

## **Mercury and Erosion Control in the Cache Creek Watershed**

### Background

In October 2005, the Central Valley Water Board amended its Water Quality Control Plan for the Sacramento River and San Joaquin River Basins (Basin Plan) to incorporate a program to control mercury in the Cache Creek watershed. One goal of the Cache Creek mercury control program is to minimize erosion of mercury-contaminated sediment due to human activities in order to protect beneficial uses in Cache Creek and to reduce loads of mercury moving downstream to the Cache Creek Settling Basin, Yolo Bypass, and eventually the Sacramento-San Joaquin Delta. The Basin Plan requires projects in the 10-year floodplain of Cache Creek to implement erosion control management practices and to monitor to ensure projects remain in compliance with Basin Plan turbidity objectives. Projects in the 10-year floodplain that may be affected by the Basin Plan amendment include but are not limited to bridge, culvert, and road construction and maintenance activities, vegetation removal, riparian plant restoration, sediment removal, and bank protection. This report outlines the methods that the Central Valley Water Board may use to identify projects that must follow the Cache Creek watershed mercury control program requirements. Project proponents may also use this report to determine whether their projects are within the 10-year floodplain.

The requirements for erosion control and compliance with the turbidity objective apply to projects conducted within the 10-year floodplains of the following: 1) Cache Creek from Harley Gulch to the Settling Basin outflow; 2) Bear Creek from tributaries draining the Rathburn and Petray Mines to the confluence with Cache Creek; 3) Sulphur Creek; and 4) Harley Gulch. All project proponents should contact the 401 Water Quality Certification Unit at the Central Valley Water Board at (916) 464-3281 regarding work within the Cache Creek channel

### 10-year Floodplain

The 10-year floodplain is the area that has a 10% chance of being inundated by a flood in any given year. Because river meandering and channel erosion change the river's topography, the boundaries of the 10-year floodplain change over time.

The Central Valley Water Board will identify projects that must follow Basin Plan requirements relating to mercury control in the Cache Creek Watershed through the project proponent's participation in the 401 Water Quality Certification Program. The Central Valley Water Board regulates activities in stream channels through this program. Authority for this program derives from the Clean Water Act Section 401 and the Porter Cologne Water Quality Control Act. Central Valley Water Board staff informs project proponents of Basin Plan requirements when proponents begin working with staff on an application for a Water Quality Certification.

Projects conducted within Cache Creek channel must be conducted under a 404 Permit, which is issued by the Army Corps of Engineers, and a 401 Water Quality Certification. For most of the length of Cache and Bear Creeks, the channel is incised and contains an active floodplain within that channel. This includes the section of lower Cache Creek within levees. Although the low flow channel may meander within the incised, broader channel, the 10-year flow is contained within the banks of the incised channel.

If project proponents need to further define the 10-year floodplain, the following methods may be used. Project proponents may use different methods to determine the 10-year floodplain depending on the available data. In most cases, stream discharge and/or stage data are available; hence, the project proponent will need to have site-specific stream cross-section data to determine the elevation above the creek bed reached by a 10-year flow.

### Within the Levee System

The lower Cache Creek flood protection system was designed to convey 10-year flood flows with three feet of freeboard (USACE, 2003). The lower Cache Creek flood protection system levees extend approximately 12 miles from the town of Yolo to the Cache Creek Settling Basin. In areas where the levees are intact and at design heights, the 10-year floodplain is defined by the water elevation three feet below the design height of the levee. If the levees are not to design specifications, project proponents should use the following methods to delineate the 10-year floodplain.

### Upstream of the Levee System

The verification of the 10-year floodplain for the Cache Creek watershed is a multi-step process that may involve computer modeling using historical river flow data, climatic characteristics, and river channel topography. For areas without the levee system or where levees are not to design specifications, project proponents should use the following steps to determine whether their project is within the 10-year floodplain;

1. Acquire historical flow records, precipitation records, and river channel and watershed topography for the project area.
2. Acquire or create hydrographs of estimated flow of the river that correspond to the 10-year flood interval, or calculate the maximum flow expected to have a 10% chance of occurring in any given year.
3. Using the site-specific cross-section data, calculate flood elevations associated with flow estimates, and determine the area of inundation by the flood stage.

The following data sources and models may be used to determine the 10-year floodplain:

1. River flow gage, precipitation gage, reservoir release, and other hydrological data can be acquired at the CA Department of Water Resources' (DWR) California Data Exchange Center (<http://cdec.water.ca.gov>) and the U.S. Geological Survey's (USGS) National Water Information System: Web Interface (<http://waterdata.usgs.gov/nwis>). Projects in close proximity to flow gages may use

flow data from the gages; however, many of the tributaries do not have flow gages. For sites without flow gages, flow hydrographs may be estimated from precipitation, which can be estimated with publicly available computer programs such as, but not limited to, the National Flood Frequency Program (NFF) developed by the USGS, and the HEC-1 model developed by the U.S. Army Corp of Engineers (USACE) Hydrologic Engineering Center.

2. The NFF is a Visual Basic program that can be used to provide simple methods to estimate peak flood discharges for ungaged (non-regulated) basins. More information on the program and its capabilities can be found at [http://water.usgs.gov/software/nff\\_summary.html](http://water.usgs.gov/software/nff_summary.html).
3. The HEC-1 program is a flood hydrograph package that simulates the precipitation-runoff process to provide estimates of flow hydrographs. More information on the program and its capabilities can be found at <http://www.hec.usace.army.mil/software/legacysoftware/hec1/hec1.htm>. The USACE has developed a HEC-1 model for the Cache Creek watershed that can estimate 10-year flood flow estimates for specific areas. Information regarding the Cache Creek HEC-1 model may be available by the USACE by contacting: [lowercachecreek@spk.usace.army.mil](mailto:lowercachecreek@spk.usace.army.mil).
4. Hydraulic models (e.g., HEC-2 & HEC-RAS) can compute the flood elevation from the flow estimates and river channel cross-sections. Other information and programs that run hydraulic models can be found at the USACE website <http://www.hec.usace.army.mil/> and the U.S. Federal Emergency Management Agency (FEMA) website [http://www.fema.gov/plan/prevent/fhm/frm\\_soft.shtm](http://www.fema.gov/plan/prevent/fhm/frm_soft.shtm).

The attached map shows the creek reaches where hydrologic data are available.

Project proponents may employ engineering/hydrological consultant firms, as necessary, to perform computer modeling based on project-specific topography information to determine their project's location with respect to the 10-year floodplain.

Cache Creek stakeholders, Yolo County, and the Cache Creek Conservancy have developed resources to guide in-channel activities, such bank stabilization and removal of invasive species. *The Landowner's Guide to Streambank Management on Cache Creek (2005)* describes necessary permitting, describes erosion control measures that have been shown to be effective in the watershed, and urges project proponents to work with local experts in resource conservation.

Other sources of information for project planners and landowners include the Resource Conservation Districts in Colusa, Lake and Yolo Counties, the Cache Creek Conservancy, and the Yolo County Division of Parks and Resources Management. Yolo County has a General Permit issued by the US Army Corps of Engineers and an accompanying 401 Water Quality Certification for the reach of Cache Creek between Capay and the upstream end of the levee. Project proponents may be able to utilize the General Permit and Certification for projects conducted within the stream channel if the Cache Creek Technical Advisory Committee (TAC) approves the project plan. The Cache Creek TAC may be contacted through the Yolo County Division of Parks and Resources Management at (530) 666-8775, 292 West Beamer Street, Woodland, CA 95695.

### References

Cache Creek Conservancy and Yolo County Dept. Planning and Public Works. 2005. Landowner's Guide to Streambank Management on Cache Creek. Available at: <http://www.yolocounty.org/prm/streambank/CC-Landowners-Guide-LR.pdf>

USACE. 2003. Lower Cache Creek, Yolo County, CA, City of Woodland and Vicinity, Draft Feasibility Report for Potential Flood Damage Reduction Project. U.S. Army Corps of Engineers, Sacramento District. March. Available at: <http://www.spk.usace.army.mil/projects/civil/lowercachecreek/feas.html>.

