ROLL CALL

- Supervisor Bradford
- Lieutenant Collins
- Supervisor Conant
- Supervisor Connelly
- Secretary Crowfoot
- Deputy Director Curry
- Supervisor Flores
- Assemblyman Gallagher
- Supervisor Lambert
- Deputy Licon

- Supervisor Lofton
- Lieutenant Million
- Director Nemeth
- Senator Nielsen
- Councilmember Pittman
- Mayor Reynolds
- Lieutenant Stokes
- Superintendent Teague
- Genoa Widener
ITEM 1: WELCOME AND INTRODUCTIONS
ITEM 2: WILDFIRES UPDATES
Fire Impacts
Lake Oroville
SRA
Suppression and Fire Damage Repair
Dozer line repair – Loafer Creek Campground
Enterprise Boat Ramp – hazard tree removal and erosion control
ITEM 3: WINTER OPERATIONS AND COMMUNICATIONS
Winter Operations Overview

- Water Year 2020 Recap
- Flood Pool Requirements
  - Enhanced Flood Pool
- Water Year 2021 Outlook
- Winter Operations Communications (C. Roberts)
USACE 1970 Flood Pool

Graph showing flood control reservoir in thousand acre-feet and accumulated precipitation parameter over time from September to June.
Lake Oroville Storage
October 1, 2019 to September 30, 2020

When the actual storage (blue line) is greater than the flood regulation rules storage (red line), Lake Oroville is encroached and is providing intended flood protection by buffering the effects of heavy runoff from the Feather River basin. During encroachment, Oroville releases are governed by U.S. Army Corps of Engineers rules (WCM 1970).
Winter Temperature and Precipitation Outlook

THREE-MONTH OUTLOOK
TEMPERATURE PROBABILITY
D 3 MONTH LEAD
MADE 15 OCT 2020

THREE-MONTH OUTLOOK
PRECIPITATION PROBABILITY
D 3 MONTH LEAD
MADE 15 OCT 2020
Winter Operations Communications

Oroville Dam Citizens Advisory Commission, November 13, 2020

Carolina Roberts, Chief, Communications and Outreach Branch, Public Affairs Office
Winter Operations Communications Information

- Operational milestones
- Feather River and Lake Oroville Conditions
- Weather forecasts
- Project developments
Lake Oroville Community Update

October 30, 2020

Fire Impact to Lake Oroville

The Department of Water Resources (DWR) is a member of the "Water Resources Working Group" led by the California Office of Emergency Services (CAL OES). This working group is a small, informal assembly of emergency management agencies and organizations involved in the multi-agency response to the fire season. The DWR is working to coordinate and implement fire management strategies at Lake Oroville.

The Lake Oroville Fire is currently burning in Butte County and has burned over 30,000 acres as of this writing. The DWR is actively monitoring the situation and has implemented measures to protect the reservoir and surrounding areas.

DWR water quality experts have expanded water sampling activities at Lake Oroville and surrounding reservoirs. DWR is also working with other agencies to ensure the safety of water supplies.

Oroville Dam Recreation

The Lake Oroville Dam and Spillway are still closed to the public due to the ongoing fire and concerns related to water quality. The Forebay is also closed, and water intake is currently not available.

Additional information about the current situation can be found on the DWR website: <https://water.ca.gov/index.php металюков пощо ви варто читати про воду, яка приблизно використовується в одній з найбільших міст.

DWR water quality experts have expanded water sampling activities at Lake Oroville and surrounding reservoirs. DWR is also working with other agencies to ensure the safety of water supplies.

Oroville Dam Recreation

The Lake Oroville Dam and Spillway are still closed to the public due to the ongoing fire and concerns related to water quality. The Forebay is also closed, and water intake is currently not available.

Additional information about the current situation can be found on the DWR website: <https://water.ca.gov/index.php металюков пощо ви варто читати про воду, яка приблизно використовується в одній з найбільших міст.}
Half of California’s water supply comes from Atmospheric Rivers, often in powerful downpours that can hit in rapid succession. Otherwise, we can gradually progress into droughts when we get fewer ARs and don’t often get out of a drought until we get plenty of rain. Seven of the last 12 droughts ended with ARs. Will we have an AR this year?

You can learn more about Atmospheric Rivers and the resources involved here: https://youtu.be/MgK4_97h5s
#California #pineapple... See More
DWR Website: https://water.ca.gov
ITEM 4: COMPREHENSIVE NEEDS ASSESSMENT
IRB Members
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.
My Background

• 20 years – Design/Assessment of dams
• 22 years – Dam safety and risk management
• Risk assessments for an inventory of 252 dams
• Dam safety modifications for nearly 100 dams (independent consultant review boards for all)
• Development of guidelines/processes for risk-based assessment of dam safety
Key Elements of Dam Safety for a Dam

- Understanding the dam system
- Knowledge of design and construction
- Performance monitoring
- Understanding of what could go wrong (risk management)
- Communication that allows issues to surface
- Documentation of identified issues and decisions
IRB Recommendations
## Status of Recommendations

<table>
<thead>
<tr>
<th>Recommendation Status</th>
<th>IRB #1</th>
<th>IRB #2</th>
<th>IRB #3</th>
<th>IRB #4</th>
<th>IRB #5</th>
<th>IRB #6</th>
<th>IRB #7</th>
<th>IRB #8</th>
<th>IRB #9</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Closed</td>
<td>21</td>
<td>12</td>
<td>11</td>
<td>4</td>
<td>3</td>
<td>6</td>
<td>10</td>
<td>5</td>
<td>1</td>
<td>73</td>
</tr>
<tr>
<td>Not Adopted</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Superseded</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>22</strong></td>
<td><strong>14</strong></td>
<td><strong>12</strong></td>
<td><strong>4</strong></td>
<td><strong>5</strong></td>
<td><strong>6</strong></td>
<td><strong>10</strong></td>
<td><strong>5</strong></td>
<td><strong>1</strong></td>
<td><strong>79</strong></td>
</tr>
</tbody>
</table>
Recommendations Not Adopted

- Basis of 150,000 cfs flow constraint
- Analysis of FCO for 2018 PMF condition
- Unbalanced FCO gate operations
- FCO Stress/Strain analysis
- Definitions of direct and indirect costs

All have been resolved with the IRB
Final Summary
1. IRB Recommendations

- Issues which potentially impacted the conclusions, recommendations and/or credibility of the process and/or reports were given formal recommendations (79 total).
- DWR and the team were highly responsive to IRB recommendations.
- All recommendations have been addressed.
2. Findings/Conclusions

• IRB agrees that the risks are generally low
• Opportunities exist to reduce risk and/or increase reliability
• With respect to dam safety, the work of DWR and the team was thorough and exhaustive.
• Integration of risk-based approaches between dam safety and asset management provides a model for consideration of vastly different types of consequences
3. Proposed Actions

• IRB strongly supports the planned interim actions due to their ability to reduce risk at a relatively low cost.

• IRB supports integration of this study’s results with similar studies being conducted for other State Water Project facilities to allow for portfolio-wide decisions.

• IRB supports presentation of the full suite of plans to DWR decision makers to allow a more rich set of choices.
4. General Comments

• Commend DWR and their team for developing a cutting-edge risk-based planning study

• Commend DWR for developing a public version of the report that conveys key information about the process, conclusions and recommended actions without disclosing critical energy infrastructure information (CEII)

• Appreciate the team’s consistent attention given to the issues we raised as recommendations.
5. Perspectives

• Unacceptable risk requiring immediate action – what does it look like?
  • Keechelus Dam
• Evolving nature of information about a dam
• Finding balance in safety, cost and benefits
Questions?
Oroville Dam Safety
Comprehensive Needs Assessment
Oroville Citizen’s Advisory Commission Meeting
November 13, 2020

John Yarbrough, DWR
CNA Purpose

No public infrastructure is ever free of risk — Continuous monitoring and assessment is needed to understand risks as well as identify any actions needed to reduce those risks.

The CNA is a planning study tasked with completing the following:

• Identify and prioritize dam safety and operational needs.

• Identify potential measures (actions) to improve the safety and reliability of Oroville Dam and its related structures.

• Identify potential plans (combinations of measures) for DWR to consider for future implementation and prioritization through normal practices and procedures.
General Approach

• Assess the current condition of the facilities through a risk assessment
  – Identify any immediate dam safety concerns
  – Identify areas needing further investigation
  – Identify risks that warrant the development of measures

• Compare the risk analysis results with the parallel independent Level 2 Risk Assessment (L2RA)

• Identify potential risk-reduction measures and plans (combinations of measures)

• Identify any measures for immediate or near-term implementation

• Consider the remaining measures and plans in DWR’s ongoing long-term planning of projects
Results

• No dam safety issues were identified that had a need for immediate risk-reduction actions

• Several areas identified where additional information is needed to reduce uncertainty

• Several measures identified for near-term implementation

• Additional measures and plans identified for further consideration

These results are based on the conditions known at this moment in time.

Excellence in dam safety requires continual monitoring, investigation and assessment to understand risks as well as actions to reduce those risks, recognizing that no public infrastructure is ever free of risk.
10th Part 12D Safety Inspection

- July 31, 2020: Submittal of 10th Part 12D Safety Inspection Reports for Oroville, Bidwell Bar Canyon and Parish Camp Saddle Dams to FERC and DSOD.

- Part 12D Independent Consultants’ Conclusion:

  “The project is suitable for continued safe and reliable operation. No emergency remedial measures are necessary for continued safe operation.”

The Part 12D Independent Consultants made 39 recommendations for Oroville Dam:

- 21 Recommendations intended to reduce uncertainty associated with select potential failure modes (conduct studies, investigations, analyses – many overlapping those recommended by CNA)
- 7 Recommendations to improve the Dam Safety Surveillance and Monitoring Plan
- 7 Recommendations to improve Operation and Maintenance Programs
- 4 Recommendations to update or improve the Supporting Technical Information Document
Next Steps – What are they and Why?

1. Complete CNA Early Implementation Projects
2. Initiate design of efficient CNA risk reduction measures
3. Implement pre-CNA $224 million planned capital investment for 2020-2025
4. Plan and Schedule investigations, studies, and surveillance enhancements (CNA and Part 12D recommendations)
5. Integrate select CNA measures into our SWP Asset Management processes

All of these steps work to reduce risk to the Oroville facilities
1. Early Implementation Projects

**Eight new Oroville Dam Toe Piezometers Completed**

**Why?** Enhance surveillance for internal erosion-related PFMs for the Main Dam and inform on-going seepage analyses and modeling.

**Five new Piezometers in the Oroville Dam – Grout and Core Block Galleries**

**Why?** Replace and augment original instrumentation, enhance monitoring of internal erosion-related PFMs.

**Four new Flood Control Outlet Headworks Piezometers Completed**

**Why?** Replace original instrumentation, monitor uplift pressures to inform on-going analyses and understanding of FCO grout curtain performance.
1. Early Implementation Projects

Flood Control Outlet Piezometers

- Foundation bedrock found in good contact with concrete; clean, and irregular.
- Foundation bedrock found to be fresh, hard dark bluish-grey amphibolite; similar to that exposed immediately downstream of the FCO Headworks during the spillway reconstruction.
2. Initiate Design of Effective CNA Measures

Three Measures to be implemented in the Near Term:

1. Install additional back-up power and remote starters for FCO Radial Gates
2. Line Palermo Canal above Hyatt ACC and Switchyard to reduce leakage and likelihood of landslides
3. Raise Parish Camp Saddle Dam by 3 feet to reduce potential for overtopping during very extreme flood events.
2. Initiate Design of Effective CNA Measures

Install additional back-up power and remote starters for FCO Radial Gates

**Why?** Further enhance power source redundancy for gate operations.

**Tentative Schedule**
- 2021 – Initiate Design
- 2023 – Initiate Construction
- 2030 – Complete Construction

- Gates need to be available during flood seasons, which limits progress and requires several years to get through all 25 gates.
2. Initiate Design of Effective CNA Measures

Line Palermo Canal above Hyatt ACC and Switchyard to reduce leakage and likelihood of landslides.

Why? Addresses potential failure modes related to the canal failing and flooding the switchyard.

Tentative Schedule
2021 – Initiate Design
2024 – Initiate Construction
- Align construction with traditional periods of zero flow to South Feather Water and Power
2. Initiate Design of Effective CNA Measures

Raise Parish Camp Saddle Dam by 3 feet to reduce potential for overtopping during very extreme flood events.

Why? Addresses one of the highest risks identified: overtopping during a storm larger than the probable maximum flood.

Tentative Schedule
2021 – Initiate Design, Fieldwork, and Environmental Reviews
Project will require greater environmental and permitting reviews than other measures.
2026 – Initiate Construction
3. Pre-CNA $224 Million Planned Capital Investment 2020-2025

- Maintains recently reduced level of risk as well as driving down pre-CNA and newly identified PFMs.
- Improves reliability of key dam appurtenances and critical equipment.

<table>
<thead>
<tr>
<th>Year</th>
<th>2020</th>
<th>2021</th>
<th>2022</th>
<th>2023</th>
<th>2024</th>
<th>2025</th>
<th>Total 2020-2025</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$41 Million</td>
<td>$29 Million</td>
<td>$49 Million</td>
<td>$55 Million</td>
<td>$24 Million</td>
<td>$26 Million</td>
<td>$224 Million</td>
</tr>
</tbody>
</table>
### Pre-CNA $224 Million Planned Capital Investment 2020 - 2025

Over 40 Projects, Including:

- Hyatt Powerplant Intake Gate Refurbishment
- Hyatt Powerplant Penstock Inspection and Repair
- Hyatt Powerplant Turbine Shutoff Valves Refurbishment
- River Valve Outlet System Upgrades
- Palermo Tunnel Bulkhead Emergency Closure Improvements
- Flood Control Outlet Radial Gate Trunnion Pin Inspections/Refurbishment
- Flood Control Outlet Radial Gate Maintenance and Repair
- Core Block Drain Hole Inspections and Cleaning
- 230 KV Power Line Refurbishment
- Oroville Physical Security Improvements
- Hyatt Powerplant New Turbine Runners
- Bidwell Bar Bridge Seismic Retrofit
- Hyatt PP Fire Detection System Upgrade
- Seismic Monitoring Upgrades
- Oroville Lakeside Access Road
- Oroville SEG Replacement
- Hyatt Powerplant Tap Guard Valve Replacement
3. Pre-CNA $224 Million Planned Capital Investment

Replacement of Stand-by Emergency Generator – August 21, 2020
3. Pre-CNA $224 Million Planned Capital Investment

River Valve Outlet System Rehabilitation

**Features**
- Procure and install two new 72-inch Double Seated Spherical Valves with Mechanical Locks on Upstream & Downstream seats.
- Allows for maintenance of upstream and downstream seats.
- Increased reliability of this low-level outlet and access to cold water supply.

**Technical Review Board (TRB)**
- DWR elected to retain a TRB comprised of dam safety, mechanical, construction, and civil engineering experts to review the design and construction of the project.

**Tentative Schedule**
- Preliminary design began in 2017
- Civil/Structural Drawings are currently at 95%-level
- Electrical/Mechanical Drawings are at 65%-level.
- Construction phase anticipated to occur between 2021-2023.
3. Pre-CNA $224 Million Planned Capital Investment

Security Improvements

Features

• Installation of gates, fencing, lighting, control systems, cameras, and standby emergency generators to harden the Oroville-Thermalito facilities.

• Supports DWR’s Security and Dam Safety policies and goals to protect lives and infrastructure, and to meet reliability and compliance requirements.

Schedule:

• Construction initiated in Summer 2018.
3. Pre-CNA $224 Million Planned Capital Investment

Oroville Dam – Lakeside Access Road

Features:

- Provides safe public access to the Spillway Boat Ramp during periods of moderate and low lake levels.

- Reduces traffic over the Flood Control Outlet, thereby reducing security costs (estimated at $1,000,000 per year).

- Supports DWR’s Security and Dam Safety policies and goals to protect lives and infrastructure.

Tentative Schedule:

- Final Design – Fall 2020
- Initiate Construction Phase – 2021 (lake level dependent)
4. Investigations, Studies, and Surveillance Enhancements

**Why:** Reduce Uncertainty, Rule-out hypotheticals, Verify Conditions, Inform analyses and decision-making.
4. Investigations, Studies, and Surveillance Enhancements

Forecast-Informed Reservoir Operations

- Preliminary FIRO feasibility studies leading to an updated Water Control Manual

Updated Water Control Manual
4. Investigations, Studies, and Surveillance Enhancements

Yuba-Feather FIRO / WCM Timelines

<table>
<thead>
<tr>
<th>Jul 2020</th>
<th>Jul 2021</th>
<th>Jul 2022</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Y-F Steering Committee Formed</td>
<td>• FIRO preliminary feasibility analysis from final CNA</td>
<td>• Technical studies/viability assessment of FIRO at Oroville &amp; New Bullards Bar</td>
</tr>
<tr>
<td>• Work plan developed to guide technical efforts</td>
<td>• Workplan finalized</td>
<td>• Identify Possible FIRO Alternatives</td>
</tr>
<tr>
<td></td>
<td>• Forecasting R&amp;D Improvements</td>
<td></td>
</tr>
</tbody>
</table>

USACE Water Control Manual Update*

*Schedule to be determined by USACE
4. Investigations, Studies, and Surveillance Enhancements

Flood Control Outlet – Non-linear Seismic Analysis

• Results will inform the need for Potential Implementation of CNA Measure – FCO Structural Upgrades

Current Schedule:
• Final Report (as-is conditions): December 2020
• Anticipate progressing with analysis of potential retrofits (if needed) in 2021.
4. Investigations, Studies, and Surveillance Enhancements

Relationship between FCO Studies and FIRO/WCM

Now

- Flood Control Outlet Non-Linear Analysis of Existing Conditions

+ 1 year

- Structural Analysis/Preliminary Design of Flood Control Outlet Structural Upgrades: Validate Feasibility and Risk Reduction

+ 2 to 3 years

- If Feasible and Risk Reduction Sufficient: Initiate Design
- If Not Feasible or Risk Reduction Insufficient: Consider New FCO Headworks Structure
- If Not Feasible or Risk Reduction insufficient: Consider Low Level Outlet at Elevation 435 ft

USACE Water Control Manual Update – Schedule Determined by USACE
4. Investigations, Studies, and Surveillance Enhancements

Part 12D – 39 Recommendations - Examples

- Sample and test Zone 1 core materials
- Stochastic flood modeling and paleoflood study
- Investigate Monolith 31-Embankment Contact

PFM/L2RA-Rec’s

- Endorsement of CNA installation of core block and grout gallery piezometers study
- Endorsement of high density 3D surveys of embankment
- Implement measures to inspect for and enhance seepage measurements

DSSMP Rec’s

- Inspect air intake at Hyatt Intake Structure
- Endorsement of CNA installation of back-up power & starters for FCO gate operation
- Refine spillway release-tailwater relationship/curve

O&M Related Rec’s

- Update STID to include L2RA report
- Estimate seismic deformations for a broad range of loadings with up-to-date methods
- Develop 3D models of foundation geology

STID Related Rec’s

- Endorsement of CNA installation of core block and grout gallery piezometers study

Reducing Uncertainty in association with Potential Failure Modes

Enhancements to Dam Safety Surveillance, Monitoring, and Inspection Practices

Enhancements to O&M Programs and Practices

Improving Supporting Technical Information Document, Project Documentation, and analyses on-record
5. Integrate CNA measures into O&M Risk Management Framework and Processes

What is going to happen to the other Measures?

- Complete the necessary studies and investigations to fill data gaps and reduce uncertainty.

- Refine the risks and treatment measures. Verify risk reduction achieved.

- Include the measure(s) into the SWP risk management process/register for planning and design.
5. Integrate CNA measures into O&M Risk Management Framework and Processes

Measures Identified by the CNA for future consideration:

- Improved pilot channel downstream of the Emergency Spillway
- New full length RCC chute Emergency Spillway
- New FCO - gated reinforced concrete chute
- Hyatt Powerplant discharge portal bulkheads
- Secant Pile Wall buttress
- Partial extension of RCC apron w/ minimally improved Channel
- Upstream bulkhead gates
- Structural upgrades/retrofit
- Backup power, local starters
- Debris control structures/devices
- Rock bolts in Hyatt Powerplant

- Palermo intake landslide stabilization
- Barrier around ACC and switchyard, landslide stability
- Palermo Canal Lining
- New High-Level Outlet at Elevation 775 ft
- New Low-Level Outlet at Elevation 435 ft
- New Low-Level Outlet at Elevation 340 ft
- Modify portion of dam that wraps around Monolith 31
- Modify the upper 40 ft of Main Dam
- Raise Main Dam by 3 ft
- Raise Bidwell Bar Saddle Dam by 3 ft
- Raise Parish Camp Saddle Dam by 3 ft
5. Integrate CNA measures into O&M Risk Management Framework and Processes

• Immediately address any urgent Dam Safety issues as they are identified

• Utilize a Risk-Informed Asset Management approach for projects that will provide additional risk reductions

• Through this approach, systematically characterize, articulate, and compare risks across the State Water Project, geographically and by infrastructure type (e.g., dams, pipelines, aqueducts, power plants)

• Make an evidence-based case for near-term and medium-term investments

• Prioritize projects that address the highest risks and achieve the greatest risk reduction, thereby maximizing overall risk reduction
Thank you

John Yarbrough
Assistant Deputy Director
California Department of Water Resources
john.yarbrough@water.ca.gov
ITEM 5: PUBLIC COMMENT

The Oroville Dam Citizens Advisory Commission will now take public comment.

We appreciate your input.
ITEM 6: ADJOURN

Thank you all for joining us today, our next Oroville Dam Citizens Advisory Commission meeting will be on February 19, 2021.