



# COMBIE RESERVOIR SEDIMENT AND MERCURY REMOVAL PROJECT DELTA TRIBUTARIES MERCURY COUNCIL

JANUARY 14, 2020



## Combie Reservoir Scope

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- The DWR and NID funded a **multi-year sediment removal project** at Combie Reservoir in the Sierra Nevada Foothills.
- The project included **extensive monitoring** to evaluate system performance, regulatory compliance and environmental impacts. Post-project monitoring is still being performed.
- The project included **public outreach and education** to communicate the importance of reservoir maintenance and mercury load reduction.

## Combie Reservoir Purpose

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- **Remove** accumulated sediment and mercury from Combie Reservoir, thus restoring reservoir capacity for agriculture, domestic drinking, hydroelectric power generation and recreational use.
- **Measure** and analyze ecological effects of MeHg concentrations in Combie Reservoir before and after the sediment removal.
- **Develop** an efficient, compliant and sustainable combination of processes for sediment removal at similar mercury-impacted reservoirs.



# Combie Reservoir Partners



## OWNER



## FUNDING AGENCIES



## IMPLEMENTATION CONTRACTOR



GREAT LAKES  
ENVIRONMENTAL &  
INFRASTRUCTURE

## PROJECT PARTNERS



## PERMITTING AGENCIES



US Army Corps  
of Engineers®

# Combie Reservoir Location





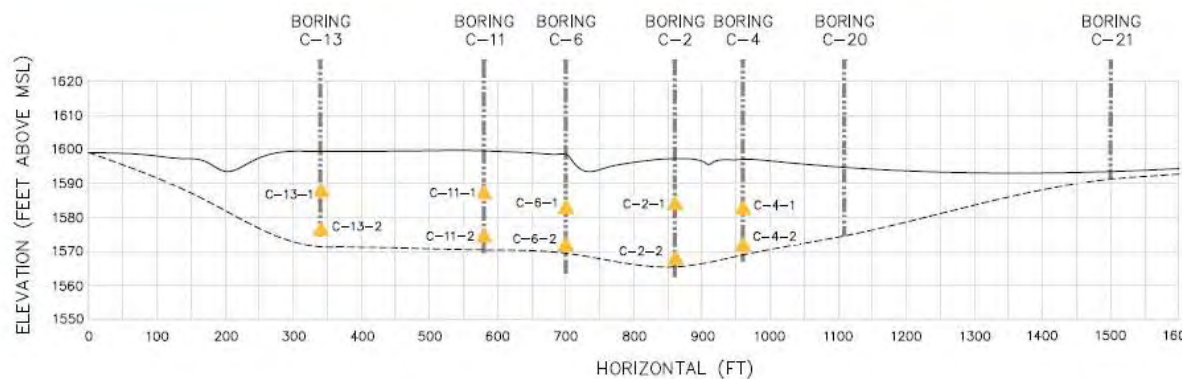
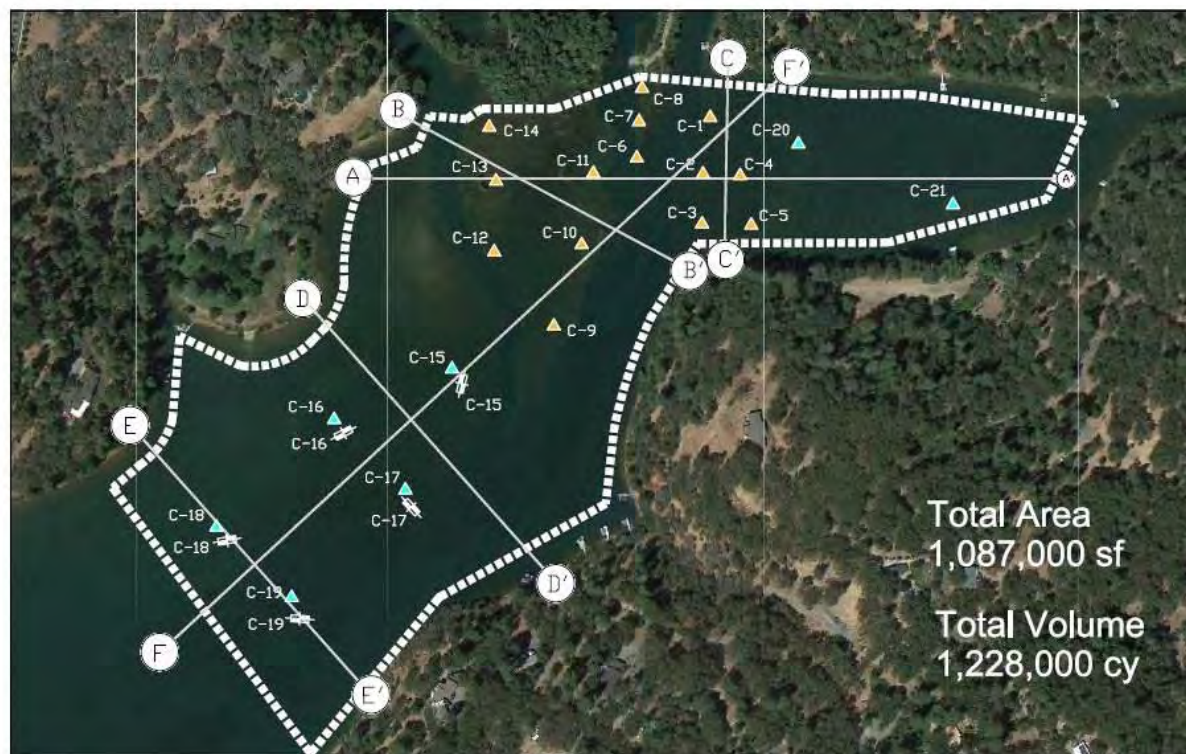
# Combie Reservoir Project Overview





# Combie Reservoir

## Sediment Characterization





# Combie Reservoir

## Dry Excavation - 2018





# Combie Reservoir Dry Excavation - 2018





# Combie Reservoir

## Dry Excavation - 2018





# Combie Reservoir

## Dredging - 2019

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# Combie Reservoir Dredging - 2019





# Combie Reservoir Dredging - 2019



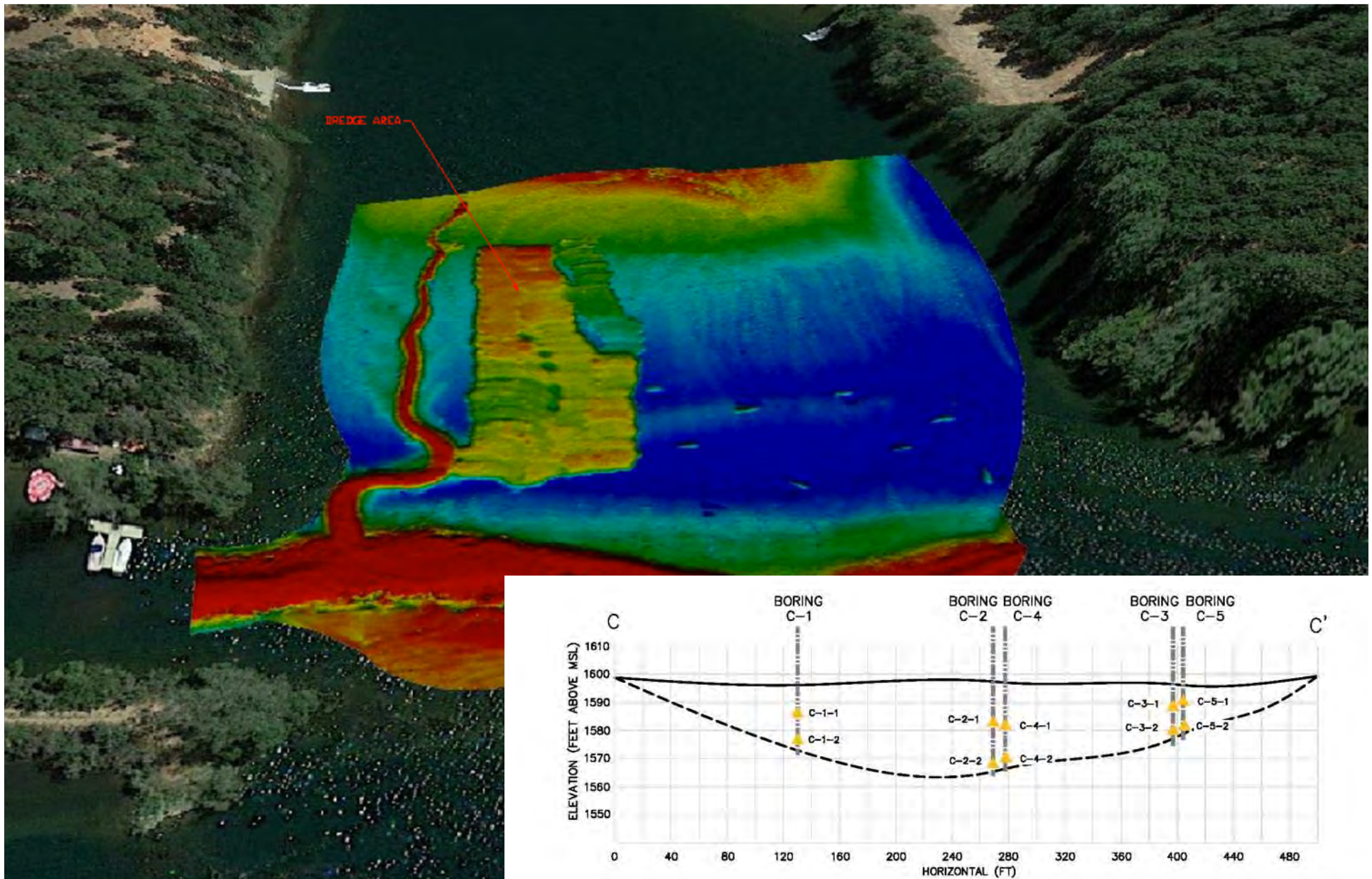


# Combie Reservoir Dredging - 2019





# Combie Reservoir Dredging - 2019



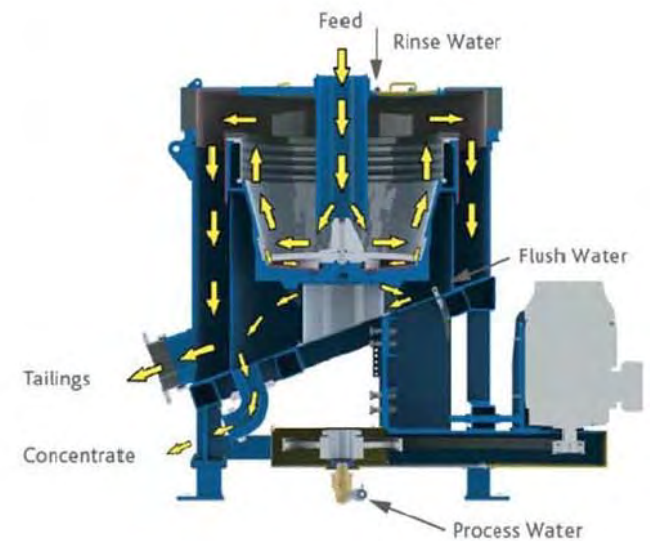
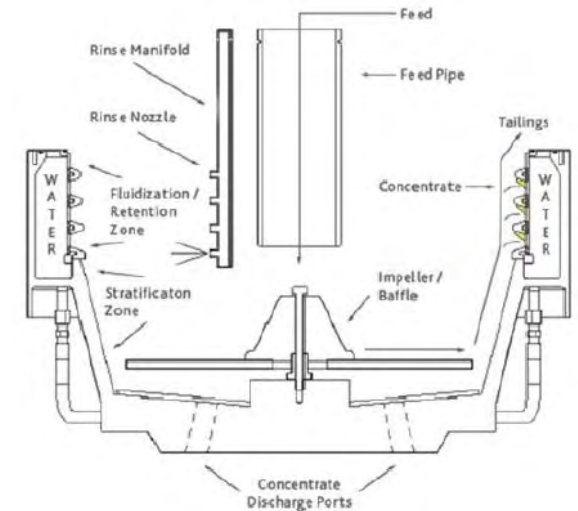
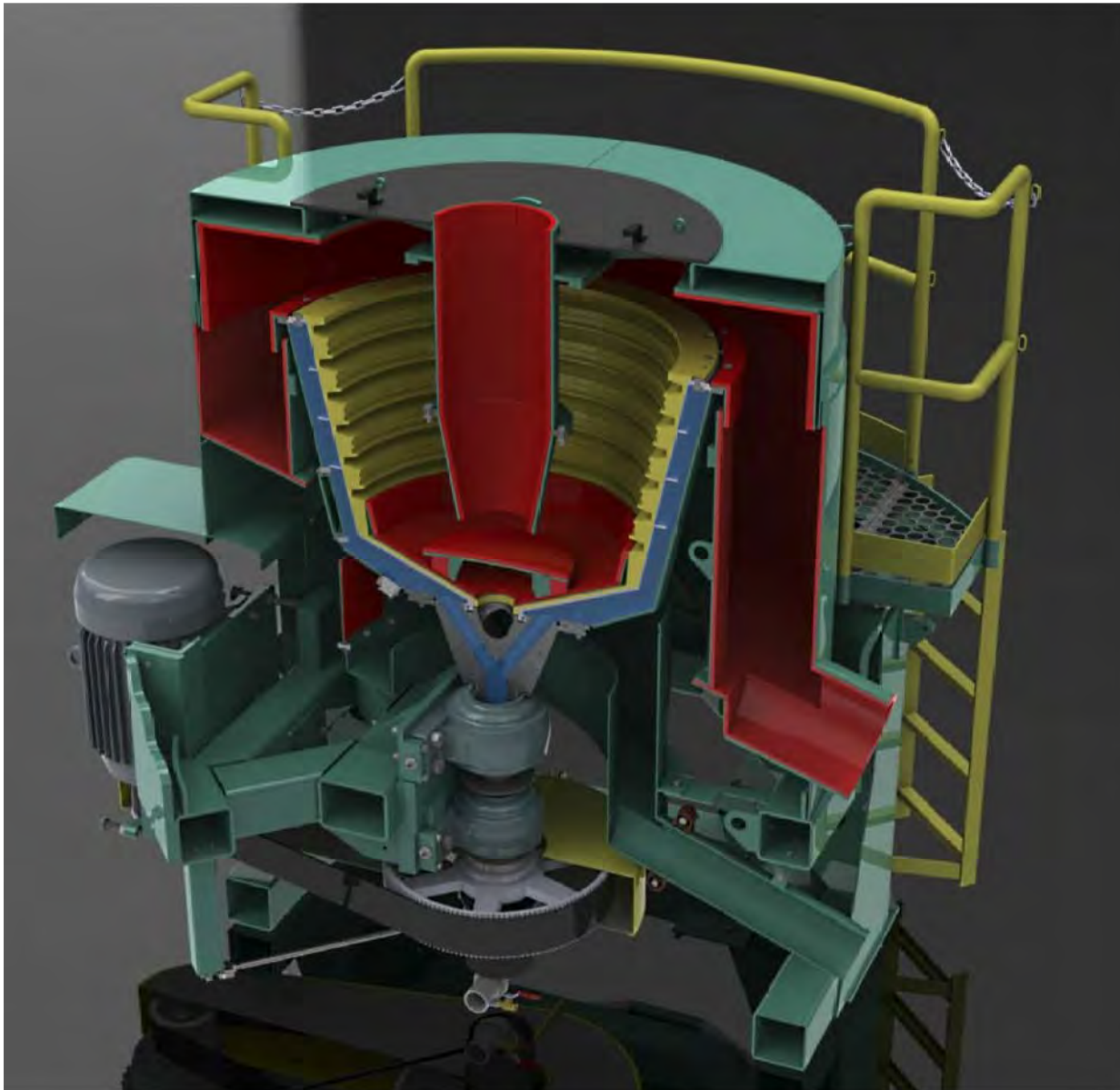


# Combie Reservoir Sediment Processing Plant





# Combie Reservoir Knelson Concentrator





# Combie Reservoir Processing Plant





# Combie Reservoir

## Flocculation, Settling and Real-Time Monitoring





# Combie Reservoir

## Water Quality Monitoring



- **Compliance monitoring** to evaluate and document compliance with permits and regulations.
- **Performance monitoring** to evaluate effectiveness and cost per unit of sediment and mercury removed.
- **Real-time monitoring** to estimate total and methyl mercury using field parameters.
- **Environmental monitoring** to evaluate changes in mercury concentrations in biota and environmental media at locations upstream and downstream.





# Combie Reservoir

## Key Preliminary Findings



1. Sediment can be removed from mercury-impaired reservoirs in compliance with regulations, without exceedance of water quality objectives, and in a manner that is protective of the environment.
2. The final report is intended to serve as a guide for maintenance dredging at similar mercury-impaired reservoirs.
3. The Project's environmental monitoring will improve our understanding of mercury and nutrient cycling and will provide additional insight regarding the potential effects of sediment removal on these complicated systems.





# Combie Reservoir

## Key Preliminary Findings (continued)



4. When feasible, sediment removal in the dry is preferred because of its lower cost and complexity.
5. The Project developed a field correlation between mercury concentrations and real-time monitoring parameters.
6. The Project demonstrated the value of partnerships between agencies and non-governmental organizations.





## Combie Reservoir For More Information

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MULTIPURPOSE WATER  
MANAGEMENT PROGRAM



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