

STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
**OROVILLE DAM SAFETY
COMPREHENSIVE NEEDS ASSESSMENT**

Independent Review Board Memorandum #6

Oroville Independent Review Board Meeting No. 6
October 17-18, 2019

IRB Members

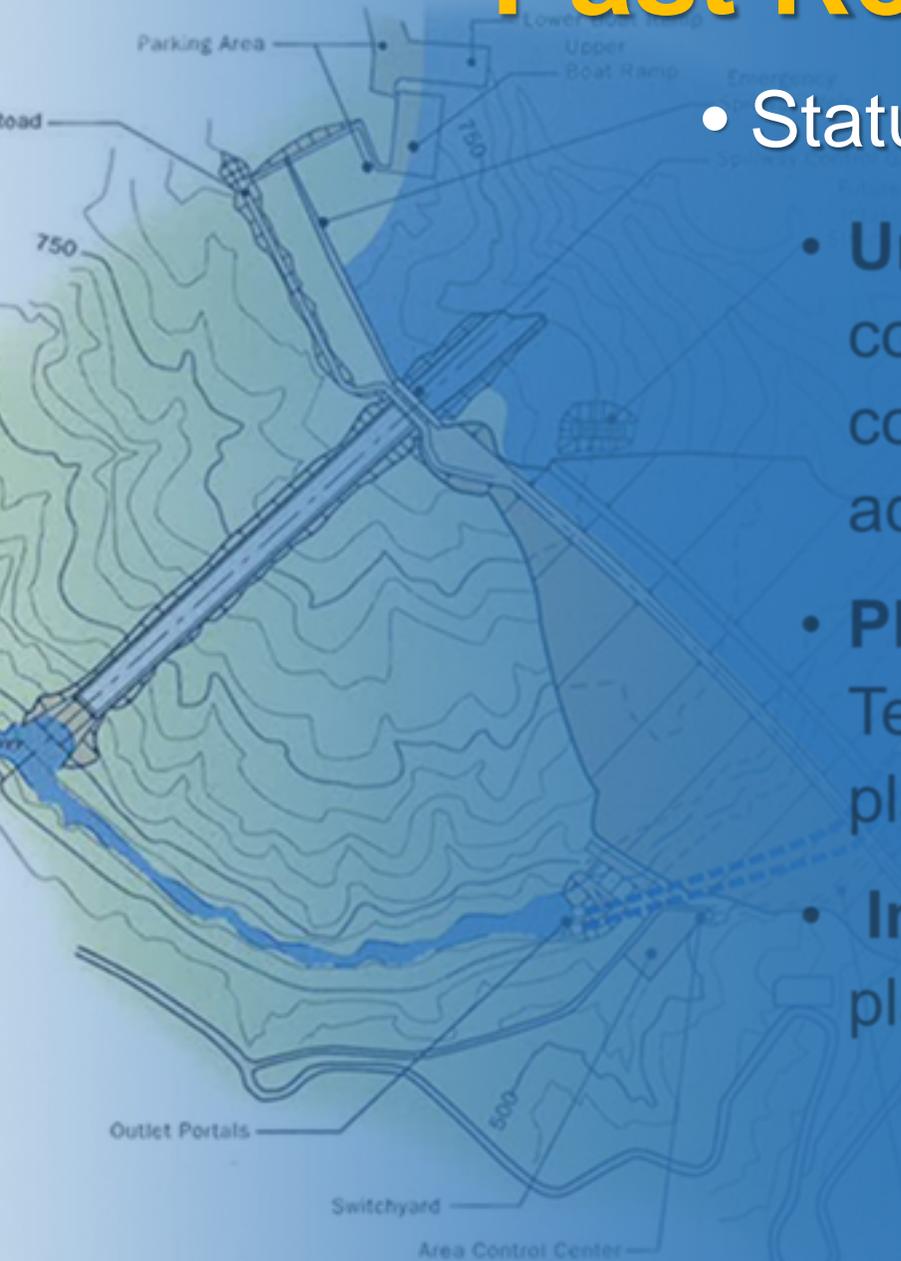
- (Elizabeth) Betty Andrews, Environmental Science Associates
- Dr. Lelio Mejia, Geosyntec Consultants
- Bruce Muller, US Bureau of Reclamation (Retired)
- Paul Schweiger, Gannett Fleming, Inc.
- Daniel Wade, San Francisco Public Utilities Commission



Past Recommendations (Comment Log)

- Status Descriptions

- **Under Consideration** – Project team is considering the recommendation, but hasn't committed to if or how the recommendation will be addressed.
- **Planned** – The IRB has accepted the Project Team's response and an appropriate action is planned.
- **In Progress** – The IRB sees evidence of the planned actions being underway.

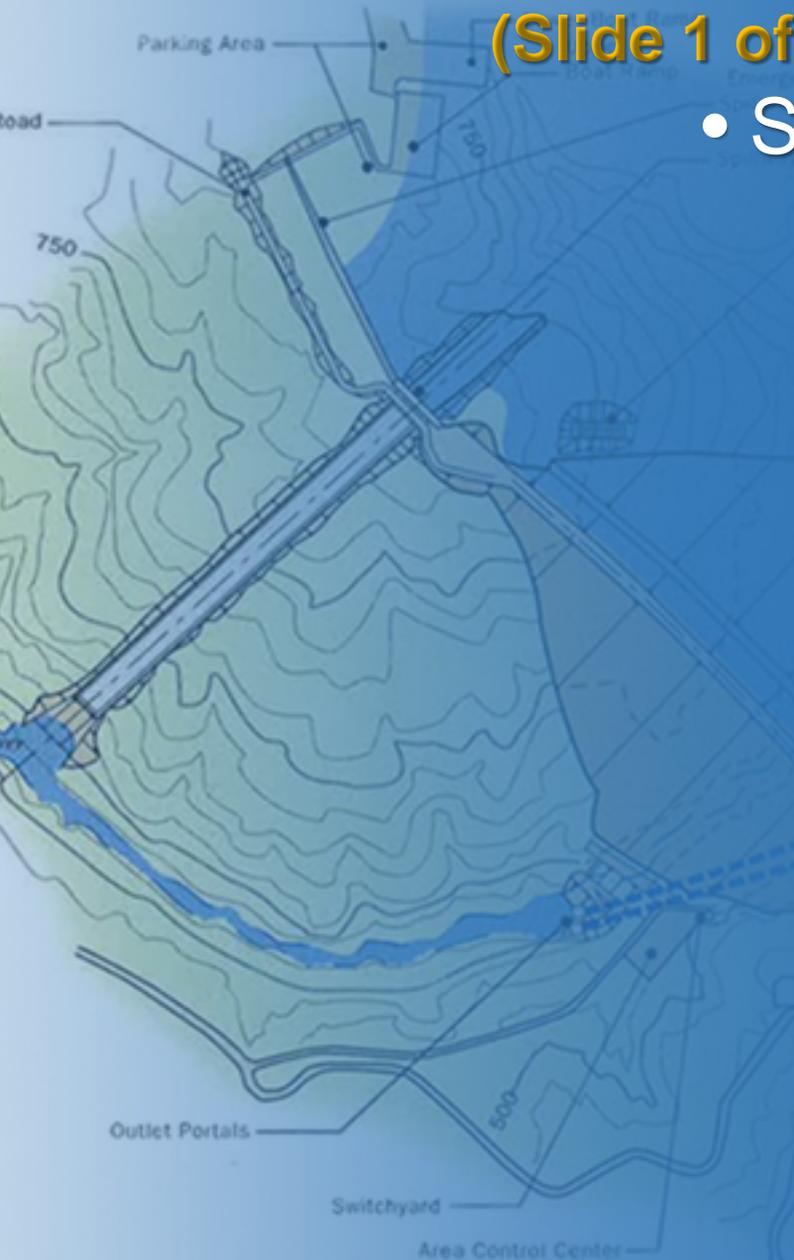


Past Recommendations (Comment Log)

(Slide 1 of 2)

- Status Descriptions

- **Closed** – The IRB has reviewed and confirmed that the Project Team’s planned action has been completed and adequately addressed.
- **Not Adopted** – The Project Team didn’t adopt the recommendation. An explanation has been or will be provided.
- **Superseded** – The IRB has revised a prior recommendation to provide additional clarity.

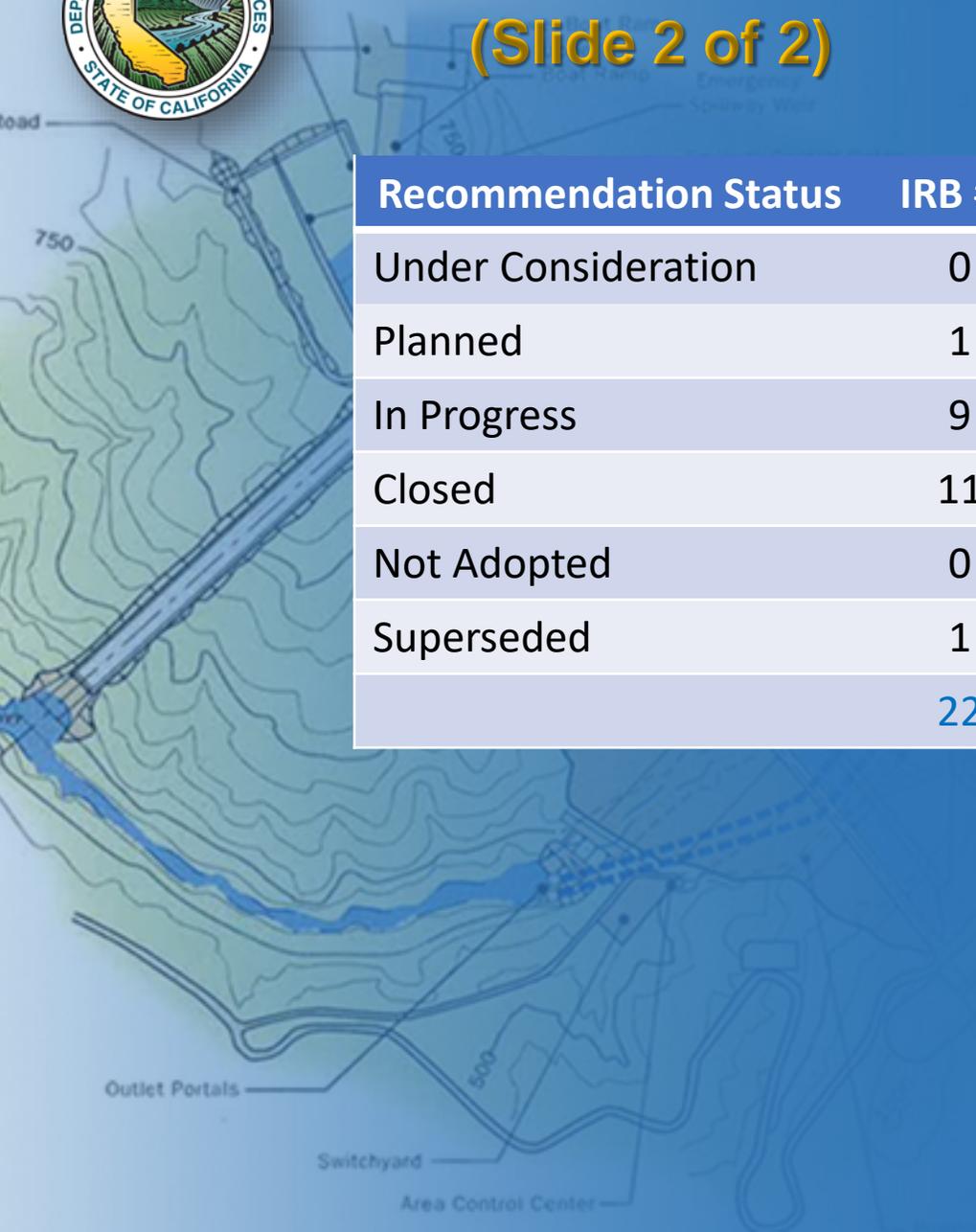


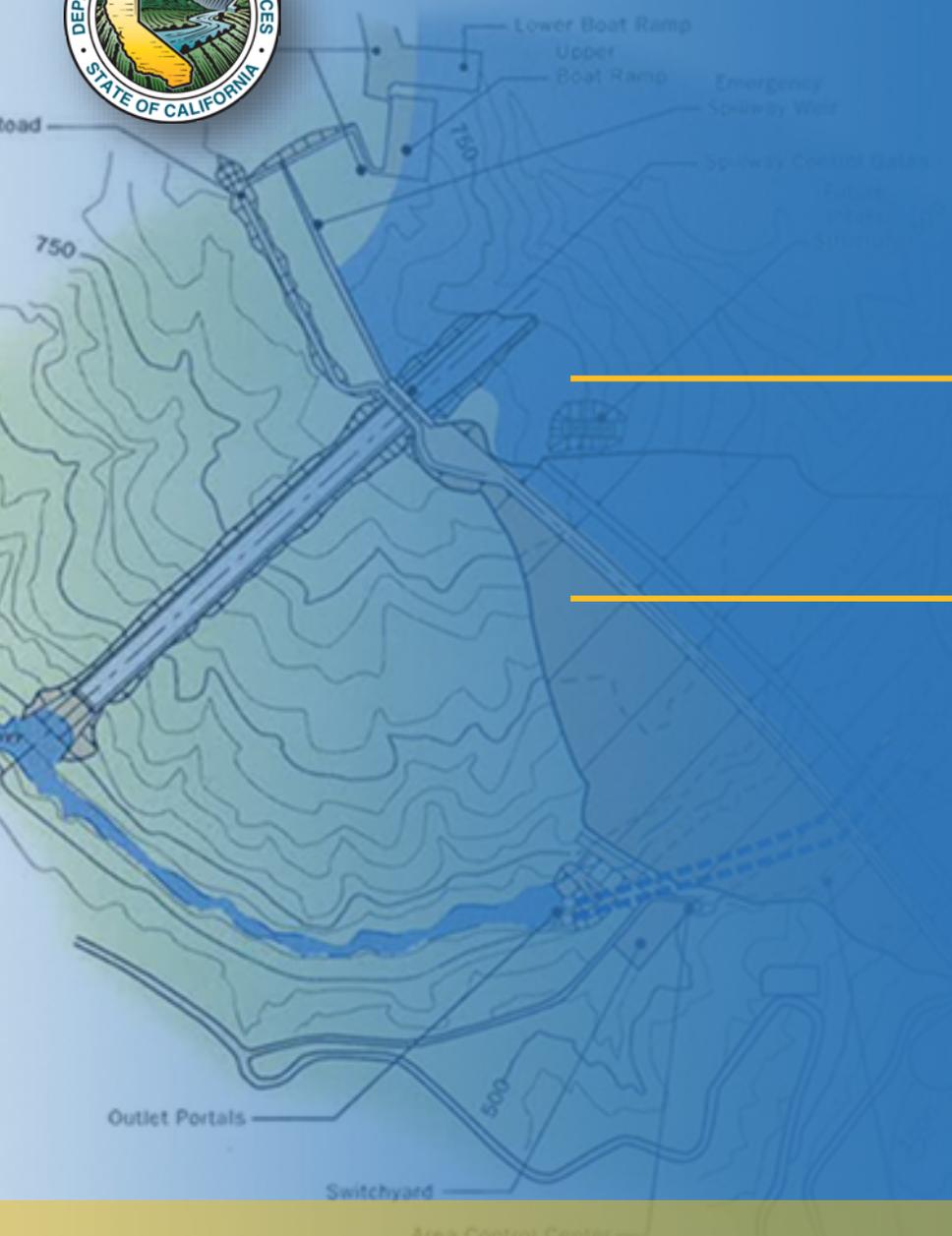


Past Recommendations (Comment Log)

(Slide 2 of 2)

Recommendation Status	IRB #1	IRB #2	IRB #3	IRB #4	IRB #5	
Under Consideration	0	0	0	0	2	2
Planned	1	2	2	1	0	6
In Progress	9	8	1	0	1	19
Closed	11	4	9	3	2	29
Not Adopted	0	0	0	0	0	0
Superseded	1	0	0	0	0	1
	22	14	12	4	5	57



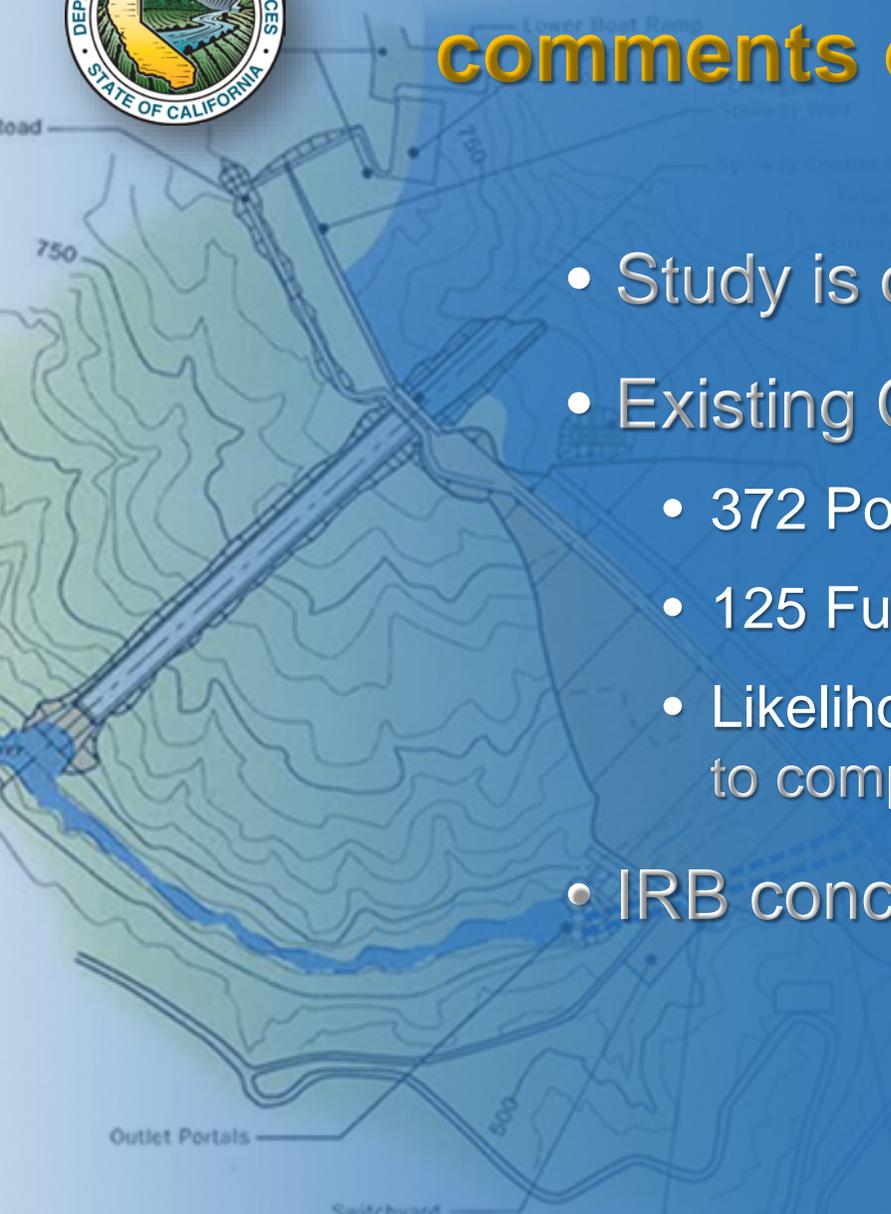


Report #6



1. Does the IRB have any recommendations or comments on the Project Status Update?

- Study is on schedule
- Existing Condition Assessments Completed
 - 372 Potential Failure Modes Considered
 - 125 Fully developed to 411 Scenarios and 2055 risk scores
 - Likelihood and Life Safety Consequences estimates continue to compare favorably with FERC Part 12 estimates
- IRB concurs with the team's approach





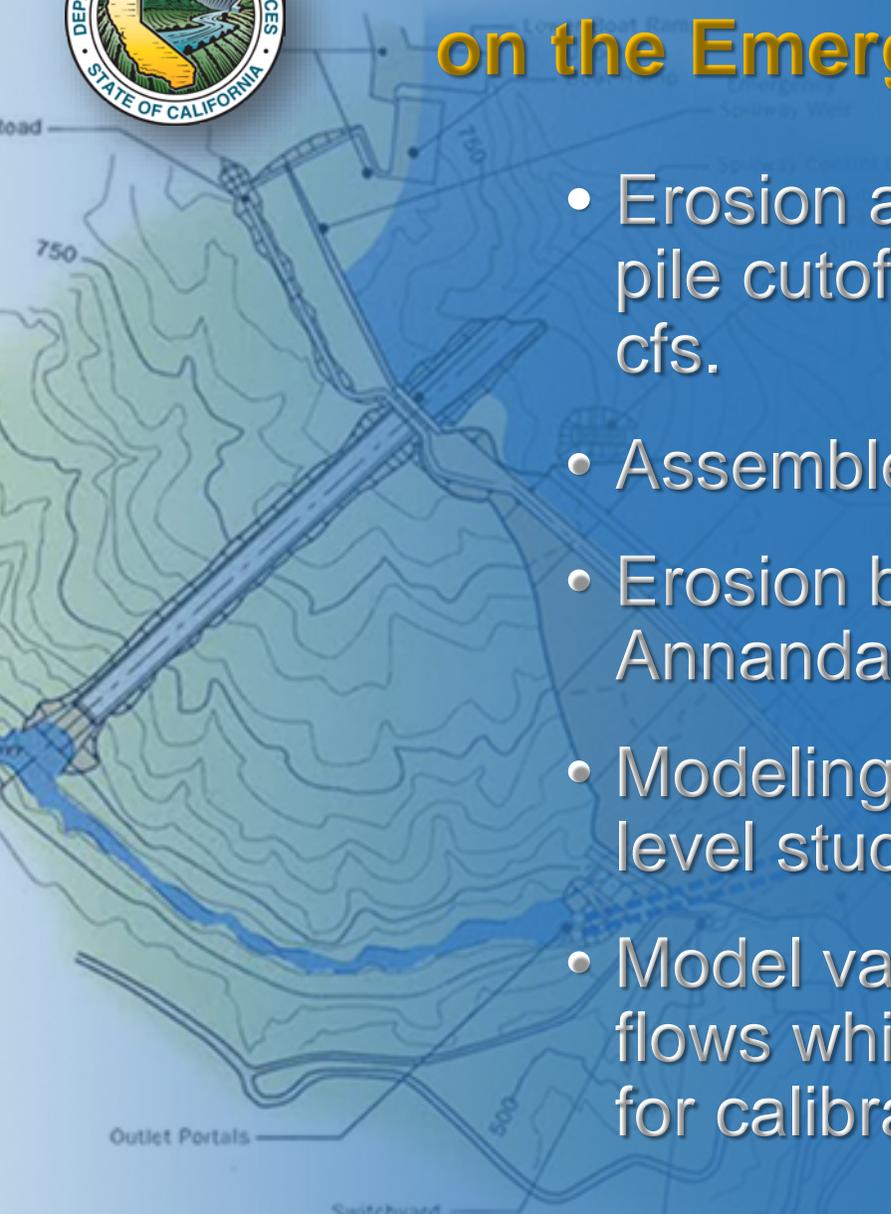
2. Does the IRB have any recommendations or comments on the task reports status update?

- IRB was provided with a preliminary draft for Task #3 (Flood Control Outlet) as an example
- IRB Suggestions
 - Include full task name identifier in the report title
 - Make extensive use of graphics and callout boxes
 - Subdivide the red risk cells into upper and lower red risk areas
 - Ensure consistency of resiliency components with other commonly used definitions (i.e. USACE)
 - Develop graphical summary for displaying the risk contributions of all PFMs estimated for each task in a single chart



3. Does the IRB have any recommendations or comments on the Emergency Spillway erosion potential?

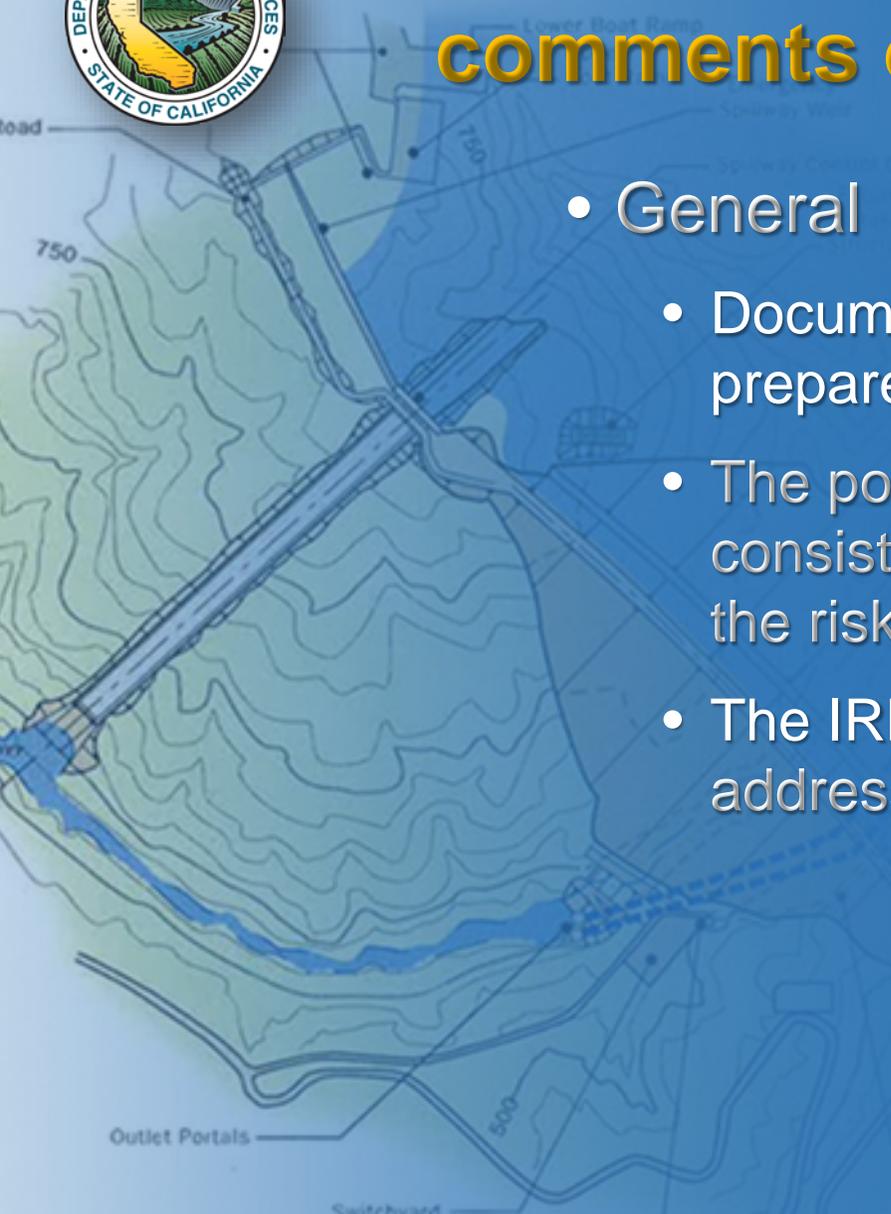
- Erosion analysis conducted downstream of the secant pile cutoff wall for flows between 6,000 cfs and 421,000 cfs.
- Assembled current knowledge of the geology of the area
- Erosion based on stream power as proposed by Annandale in 1995
- Modeling assumptions appear reasonable for a planning level study
- Model validated by running 2017 emergency spillway flows which yielded reasonable results without the need for calibration.





4. Does the IRB have any recommendations or comments on the updates for Tasks 1, 3, 4 or 5?

- General
 - Documentation of potential failure modes has been well prepared.
 - The potential for emergency intervention has not been consistently included. Conservative in that it will over estimate the risk.
 - The IRB recommends that emergency intervention be addressed in each failure mode developed.





4. Does the IRB have any recommendations or comments on the updates for Tasks 1?

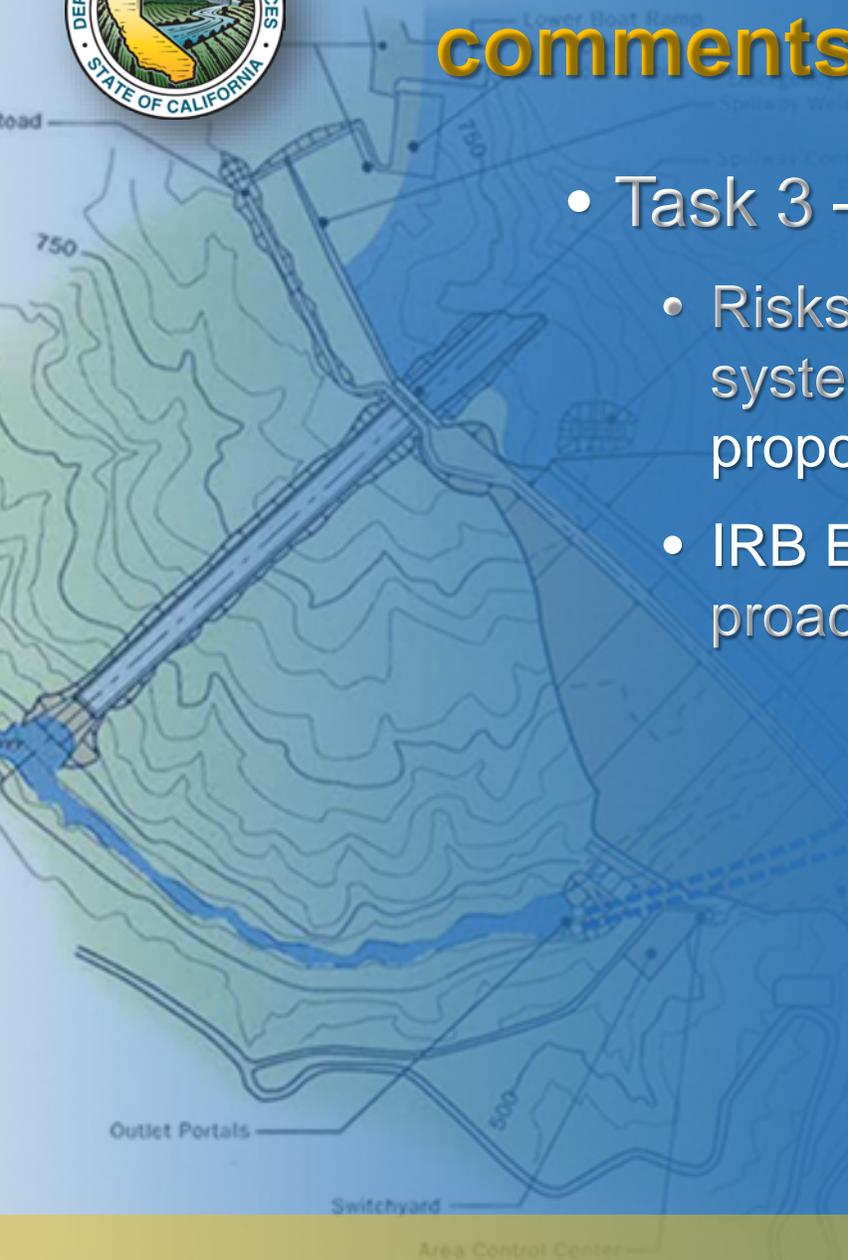
- Task 1 – Emergency Spillway
 - Two PFMs carried forward for developing mitigation measures:
 - Erosion of hillside materials creating tailwater impacts on Hyatt Powerplant
 - Scour downstream of the secant pile cutoff leading to undermining of the secant pile wall, apron, and concrete monoliths.
 - 50 Conceptual measures considered
 - 9 Measures survived the screening process to become “recommended measures”





4. Does the IRB have any recommendations or comments on the updates for Tasks 3?

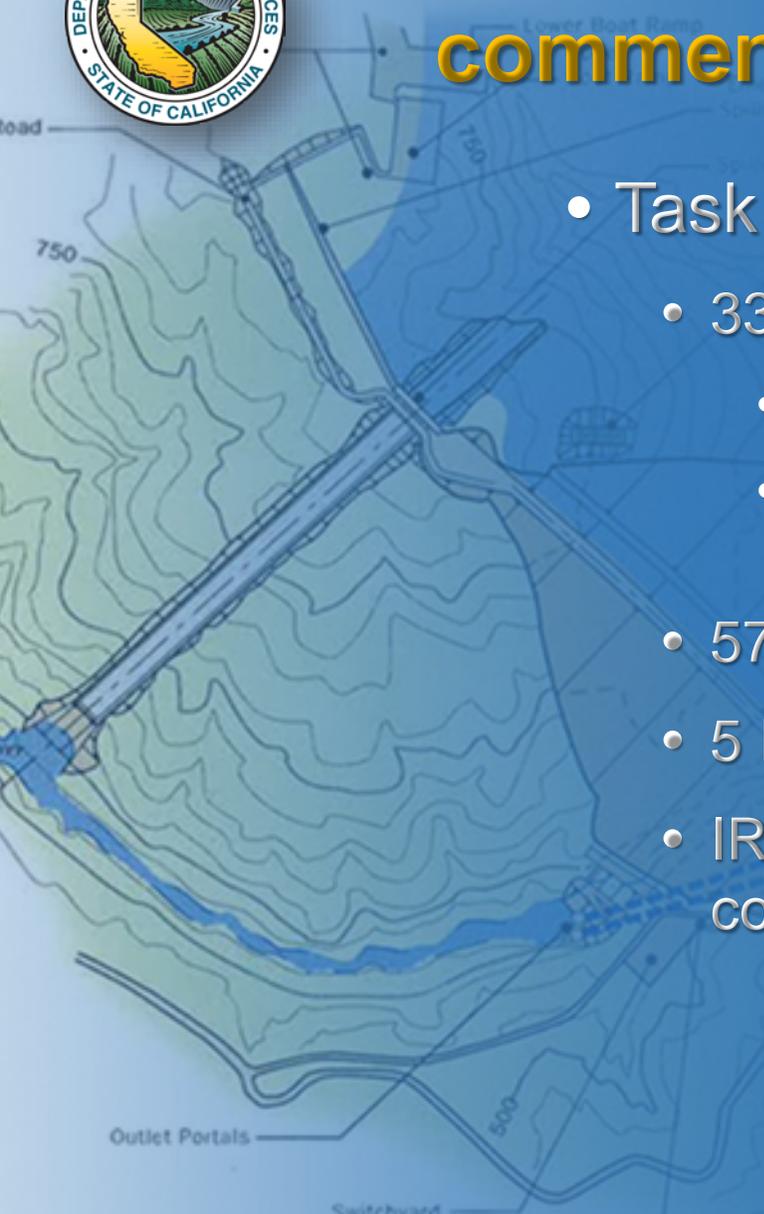
- Task 3 – FCO Headworks and Main Spillway
 - Risks indicate long-term performance of the gate support system to be a leading risk/concern, however no measures are proposed to address this situation.
 - IRB Encourages DWR to use the CNA study to document a proactive approach to researching and addressing this issue.





4. Does the IRB have any recommendations or comments on the updates for Tasks 4?

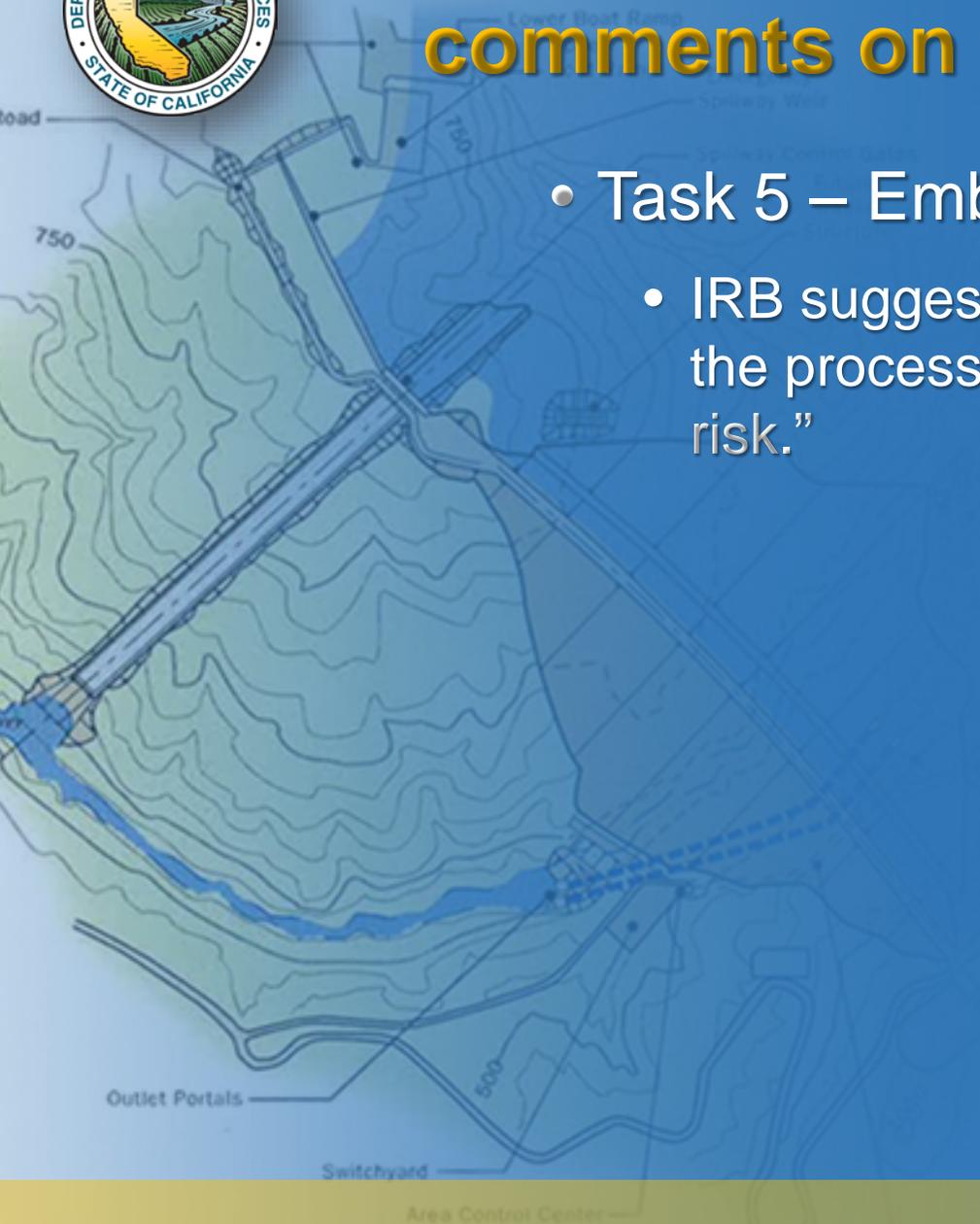
- Task 4 – Low Level Outlet
 - 33 PFMs developed with primary risks in:
 - Rock anchors of Hyatt Power plant
 - Slope instability above the Palermo Tunnel inlet, Hyatt Switchyard, Area Control Center Building and the Hyatt Access Portal
 - 57 Potential mitigation measures considered
 - 5 Recommended measures
 - IRB recommends consideration of an additional measure consisting of a dual-purpose single low level outlet.





4. Does the IRB have any recommendations or comments on the updates for Task 5?

- Task 5 – Embankments
 - IRB suggests that the team provide additional information for the process used to identify selected PFMs as being “highest risk.”



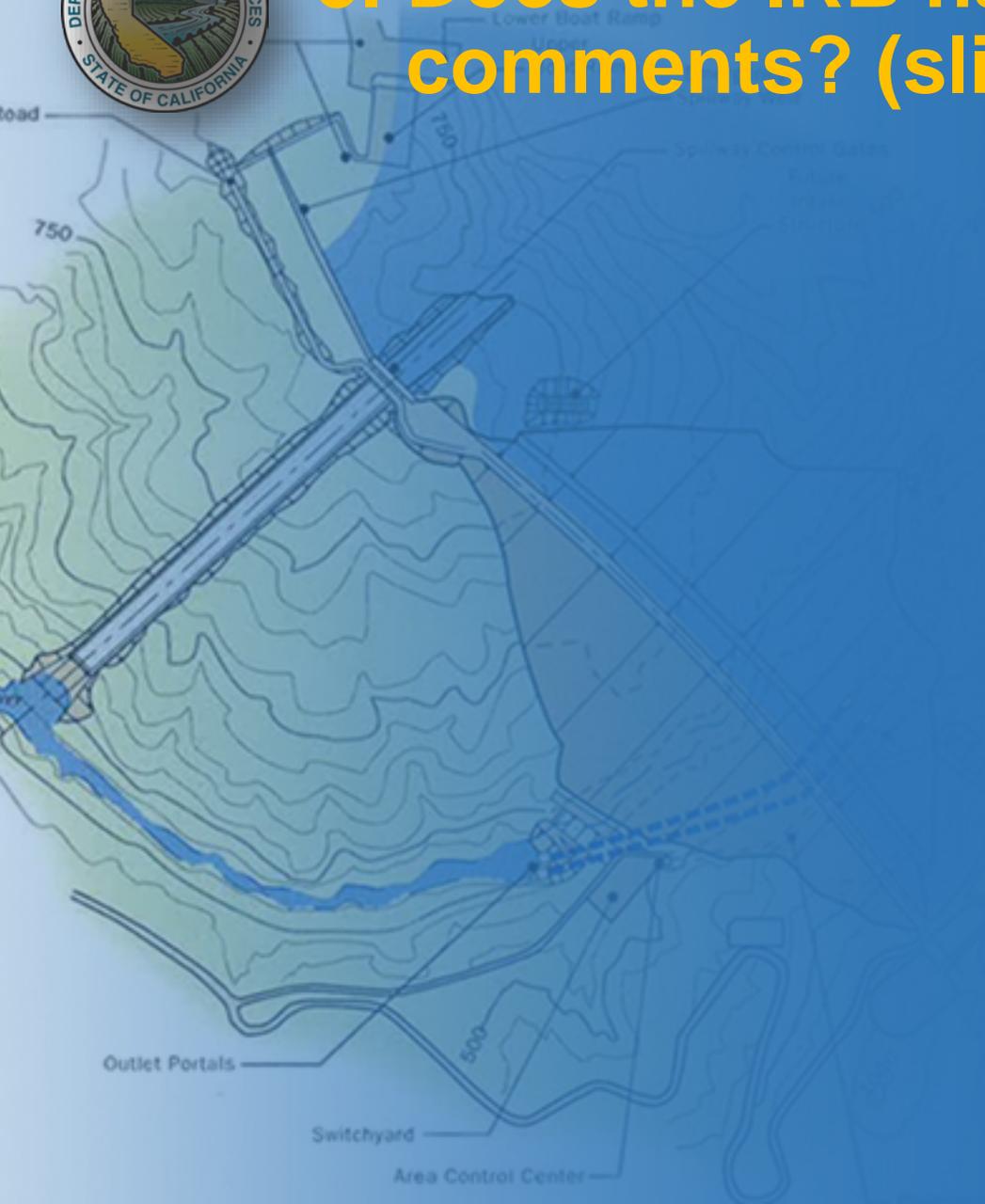


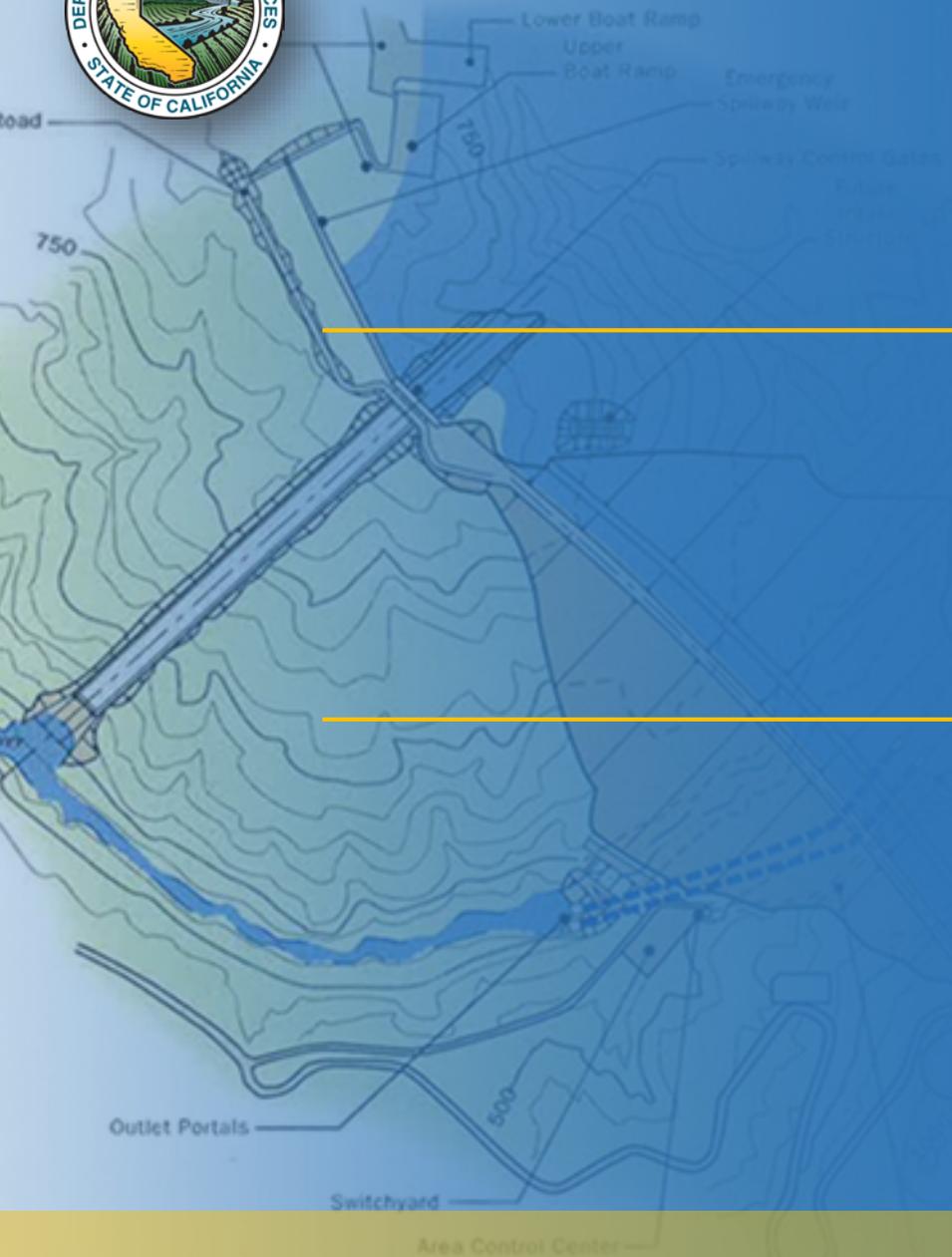
5. Does the IRB have any other recommendations or comments? (slide 1 of 2)





5. Does the IRB have any other recommendations or comments? (slide 2 of 2)





Questions?