

**WATERSHED ASSESSMENT STUDY PLAN
LOWER CACHE CREEK THROUGH CAPAY VALLEY**

Prepared for:

Yolo County Resource Conservation District

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1.0 INTRODUCTION

Kamman Hydrology & Engineering, Inc. (KHE) is pleased to represent the following Watershed Assessment Study Plan for completion of a hydrologic/geomorphic watershed assessment and conceptual restoration design for the Capay Valley segment of Lower Cache Creek. Preparation of the Watershed Assessment Study Plan is stipulated in the Yolo County Resource Conservation District's (RCD) Full Proposal Application to the CALFED Watershed Program, dated June 1, 2007. This Watershed Assessment Study Plan is being submitted to the RCD, project stakeholders, and the project Technical Advisory Committee (TAC) for their review and approval prior to implementation of the proposed studies.

2.0 PROJECT BACKGROUND

Cache Creek, located in Lake, Colusa and Yolo Counties, can experience large fluctuations in water flow, contributing to stream bank erosion and downstream sedimentation. The Army Corps of Engineers has estimated that approximately 33 acres of agricultural land are lost each year due to bank erosion in the Cache Creek Watershed (USACOE, 1975). The channel instability also threatens adjacent homes, and can negatively impact the riparian habitat along the creek that functions as an important wildlife corridor from the Western Coastal Range to the Yolo Bypass. Additionally, a significant proportion of mercury and methylmercury transported into the Bay-Delta originates from the Cache Creek watershed. Methylmercury is stored in floodplain soil and in-channel erosion of previously deposited mercury-laden sediment may account for up to 80% of the total mercury load in Cache Creek (Cooke and Morris, 2005).

3.0 STUDY GOALS AND OBJECTIVES

The main goal of this proposed study is to conduct a hydrologic and geomorphic assessment of the Capay Valley reach of Lower Cache Creek in order to address both the causes and the above-mentioned consequences of bank erosion. Goals the watershed assessment study include:

- a) Determine the underlying causes of channel instability;
- b) Obtain and utilize historic and current site-specific data to produce models that predict locations and future rates of erosion;
- c) Produce a ranking system to prioritize sites for stabilization and restoration;
- d) Develop restoration designs for selected sites through collaboration between the watershed assessment team, the local stakeholders group, and local entities including the County of Yolo, the Rumsey Rancheria, and the Yolo County Flood Control and Water Conservation District;
- e) Utilize the assessment process to provide a framework for the development of a watershed education program called the Yolo STREAM Project, for underserved local middle school students that will provide field-based training in the collection, interpretation and multi-media reporting of important features that describe the condition of their watershed;
- f) Integrate assessment information regarding local strategies for the reduction in erosion of mercury-laden sediment into a larger, regional perspective facilitated through the on-going collaboration of the tri-county Cache Creek Watershed Forum, and its efforts at regional vegetation management and erosion control; and

- g) Utilize the information derived from the watershed assessment to facilitate future funding and project permitting by assisting local landowners to apply for USDA, USFWS and other restoration funding and collaborating with a local community media organization to develop funding mechanisms/strategies to support environmental education.

4.0 DESIRED OUTCOMES

The desired outcomes of the proposed Watershed Assessment Study are as follows.

Restoration Planning: Since 1995, The County of Yolo as well as the USDA Natural Resource Conservation Service (NRCS) has spent millions of dollars during winter storm events to stabilize the banks of Cache Creek through its Emergency Watershed Protection (EWP) Program. A desired outcome of this study is to determine the underlying causes of channel instability in order to produce a strategy to prioritize sites for stabilization and restoration. The findings from this study are also aimed at the development of long-term solutions instead of short-term reduction in symptoms where bank protection or restoration could exacerbate erosion elsewhere. The local residents have been working together since 1996 as the Cache Creek Watershed Stakeholders Group and in 2003 released the Capay Valley Watershed Stewardship Plan that lists reducing stream bank erosion as its first goal. The Yolo County RCD has worked closely with this group and it has identified over 60 creek side parcels where the landowners are ready and willing to proceed with restoration work, and has obtained funding through the Wildlife Conservation Board to begin restoration efforts. The information provided by the proposed watershed assessment is designed to provide guidelines for restoration design of these future restoration projects and is, in fact, the missing link for their implementation. A multiple-landowner proposal for USDA Wildlife Habitat Incentive Program (WHIP) funding currently awaits approval pending completion of the geomorphic analysis we are proposing. The permitting for this project and other individual pending projects on the creek will be in place before 2008 through the 5-year Yolo County Coordinated Permit Program, which the YCRCD and NRCS have been shepherding for the past two years.

Reducing Bank Erosion: The potential benefits of stabilization and restoration will include a reduction in the severe bank erosion that has occurred over the past 30 years, reduction in the risk to property and bridges, and valuable agricultural soil. It will also improve the quality of water leaving Yolo County and entering the Bay-Delta, and the riparian habitat which forms a crucial wildlife feeding and migratory corridor for a wide variety of species. The data acquired through the assessment has several applications to lands further upstream in the watershed, where erosion is also a serious issue. The continued collaboration with the Cache Creek Watershed Forum can contribute to watershed-wide strategies of erosion control.

Contributing to Community Education: The information and expertise provided by the large-scale assessment will contribute to the development of a watershed science education and outreach program (Yolo STREAM Project) for local middle school students, to supplement their studies of earth and life sciences, and train them to produce their own environmental video documentaries. By providing students with the data and findings of this study, they will be able to contribute to an increased awareness and long-term interest in resource stewardship within the local community.

Improving Water Quality: Streambed and bank sediments of Cache Creek are a significant source of mercury and methylmercury to downstream receiving bodies of water, most notably the Bay-Delta. Erosion of mercury-laden sediment can contribute to as much as 80% of the total mercury load in Cache Creek. Beginning in 1988, the US EPA identified Cache Creek and some of its tributaries as impaired

due to mercury, and recommended that they be placed on the 303(d) list of impaired water bodies. The goals of the watershed assessment are to determine the underlying causes of channel instability, to utilize the data to produce models that predict the likely locations and future rates of erosion, and to produce a ranking system to prioritize sites for stabilization and restoration. These future stabilization and habitat restoration activities will reduce the severe bank erosion that has been occurring in the creek for at least the past 30 years, and will contribute to the improvement of the quality of water exported downstream into the Bay-Delta.

Riparian Corridor Restoration: Cache Creek is a major corridor in Yolo County linking the Coast Range with the Yolo Basin. In the Upper watershed and down through Capay Valley, the riparian area is largely intact with substantial native riparian vegetation and forest along most of the bank and bars. Through the 33-mile Capay Valley reach, the stream has no levees and has full access to its natural floodplain, giving the riparian corridor a width of up to one mile in some places, and allowing for significant and diverse wildlife habitat. This is threatened by severe stream bank erosion and the encroachment of tamarisk and arundo, as they colonize point bars and eroded sites, out-competing more wildlife-friendly native species for newly exposed or deposited soil and water. The YCRCD has received funding from the Wildlife Conservation Board to initiate tamarisk and arundo removal in the creek corridor. However, they lack adequate geomorphic information to initiate associated bank protection projects along the creek, and acknowledge the need for a geomorphic assessment. The information developed from this study will guide appropriate habitat restoration to enhance the ability of the Cache Creek riparian zone to function as a major wildlife corridor.

5.0 GENERAL STUDY APPROACH

The watershed assessment will evaluate and attempt to quantify changes in hydrologic and geomorphic conditions in response to historical changes in land-use and water development (e.g., diversions, reservoir construction, groundwater pumping, etc.) as well as identify existing spatial and temporal conditions that are trending towards or away from geomorphic equilibrium. This assessment will also evaluate and quantify how historic human-induced changes in hydrologic/geomorphic conditions affect riparian ecology in terms of the lost or altered floodplain area, character (e.g., duration/depth of surface and groundwater saturation) and inundation frequency. A key product of this assessment will be to distinguish between “natural” and “accelerated” bank erosion, and to identify the underlying causes (both natural and anthropogenic) so that appropriate solutions can be developed.

The table on the following page summarizes the interrelationship between the types of ecological and stressor indicators that will be described/quantified under the proposed assessment, the specific measurements and data used to describe and quantify these indicators, and how these indicators interact and influence the main ecological attributes being addressed by this investigation.

In terms of restoration planning, the Watershed Assessment Study Plan will produce the following benefits: a) it will provide a strategic project framework, so that limited restoration funds are efficiently prioritized and focused where it is most needed and sustainable; and b) it will increase the durability and cost-effectiveness of the individual plans by increasing the system’s stability and resiliency over a determined range of floods. The information provided from this assessment will help synthesize and build on information previously collected by the Army Corps of Engineers, RWQCB and others, and will contribute to public and private stakeholders’ future ability to pursue or leverage funds for and conduct stabilization, restoration and water quality improvement projects along the creek.

ECOLOGICAL ATTRIBUTE	ECOLOGICAL INDICATORS	ECOLOGICAL STRESSORS	MEASURES
<ul style="list-style-type: none"> • Hydrology/Geomorphology (FOCUS) 	<ul style="list-style-type: none"> • Existing and historic surface water flow rates (flood flow magnitude and frequency and baseflow rates) • Existing and historic groundwater level conditions and surface water interaction • Flow hydraulics (velocity, shear stress, capacity) • Sediment transport capacity vs. supply • Channel morphology and stability • Channel-Floodplain connectedness 	<ul style="list-style-type: none"> • Basin surface water development • Basin groundwater development • Encroachment into floodplain/creek corridor (loss of flood storage and riparian vegetation) • Urbanization • Instream structures (e.g., bridges; water diversions) 	<ul style="list-style-type: none"> • Aerial photographs and land-use maps • Topography and geology maps • Diversion records • Reservoir data • Groundwater withdrawal data • Channel grain-size measurements • Channel cross-sectional and longitudinal profiles • Vegetation and wetland delineation maps • Reference reach variables • Sediment supply and transport measurements
<ul style="list-style-type: none"> • Landscape Condition 	<ul style="list-style-type: none"> • Historic land use change • Riparian corridor type and distribution 	<ul style="list-style-type: none"> • Land use change in upper watershed • Urbanization 	<ul style="list-style-type: none"> • Aerial photographs and land-use maps • Topography and geology maps • Vegetation and wetland delineation maps • Reference reach variables
<ul style="list-style-type: none"> • Chemical and Physical Characteristics 	<ul style="list-style-type: none"> • Sediment transport capacity vs. supply • Soil Mercury concentrations • General physical water quality parameters (esp. temperature) 	<ul style="list-style-type: none"> • Mining (gold and gravel) 	<ul style="list-style-type: none"> • Soil and water quality data • Sediment supply and transport measurements
<ul style="list-style-type: none"> • Natural Disturbance Regimes 	<ul style="list-style-type: none"> • Existing and historic flood flows • Channel-Floodplain connectedness 	<ul style="list-style-type: none"> • Vegetation/habitat conversion 	<ul style="list-style-type: none"> • Topography and geology maps • Reference reach variables

6.0 PROPOSED SCOPE OF WORK

The proposed Scope of Work to complete the Watershed Assessment Study Plan is presented below.

Task 1: Hydrologic and Geomorphic Watershed Assessment, Part I: Environmental Condition Assessments

The main objective of this task is to collect, compile, and synthesize available data in order to describe the physical watershed characteristics and dominant processes controlling: creek channel form, stability, plan-form evolution and trends, surface/ground water interaction, and associated ecological function. Information gained will be used to determine potential evolutionary trends in the creek corridor geomorphology and stability.

Subtask 1.1: Watershed Description and Classification

- a) Compile spatial data base in GIS and map watershed characteristics. Stream channel forms and processes in the Capay Valley are reflective of a set of independent watershed controls: climate, geology, physiography, vegetation, soils, and land use. Description of how these controls vary spatially and temporally is an important step in identifying the dominant geomorphic processes affecting the stream channel at any given location.
- b) Research and quantify land use history. Land use changes can alter the hydrologic characteristics of a watershed by impairing the infiltration of precipitation, accelerating the flow of surface runoff, and as a result, accelerating rates and magnitudes of hill slope and stream bank erosion. Contemporary land cover and land use patterns will be quantified from existing USGS databases. Historical sources of land cover and land use data will be compiled for comparison.
- c) Compile and analyze digital records of hydrologic data. Existing data (Mean daily and monthly discharge values; annual peak discharge values) will be compiled for stations operated by the USGS and the CA DWR. These data will be evaluated to describe seasonal and inter-annual variability of flow and temporal trends to determine the hydrologic response to environmental changes in the watershed during the period record.
- d) Research and document a water development history in order to describe and semi-quantify how these changes have impacted creek hydrology. Information that we will attempt to assemble and analyze include: flow and water diversion operation records; land use practices in terms of water development history (both surface water and groundwater); and available historical groundwater level data.
- e) Collect, compile, and synthesize available geomorphic data. Information from previous investigations of geomorphic processes in the Cache Creek watershed will provide metrics of baseline conditions for comparison to data collected at field reference sites in 2008.
- f) Obtain, review, and analyze aerial imagery. A temporal series of aerial images will be analyzed to evaluate changes in stream channel width and sinuosity as well as changes in the extent of riparian vegetation and floodplain conditions.
- g) Conduct interviews with long-term residents. Qualitative observations of hydrologic and geomorphic change to the Cache Creek riparian corridor from long-term residents will contribute to the understanding of the physical response to watershed changes in recent decades.

- h) Review of previous technical investigation reports. A preliminary list of documents to be reviewed is included as Appendix A.

Subtask 1.2: Field Investigations

Implement field data collection programs to characterize existing creek corridor conditions, make comparisons to historic data, and provide input for additional analyses of hydrologic and geomorphic processes.

- a) Resurvey of cross-sectional profiles. Cross-sections were surveyed in and monumented in 1984 at 49 sites in the Capay Valley for USGS Water Resource Investigations Report 88-4188 and as part of the Simon's and Li 1987 study. If the monuments can be relocated, an additional survey of these cross-sections will allow for a comparison of channel changes during the period 1984-2008.
- b) Establish six to ten reference sites for further investigation of longitudinal profiles, bed material distributions, channel morphology and bank erosion rates.
- c) Field reconnaissance, description, and classification of stream bank erosion. Reconnaissance will include photography and GPS location of selected stream banks in order to present a broad scale summary of bank erosion and channel migration processes in the study area.

Deliverable: Selected Sections of a Technical Watershed Assessment and Conceptual Restoration Design Report and presentations summarizing interrelationship between changes in historic land use, hydrology, channel geomorphology, and riparian corridor conditions. The report will integrate the information and findings from this Task to provide a clear description of the dominant hydrologic and geomorphic processes at work in the watershed and a conceptual model of how the creek system reacts to anthropogenic changes.

Task 2: Hydrologic and Geomorphic Watershed Assessment, Part II: Empirical and Analytical Stability Assessments

This Task includes time and materials to complete a suite of independent technical analyses to identify areas and magnitude of channel stability problems.

- a) Investigation of at-a-station hydraulic geometry relations (channel width, depth, and area vs. discharge). These data will be quantitatively compared to similar relations for known areas of stable geometry both within the project area and other streams in the region. Such comparison of known stable relationships can further guide the assessment process and assist in the differentiation between “accelerated” bank erosion and erosion associated with “natural” channel migration.
- b) Calculation of hydraulic parameters such as velocity, shear stress, and stream power for a range of natural discharges. These parameters will be calculated using analytical solutions and/or numerical models in order to quantify the hydraulic properties of different channel configurations. Results will be used as input to the sediment budget investigation (Subtask 2c) and to improve our understanding of bank erosion and channel migration processes of Cache Creek.

- c) Sediment budget investigation. At the least, we will be able to calculate stream capacity and competence for specific study reaches. If sufficient information and data is unearthed during our background investigation work, we will attempt to estimate sediment inputs, outputs, and sediment storage. Such information will be incorporated into an estimate of mercury loadings from the project area (Subtask 2d).
- d) Synthesize existing information regarding the mass loadings of mercury that originate from the project area to the downstream watershed. No new soil or water testing for mercury is proposed for this study. Instead, the assessment will rely on the comprehensive data and soil/water mercury loading information and estimates presented in the RWQCB's Basin Plan Amendment reports.
- e) Map the distribution and extent of floodplain that is both connected and disconnected to the channel in terms of natural and healthy frequency and duration of flooding.

Deliverable: Selected Sections of Technical Watershed Assessment and Conceptual Restoration Design Report and presentations summarizing results of stability assessments and conceptual understanding that explains the historic, existing, and future evolution of the creek corridor within the study reach.

Task 3: Development of Conceptual Restoration Designs

This task includes time and materials to develop hydraulic- and geomorphic-based conceptual channel stability and riparian corridor restoration designs that address identified adverse impacts associated with existing conditions. Ideally, typical restoration approaches and designs will be developed that may be applied throughout the 33-mile creek corridor along reaches exhibiting similar conditions and experiencing similar impacts/disturbance. Working closely with RCD and TAC staff, we will identify, rank and prioritize sites according to their feasibility and cost for restoration. In a broader context, we will also provide recommendations for watershed-wide best management practices that will reduce stressors on the Creek corridor. We will work closely with RCD staff ecologists and restoration planners to integrate these concepts with on-going or planned non-native vegetation removal and native replanting projects. Although currently not a primary objective of this project, the needs and importance for improving fishery habitat will be discussed with the TAC and evaluation criteria developed, as needed, during implementation of the assessment.

Deliverable: Selected Sections of Technical Watershed Assessment and Conceptual Restoration Design Report presenting proposed restoration approaches using text, schematics, figures, and maps. This report will provide sufficient detail and variety of design approaches to satisfy CEQA/NEPA environmental compliance needs, initiate permitting for specific projects and guide design-build-type construction.

Task 4: Technical Watershed Assessment and Conceptual Restoration Design Report

This report will present findings and recommendations from the watershed assessment and proposed conceptual restoration alternative designs. This report is intended to document and provide the technical support/rationale behind proposed conceptual restoration designs. As such, this report will document the necessary details and rationale for how proposed conceptual designs will achieve project goals and objectives. In addition, the report will discuss potential impacts from project activities to the surrounding environment as required by CEQA/NEPA. The report will also serve as the medium for presentation of the analysis methods, findings, and recommendations developed through completion of channel stability assessment tasks.

Deliverable: A draft of the Report will be provided after 16-months of study and assessment. Four sets of all draft documents, including plans, report, drawings, and conceptual construction cost estimates, shall be included in the draft submittal. A final Report will be generated one (1) month after a comprehensive set of review comments are received. The final submission will address all comments. If there are significant comments

requiring changes to alternative designs, it may be necessary to prepare a stand-alone memorandum including a comprehensive list of comments and revisions incorporated between draft and final versions. Final drawings will be on 11x17-inches. Digital versions of all drawings and documents will be submitted as part of the final product, with all drawings being provided in ArcView GIS or AutoCad formats. Documents will be submitted in a word compatible format, and drawings also submitted as JPG files for potential use in presentations.

Task 5: Meetings and Educational/Public Outreach

This task includes time for the technical watershed assessment team to prepare for and provide presentations at a variety of stakeholder/public/TAC meetings and assist with educational components of the project, including: up to four (4) Public/Stakeholder meetings; and three (3) Adaptive Management/TAC meetings.

An important objective of the watershed assessment is to provide earth- and life-science educational opportunities to local area students within their own community and watershed. Partnering with Center for Land-based Learning staff, and pursuant to California Science Content Standards, we will ensure that the watershed assessment provides students with the opportunity to measure/monitor relevant physical and ecological parameters in order to better understand the linkages within and between physical and biological sciences. We understand that it will be important that student activities provide meaningful baseline data that they can compare and contrast on their own and that can be replicated easily from year-to-year by future visiting students. Therefore, this task also includes time to assist in preparing curriculum and exercises for the Community Science program; and annual field trips (total of two years) to lead and conduct Community Science program field exercises. In addition, this task includes time and materials for maintaining regular communications and coordination with RCD staff regarding project activities.

7.0 STUDY ADAPTIVE MANAGMENT

Adaptive Management and the opportunity for evaluating project performance during implementation of the watershed assessment will be provided at the project mile-stone meetings where study findings and proposed next steps will be presented to the RCD, Stakeholders, and TAC representatives. The basic TAC will consist of independent experts from the Yolo RCD, USDA, NRCS, BLM, RWQCB, UC Davis, CDFG, private environmental consultants and representatives from the County of Yolo, the Yolo County Flood Control and Water Conservation District, the Cache Creek Watershed Stakeholders Group and Rumsey Rancheria.

The project mile-stone meetings will provide the RCD, Stakeholders and TAC with the opportunity to provide comment and recommendations for redirecting study components as deemed necessary. TAC recommendations will be incorporated into subsequent project steps. Meetings will be held at the following project mile-stones:

- I. At the 50-percent complete stage of Tasks 1 and 2, the Watershed Assessment Team will present preliminary findings, data gaps, and proposed modifications to the study plan, if deemed necessary.

- II. At the 100-percent complete stage of Tasks 1 and 2, the Watershed Assessment Team will present findings of the study to-date and discuss the identified opportunities and constraints for project alternatives to be developed under Task 3.

III. At the 50-percent complete stage of Task 3, the Watershed Assessment Team will present preliminary project alternative conceptual designs for discussion and refinement.

IV. At the 100-percent complete stage of Task 3, the Watershed Assessment Team will present final project alternative conceptual designs for discussion and propose preferred project alternatives, if appropriate at that time.

V. The completion and submittal of the Draft Technical Watershed Assessment and Conceptual Restoration Design Report will provide the RCD, Stakeholders and TAC with a final opportunity to comment on project findings and recommended project designs

8.0 PROPOSED SCHEDULE

A schedule to implement the Watershed Assessment Study Plan is provided as Figure 1.

9.0 COST ESTIMATE

Table 1 presents the study cost estimate contained in the Yolo County Resource Conservation District's (RCD) Full Proposal Application to the CALFED Watershed Program, dated June 1, 2007.

**FIGURE 1:
PROPOSED SCHEDULE**

**Watershed Assessment Study Plan
Cache Creek through Capay Valley**

(Time from date of authorization to proceed)

Task Descriptions	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	Month 13	Month 14	Month 15	Month 16	Month 17	Month 18
Task 1: Hydrologic & Geomorphic Watershed Assessment																		
<i>Subtask 1.1: Historical Data Analysis</i>						*1.												
<i>Subtask 1.2: Field Investigations</i>																		
Task 2: Empirical and Analytical Stability Assessments										*2.								
Task 3: Development/Assessment of Conceptual Alternatives												*3.						
Task 4: Technical Assessment and Conceptual Restoration Design Rpt.																		
- <i>Draft Report</i>																*4.		
- <i>Final Report</i>																		*5.
Task 5: Project and Public Meetings (in addition to Task 3)																		

* (MILESTONES):

1. Presentation of Findings to Stakeholders/Public
2. Presentation of Findings to Stakeholders/Public
3. Presentation of Preliminary Conceptual Restoration Alternatives to Stakeholders/Public
4. Presentation of Final Conceptual Restoration Alternatives to Stakeholders/Public
5. Release of Final Technical Assessment and Conceptual Restoration Design Report

Appendix A. Preliminary list of technical investigative reports to be reviewed in conjunction with the hydrologic and geomorphic watershed assessment.

Conservation, Restoration, and Resource Management

NHC, 1995, Cache Creek Streamway Study, *Technical Studies and Recommendations for the Lower Cache Creek Resource Management Plan*, prepared for the Yolo County Community Development Agency, October.
U.S. Army Corps of Engineers. 1995. Reconnaissance report: Cache Creek environmental restoration, California.
U.S. Fish and Wildlife Service. 1995. Draft Cache Creek environmental restoration study.
Yolo County Community Development Agency. 1996. Cache Creek resources management plan for lower Cache Creek.
Yolo County Resource Conservation District, 2002, Capay Valley Conservation and Restoration Manual.

Geomorphology

Harmon, Jerry G., 1989, Streamflow, Sediment Discharge, and Streambank Erosion in Cache Creek, Yolo County, California, 1953-86, U.S. Geological Survey Water Resources Investigations Report 88-4188.
Lustig, Lawrence K., and Busch, Robert D., 1967, Sediment Transport in Cache Creek Drainage Basin in the Coast Ranges West of Sacramento, California, Geological Survey Professional Paper 562-A.
Simons, Li, & Associates, 1987, Geomorphic Analysis of Cache Creek Between Rumsey and Madison, Yolo County, California, Prepared for the U.S. Army Corps of Engineers.

Irrigation, Flood Control, and Water Development

California Department of Water Resources, 1961, *Clear Lake-Cache Creek Basin Investigation*: Bulletin 90.
California Department of Water Resources, 1965, *Land and water use in Putah-Cache Creeks Hydrographic Unit*: Bulletin 94-13.
Chandler, A., 1901, *Water Storage in Cache Creek, California*: U.S. Geological Survey Water-Supply Paper 45.
Wilson, J., circa 1902, Irrigation investigations on Cache Creek: U.S. Department of Agriculture, Office of Experiment Stations, Report to Irrigation Investigations in California, Bulletin 100.
U.S. Army Corps of Engineers, 1975, Investigation for Flood Control and Related Purposes, Cache Creek Basin, California: U.S. Army Corps of Engineers.
U.S. Army Corps of Engineers, 1994, Reconnaissance Report, Westside Tributaries to Yolo Bypass, California, June.

Water Quality

Cooke, J. and Morris, P., 2005, Amendments to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control of Mercury in Cache Creek, Bear Creek, Sulpher Creek, and Harley Gulch, Staff Report, Regional Water Quality Control Board, Central Valley Region.
Domagalski, J., Slotten, D., Alpers, C., Suchanek, R., Bloom, N., Ayers, S., and Clinkenbeard, J., 2004, Summary of Mercury Studies in the Cache Creek Watershed, California, 2000-2001, U.S. Geological Survey Water-Resources Investigations Report 03-4335.
Domagalski, J., Alpers, C., Slotten, D., Suchanek, and Ayers, S., 2004, Mercury and Methylmercury Concentrations and Loads in the Cache Creek Watershed, California, *Science of the Total Environment* 327: 215-237.
Foe, C., and Coyle, W., 1999, Mercury Concentrations and Loads from the Sacramento River and from Cache Creek to the Sacramento-San Joaquin Delta Estuary, California: Water Quality Control Board, Central Valley Region, Sacramento, California.
Sorenson, S. and Elliott, A., 1981, *Water-Quality Assessment of Cache Creek, Yolo, Lake, and Colusa Counties, California*, U.S. Geological Survey Water-Resources Investigations Open-File Report 81-677, Prepared in cooperation with the California State Water Resources Control Board.