

FLOOD PROTECTION PROJECTS & THEIR REGULATORY PROCESS: **CASE STUDY**

Lower Walnut Creek De-Authorization Process



San Francisco Bay
Conservation & Development
Commission



A PRODUCT OF FLOOD CONTROL 2.0

FLOOD CONTROL **2.0**



The Selective De-Authorization of Lower Walnut Creek

Flood Control 2.0 - Flood Protection Project Case Study
San Francisco Bay Conservation and Development Commission

November 2016

Updated January 2017

*Cover Design: San Francisco Estuary Institute
Cover Photos: Adrien Baudrimont*

Table of Contents

| | | |
|-------|----------------------------------|----|
| I. | Introduction | 4 |
| II. | Channel History..... | 5 |
| III. | USACE Levee Requirements..... | 8 |
| IV. | The End of an Era | 9 |
| V. | Selective De-Authorization | 11 |
| VI. | Looking Forward | 11 |
| VII. | Conclusion..... | 12 |
| VIII. | Who We Are..... | 12 |
| | Sources and References..... | 13 |

I. Introduction

The U.S. Army Corps of Engineers (USACE) has a long history with national flood protection and through the Flood Control Act of 1936 plays an important role in flood control projects. Not only does USACE construct federal flood protection projects, it also partners with local sponsors in building, improving or expanding their systems, bringing them into the federal fold. Authorized to help with flood damages, USACE provides technical manuals for operations and maintenance, as well as disaster preparedness. USACE also assists the local sponsors of non-federal flood control systems of all sizes throughout the country in the form of guidance on the proper operations and maintenance of the systems. USACE can help these local sponsors before, during and after a flood; and more importantly can explain the minimum standards necessary for non-federal projects to remain eligible for USACE rehabilitation services post-flood.

In 2003 Contra Costa County Flood Control and Water Conservation District (CCCFCD) began a process that would take them from a partnership with USACE of over 50 years involving 22 miles of flood control channels, to regaining control of one of the system's channels that was particularly difficult to manage under their agreement. This process generated numerous scientific studies, hydraulic modeling, land and biological surveys, coordination and cooperation with state and federal resources agencies and two branches of USACE. It resulted in requesting and obtaining specific authorizations from Congress to selectively de-authorize the USACE's flood control program for lower Walnut and Pacheco Creeks. The story of Lower Walnut Creek is one of creativity and ability to find opportunities under challenging circumstances. CCCFCD had to find a way to manage and maintain lower Walnut Creek channel differently than the rest of the system while still retaining the appropriate level of flood protection. It also had to maintain its ability to pass USACE inspections while minimizing environmental impacts on sensitive habitat and preventing the channel's physical differences and challenges from rendering the rest of the system ineligible for federal flood protection funding.

Walnut Creek Channel is located in the north, central portion of Contra Costa County along the southern shore of Suisun Bay and drains a watershed of over 146 square miles. This watershed includes the many creeks that drain Concord, Walnut Creek, Pleasant Hill, Lafayette, Alamo, Danville, and portions of Martinez, Moraga and San Ramon. The majority of Walnut Creek is not tidally influenced and has both earthen and concrete lined channels, as do some of its tributaries. The subject of this case study, the lowest reach of Walnut Creek, is a 2.5-mile long channel from the Burlington Northern Santa Fe (BNSF) railroad to Suisun Bay, as well as the lowest 1.5-miles of adjoining Pacheco Creek, both of which are tidally influenced (CCCFCD, July 2007). These sections of lower Walnut and Pacheco creeks are wide, flat, shallow, earthen channels with thickly vegetated banks providing habitat for several protected species (salt marsh harvest mouse, Ridgway's rail, and California black rail). These lower channels are surrounded by mostly undeveloped land and various land uses: highways, railroads, landfills, the Tesoro oil refinery, the Central Contra Costa Sanitary District water treatment plant and the Pacheco Marsh.

II. Channel History

1950s and 1960s

After World War II, central Contra Costa County, like many areas, experienced tremendous suburban residential growth in low-lying areas that historically served as floodplains. As part of this trend, in the 1940s and 1950s, landowners adjacent to lower Walnut Creek channelized and realigned this part of the creek to better contain stormwaters and to reclaim marshlands for agricultural and industrial uses. Large rainstorms in 1955 and 1958 resulted in widespread damage and the newly formed CCCFCD requested federal assistance from USACE. The USACE Walnut Creek project began construction in 1964 and enlarged and deepened these channels and constructed levees.

CCCFCD and USACE entered into a standard operations and maintenance agreement under which USACE primarily constructed the flood control channels and CCCFCD, as the local sponsor, would own and maintain the channels in perpetuity to USACE standards. The Lower Walnut Creek Channel design was informed by a 1961 U.S. Geological Survey (USGS) report titled *Fluvial Sediments Transported by Streams Tributary to San Francisco Bay Area*. In 1964, the USACE constructed the first phase of the project: a flat-bottomed earth-lined channel, approximately 400-foot wide and designed to carry the flows of a 100-yr storm event (1% chance). This most downstream 5-mile phase, from Walnut Creek's mouth to the confluence of Grayson Creek, ultimately expanded to 22 miles on the creek's main stem and its tributaries. Once complete, the CCCFCD expected to take responsibility for the channel and manage it per USACE's Operation and Maintenance Manual (OMM) for the Walnut Creek project (CCFCD, 2007).

1970s

When they entered into agreement with USACE, CCCFCD understood that, based on the USGS study the lower Walnut Creek channel would require minimal dredging (36,000 cy per year) and that costs to maintain the channel would be in the range of \$16,000 (1962 dollars) annually for "clearing, snagging, and removal of deposits" of the lower reach (USACE, 1973). Once built, it was quickly apparent that the sedimentation rates for the lower portion of the Walnut Creek channel were highly under-estimated, as was the cost to maintain the channel. CCCFCD was very concerned about the project's functionality and maintenance and would not accept responsibility for the highly accretive new channel.

In 1972, at the request of CCCFCD and USACE, USGS produced a second study on the sedimentation of the Lower Walnut Creek channel which found that between 1965-1970 the stream flows and sediment discharge were higher than average, that the sediment accreted more rapidly in the channel after a dredge event and that the shoaling slowed as the sediment levels in the channel reached an equilibrium. The 1972 USGS findings indicated that not only were the sedimentation rates higher than previously thought but the stream flows, sediment trap efficiency, and sediment discharge were also higher. The new study results estimated that the annual volume of depositions in the channel was approximately 160,000 cy as opposed to the 1961 USGS study's estimate of annual volume of 36,000 cy (USACE, 1973). In response to the USGS analysis, USACE concurred that the deposition in the channel was higher than expected and

proposed to perform a one-time dredge operation to restore capacity to the new channel. Because of the extraordinary nature of this unforeseen dredging, USACE applied a one-time cost-sharing of 2/3 local sponsor and 1/3 federal, to the project (USACE, 1973). In 1973 USACE's contractor dredged 850,000 cubic yards (cy) from the Lower Walnut Creek channel including parts of Pacheco Creek (CCCFCD, 2007), bringing the channels back to design depth ranging from -6 ft NAVD88 to 3.5 ft NAVD88 (CCFCD, 2011).

During this same period, several environmental laws were passed at the state and federal level, including the Clean Water Act (federal and state), the Endangered Species Act (federal and state), and the McAteer Petris Act and the Porter Cologne Act. These laws required permits for activities that affected Waters of the State, Waters of the United States, San Francisco Bay and its marshes specifically, and listed and fully protected species. Because flood protection projects occur in riparian and wetland areas, which are habitat for many species, and also have potential impacts to water quality, these new laws required additional permitting and further protections.

1980s

In the 1980's CCCFCD developed a proposed project to dredge lower Walnut Creek but found the project to have significant engineering and permitting challenges. Based on the previous dredging, it was understood that the lower channel would accrete very quickly after being de-silted and slowed as sediment levels reached equilibrium. In order to be consistent with the OMM, CCCFCD would be required to dredge the channel more frequently, and remove all of the vegetation in and along the channel. In preparation for the previous dredge event in 1973, USACE had been in contact with resources agencies including California Department of Fish and Game (now Wildlife), Regional Water Quality Control Board, and the Environmental Protection Agency Region IX, to coordinate plan reviews for anticipated future channel dredging (USACE, 1973). Due to the issuance of new environmental laws, the regulatory setting had changed significantly. Consequently, CCCFCD encountered new requirements as they sought authorization for the channel dredging and levee work. CCCFCD found it very difficult to obtain regulatory permits for the proposed work as the regulatory and resources agencies would no longer allow removal of sensitive habitat without requiring extensive and expensive minimization measures and mitigation for the impacted species. CCCFCD realized that they could not meet the OMM requirements for the lower channel and at the same time meet those of the regulators protecting listed and protected species. CCCFCD eventually postponed the dredging project and continued to work with USACE to find a feasible and more sustainable solution for maintaining lower Walnut Creek.



1990s

By the early 1990s, the banks of Lower Walnut Creek channel had grown thick with vegetation and CCCFCD estimated that 650,000 cy of sediment had accreted in the area dredged by USACE in 1973. In order to uphold their maintenance agreement with USACE, CCCFCD once again began the permitting process to bring the channel into compliance with their OMM. The OMM specifications included dredging the channel back to original elevations; removal of all vegetation in and along the channel and maintenance of levees. After spending \$1 million on engineering studies as well as directing numerous resources to obtain regulatory permits, CCCFCD concluded that the dredging and levee work was once again not likely to be authorized based on the significant environmental impacts that would result from adhering to USACE requirements. Specifically, the vegetation that had developed along and in the channel was now recognized as high ecological value habitat for salt marsh harvest mouse, Ridgway's rail and California black rail. California Department of Fish and Wildlife (CDFW) lists these species as "fully protected" and would not allow their "take" in any form, including their relocation (CCCFCD, 2007). Therefore CDFW would not allow their habitat to be removed. There was no evident path forward.

It is important to note that although the work associated with maintaining the flood control capacity in the lower channel was stalled, other dredging was being conducted in the Walnut Creek channel. During the 1990s the Tesoro oil refinery performed dredging in the lower, tidally-influenced portion of the creek, downstream of Union Pacific railroad to bring in equipment barges and launch their spill boat (P. Detjens 2009). Per their agreement to maintain the upper Walnut Creek channel as directed by the OMM, CCCFCD successfully de-silted the non-tidal portions of the channel with excavators and trucks, removing approximately 270,000 cy of sediment between 1986 and 1989, 76,000 cy in the early 1990s and 25,500 cy in 2006.

Listed Species: A species, subspecies, or distinct vertebrate population segment that has been added to the Federal lists of Endangered and Threatened Wildlife and Plants. Their protection is regulated by U.S. Department of Fish & Wildlife.

Fully Protected Species: The fish, amphibians/reptiles, birds and mammals considered by the state to be rare or facing possible extinction and requiring additional protection. Most fully protected species are also listed as threatened or endangered under the more recent endangered species laws and regulations. Fully Protected species may not be taken or possessed at any time and no licenses or permits may be issued for their take. California Department of Fish and Wildlife regulates their protection.

2000s

In an attempt to resolve CCCFCD's difficulty in adhering to the OMM to maintain the accretive lower channel, CCCFCD and USACE Operations Branch proposed to conduct a General Reevaluation - a study to reformulate or modify a plan, or portions of a plan, under current USACE planning criteria (USACE, IWR). In this case the *Lower Walnut Creek General Re-evaluation Report* (GRR) would reassess the original channel and levee design and the system's traditional method of managing the flood control facilities in order to incorporate ecosystem restoration objectives (CCCFCD, 2007). The GRR would identify and study alternatives to de-silting the

trapezoidal channel to maintain its design depth. Such alternatives would provide flood capacity while creating opportunities to setback levees and create wetland riparian habitat within the project area, extending from the mouth of Walnut Creek to Monument Boulevard (approximately 8 miles). Results of the GRR would address the conflict between USACE Operation’s maintenance requirements and CCCFCD’s desire to maintain and manage the sediment accretion, levees, and sensitive habitat in a more nature based, sustainable manner. Congress agreed that there was federal interest in pursuing this project and in 2003 CCFCD signed a federal cost share agreement for the GRR with USACE as lead.

III. USACE Levee Requirements

Upon agreeing to partner in a flood control project with USACE, the local sponsor of the project agrees to maintain the USACE built infrastructure (levees, channel) as specified in the project’s OMM. USACE Operations and Readiness Branch provides the OMM and evaluates if the maintenance performed is adequate and adheres to its designs. OMMs from the 1960s, like the one for the Walnut Creek Project, are engineering based and technical with no/little reference to environmental values of the facility.

Once constructed, the levees and channels undergo routine and periodic inspections to identify any areas of noncompliance. Such deficiencies need to be addressed in order for the flood control system to benefit from federal flood control disaster rehabilitation and repair programs.

- Routine Inspection, also called continuing eligibility inspection, is a visual inspection that verifies proper levee system operation and maintenance. These are conducted annually.
- Periodic Inspection verifies proper operation and maintenance, and provides a more rigorous level of assessment than the Routine Inspection. These inspections are conducted every five years (USACE, 2014).

Both Routine and Periodic Inspections incorporate a consistent inspection checklist that applies to all USACE constructed levees, regardless of setting and result in a levee system rating for operation and maintenance of the project. This rating determines if a levee system is included as active in the USACE’s national Levee Safety Program. Active levees in the Rehabilitation and Inspection Program are eligible for federal rehabilitation funds (PL 84-99) for damages caused by a flood event. The USACE Levee Safety Program focuses on projects designed and built for all different levels of flood events (such as 10-, 50- year floods), not just the 100-year flood (USACE, 2014).

PL 84-99

As a partner in a federal flood control project, the CCCFCD’s Walnut Creek channels are

PL 84-99:

USACE disaster assistance program, PL 84-99, provides federal funds for repair of federally built flood control facilities (dams, channels, levees) that are damaged by large storms. In order to be eligible for PL 84-99 assistance, the federal flood control project must receive and maintain an “Acceptable” or “Minimally Acceptable” rating from USACE when they perform their annual inspections. If any part of the project receives an “Unacceptable” rating, the entire project is put on probation for a year; and is listed as inactive if the problem persists the second year and becomes ineligible for funding until the problem(s) is fixed.

evaluated annually in order to remain eligible for USACE's PL 84-99 disaster assistance program. These inspections are required under the USACE levee rehabilitation program to ensure compliance with federal maintenance standards (USACE, 2014). In the aftermath of Hurricane Katrina in 2005, USACE required that all deficient levees (federal and non-federal) be identified, inspected and any areas of non-compliance repaired within one year to remain eligible for PL 84-99.

In early 2007, Walnut Creek channel was evaluated and certain levees and reaches were deemed deficient because of excessive sediment present in lower Walnut Creek. This rating impacted the entire Walnut Creek channel as USACE considered all 22-miles of the Walnut Creek project as one unit and inseparable, therefore if a section of channel was not in compliance, the entire channel was deemed noncompliant. In reaction to this "Unacceptable" rating CCCFCD quickly developed the *Interim Protection Measures Project* to propose actions that would both satisfy USACE and avoid work in the environmentally sensitive areas of the lower channel until the long-term solutions of the on-going GRR were available. The *Interim Protection Measures Project* designated the lower 2.5 miles of channel as the highest in biological value with the least constructability. USACE agreed that working in the reach between the BNSF railroad and the mouth of Walnut Creek was infeasible and therefore agreed to temporarily suspend oversight of this reach while the GRR project was underway. This temporary suspension allowed the sensitive habitat of the lower channel to remain undisturbed while work was done upstream of the BNSF.

In order to keep the upper 18 miles of Walnut Creek channel eligible for PL 84-99 funding, the CCCFCD developed and implemented the *Interim Protection Measures Project* within USACE's one-year timeline. This included planning and designing the proposed work, obtaining the necessary regulatory permits and completing the project by the end of 2007. Carrying out the *Interim Protection Measures Project* CCCFCD accomplished the following in the 1.5-mile long Lower Walnut Creek reach between the BNSF railroad and the Clayton Valley Drain:

- Removed approximately 200,000 cy of sediment to restore hydraulic conveyance;
- Raised approximately 15,000 linear feet of levees by 0.5 to 1.5 feet, back to its original design elevation;
- Revegetated disturbed areas with native wetland and upland species;
- Implemented best management practices to minimize impacts to the creek environment outside the project area.

This incredibly short turn-around time and the success of the *Interim Protection Measures Project* was due to CCCFCD's dedicated employees thinking creatively, working long hours and the support and cooperation of the regulatory agencies.

IV. The End of an Era

Meanwhile the work on the GRR continued, but by 2012 the GRR was still not complete. After spending \$3 million dollars on the studies that spanned nearly a decade, USACE had used up its allotted GRR funds and could no longer contribute financially to the unfinished study. CCCFCD

wanted to complete the work started by the GRR for lower Walnut Creek, also known as the *Lower Walnut Creek Restoration Project*, in order to manage lower Walnut Creek in a sustainable manner. Some of the valuable data generated by the GRR included: topographic and bathymetric surveys of the channel, sediment characterization, hydraulic modeling, wildlife and habitat surveys, wetland delineations and vacant land surveys. All of these contributed to establishing the lower reaches' baseline conditions (located at <http://www.lowerwalnutcreek.org> (CCCFCD, 2007). CCCFCD wanted to put these data to good use yet understood that additional federal funds were not likely to be granted by Congress to enable the USACE to proceed with the partnership. With the GRR stalled without having provided any long-term solutions there was concern that USACE Operations would once again rate the lower channel as unacceptable and that the entire Walnut Creek channel would lose its PL 84-99 eligibility.

This limbo situation left CCCFCD with few options: 1) to continue to lobby for federal funds to restart the GRR; 2) to continue the GRR under a Section 408 program under which CCCFCD would implement a locally preferred, and USACE approved plan that provided design level flood protection; or 3) request that the lower 2.5 mile reach of Walnut Creek, downstream of the BNSF railroad and including the 1.5 mile reach of adjoining Pacheco Creek, be separated from the federal system and be managed under local control (CCCFCD, 1/2013).

The significantly different physical characteristics of lower Walnut Creek compared to the rest of the 18 miles of channel presented important resource issues and a strong argument for its separation. The non-tidal, upper reaches of Walnut Creek cross densely developed areas and contain rock and earthlined channels, rectangular concrete-lined channels and drop structures. De-silting these channels can be done when the channels are dry and the work has minimal environmental impact on the surrounding areas. Comparatively, the lower, tidal section of Walnut Creek channel is mostly surrounded with land with lower flood risk. Its earthen channel is flatter, wider and shallower with heavy sedimentation and has thick vegetation growing in and along its sides and levees. These characteristics posed specific regulatory problems, as CCCFCD cannot easily obtain authorization for wholesale removal of sensitive habitat from the regulatory and resources agencies. Discussions with the agencies indicated that acquiring permits for work adhering to the OMM in the lower channel would be a lengthy and expensive process, with no guarantee of success, and that very extensive mitigation would be required.

CCCFCD decided that their best path forward would be to continue the work of the *Lower Walnut Creek Restoration Project* on their own, addressing flood protection in the lower channel in a nature-based manner that would retain flood protection levels and protect sensitive habitat and the environment. The project could be planned, designed and implemented on a local level and would be more in line with the requirements and policies of the regulatory agencies, leading to more affordable and efficient implementation. After more than ten years of the USACE unfinished planning process and the imminent risk of losing Walnut Creek's PL 84-99 program eligibility, CCCFCD took the first steps to remove lower Walnut Creek (from the BNSF railroad to the mouth of the creek), from the USACE oversight by beginning the selective de-authorization process.

V. Selective De-Authorization

Selective de-authorization is described as “[a] process where Congress directs USACE to remove a portion of a USACE-constructed facility from the federal system. This allows local control and oversight of the facility” (CCFCD, 2013).

In late 2012, with the support of Contra Costa County Board of Supervisors, CCCFCD requested the Congress to allow the removal of the Lower Walnut Creek Channel from the larger USACE project. In June 2014 Congress passed the Water Resources Reform and Development Act (WRRDA), which instructed the USACE to remove the lower reaches of Walnut Creek from the federal system. This action de-authorized the 2.5 miles of lower Walnut Creek and the 1.5 miles of adjoining Pacheco Creek, removing USACE’s oversight and making CCCFCD solely responsible for their maintenance and management. Now real restoration planning could begin.

VI. Looking Forward

By assuming local control over the lower reaches of Walnut Creek and Pacheco Creek, CCCFCD will adhere to the USACE Section 404 regulatory requirements, but no longer need to meet USACE Section 408 requirements as outlined in the OMM. In essence, these de-authorized portions now must only meet the same standards as other non-federal projects. The remaining reaches upstream of the BNSF railroad will continue to be managed under the USACE operations and maintenance agreement, following the OMM. Although the lower reaches will no longer be eligible for PL 84-99 funds CCCFCD believes that taking in account the characteristics of Lower Walnut Creek, its wide, shallow channel, and the non-sensitive to flood risk surrounding lands, CCCFCD is prepared to take on the risk of repairing the channel should the need arise.

Currently CCCFCD is moving ahead with the *Lower Walnut Creek Restoration* project, which includes setting back the levees to better connect Walnut Creek to its historic flood plain as well as work in Pacheco Marsh and in Pacheco Creek (CCCFCD, FAQ). The planning process is nearly complete (75-80% complete) and CCCFCD expects that the preliminary designs will be ready in spring 2017. CCCFCD will begin the CEQA and permitting process in mid-2017 and is aiming to begin the construction and restoration work in 2020-2021.

Local funding (tax assessments) and control have allowed a more inclusive planning process as well as flexibility and a community-based focus. CCCFCD has initiated outreach to watershed stakeholders in their efforts to include the community in the planning and improvements of public access, wetland and aquatic habitat, water quality and decrease in flood risk. The Lower Walnut Creek Restoration Project website contains information on the project and lower Walnut Creek in general including photos, scientific reports, public meeting minutes, and project updates. Tours of lower Walnut Creek and information meetings are organized on a regular basis to encourage public to view the project area and engage in the restoration process.

Looking to the future, CCCFCD is pushing for a statewide ballot that would consider flood control as a utility (like drinking water, sewer, etc.), making funding and planning for flood protection easier to finance.

VII. Conclusion

CCCFC and USACE had partnered on the design and construction of approximately 22 cumulative miles of channel on Walnut Creek and its tributaries from 1965 to the mid 1990s. These stretches of channel had very different characteristics and although considered as part of the whole of the Walnut Creek system, they were managed differently. After construction, the lower section of the creek reaching the Bay was immediately the most problematic to manage and presented regulatory and financial challenges. Many attempts were made by CCCFC and USACE to resolve the management and maintenance issues of these four miles of channel over three decades. Finally, when faced with either the entire Walnut Creek channel being rated as inactive and no longer eligible for PL 84-99, or being required to maintain the reach as it was designed in 1965 even though resources agencies were reluctant to permit the work, CCCFC took the exceptional step of de-authorizing the lowest reach of the Walnut Creek project.

Looking back, this unusual move by CCCFC allowed them to have the best of both worlds, with the upper Walnut Creek channel still under the USACE/CCCFC partnership and therefore eligible for federal disaster relief benefits and the lower channel now less constrained by the OMM requirements and able to be managed and maintained in a more sustainable manner.

VIII. Who We Are

This case study was developed through Flood Control 2.0: Rebuilding Habitat and Shoreline Resilience through a New Generation of Flood Control Channel Design and Management, an EPA-funded partnership of the San Francisco Bay Conservation and Development Commission (BCDC), the San Francisco Estuary Partnership (SFEP), the San Francisco Bay Joint Venture (SFBJV), and the San Francisco Estuary Institute (SFEI). This case study was only possible through the cooperation of the Contra Costa County Flood Control and Water Conservation District. The four agencies mentioned above are working together to provide information resources and technical assistance to support flood control agencies in the design and evaluation of flood control projects for improved flood control function, sediment transmission, and Bay connectivity.

The primary author for this report is Pascale Soumoy, Coastal Program Analyst, with assistances from Anniken Lydon and Brenda Goeden of the Sediment Management Team at the San Francisco Bay Conservation and Development Commission. We would like to thank Paul Detjens, Senior Civil Engineer at the Contra Costa County Flood Control and Water Conservation District for his participation, contributions and feedback during this case study analysis. For more information, please see the Lower Walnut Creek Restoration Project website www.lowerwalnutcreek.org. See also the Flood Control 2.0 website at FloodControl.sfei.org for more information related to innovative flood control projects around the region and useful tools/guidance for developing a multi-benefit flood control project.

Sources and References

Arnold, Joseph L. 1988. Office of History U.S. Army Corps of Engineers. *The Evolution of the 1936 Flood Control Act*

California Department of Fish and Wildlife.
http://www.dfg.ca.gov/wildlife/nongame/t_e_spp/fully_pro.html

Contra Costa County. June 25, 2013. Memo to Flood Control District Board of Supervisors. *Authorize Flood Control District to remove lowest 4 miles of Army Corps of Engineers' "Walnut Creek Project" from Corps oversight.*

Contra Costa County. January 15, 2013. Memo to Flood Control District Board of Supervisors. *Authorize Flood Control District to explore removal of lowest 2.5 miles from Army Corps of Engineers' "Walnut Creek Project."*

Contra Costa County Flood Control and Water Conservation District. 2013. *Lower Walnut Creek Selective Deauthorization FAQ*

Contra Costa County Flood Control and Water Conservation District. 2011. *Lower Walnut Creek Thalweg Profiles*

Contra Costa County Flood Control and Water Conservation District. 2007. *Lower Walnut Creek Corrective Action Plan*

Detjens, Paul R. 2009. *Summary of Sediment Issues in Lower Walnut Creek*, Contra Costa County Flood Control and Water Conservation District

U.S. Army Corps of Engineers. 1972. *Walnut Creek Project, Contra Costa County, California – Letter Supplement No. 3 to Design Memorandum No. 1*

U.S. Army Corps of Engineers. <http://www.spk.usace.army.mil/>.2014. *Levee Systems Inspection Update, Sacramento District*

U.S. Army Corps of Engineers, Institute for Water Resources.
<http://www.iwr.usace.army.mil/Missions/Flood-Risk-Management/Flood-Risk-Management-Program/Frequently-Asked-Questions/FAQ-Definitions/>

U.S. Fish and Wildlife Service. <https://www.fws.gov/Midwest/endangered/glossary/index.html>