LAKE COMBIE SEDIMENT & MERCURY REMOVAL PROJECT

PROJECT OWNER

NID

MISSION STATEMENT

The District will provide a dependable, quality water supply; continue to be good stewards of the watersheds, while conserving the available resources in our care.

For more information regarding this project, please visit:
www.nidwater.com/projects

PROJECT CONTRACTOR

GREAT LAKES ENVIRONMENTAL & INFRASTRUCTURE

MISSION STATEMENT

Committed to minimizing your risk and liability, through a culture of safety, innovation, and excellence.

PROJECT PARTNERS

NV5

USGS science for a changing world

THE SIERRA FUND

PERMITTING AGENCIES

CALIFORNIA DEPARTMENT OF FISH & WILDLIFE

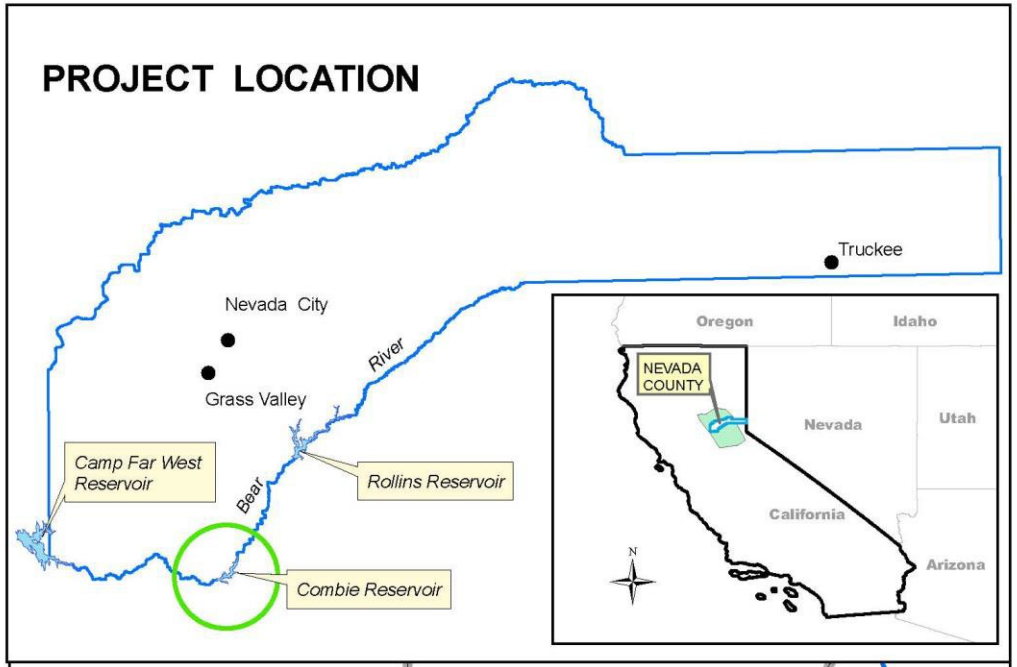
STATE OF CALIFORNIA CENTRAL VALLEY REGIONAL WATER QUALITY CONTROL BOARD

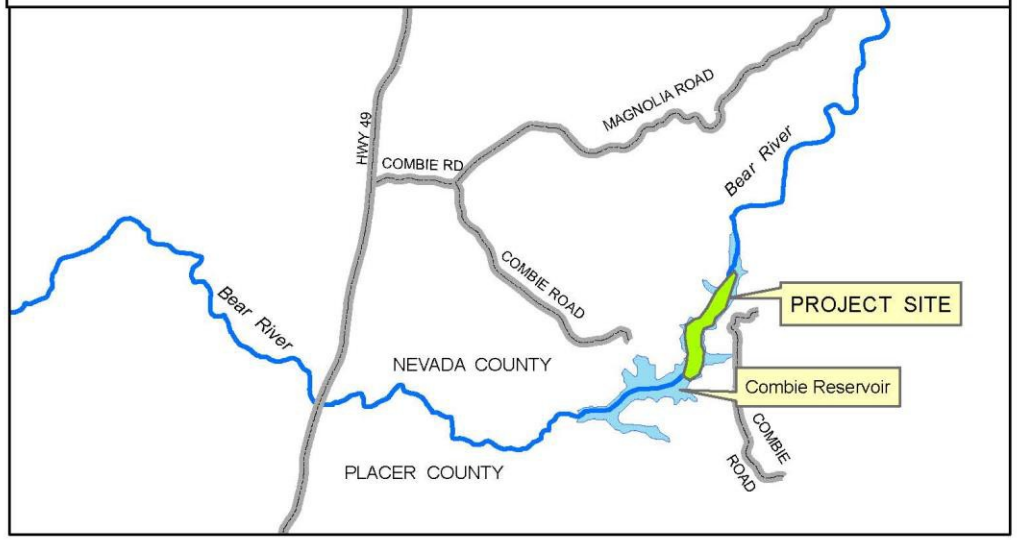
US Army Corps of Engineers

PROJECT FUNDING

Funding for this project has been provided in part by the Costa-Machado Water Act of 2000 (Proposition 13) and through an agreement with the State Department of Water Resources.

DEPARTMENT OF WATER RESOURCES STATE OF CALIFORNIA

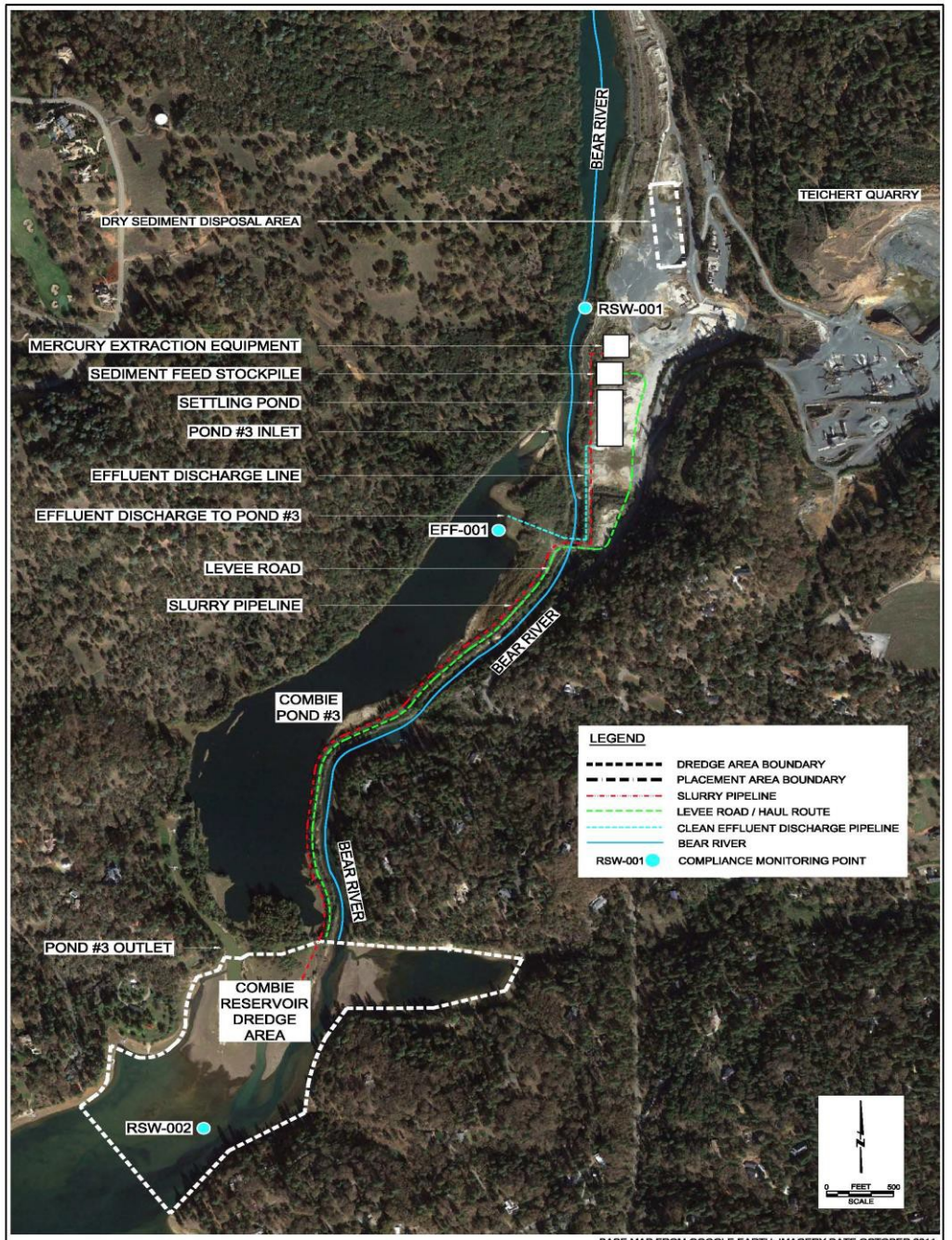




Job Title: **COMBIE RESERVOIR SEDIMENT AND MERCURY REMOVAL PROJECT**

NEVADA IRRIGATION DISTRICT
NEVADA COUNTY -- PLACER COUNTY
GRASS VALLEY, CALIFORNIA

Scale: No Scale
Sheet: 2 of 2



BASE MAP FROM GOOGLE EARTH; IMAGERY DATE OCTOBER 2011

SITE MAP - LOW WATER
COMBIE RESERVOIR SEDIMENT AND MERCURY REMOVAL PROJECT
MEADOW VISTA, CALIFORNIA

WDID #	5A29CR00068
NPDES #	CAG995002
NVS PROJECT	4688.02
DATE	APRIL 2018

FIGURE 4

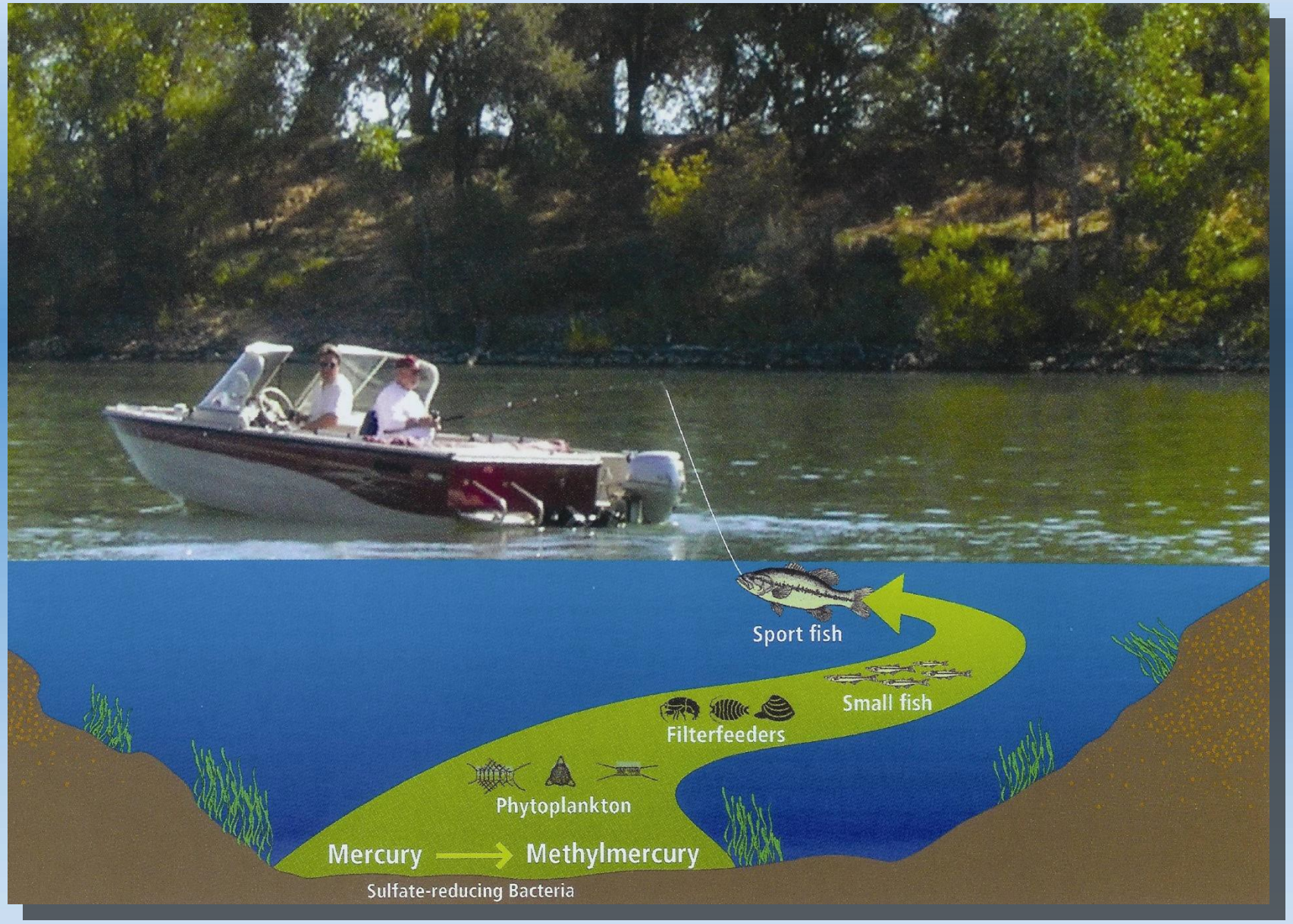
NID

Project Purpose

The Combie Sediment & Mercury Removal Project is intended to:

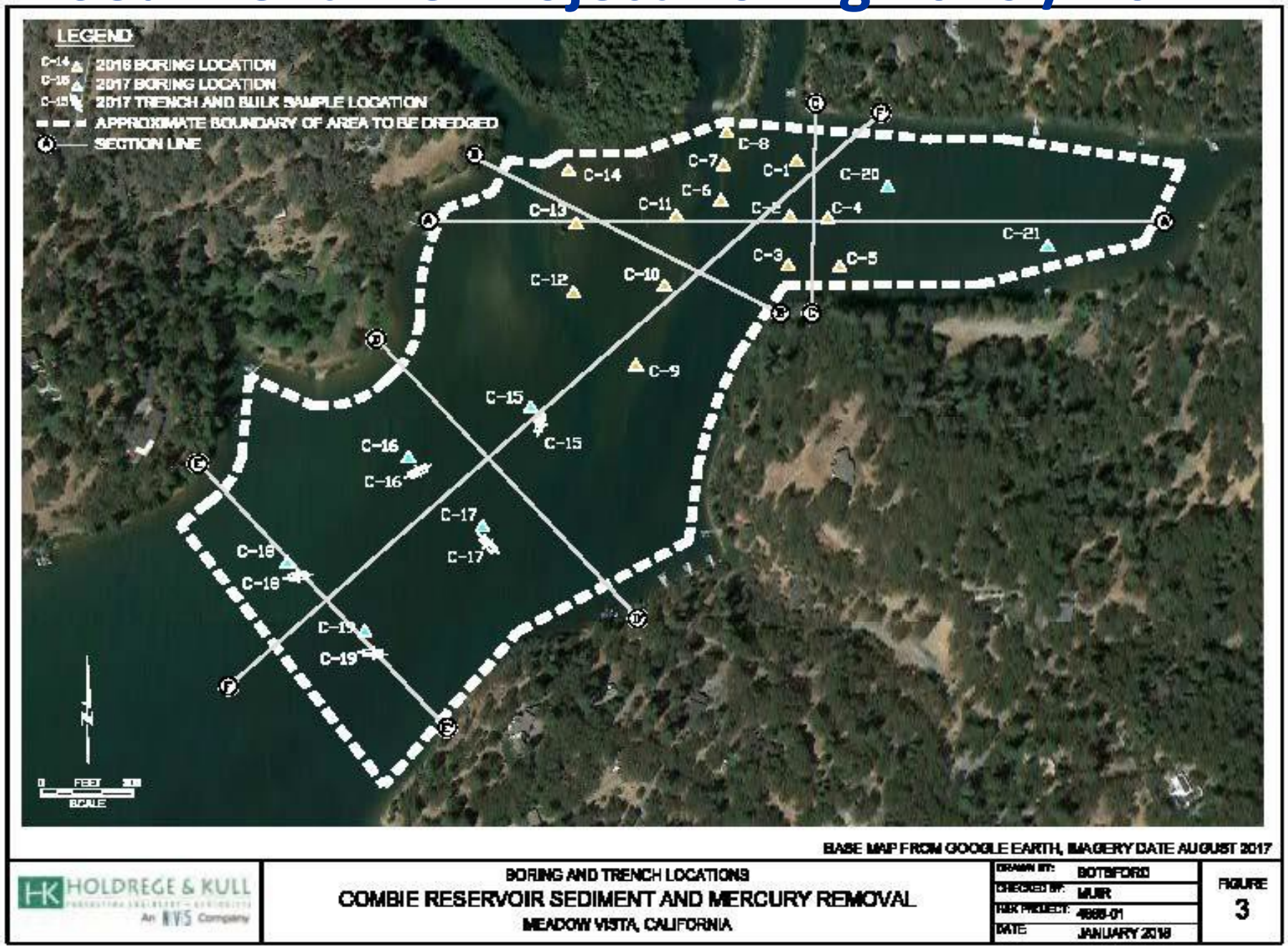
- Remove accumulated sediment and mercury from Combie Reservoir, thus restoring reservoir capacity for agriculture, domestic drinking, hydroelectric power generation and recreation use.
- Measure and analyze ecological effects of MeHg concentrations in Combie prior and post removal activities.
- Develop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

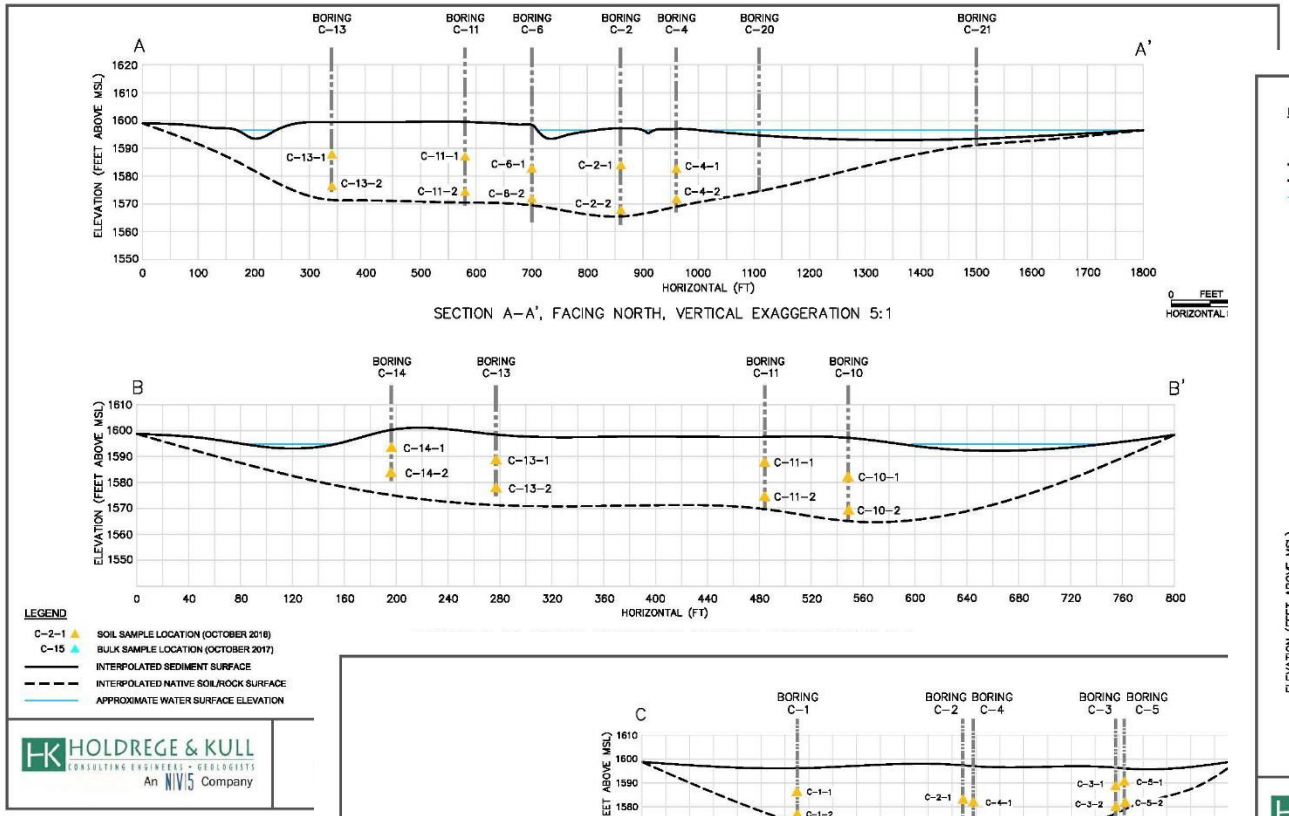
Methylmercury Bioaccumulation

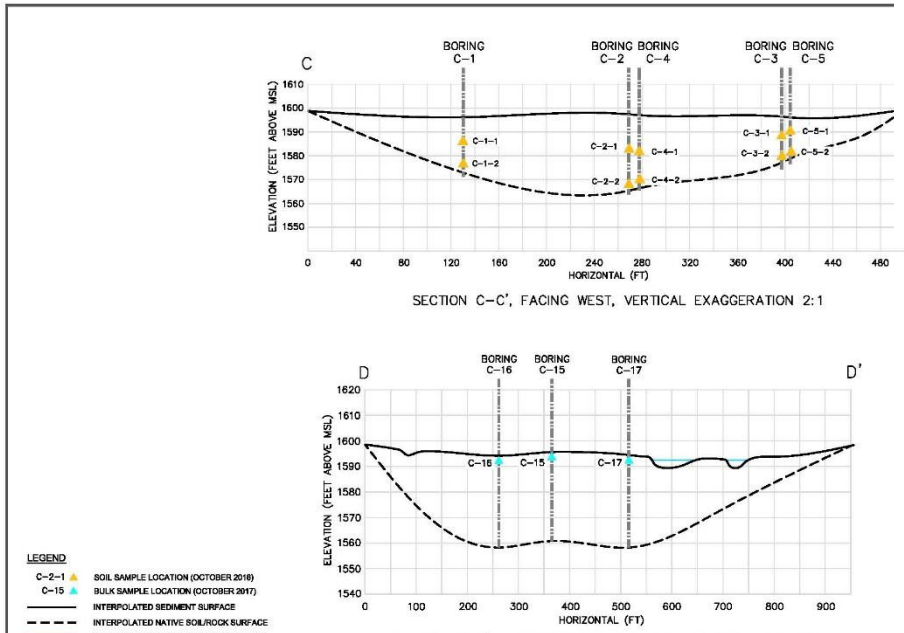


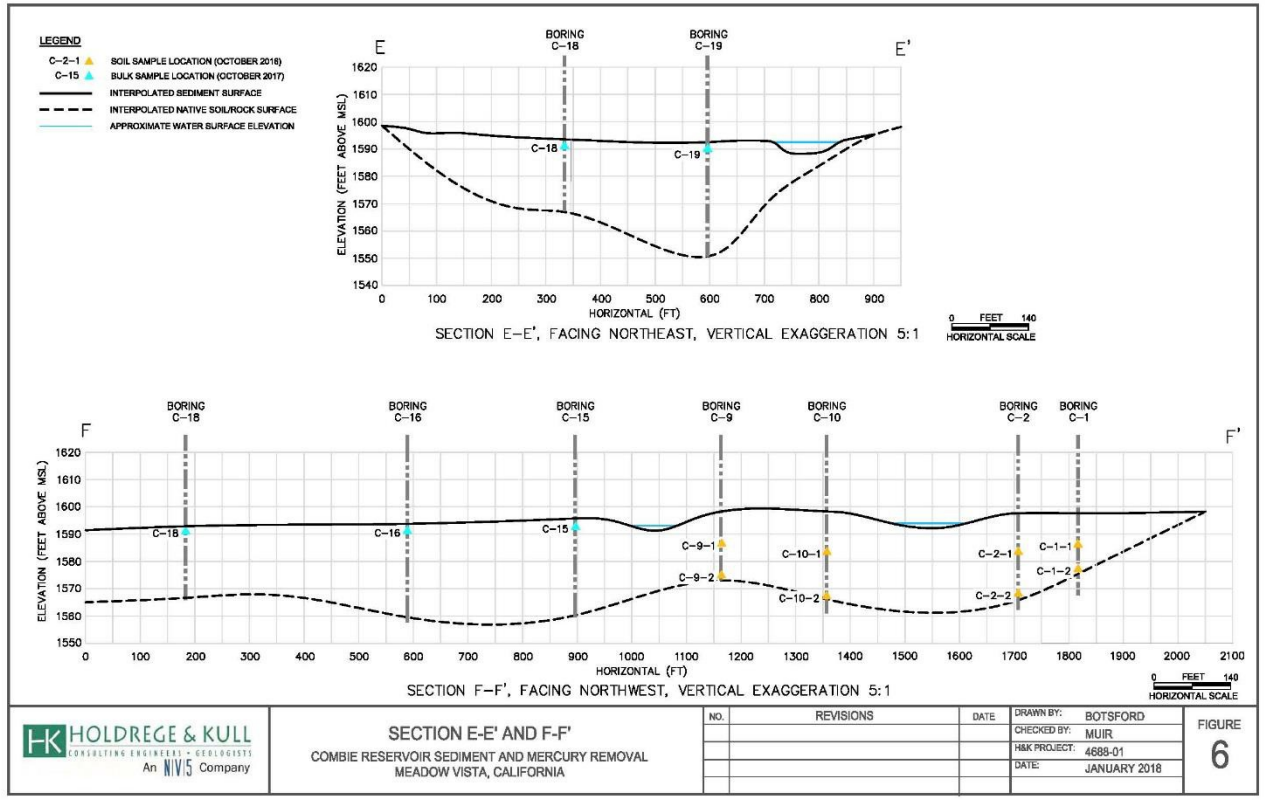
Core Boring & Bulk Sediment Sampling 2016 - 2017

Sediment Pre-Project Boring 2016 / 2017





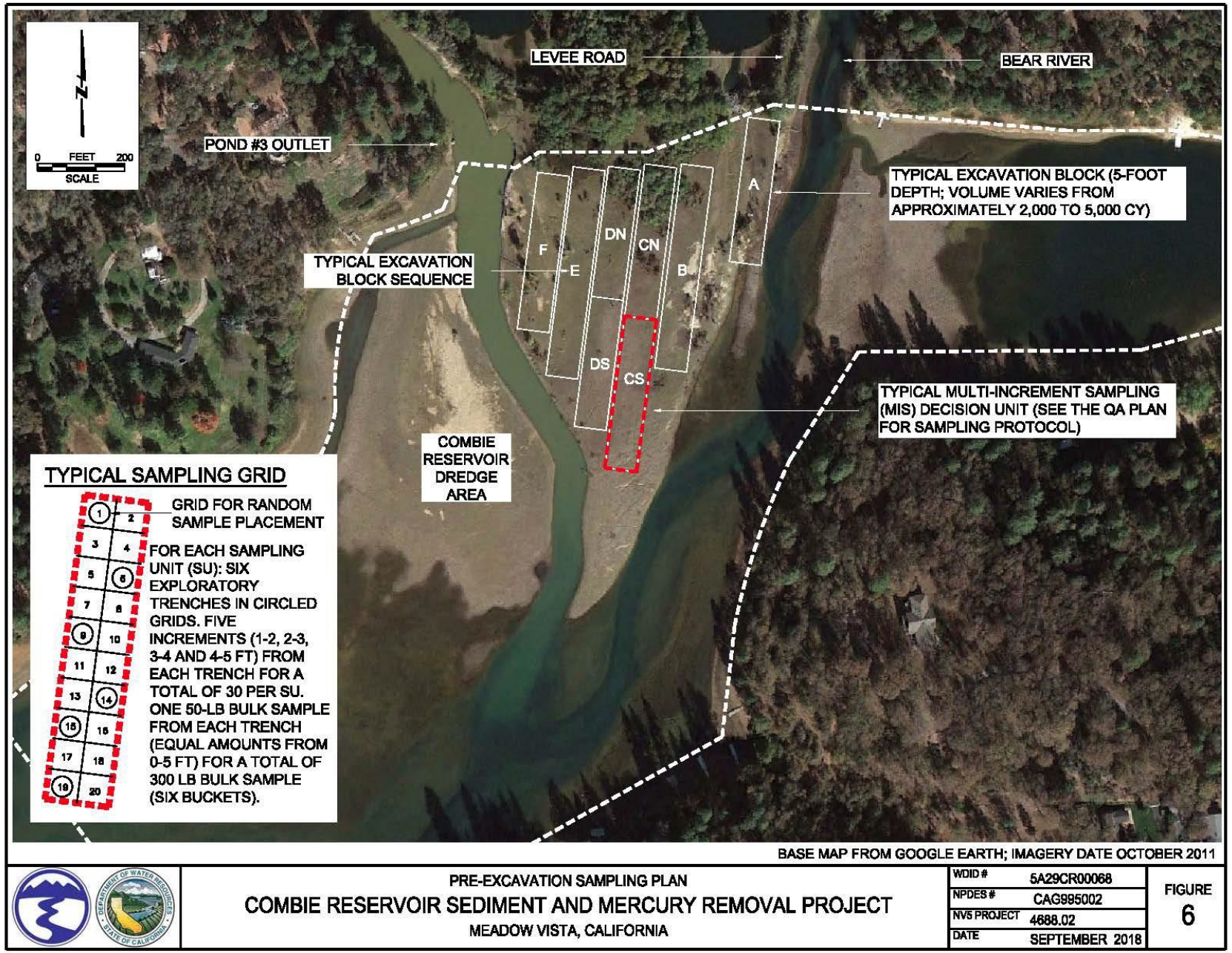




Sediment Pre-Project Boring 2016 / 2017

- ~ 5' – 50' Deep

Dry Excavation Preparation – Aug / Sept 2018



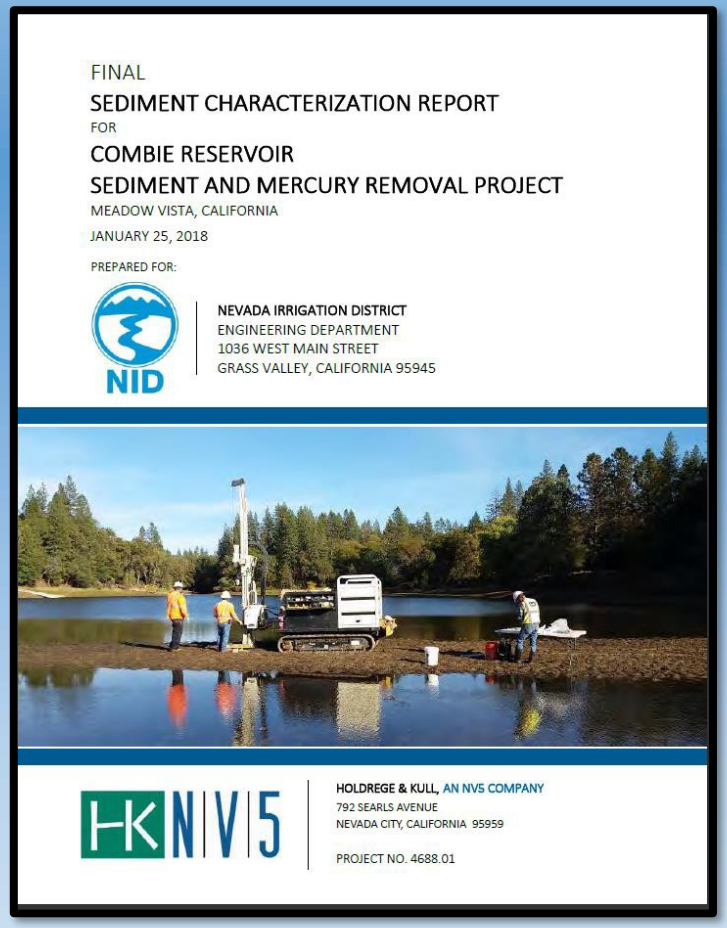
Bulk Sediment Sampling Aug/Sept 2018

Sediment Core Boring Results

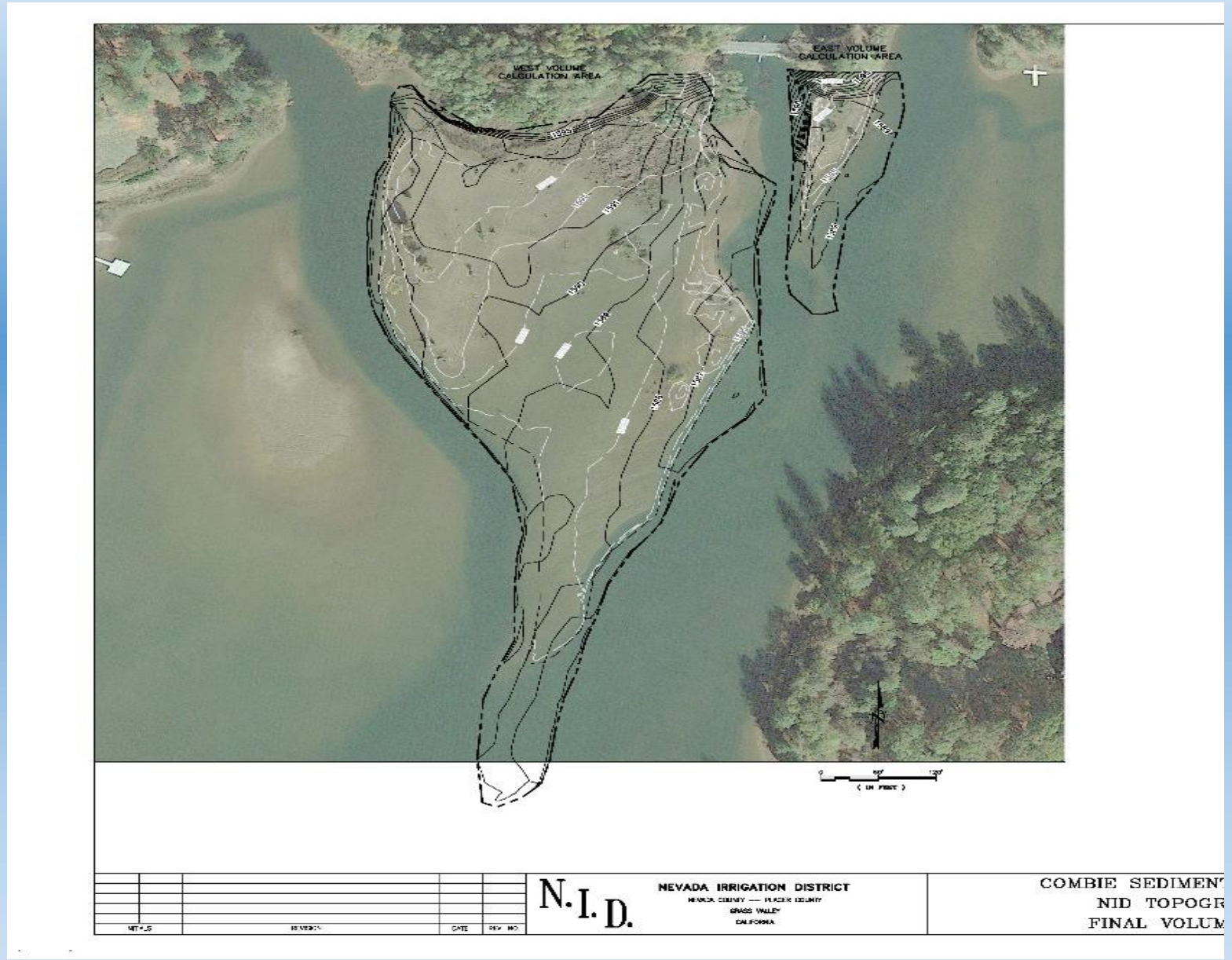
	Hg (ppm)
DTSC-SL & RSL's	**1**
Average	**<0.42**
C-1	0.22
C-2	0.18
C-3	0.61
C-4-1	<0.1
C-4-2	0.3
C-5	0.48
C-6	<.01
C-7-1	<.01
C-7-2	<.01
C-8	<.01
C-9	<.01
C-10-1	<.01
C-10-2	<.01
C-11-1	<.01
C-11-2	<.01
C-12-1	<.01
C-12-2	<.01
C-13	<.01
C-14	<.01
C-15	0.42
C-16	0.63
C-17	0.47
C-18	0.48
C-19	0.38

Additional 4,000 lbs Bulk Sampling

- 0.2 to 0.4 ppm Hg in whole samples
- 0.1 to 0.2 ppm Hg in the sand fractions
- 0.4 to 0.6 ppm Hg in the silt fractions


FINAL
SEDIMENT CHARACTERIZATION REPORT
FOR
COMBIE RESERVOIR
SEDIMENT AND MERCURY REMOVAL PROJECT
MEADOW VISTA, CALIFORNIA
JANUARY 25, 2018
PREPARED FOR:
NID
NEVADA IRRIGATION DISTRICT
ENGINEERING DEPARTMENT
1036 WEST MAIN STREET
GRASS VALLEY, CALIFORNIA 95945
HK NV5
HOLDREGE & KULL, AN NV5 COMPANY
792 SEARLS AVENUE
NEVADA CITY, CALIFORNIA 95959
PROJECT NO. 4688.01

Dry Excavation Survey – 40,000 cu/yd



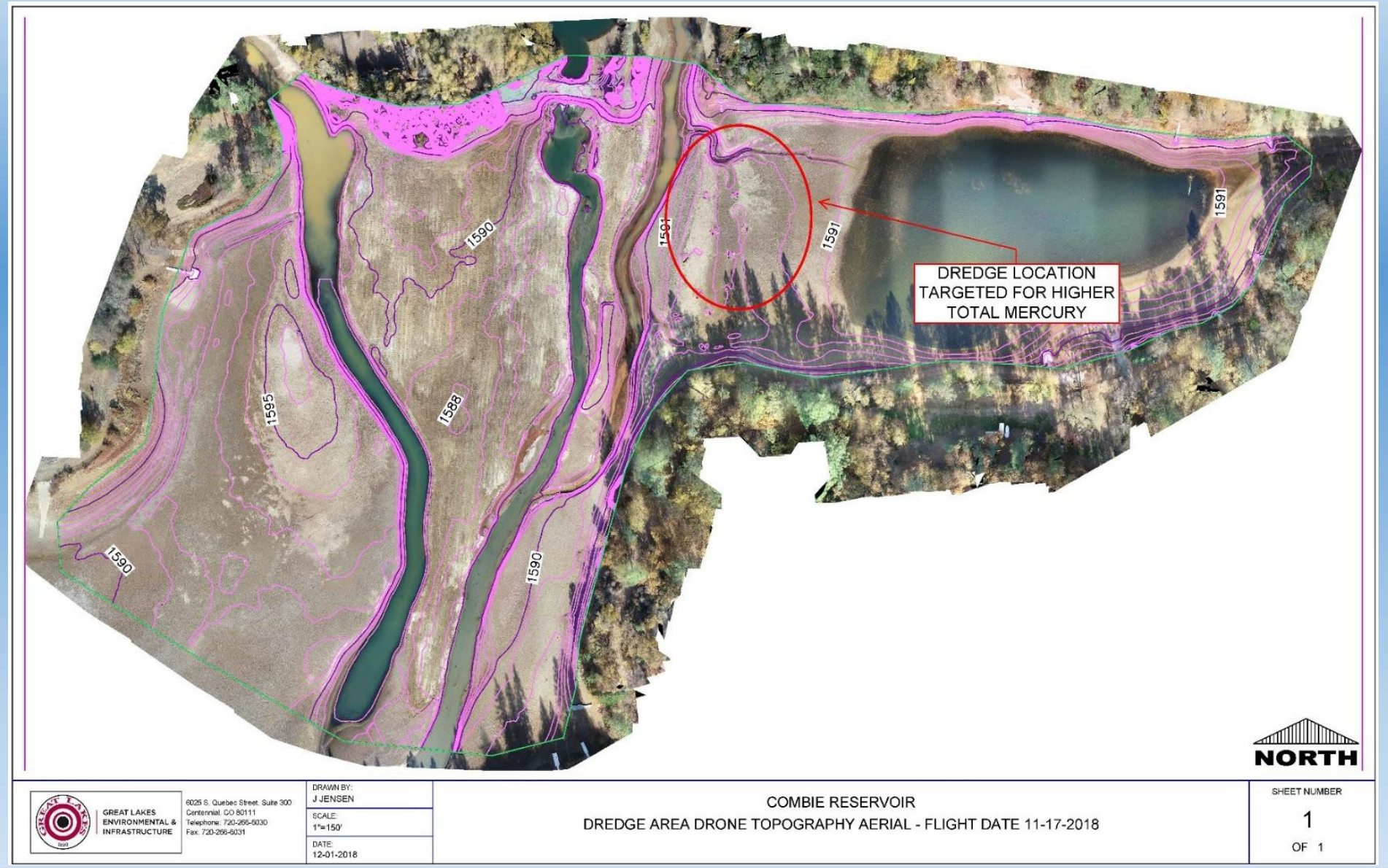
Dry Excavation – Oct/Nov 2018

Dry Excavation – Oct/Nov 2018

Dry Excavation – November 2018

Dredging Execution – Spring/Summer 2019

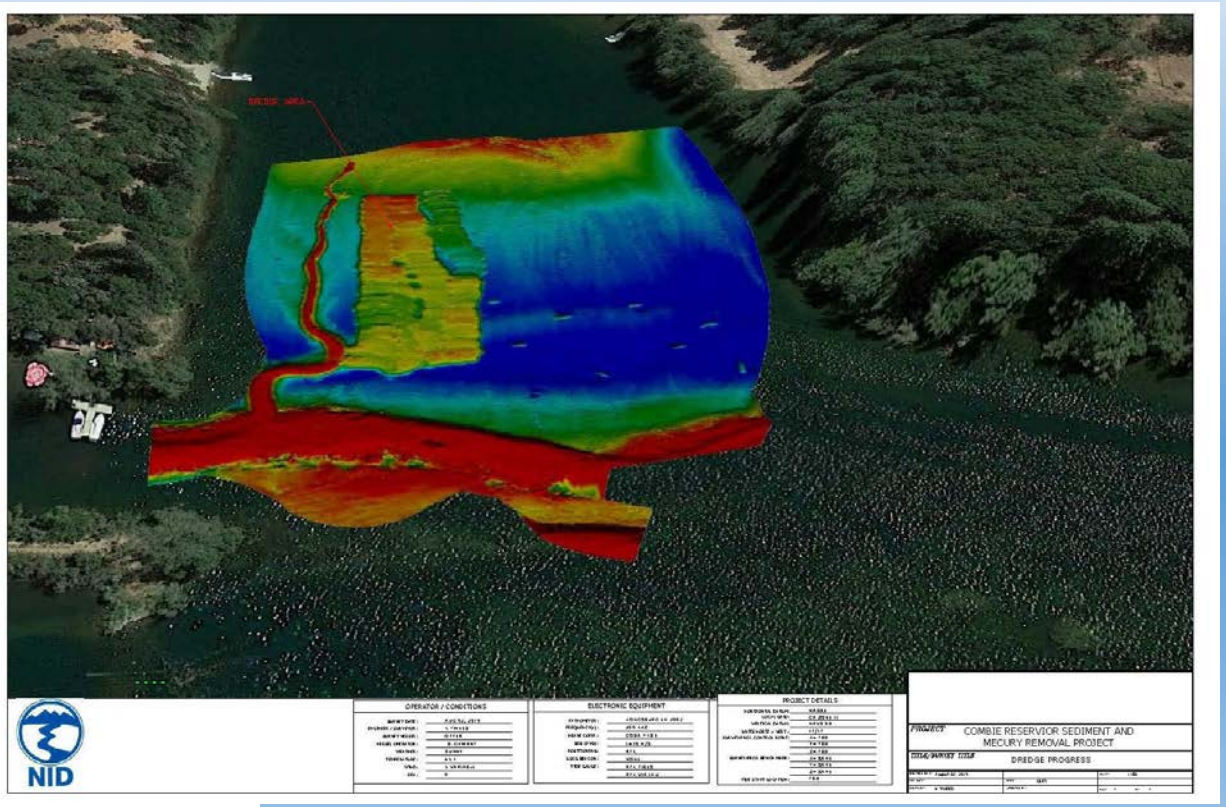
Targeted dredge location for higher anticipated mercury concentration

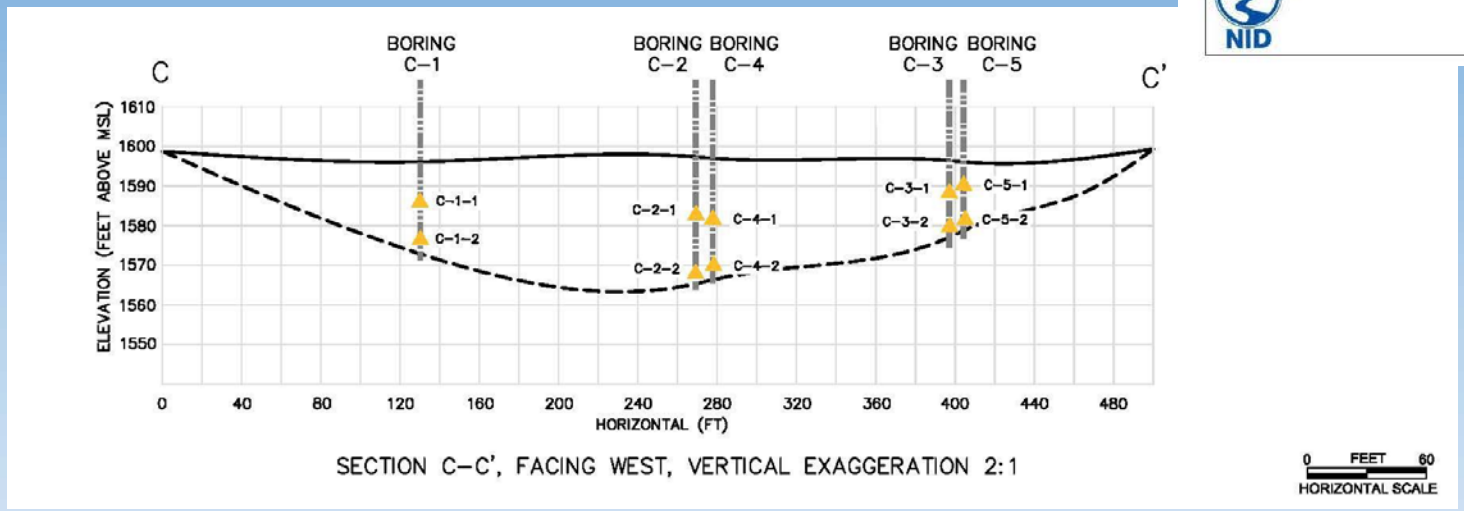


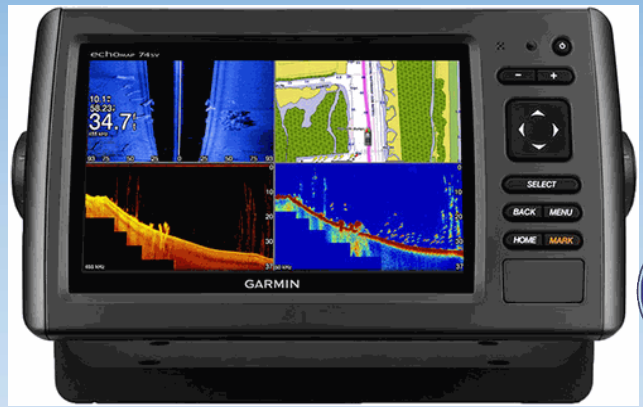
Dredging Execution – Spring/Summer 2019

PRECISION DREDGE PLAN

- Dredge locations and target sediment removal based on previous investigations
- Dredge areas located using GPS
- GPS positioning corresponding with Holdrege and Kull soil sample locations







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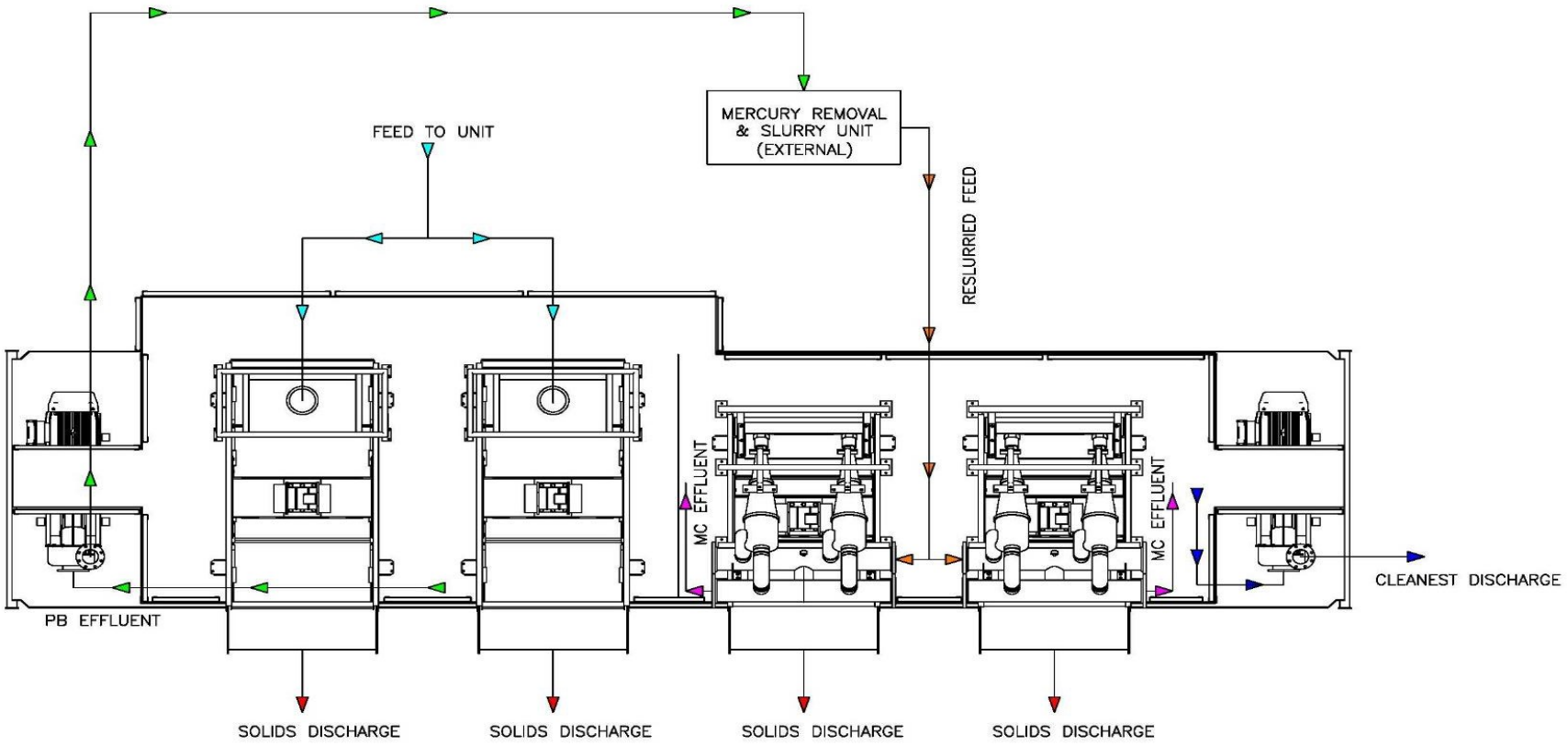
DEPARTMENT OF WATER RESOURCES · STATE OF CALIFORNIA ·

Dredging Execution – Spring/Summer 2019

Treatment Process – Spring/Summer 2019

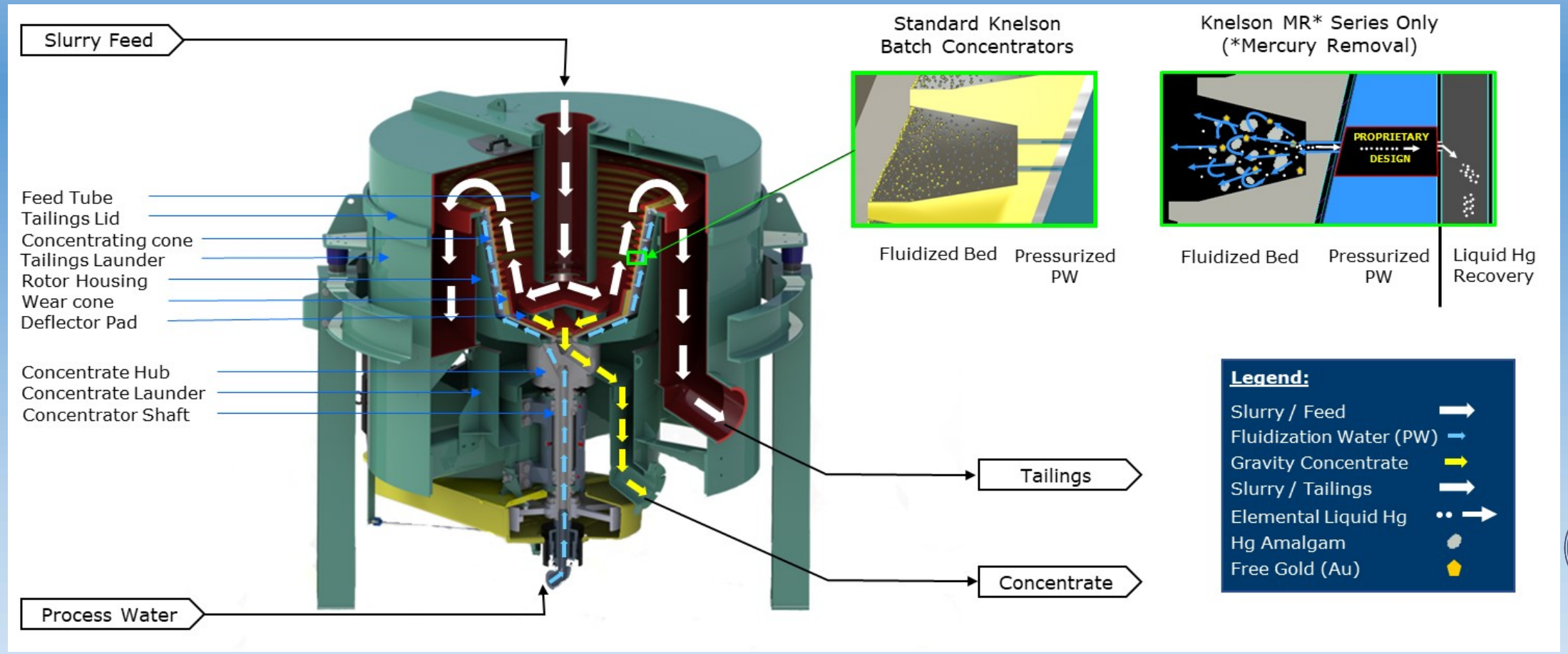
Treatment Process – Spring/Summer 2019

- **Treatment process diagram – tri-flow, concentrator, and hydro cyclones**
  - **Material passes 10 mesh screen**
  - **Effluent is pumped through concentrator**
  - **Concentrator effluent then goes through hydro cyclone and process water is sent to flocculation circuit, settling pond**



Concentrator Flow Diagram

- **600-480 GPM , Assumed 11-15% solids in feed**
- **Fluidization circuit connected from separate clean water feed**
- **Concentrator tailings pumped to hydro cyclones for finer material removal**



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Post It Day

A project to post state-issued fish consumption advisories at Sierra reservoirs

Mercury was brought to the Sierra Nevada region for use in gold processing during California's Gold Rush. The most significant human health threat stemming from the resource extraction of that era is exposure to mercury through the consumption of contaminated fish.

Overview

Since 2015, The Sierra Fund (TSF) has organized an annual volunteer event to post fish consumption advisories, issued by the California Office of Environmental Health Hazard Assessment (OEHHA), at regional water bodies. Fish consumption advice is communicated in terms of species, demographic group and the recommended maximum number of servings that can be safely consumed within one week. ***The goal of this project is to increase access to important guidelines for making healthy fish choices, especially for those with a higher exposure risk.***

Who's at risk?

Mercury is a developmental neurotoxin. Sensitive populations include women of childbearing age and children. Additional at-risk populations include groups who consume fish at a higher rate than the general population, such as for cultural or subsistence diets.

Why the need?

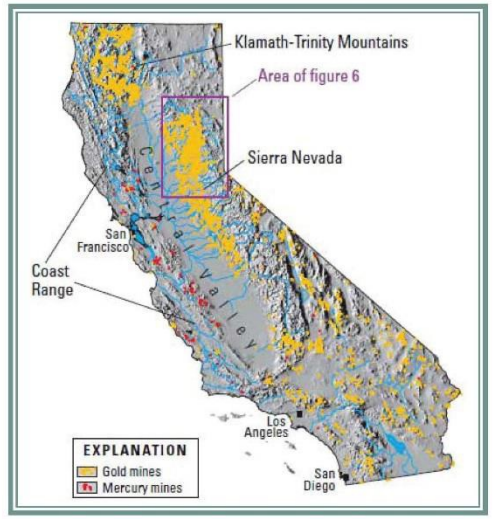
While OEHHA issues fish consumption advisories, no agency is mandated to post this information at the places where people fish. Fish consumption advisories are posted inconsistently in mercury-contaminated watersheds across the state, which can create the false perception that at locations where advisories are not posted, the fish must be safe to eat.

Next Steps

Informed by three years of organizing Post It Day, TSF published a model protocol outlining the steps and best practices to plan and execute regional fish consumption advisory posting events. TSF will continue to present the protocol to agencies in mercury-impacted watersheds to encourage robust posting of fish consumption advisories statewide. OEHHA frequently issues new site-specific advisories, and TSF will leverage the momentum around these releases by identifying and contacting regional entities who may be uniquely situated to lead posting events.

By the Numbers

In 3 YEARS,
60 VOLUNTEERS have
posted nearly
100 LOCATIONS at over
20 WATER BODIES in
5 WATERSHEDS
in the Sierra.
9 TARGET WATER BODIES
have been posted in
2 LANGUAGES,
Spanish and English.



Map Source: USGS Fact Sheet 2005_3014_v1.1

Mercury was mined from California's Coast Range and transported to the Sierra Nevada to improve gold recovery, as mercury is an amalgam to gold.

Thank You Project Funders!

Past and present project funders include: Clarence E. Heller Charitable Foundation, California Department of Water Resources, California Environmental Protection Agency, California Wellness Foundation and Rose Foundation for Communities and the Environment.

The Sierra Fund - 103 Providence Mine Road, Suite 101, Nevada City, CA 95959 - (530) 265-8454 - www.sierrafund.org