

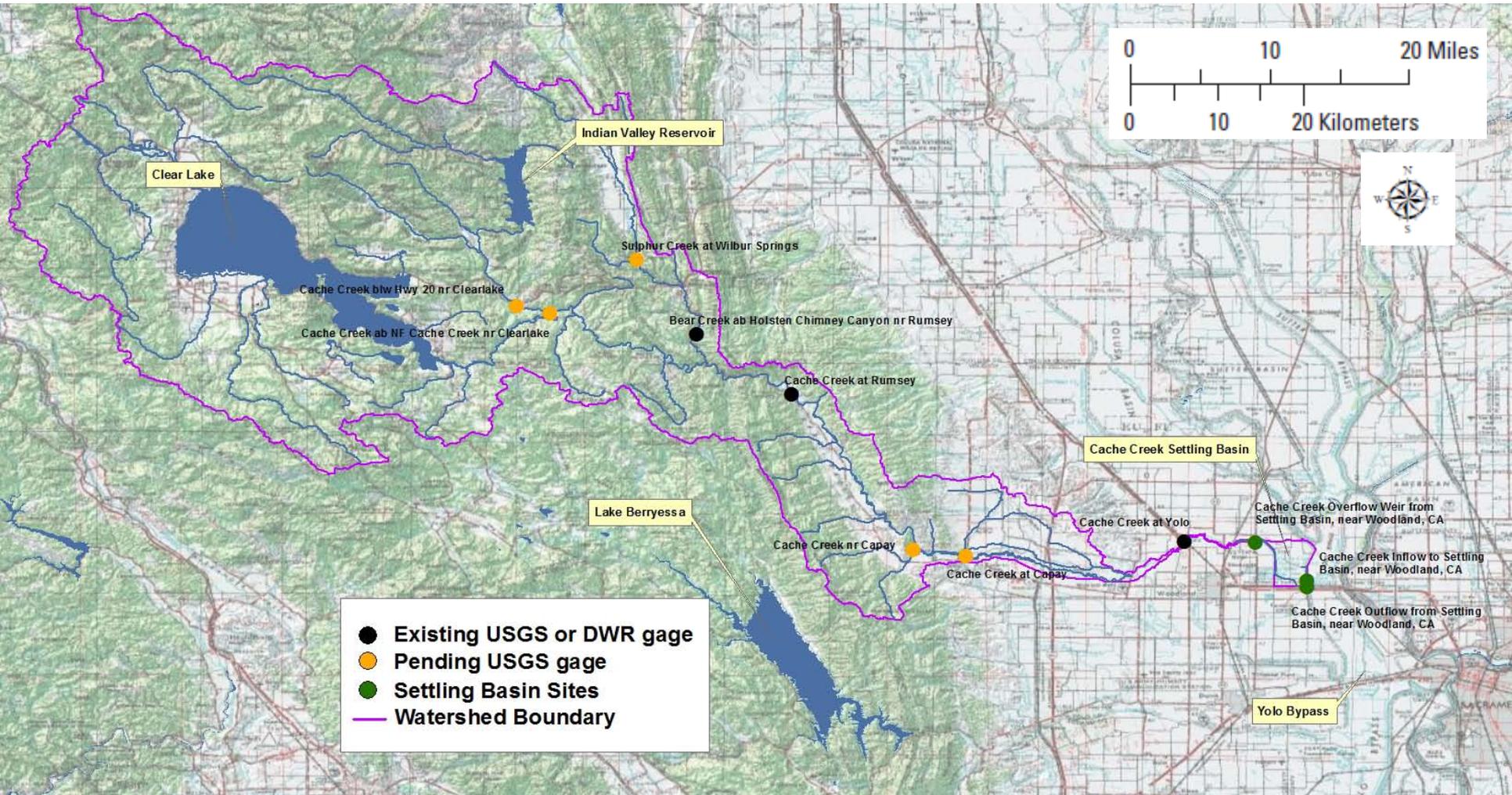
Cache Creek Settling Basin Delta Mercury Control Program

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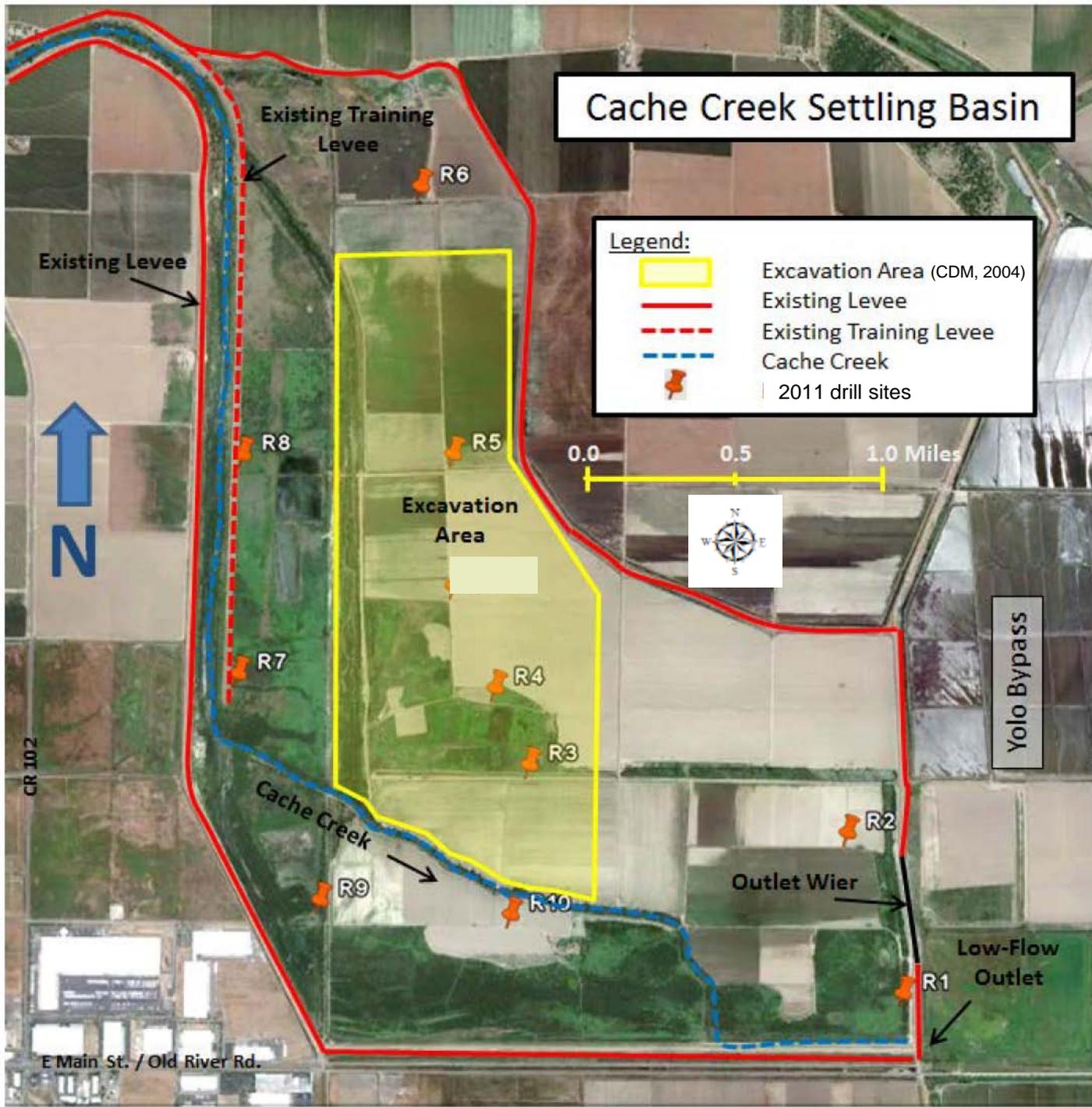
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Cache Creek Watershed



Cache Creek Settling Basin



CACHE CREEK SETTLING BASIN



Woodland

West Levee

South Levee

Cache Creek Settling Basin

Interstate 5

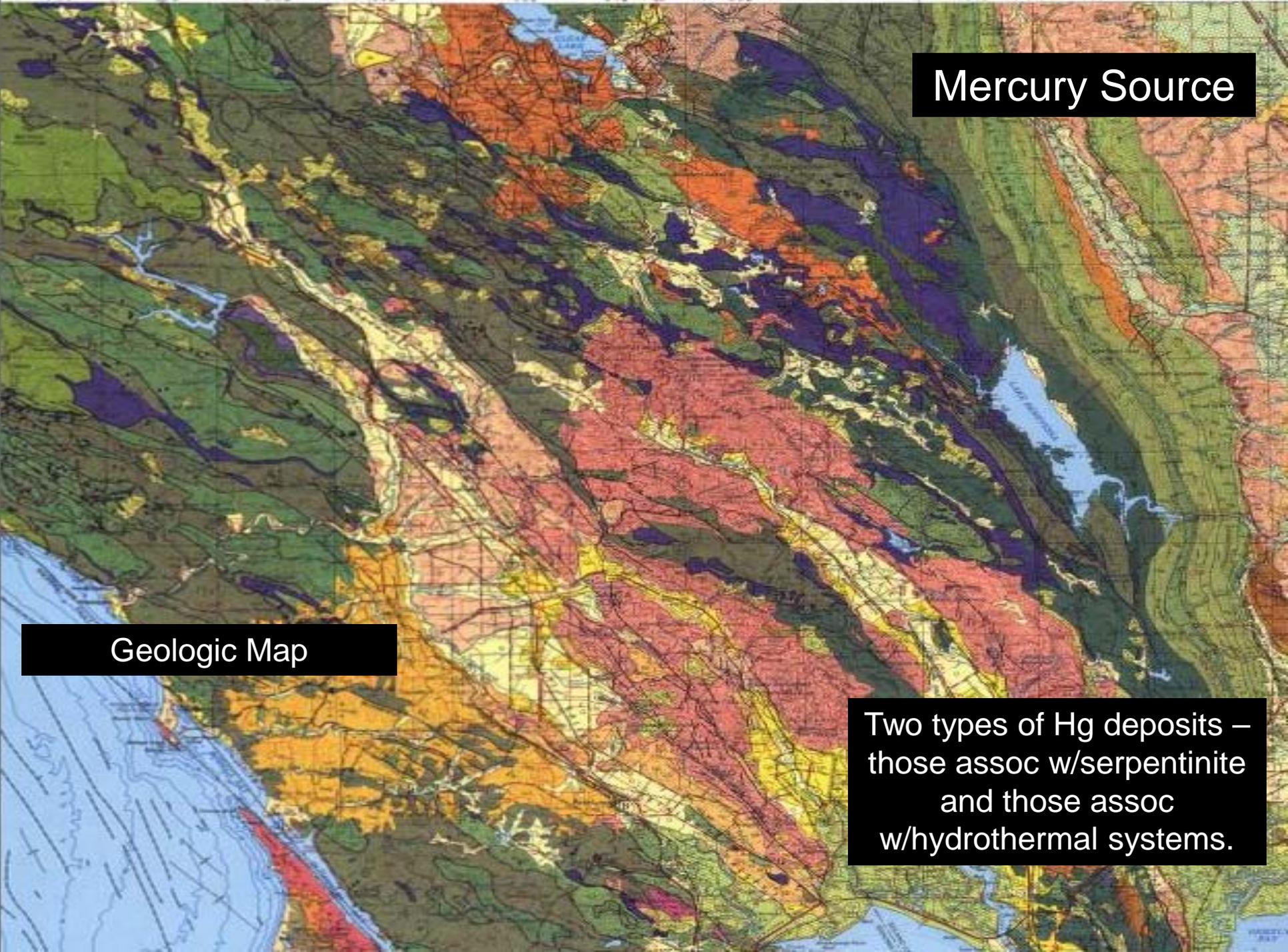
Outlet Weir

Yolo Bypass

Sacramento River

History of CCSB

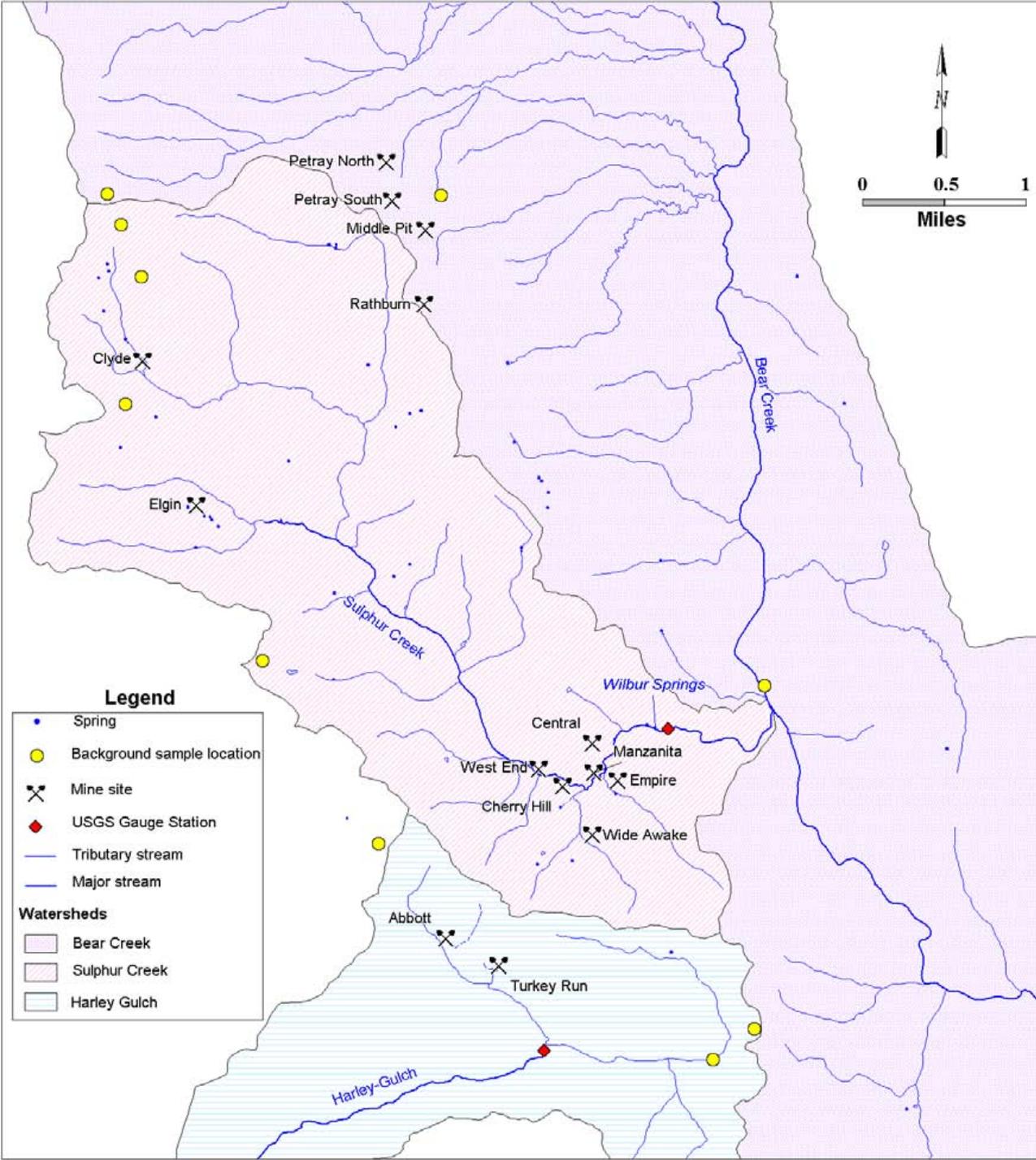
- Current Basin configuration completed in 1993 by the USACE
- Sole function is to prevent excessive sediment from entering the Yolo Bypass
- 50 year lifespan
- Weir raise to occur at year 25 (2018) OR when the measured trap efficiency is less than 30%
- Weir length of 1740 feet – spills directly into the Yolo Bypass
- Design Flow Rate of 30,000 cfs
- Basin area is approximately 3600 acres (approx. 5.6 mi²)
- Cache Creek drains approx. 1160 mi² watershed to the CCSB.
- Operated and Maintained by DWR's Sacramento Maintenance yard



Mercury Source

Geologic Map

Two types of Hg deposits –
those assoc w/serpentinite
and those assoc
w/hydrothermal systems.



Sulfur Creek Mining District

Assessment of the Feasibility of Remediation of Mercury Mine Sources in the Cache Creek Watershed

Current Studies

- Trap Efficiency of the CCSB (UC Davis, USGS)
- CCSB Mercury Load Determination (USGS)
- Cache Creek Watershed (UC Davis, USGS)

CCSB Trap Efficiency Study

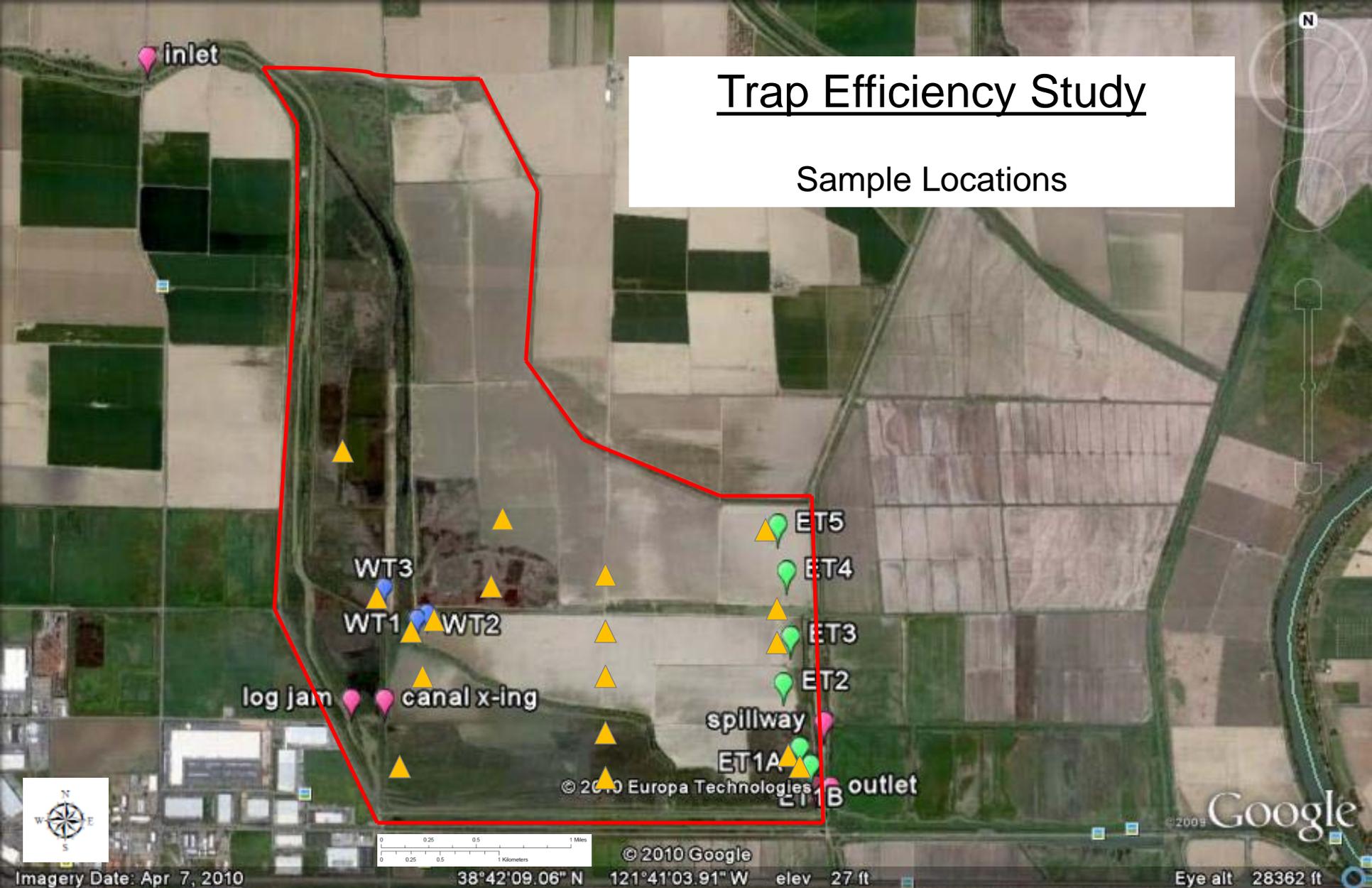
- Initiated in 2008
- The Corps' O&M manual requires evaluation of the Basin trap efficiency and the effectiveness of the outlet weir.
- UCD is modeling sediment transport by use of two-dimensional numerical models, RMA2 and SED2D.
- USGS determining:
 - Flow rates
 - Suspended sediment loads into and out of the Basin
 - Velocity profiling within the Basin to calibrate UCD's model

CCSB Trap Efficiency Study

- Once the model is calibrated, scenarios can be evaluated to determine the effects of changes made to the Basin.
- Report anticipated in July of 2012.
- Modeling efforts will continue indefinitely in order to capture a full range of flows.
- Weir raise to occur at year 25 (2018) OR when the measured trap efficiency is less than 30%.

Trap Efficiency Study

Sample Locations



Flow, velocity, suspended sediment, and bed sediment sample locations.

CCSB Mercury Load Determination

What are we trying to accomplish?

- Develop a conceptual model describing transport of THg and MeHg in and out of the CCSB and transformation of THg to MeHg within the CCSB.
- Determine which factors and (or) hydrogeochemical processes are most strongly associated with the transport of higher concentrations or loads of MeHg and THg from the CCSB.

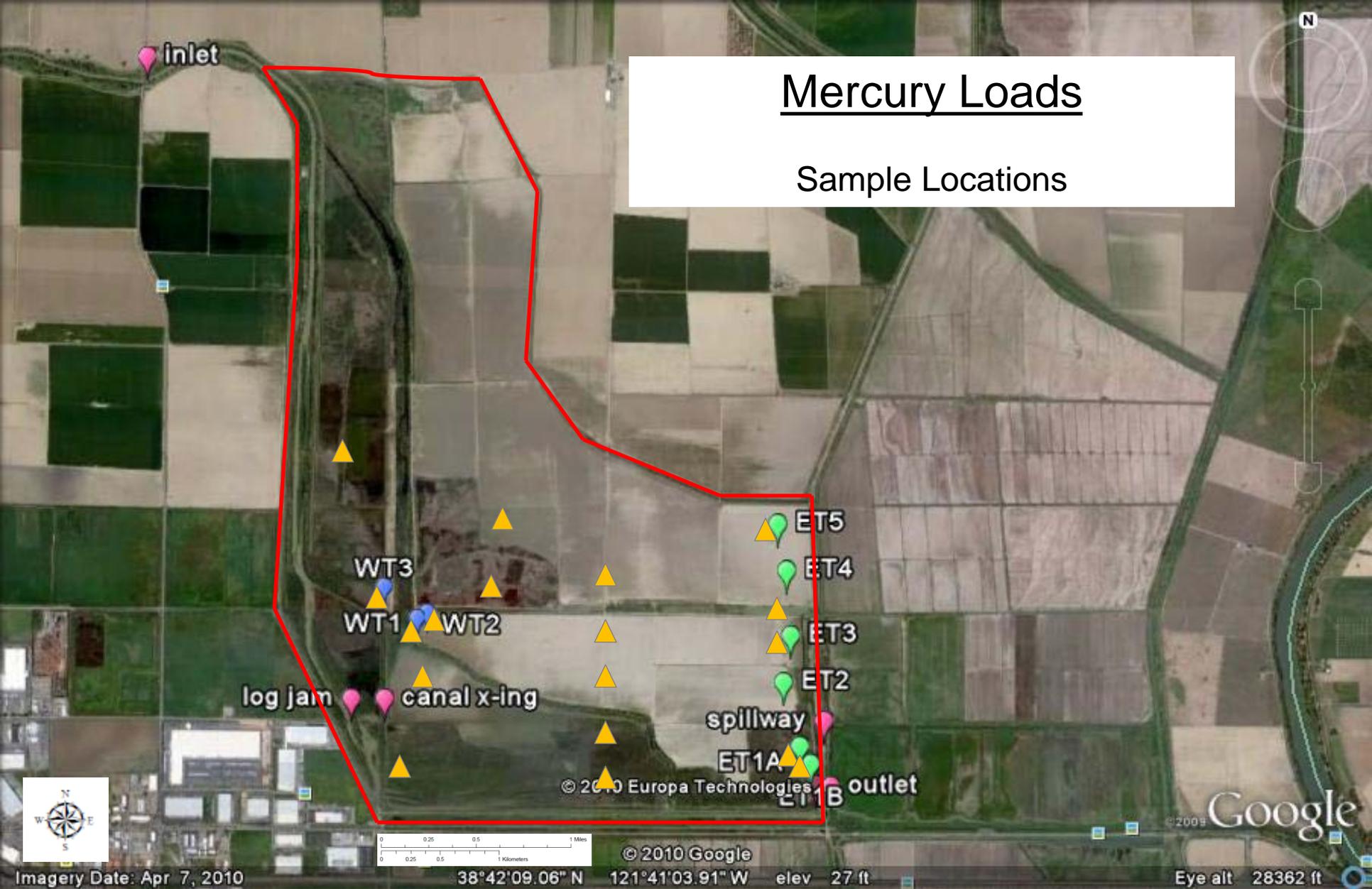
CCSB Mercury Load Determination

Project Objectives and Approach

- Determine THg, MeHg, and Hg(II)_R concentrations at the inlet and outlets of the CCSB during non-storm flow (baseline) and storm conditions over multiple water years and to compute associated loads.
- Assess the temporal and spatial variability of THg and MeHg in sediment, water, and biosentinels within the CCSB.
 - Evaluate six habitat subtypes: three agricultural and three non-agricultural (woody riparian, non-woody riparian, and open water).
 - Bird Boxes and Fish Cages
- Identify the vertical variability in THg in deep sediment cores to identify potential layers of high concentration.

Mercury Loads

Sample Locations



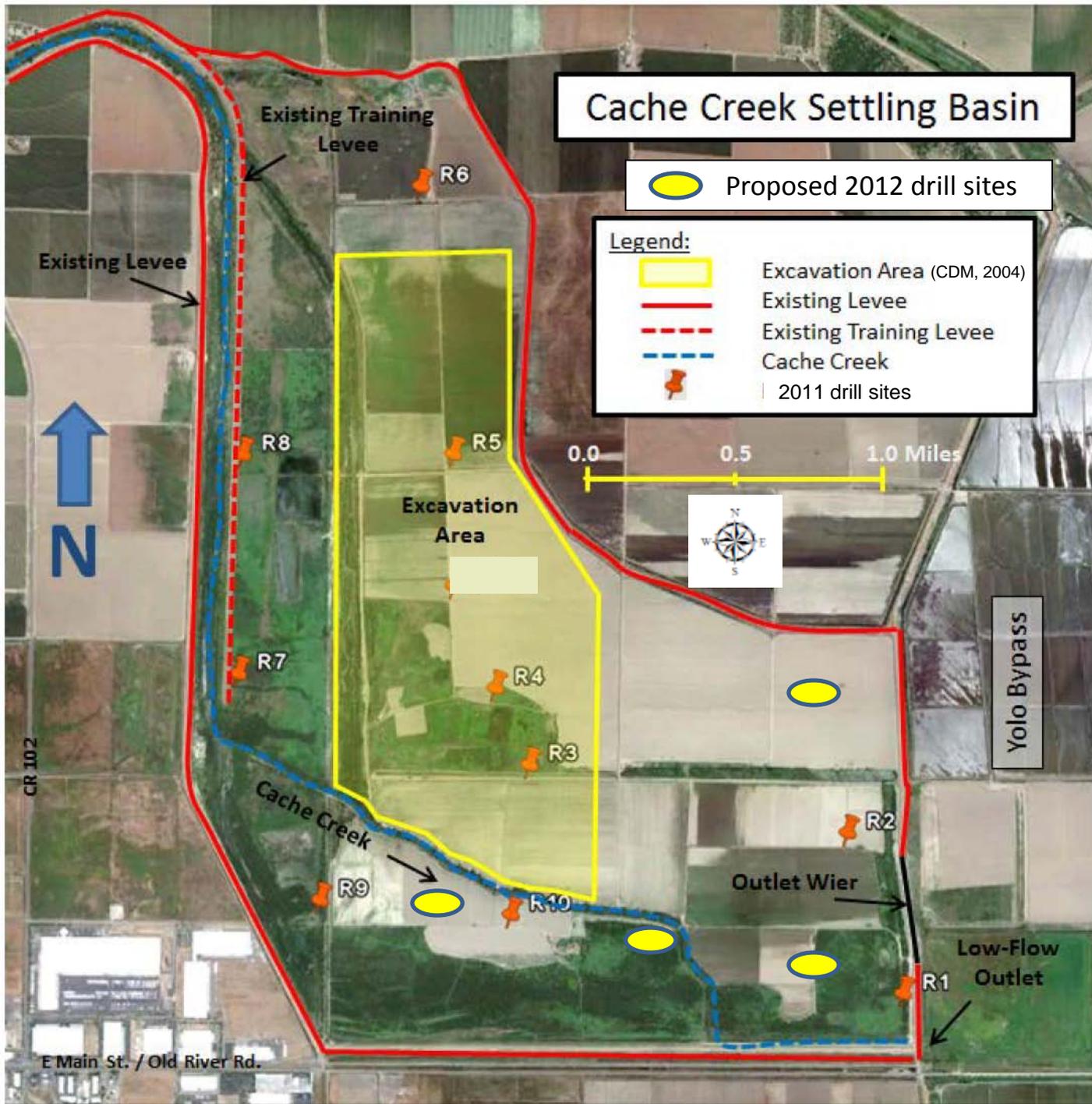
Flow, velocity, suspended sediment, and bed sediment sample locations.
Water quality and sediment chemistry samples.

Cache Creek Settling Basin

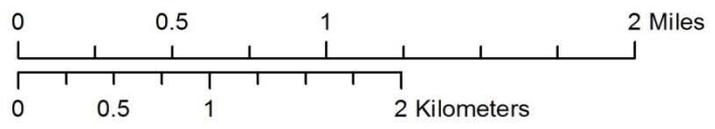
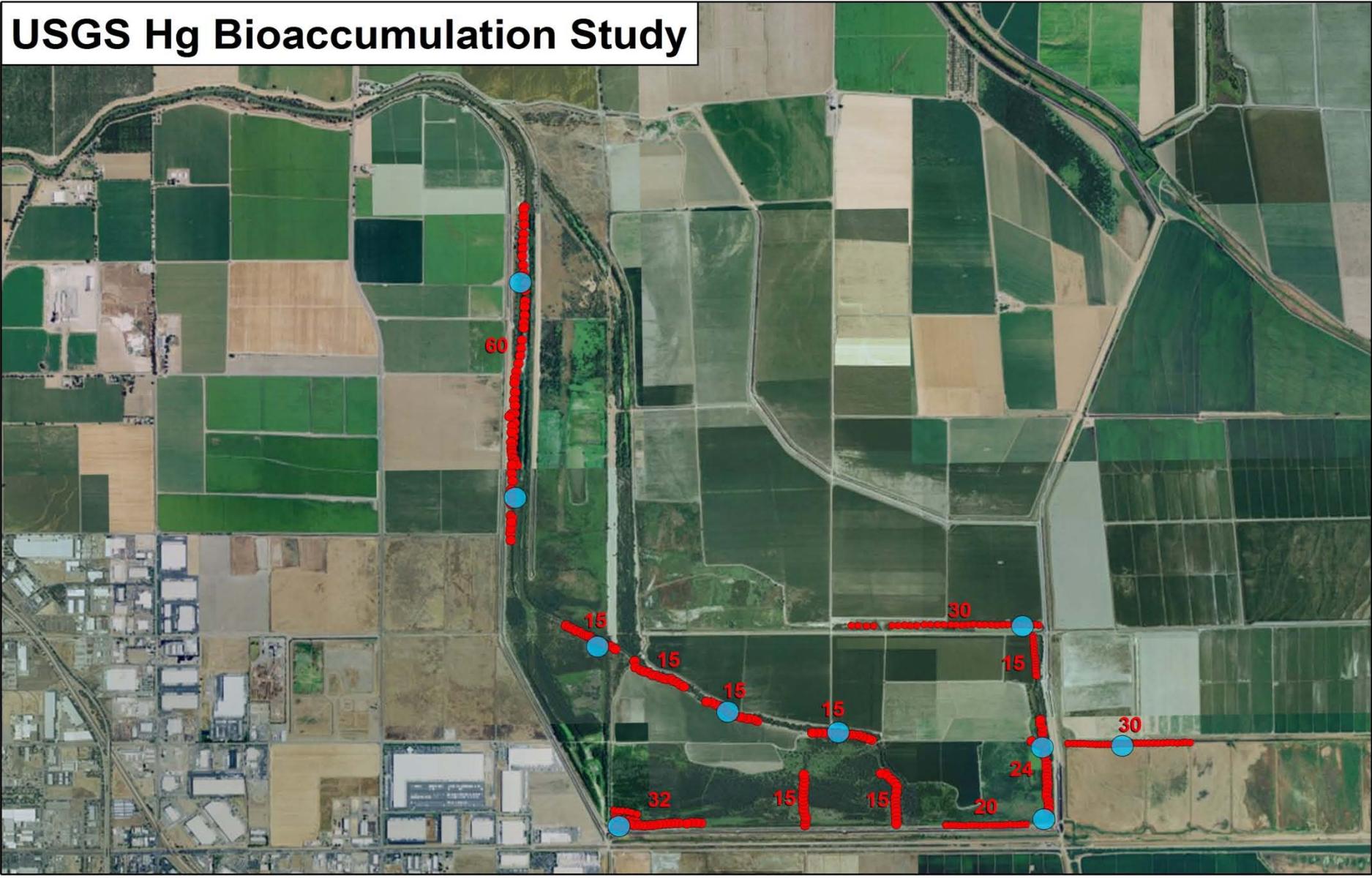
Proposed 2012 drill sites

Legend:

- Excavation Area (CDM, 2004)
- Existing Levee
- Existing Training Levee
- Cache Creek
- 2011 drill sites



USGS Hg Bioaccumulation Study

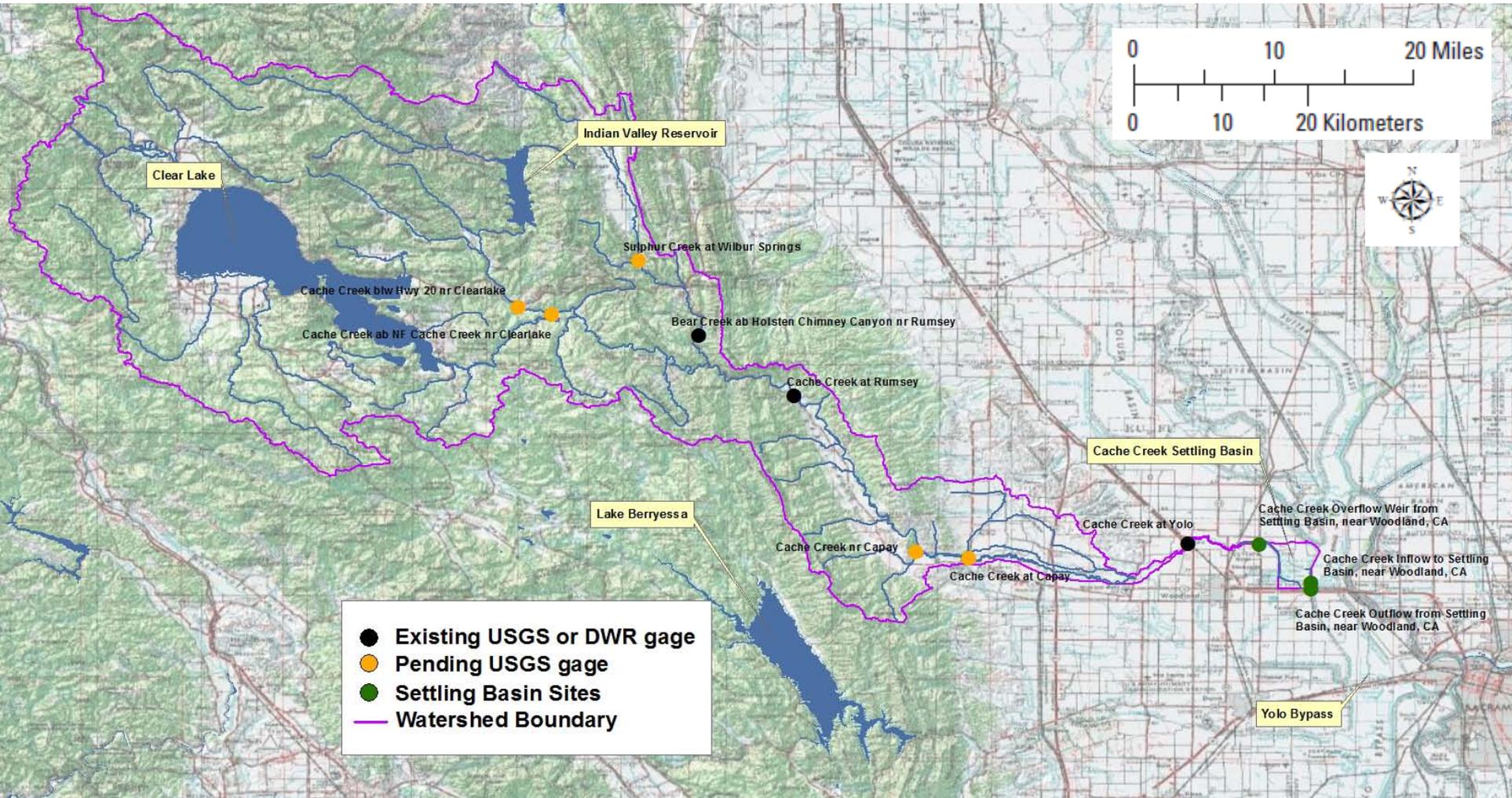


- Tree swallow nest boxes
- Fish cages





Cache Creek Watershed Study



Proposed USGS sampling stations and gage locations, WY 2013-14

Cache Creek Watershed Study

- Determine flow rates, sediment, and mercury loads within the watershed.
- Develop sediment transport model of the watershed.
- Model historical and future flow rates, sediment, and mercury budgets using:
 - **W**atershed **E**nvironmental **H**ydrology (WEHY) Modeling
 - Climate Change Modeling.

Cache Creek Watershed Study

- Modeling results will be used to develop a range of predictions of sediment loads entering the CCSB.
- Modeling is being conducted by UC Davis.
- Data collection for the models will be conducted by USGS.