

BUTTE CREEK

CALIFORNIA DEPARTMENT OF FISH AND GAME ANADROMOUS FISH RESTORATION AND CALFED PROGRAMS



VISION

Local, broad-based watershed organization which facilitates restoration and long-term maintenance of watershed function, a component of which is achievement of anadromous fish restoration goals.

Butte Creek Anadromous Fish Restoration

The California Department of Fish and Game (CDFG) in coordination with other state and federal resource management agencies, water interests and local stakeholders, has since about 1992 implemented major restoration actions in the Butte Creek watershed. Restoration has been focused primarily upon anadromous fish, specifically the state and federally listed spring-run Chinook salmon, and steelhead trout. State and federal legislation in the late 1980's, early 1990's provided guidance for restoration activities in the Central Valley. Specifically, the state Salmon, Steelhead Trout, and Anadromous Fisheries Program Act (1988), and federal Central Valley Project Improvement Act (PL 102-575, 1991) required that all reasonable efforts be made to restore and maintain anadromous fish populations on a long-term basis. Based upon this legislative direction, restoration plans were developed by CDFG (Restoring Central Valley Streams: A Plan for Action, November 1993), and the U.S. Fish and Wildlife Service (Anadromous Fisheries Restoration Program, 1998). The original legislative intent (state and federal), including the respective restoration plans, was subsequently incorporated in the CALFED Bay-Delta Program Record of Decision (August 2000) and the CALFED Ecosystem Restoration Program (August 2001). Effective January 1, 2003, the California Bay-Delta Authority was created to provide a governance structure for all CALFED programs, including the Ecosystem Restoration Program.

Butte Creek originates in the Lassen National Forest on the western slope of the Sierra Nevada Mountains. The creek is a tributary to the Sacramento River through two points: Butte Slough at Sacramento River Mile 139 near Colusa, and the Sutter Bypass and Sacramento Slough at Sacramento River Mile 80 near Karnak. The watershed ranges from 7,087 feet in elevation in the headwaters to approximately 150 feet at the Sacramento River points of entry and encompasses approximately 797 square miles (excluding the Sutter Bypass). Average annual unimpaired runoff is approximately 245,000 acre-feet, while imports from the Feather River, Sacramento River, and Little Chico Creek exceed 550,000 acre-feet annually. The Butte Slough and Sutter Bypass reaches of Butte Creek serve as a flood relief and convey all Sacramento River flows above approximately 25,000 cubic feet per second. The anadromous reach of Butte Creek is approximately 90 miles, extending from impassable natural barriers approximately 15 miles northeast of Chico to the bottom of the Sutter Bypass near Verona.

Butte Creek is one of only three tributaries to the Sacramento River that continues to harbor a sustaining population of the state and federally listed spring-run Chinook salmon. Major restoration actions (Table 1 and Figure 2) undertaken since about 1992 have significantly contributed to an increase in the spring-run salmon population (Figure 1) and reduced the potential for extinction. To date approximately \$35 million has been spent on restoration activities since 1992 (not including cost of multiple studies and technical evaluations). Significant commitments have been made to acquisition, physical monitoring, and management of instream flows. Actions include the M&T Ranch water exchange agreement, Durham Mutual water acquisition agreement, ten real-time flow gauging stations (Figure 2), and dedication of CDFG personnel to monitor and manage the acquired flows.

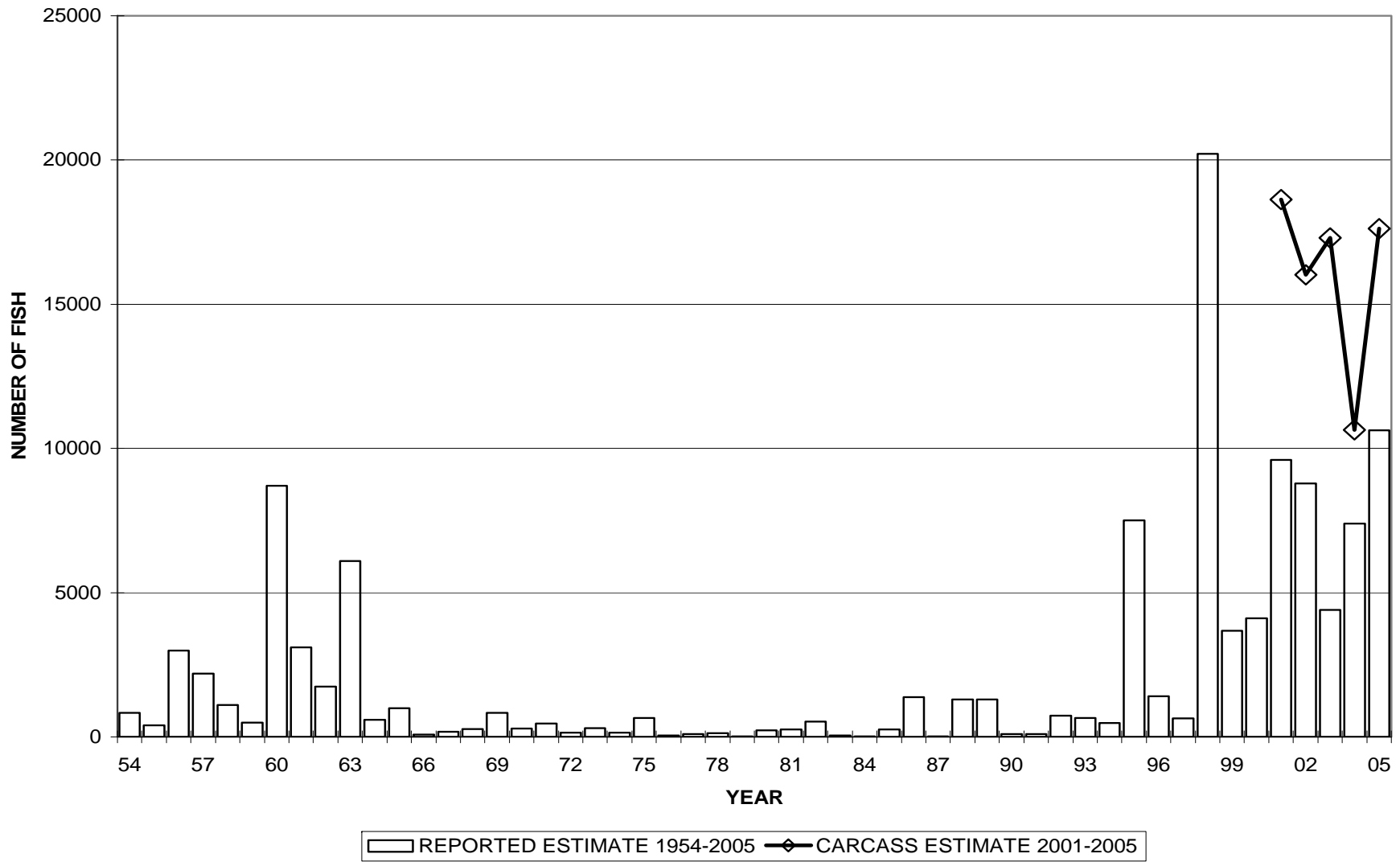


Figure 1. Estimated number of spring-run Chinook returning to Butte Creek for period 1954 to 2005

Table 1. Major Fishery Restoration Actions in Butte Creek for period 1993-2005

Year	Restoration Action	Partners*	Funding	
			Source	Approximate Cost**
1993	<i>Point-four Dam removed</i> and users provided with alternate supply of water conveyed through upgraded WCWD delivery canals, eliminating need for replacement of ineffective fish ladder and construction of fish screen. (Resources Agency, 1989; Pike, 1991; CDFG, 1993)	FSR, WCWD, CDFG, CDWR.	WCWD	\$235,000
			Prop. 70	\$130,000
			Total	\$360,000
1994	<i>Fishing regulations changed</i> to prevent take of salmon and steelhead.	CDFG	-	-
1995	<i>Parrott-Phelan diversion fish screen installed</i> with capacity of 150 cfs, meeting state and federal fish screen requirements. (Resources Agency, 1989; CDFG 1993; Broddrick, 1994; Heise, 1994; USFWS, 1997)	CDFG, USFWS, M&T, PIC.	Prop. 70	\$65,000
			M&T/PIC	\$65,000
			Total	\$130,000
1995-ongoing	<i>Butte Creek spring-run Chinook life history study initiated</i> to guide implementation and ongoing management of restoration actions. (USFWS, 1997; Hill and Webber, 1999; Ward and McReynolds, 2004; Ward et al., 2004a, 2004b, 2004c, 2004d; McReynolds et al. 2005; Ward et al. 2005).	AFRP, CDFG, PG&E, CSUC, NFWF, CALFED.	AFRP, CALFED	\$927,000
			CDFG	\$1,980,000
			PG&E	\$77,000
			Total	\$2,984,000
1996-ongoing	<i>Ten gaging stations installed</i> or modified and operated by DWR to provide real-time flow and temperature monitoring capability through California Data Exchange Center. (CDEC) (USFWS, 1997; Resources Agency, 1989).	USFWS, AFRP, CDFG, DWR, CALFED.	AFRP	\$489,000
			CALFED	\$330,000
			Total	\$719,000
1996	<i>Parrott-Phelan diversion fish ladder installed</i> with a capacity of 300 cfs. (Resources Agency, 1989; CDFG, 1993; Turner, 1995; Mendenhall, 1996; USFWS, 1997)	CDFG, DWR, WCB, AFRP	WCB	\$318,000
			AFRP	\$140,000
			Four Pumps	\$299,000
			Total	\$757,000
1996	<i>Fish Habitat team formed</i> to monitor and manage restoration actions including instream flows.	CDFG.	CDFG	\$940,000
			Total	\$940,000
1996	<i>Instream flows of 40 cfs acquired</i> October through June in Butte Creek from Parrott-Phelan diversion to confluence with Sacramento River, for spring-run Chinook and steelhead migration and rearing. Water exchange agreement was part of Big Chico Creek M&T pumps relocation project funded by CVPIA \$2,200,000, Bay-Delta Accord Category III (Metropolitan Water District) \$1,550,000, WCB \$500,000; Ducks Unlimited \$150,000, USFWS \$150,000. (Resources Agency, 1989; CDFG, 1993; Agreement, 1996; USFWS, 1997)	M&T, PIC, USFWS, CDFG, USBR, MET, WCB, DU.	-	-
1997	<i>Acquired Keeney property</i> consisting of 56 acres of stream front land to protect riparian habitat adjacent to Butte Creek to benefit anadromous fisheries and associated aquatic environments. (Resources Agency, 1989; USFWS, 1997; NCPR, 1999; USFWS, 2000)	KR, CNLM, BCFG, USFWS.	AFRP	\$735,000
			Total	\$735,000

Year	Restoration Action	Partners*	Funding	
			Source	Approximate Cost**
1997-98	Completed Western Canal siphon and dam(s) removal project. Project implemented as alternative to building fish ladders and fish screens at two WCWD dams, McGowan Dam, McPherrin Dam, and providing fish screens at twelve associated diversions. Alternate sources and/or water conveyance systems were built, allowing removal of the four structures. Project involved installation of an 850 foot siphon under Butte Creek, 2,500 feet of pipelines, 4 pumping stations, 7 check structures, 24,000 feet of new/improved canals, and removal of 4 dams. (Resources Agency, 1989; CH2M Hill, 1992; CDFG, 1993; CH2M Hill, 1995a; CH2M Hill, 1995b; CH2M Hill, 1995c; CH2M Hill, 1996a; CH2M Hill, 1996b; USFWS, 1997)	WCWD, GR, MR, MPR, USBR, CDFG, USFWS, CDWR, MET.	Tracy Mit.	\$150,000
			WCWD	\$3,283,000
			CALFED	\$3,133,000
			Cat. III, MET	\$3,133,000
			Total	\$9,699,000
1998	Acquired McAmis property consisting of 93 acres of stream front land above and contiguous with 285 acre CDFG Ecological Reserve to protect spring-run Chinook and steelhead habitat. (Resources Agency, 1989; USFWS, 1997; CSUC, 2000)	CDFG, USFWS, WCB, NFWF, CSUC.	AFRP	\$125,000
			NFWF	\$132,000
			WCB	\$425,000
			CALFED	\$186,000
			Total	\$868,000
1998	Installed Durham Mutual Diversion fish ladder with a maximum flow capacity of 80 cfs, and fish screen with a maximum diversion capacity of 56 cfs. (Resources Agency, 1989; CDFG, 1993; CDWR, 1996; CDWR 1997a; Beak 1997; Borcalli, 1997; USFWS, 1997; Borcalli 1999a; Borcalli 1999b)	DMWC, CDWR, CDFG, USFWS, TNC, DU.	Tracy Mit.	\$66,000
			Cat.III, MET	\$316,000
			CVPIA	\$465,000
			Four Pumps	\$88,000
			Total	\$935,000
1998	Water acquisition at Durham Mutual Diversion to provide up to 5 cfs dedicated flows for instream use through Butte Creek to confluence with Sacramento River to benefit spring-run Chinook and steelhead migration and rearing. (Resources Agency, 1989; CDFG, 1993; Lilly, 1997; USFWS, 1997; Gilbert 1998; JSA 2001b)	RRI, DMWC, USBR, CDFG.	RRI	-
			Total	-
1998	Installed Adams Diversion fish screen with a maximum diversion capacity of 135 cfs and fish ladders with a maximum flow capacity of 80 cfs under dam-in condition, and modified vertical-slot/roughened chute under dam-out condition. (Resources Agency, 1989; CDFG, 1993; CDWR, 1996; CDWR, 1997b; USFWS, 1997; Beak, 1998; Borcalli, 1998; Borcalli,1999c; USFWS, 1997)	REP, CDWR, CDFG, DU, MET, USBR, USFWS.	Tracy Mit.	\$66,000
			CALFED	\$521,000
			Cat. III, MET	\$521,000
			Total	\$1,108,000
1998	Installed Gorrill Diversion fish screen with a maximum diversion capacity of 121 cfs and fish ladders with a maximum flow capacity of 80 cfs under dam-in condition, and vertical-slot under dam-out condition. (Resources Agency, 1989; CDFG, 1993; CDWR, 1996; USFWS, 1997; CDWR, 1997c; MWH, 1998; MWH, 1999; MWH, 2002)	GR, CDFG, CDWR, DU, WCWD, MET, USBR.	Tracy Mit.	\$66,000
			CALFED	\$756,000
			Cat. III, MET	\$756,000
			Total	\$1,578,000

Year	Restoration Action	Partners*	Funding	
			Source	Approximate Cost**
1999-01	Replaced Sanborn Slough earthen weir and culvert structure with engineered water control structure and fish ladder. (Resources Agency, 1989; CDFG, 1993; USFWS, 1997; JSA, 1998; JSA, 1999a; JSA, 1999b; JSA, 1999c; JSA, 1999d; JSA, 1999e; JSA CDWR 1999; JSA, 2000a; JSA, 2000b; JSA 2000c).	CWA, DU, CDWR, USFWS, AFRP, CDFG, RD 1004, FT.	AFRP	\$67,000
			USFWS	\$1,000,000
			CALFED	\$950,000
			Total	\$2,017,000
1999	Installed Drumheller Slough adult exclusion barrier to prevent spring-run Chinook salmon from straying out of Butte Creek into RD 1004 diversions. (Resources Agency, 1989; CDFG, 1993; USFWS, 1997; JSA, 1998; JSA 1999d; Green et al., 2000; Ensign & Buckley 2001a; Ensign & Buckley 2001b).	CDFG, USBR, CDWR, RD 1004, CWA, DU, USFWS.	Tracy Mit.	\$30,000
			AFRP	\$77,000
			Total	\$107,000
2000	Completed Butte Creek Conservancy Watershed Existing Conditions Report and Management Strategy. Project initiated to build cooperative partnerships to compile and develop information related to the management of watershed resources, provide a forum for the continuation of existing efforts to improve anadromous fish populations, and to develop and implement a program to restore and maintain all aspects of watershed health and function (USFWS, 1997).	BCWC, CSUC, USFWS, CDFG, Cat. III.	AFRP	\$452,000
			CAT III	\$83,000
			NFWF	\$83,000
			Total	\$618,000
2002	Installed upgraded water control structure and fish ladder at Sutter Bypass East West diversion, fish ladder and fish screen at Sutter Bypass Weir #5, and upgraded water control structure at Sutter Bypass Weir #3 (Resources Agency, 1989; CDFG, 1993; USFWS, 1997; JSA, 1998; JSA, 1999g; JSA, 1999h; JSA, 1999i; JSA, 1999j; JSA, 2001a; USFWS, 2002; MWH, 2004a; MWH, 2004b; MWH, 2004c; MWH, 2004d; MWH, 2004e; MWH, 2004f).	BSID, USFWS, CDWR, CDFG, DU.	CALFED	\$4,783,000
			Total	\$4,783,000
2003-04	Installed upgraded water control structure at Butte Sink North Weir, water control structure and fish ladder at Butte Sink End Weir, and water control structure and fish ladder at Butte Sink Morton Weir complex and Driver's Cut Outfall and RD 833 adult exclusion barriers. (Resources Agency, 1989; CDFG, 1993; USFWS, 1997; JSA, 1998, JSA 1999; JSA, 2000a; JSA, 2000b; JSA, 2000c; Borcalli, 2001; JSA, 2003a; JSA, 2003b).	WMDC, FTDC, CDFG, USFWS, NMFS, DU, CWA.	CALFED	\$5,748,000
			Total	\$5,748,000
2005 - ongoing	Butte Sink White Mallard Dam and associated diversions evaluation and recommended actions. (Resources Agency, 1989; CDFG, 1993; USFWS, 1997; JSA, 2000; ECORP, 2002; Ensign & Buckley, 2002)	WMDC, FTDC, CDFG, USFWS, NMFS, DU, CWA, RD1004	-	-
2005 - ongoing	Sutter Bypass west side Weir #1 and Guisti Weir assessment (Resources Agency, 1989; CDFG, 1993; USFWS, 1997; USFWS, 2002; CDWR 2002; DU, 2002; CDWR 2003; JSA 2005).	USFWS, CDWR, CDFG, DU, AR	-	-

Year	Restoration Action	Partners*	Funding	
			Source	Approximate Cost**
2005 - ongoing	<i>Sutter Bypass east side diversions and weirs assessment</i> (Resources Agency, 1989; CDFG, 1993; USFWS, 1997; CDWR 2002; CDWR 2003; USFWS, 2002; JSA 2005).	USFWS, CDWR, CDFG, DU, SBWUA, BSID, USBR.	-	-
Total All Projects				\$34,869,000

** Does not include cost of planning, environmental assessment, and permitting.

*** Partial List of Partners**

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| 1. Anadromous Fish Restoration Program (AFRP) | 21. McGowan Ranch (MR) |
| 2. Amaral Ranch (AR) | 22. McPherrin Ranch (MPR) |
| 3. Bay Delta Accord Category III (Cat. III) | 23. Metropolitan Water District of Southern Calif. (MET) |
| 4. Butte County Fish and Game Commission (BCFGC) | 24. M&T Chico Ranch (M&T) |
| 5. Butte Creek Watershed Conservancy (BCWC) | 25. National Fish and Wildlife Foundation (NFWF) |
| 6. Butte Slough Irrigation District (BSID) | 26. National Marine Fisheries Service (NMFS) |
| 7. California Bay Delta Program (CALFED) | 27. Pacific Gas and Electric (PG&E) |
| 8. California Department of Fish and Game (CDFG) | 28. Parrott Investment Co. (PIC) |
| 9. California Department of Water Resources (CDWR) | 29. Rancho Esquon Partners (REP) |
| 10. Center for Natural Lands Management (CNLM) | 30. Reclamation District 1004 (RD 1004) |
| 11. California State University, Chico (CSUC) | 31. Resources Renewal Institute (RRI) |
| 12. California Waterfowl Association (CWA) | 32. Sutter Bypass Water Users Assoc. (SBWUA) |
| 13. Ducks Unlimited (DU) | 33. The Nature Conservancy (TNC) |
| 14. Durham Mutual Water Company (DMWC) | 34. Tracy Mitigation Fund BOR (Tracy Mit.) |
| 15. Field and Tule Duck Club (FTDC) | 35. United States Bureau of Reclamation (USBR) |
| 16. Five Star Ranches (FSR) | 36. United States Fish and Wildlife Service (USFWS) |
| 17. Foraker Trust (FT) | 37. Western Canal Water District (WCWD) |
| 18. Four Pumps Fund CDWR (Four Pumps) | 38. White Mallard Duck Club (WMDC) |
| 19. Gorrill Ranch (GR) | 39. Wildlife Conservation Board (WCB) |
| 20. Keeney Ranch (KR) | |

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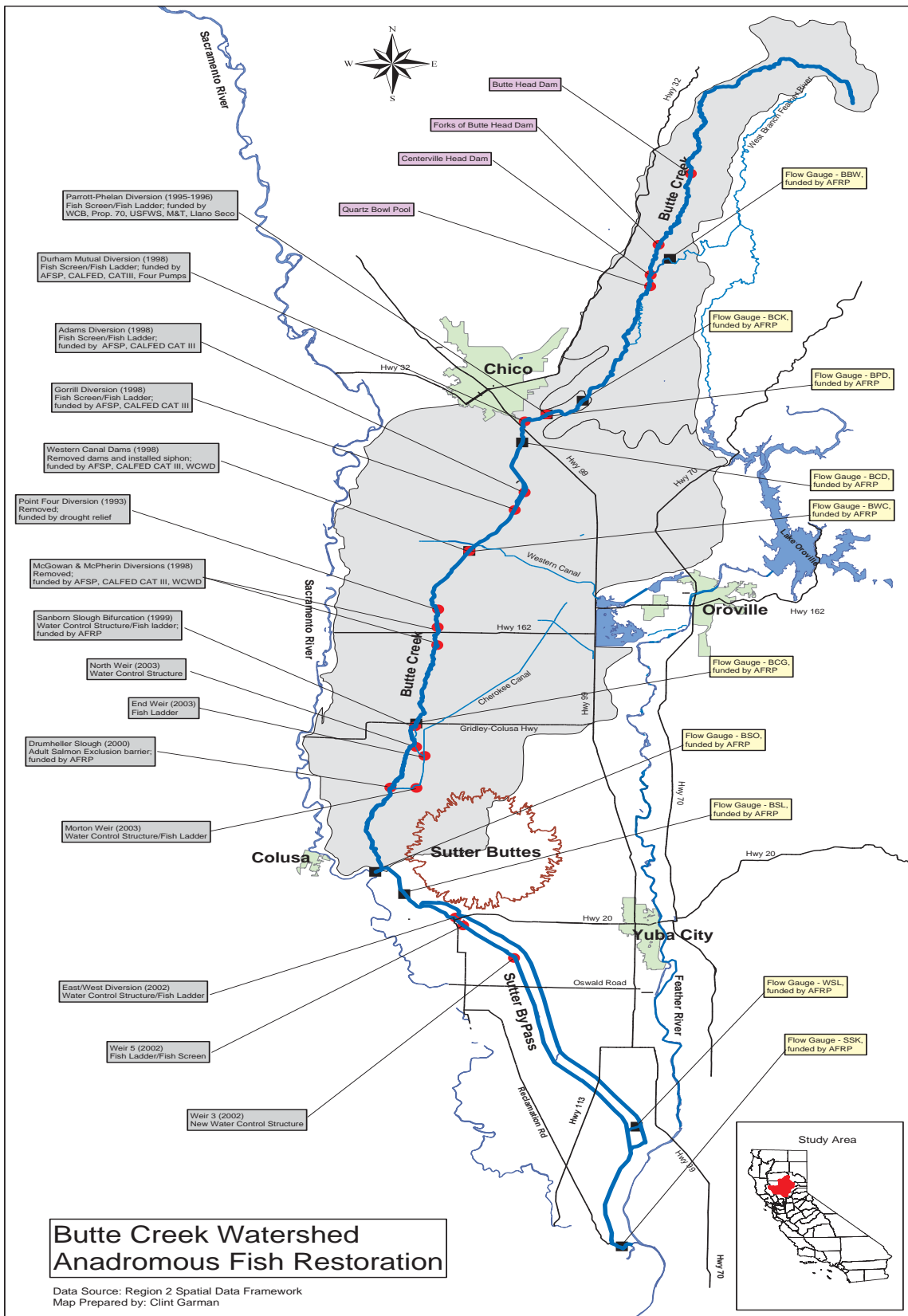


Figure 2. Map of Butte Creek watershed showing anadromous fish restoration actions