

Bank Swallow (*Riparia riparia*) Colony Population Status and Trends on the Middle Sacramento River—1999 to 2012

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Surveys for the Bank Swallow (*Riparia riparia*) along the middle Sacramento River from Red Bluff (RM 243) to Colusa (RM 143) (Figure 1) have been conducted nearly annually from 1986 to present. Surveys from 1999 onward were done using standardized periods and GPS with data error-proofed and entered into a geospatial database (Garcia 2009). Results show that while the number of active burrows in 2012 was only 9% below the 1999 count, the most recent three-year mean is 31% lower than the first three-year mean (Table 1) and indicative of a pronounced declining trend (Figure 2). The cause for decline is likely the continued loss in nesting habitat due to increases in bank revetment. From 1936 to 2012, over 50 miles of agency rock and private rubble were dumped on the banks of the Sacramento River between Red Bluff and Colusa (Figure 3). Since then, additional colony locations have been lost to both agency and private bank revetment (Figure 4). If these population and habitat trends continue, Bank Swallow will likely become extirpated on the Sacramento River. Girvetz (2010) found that the total available area of suitable habitat seemed to drive Bank Swallow population trends and that restoration of riverbank habitat (removal of riprap) reduced extinction probability to less than 10%. This is a 57% reduction in the probability of the population dropping below the quasi-extinction threshold compared to the current condition (Golet and others 2013). The recently completed Bank Swallow Conservation Strategy specifies the amount and type of habitat restoration (rip-rap removal and riparian and floodplain vegetation restoration) needed to recover and maintain the species on the middle Sacramento River, its tributaries and elsewhere in California (Bank Swallow Technical Advisory Committee 2013).



References
Bank Swallow Technical Advisory Committee. 2013. Draft Bank Swallow (*Riparia riparia*) conservation Strategy for the Sacramento River Watershed, California. Bank Swallow Technical Advisory Committee, April 2013.
Garcia, D. 2009. Spatial and temporal patterns of the Bank Swallow on the Sacramento River. Master's Thesis. Chico State University, Chico, CA. 94 pp.
Girvetz, E.H. 2010. Removing erosion control projects increases bank swallow (*Riparia riparia*) population viability modeled along the Sacramento River, California USA. *Biological Conservation*. 143: 828-838.
Golet, G.H. and others. 2013. Successes, failures and suggested future directions for ecosystem restoration of the middle Sacramento River, California.

Table 1. Bank Swallow nest burrow count trends, Sacramento River, Red Bluff to Colusa (RM 243 – RM 143): 1999–2012. Data from Bank Swallow Technical Advisory Committee (2013).

Year	Total Burrows	% Change from Previous Year	3-Year Average of Total Burrows	% Change from Previous 3-Year Average
2012	15,054	28.6	12,475	-3.1
2011	11,710	9.8	12,877	-13.3
2010	10,662	-34.4	14,860	-13.5
2009	16,259	-7.9	17,186	4.6
2008	17,660	0.1	16,430	1.3
2007	17,640	26.1	16,223	-1.3
2005	13,990	-17.9	16,430	-4.2
2004	17,040	-6.7	17,153	-4.0
2003	18,260	13.0	17,863	0.2
2002	16,160	-15.7	17,820	-0.8
2001	19,170	5.7	17,963	
2000	18,130	9.3		
1999	16,590			

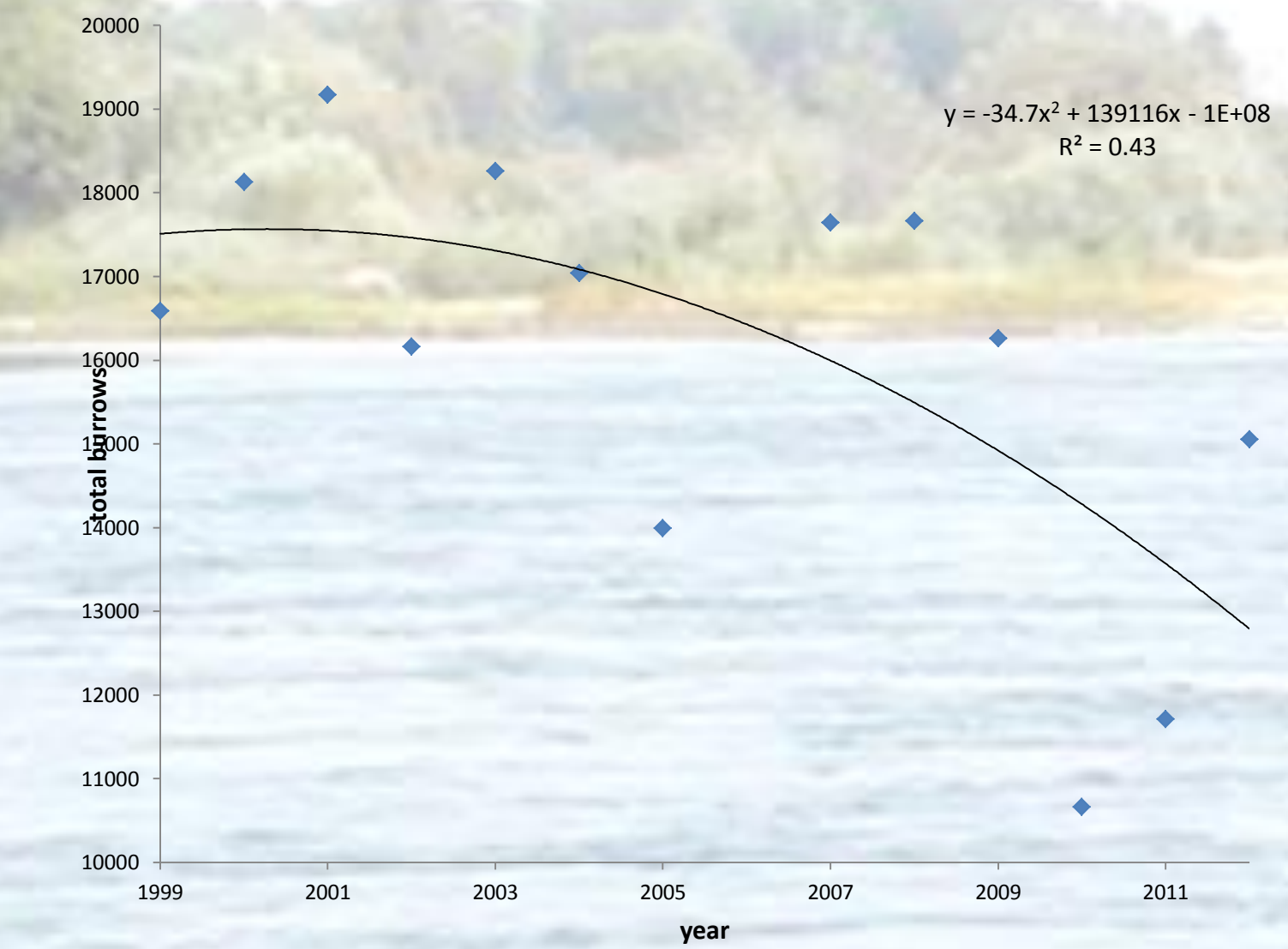


Figure 2. Total number of Bank Swallow nest burrows counted on the Sacramento River between the Red Bluff Diversion Dam and the Colusa Bridge (RM 234–RM 134): 1999–2012. Data from Bank Swallow Technical Advisory Committee (2013).



Figure 1. Sacramento River, showing reach segments, and Feather River.

The Bank Swallow (*Riparia riparia*) on the middle Sacramento River (Red Bluff to Colusa)

- California State-listed threatened, colonial nesting neotropical migratory landbird
- Riparian Habitat Joint Venture Focal Species, TNC Ecological Flows Study Terrestrial Indicator Species, Middle Sacramento River Ecosystem Restoration Indicator Species, and “candidate focal species” for the Central Valley Joint Venture
- About 85% of the California Bank Swallow population breeds on the Sacramento & Feather rivers, excavating nesting burrows in eroding river banks forming various-sized colonies (Figures 1 & 5)
- About 90% of these occur on middle Sacramento River Reach 2 and Reach 3 (Figure 1)
- Middle Sacramento River characterized by over-bank flooding, erosion & deposition, lateral channel migration, floodplain re-working, on-channel meander loops, off-channel oxbow lakes & floodplain sloughs
- California Department of Fish and Wildlife began monitoring surveys and research in 1986, listed as threatened species in 1989, and developed a recovery plan in 1992 (needs revision)
- Cause for population decline appears strongly tied to habitat loss associated with bank revetment (agency rip-rap and permitted / unpermitted privately installed rubble)
- Sacramento River National Wildlife Refuge is established in 1989 to acquire 18,000 acres of flood-prone lands within the 100-year floodplain between Red Bluff and Colusa; in 2001 the Refuge removed private levees on the Flynn and Rio Vista Units and in June 2002, 2,770 BANS burrows were counted at the new Flynn colony site; in 2007 1/3rd of the BANS colonies on middle Sacramento River occurred on the eroding banks of the Refuge; by 2012, with its partners The Nature Conservancy and River Partners, the Refuge totals 10,235 acres— including 5,280 acres of restored riparian and floodplain habitats
- California Department of Water Resources has documented over 50 miles of bank revetment from Red Bluff to Colusa, a 100-mile stretch of the river (Figure 3)
- Research indicates that 10% of existing bank revetment must be removed to stabilize the Bank Swallow breeding population on the middle Sacramento River
- The Bank Swallow Technical Advisory Committee formed in December 2006 after River Mile 182 (Sacramento River Wildlife Area Jacinto Unit) was rip-rapped under suspect circumstances (Figure 4)
- Bank Swallow Technical Advisory Committee drafted Version 1 of the Bank Swallow (*Riparia riparia*) Conservation Strategy for the Sacramento River Watershed, California (April 2013)
- Habitat restoration consists of riparian floodplain habitat restoration (including native herbaceous species) and floodplain re-connection (removing levees and bank revetment)

Bank Swallow Colonies—Middle Sacramento River 2009 – 2010 – 2011 - 2012

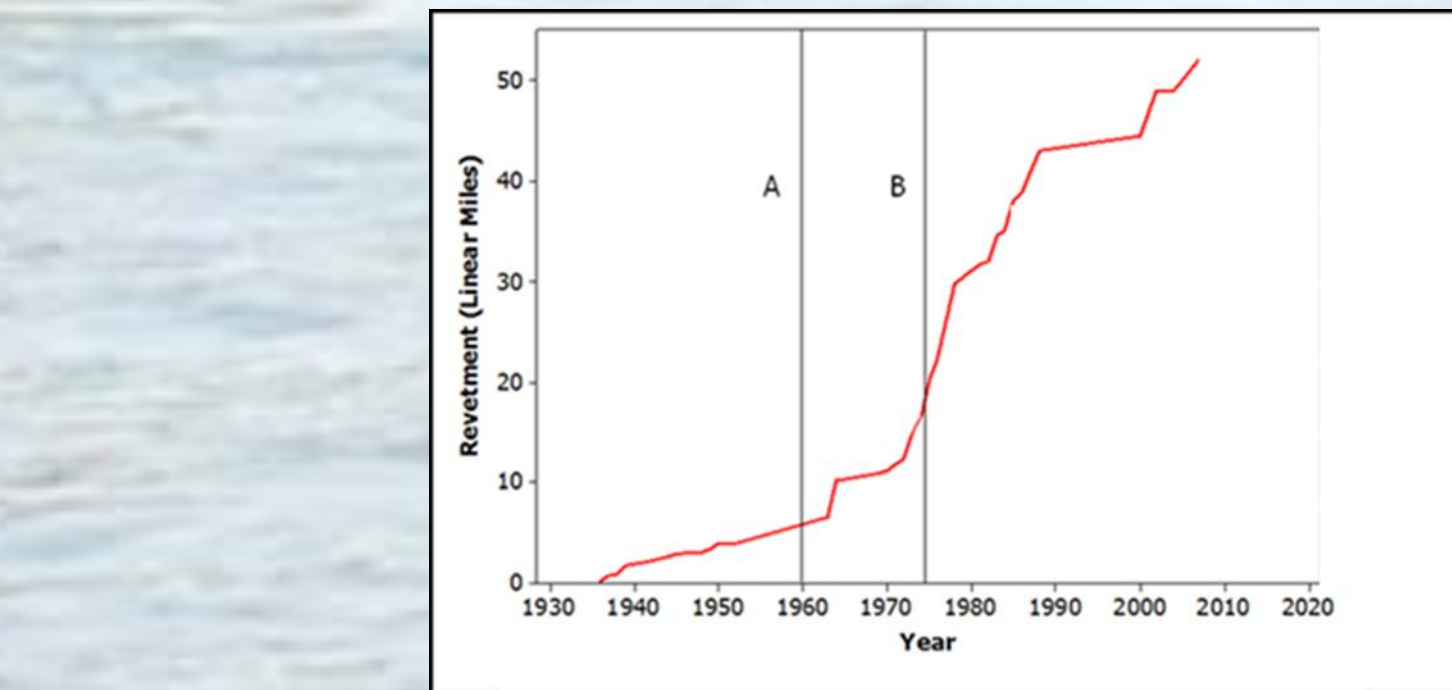
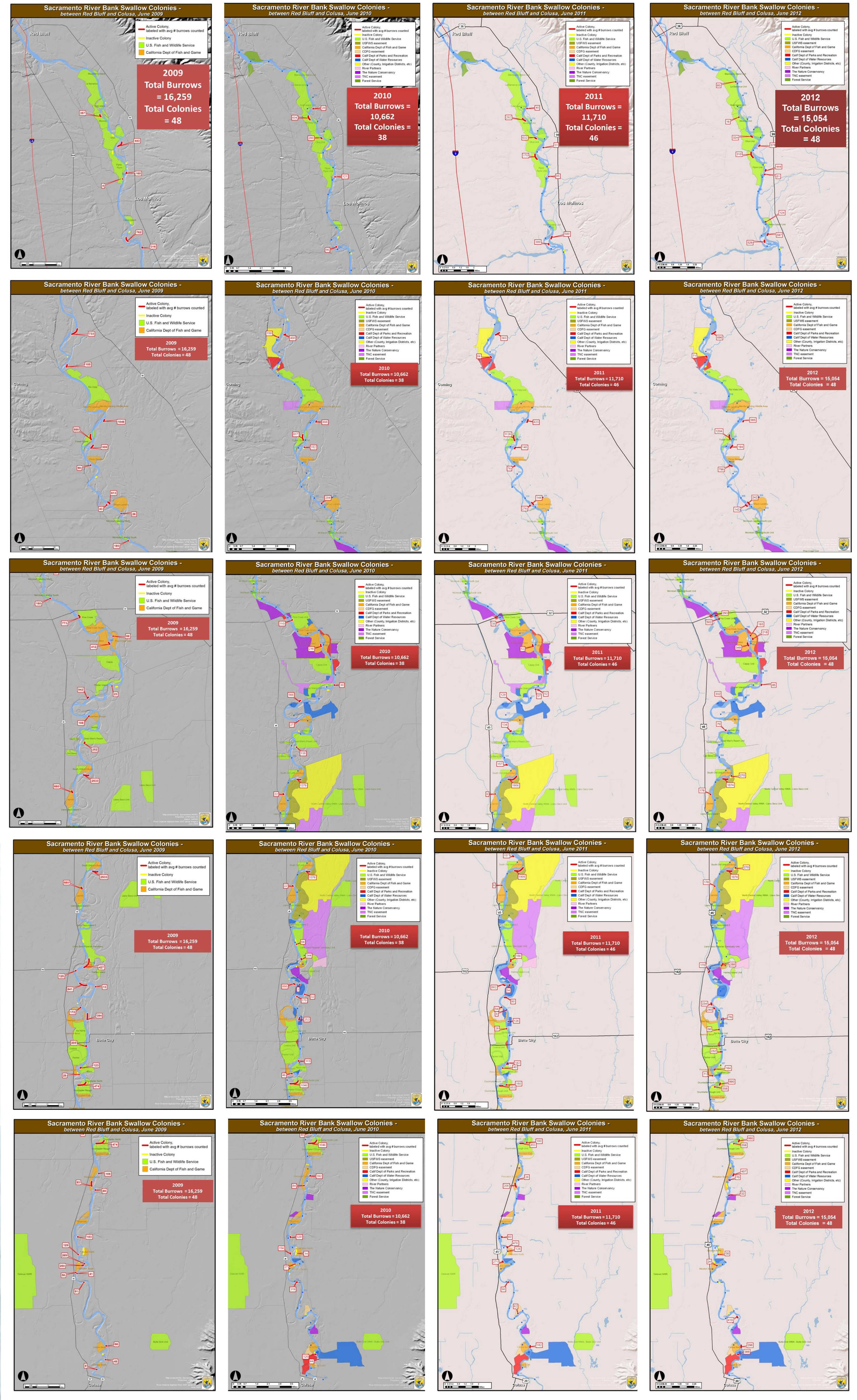


Figure 3. Cumulative length of rock revetment placed on the middle Sacramento River between Red Bluff and Colusa (approximately 100 miles of river) from 1935–present. Vertical line A – Initial authorization of SRBPP, Phase 1, 1960, Vertical line B – Authorization of SRBPP, Phase 2, 1974. Data from Bank Swallow Technical Advisory Committee (2013).

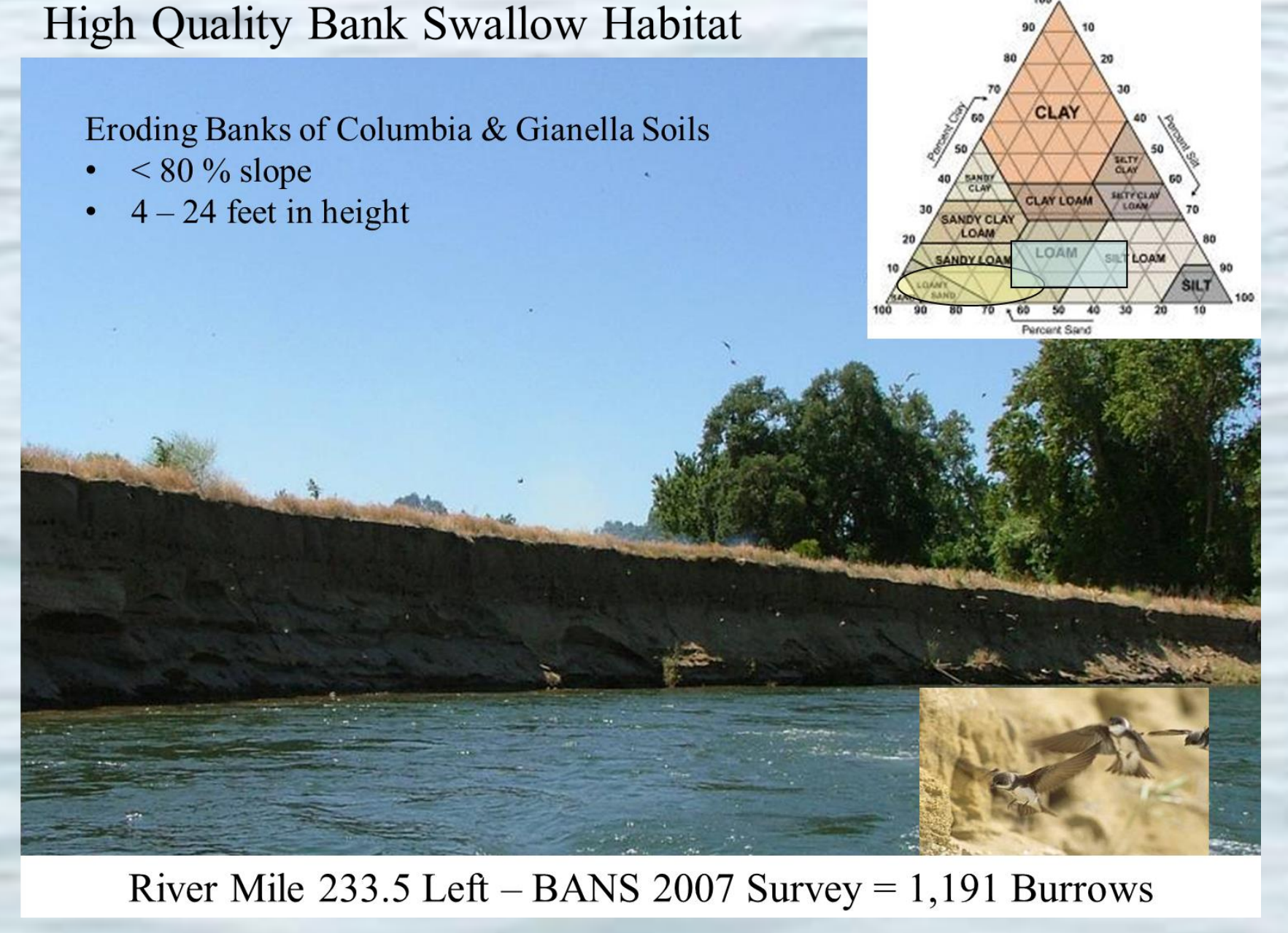


Figure 5. Bank Swallow colony nesting habitat on the middle Sacramento River.

Bank Armoring (Rip-rap) Identified as a Major Cause of Habitat Loss

Fall 2006: Bank with sloped rock
 Winter 2006: Bank with "emergency rock"



River Mile 233.5 Left— Private Bank Revetment 2012
 • Irrigated *Arundo donax* &
 • Trenched rip-rap

Figure 4. Examples of recent agency and private rock revetment at significant Bank Swallow Colony locations.