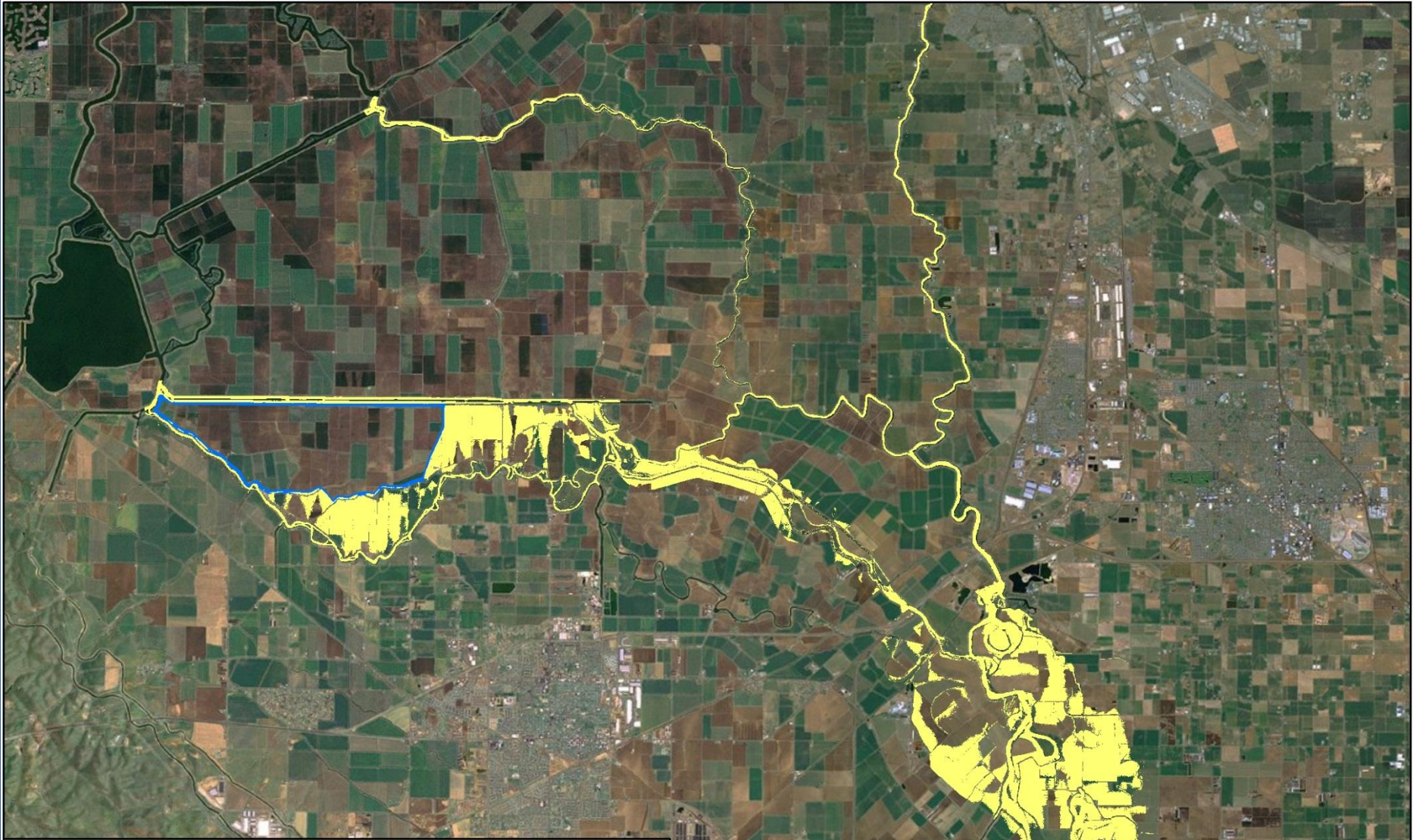


0 1.25 2.5 5 Miles

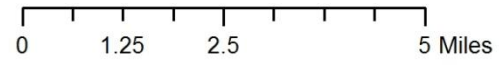


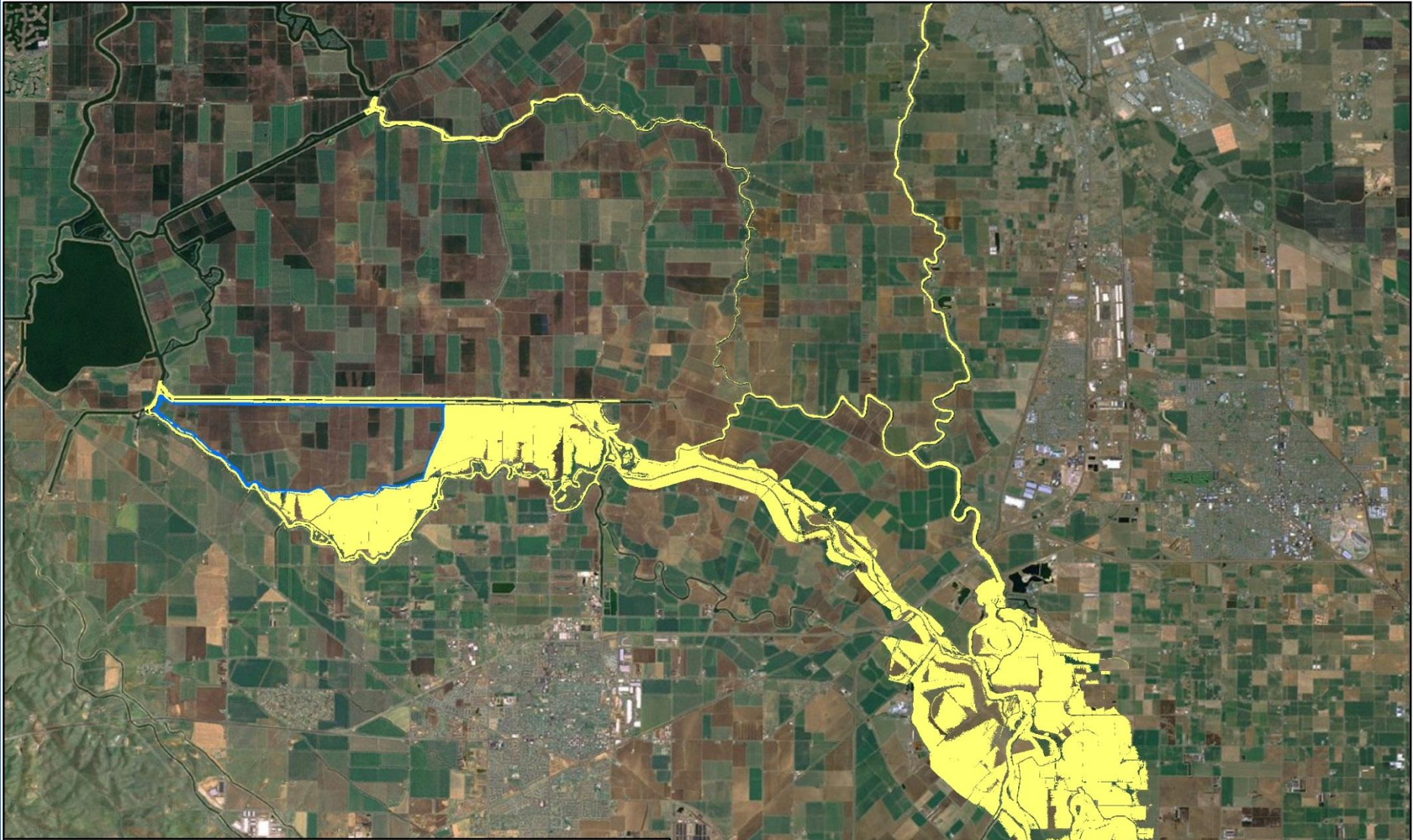
South Delta Proposed Conditions Inundation,
Approximately 15,000 cfs



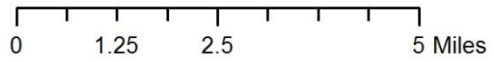


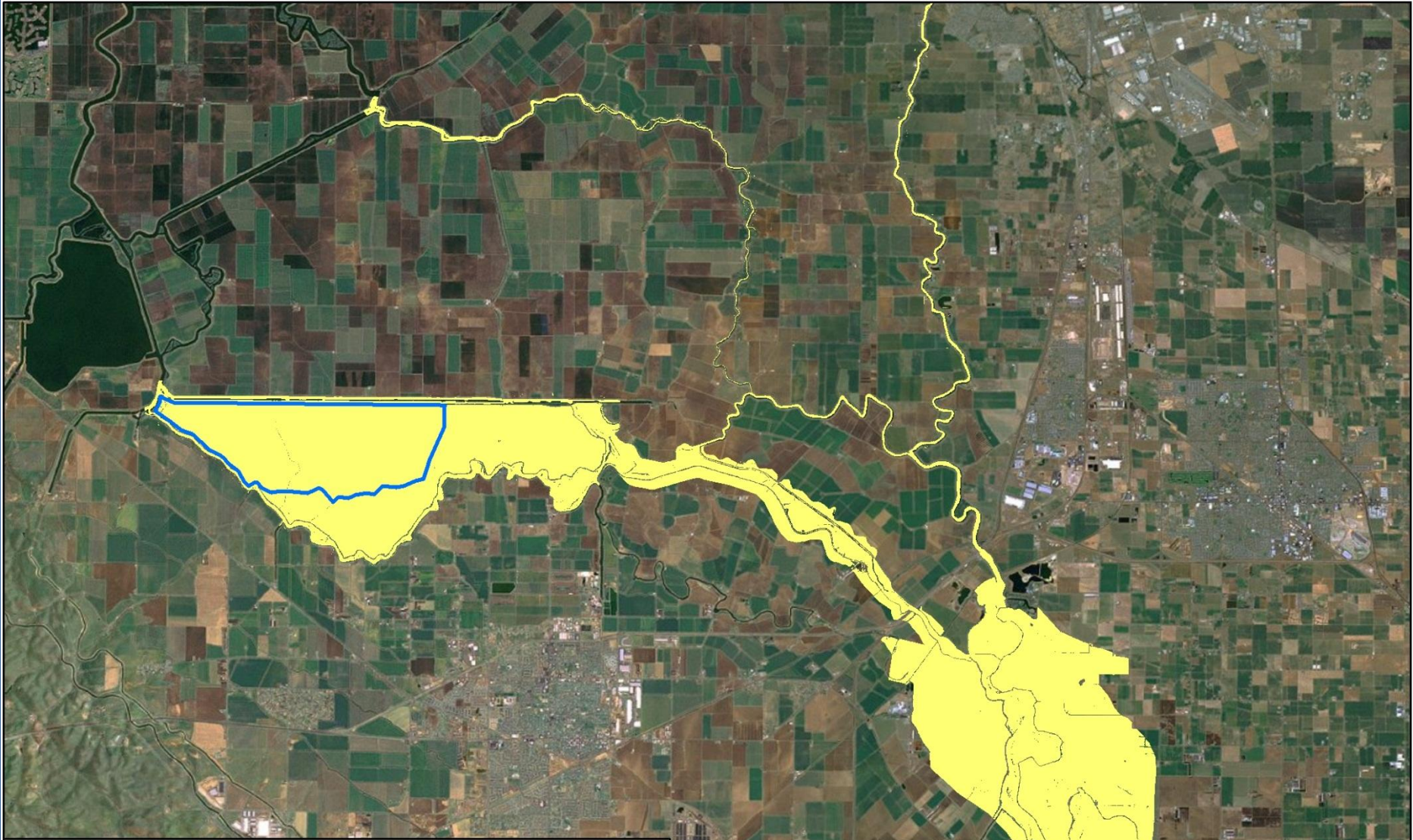
South Delta Proposed Conditions Inundation,
Approximately 20,000 cfs



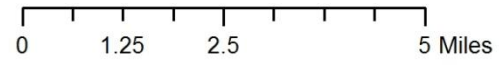


South Delta Proposed Conditions Inundation,
Approximately 25,000 cfs



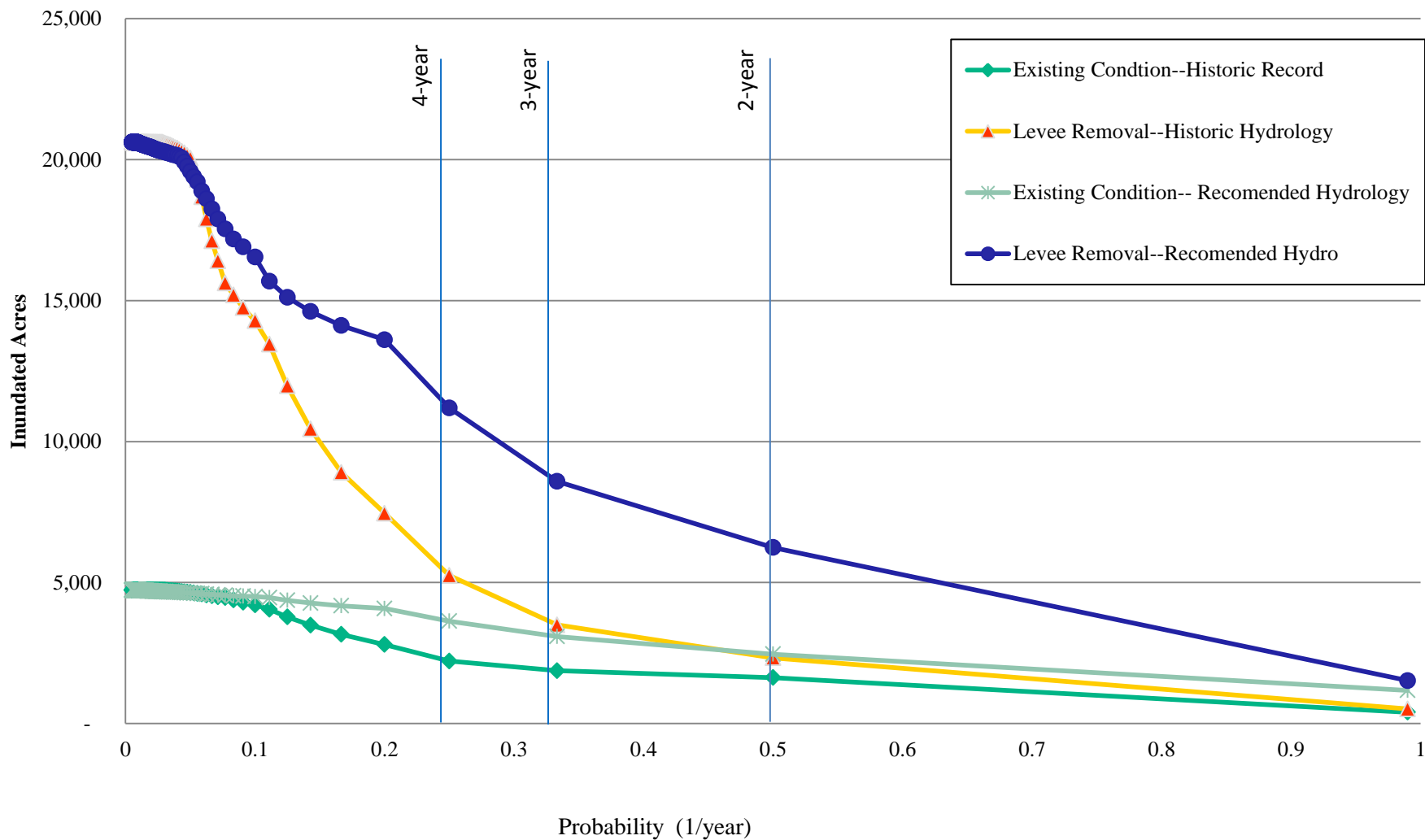


South Delta Proposed Conditions Inundation, Approximately 48,500 cfs (~50-year event)



Ecosystem Results

December-May, 14 Day Inundation



Ecological Goals of Reservoir Reoperation

- Provide flow necessary to sustain species, habitats, and ecological process.
- Mimic natural flow regime, to the extent practical, to sustain species, habitats, and ecological processes.
- Unimpaired flows provide guidance on how to shape restoration hydrographs, but unimpaired flows are not necessarily the goal.

Reservoir Re-operation Evaluation Approach

- Identify ecological objectives.
- Identify flows needed to meet ecological objectives.
- Develop annual restoration hydrographs for each year type.
- Model annual hydrographs and identify undesirable reservoir impacts.
- Re-run model with alternative water management strategies (efficiency, transfers, groundwater banking, flood reservation rules) and constraints on irrigation and restoration flow releases to prevent reservoir impacts.
- Adjust restoration hydrographs and water rights to balance beneficial uses.

What is right level of detail or time step for modeling and analysis?

- Screening level water supply modeling: monthly time step and coarse resolution .
- Planning level water supply modeling: monthly time step with detailed resolution.
- Ecological modeling: weekly or daily time steps. If needed, downscale monthly water supply output into daily time steps.