Final Date: 3 February 2010

To: Files
From: DFG Staff
Subject**: 2009 Bank Swallow population survey, Sacramento and Feather Rivers**
Contact: David Wright, North Central Region, Resource Assessment Program

The annual survey of the State-threatened Bank Swallow (*Riparia riparia*) population on the Sacramento River was conducted on June 9,10 and 11, 2009. Surveying was done primarily by staff of the U.S. Fish and Wildlife Service –Sacramento National Wildlife Refuge, DFG, and the Department of Water Resources. Training in survey methodology was provided to DFG Northern Region staff and these personnel then assisted with a survey of an upper Sacramento River reach that has not been regularly surveyed, as well as off-river sites.

The core annual survey begins just below the Red Bluff Diversion Dam, river mile (RM) 243.0, and continues southward to Colusa, RM 144. Total active burrow numbers at each colony were tally-counted by two observers and the two counts averaged. Colonies were recounted when the two counts differed by more than 10 percent. GPS tracks of colony locations were recorded. Field data were recorded electronically on a laptop computer or were tallied on paper forms and later entered into a spreadsheet.

Although the core repeated survey reach is Red Bluff to Colusa, numbers of bank swallows have consistently been estimated for the full DFG Sacramento River "survey" report as Redding to Verona (confluence of the Feather River). In (most) years where the Redding to Red Bluff and Colusa to Verona reaches were not actually counted, numbers for these reaches were extrapolated based from the last actual counts relative to the latest, core-reach counts. For example, past numbers for the Sacramento River reach from Colusa to Verona in recent years have been estimated based on year-2000 data provided by Craig Swolgaard,

In our 2009 effort, we surveyed additional river reaches that have not recently been examined. As with the 2008 survey, we benefit from a survey of the Feather River below Oroville Dam conducted by the Department of Water Resources (contact: Ryan Martin). These surveys used the same methods as the ongoing annual survey of the core section.

As has been standard practice in the past, we have converted burrow counts to approximate numbers of nesting bank swallow pairs using a 45 percent burrow occupancy figure. This occupancy value dates to fieldwork from the 1980s (Garrison et al. 1987). We hope to gather data to update the value during the 2010 field season.

RESULTS
Sacramento River, Redding to Red Bluff

This upper reach has not been part of the usual annual survey but was surveyed as far upriver as RM295 during 2008, and to Keswick Dam (RM302) during 2009.

		Number of Burrows			
River Mile		**2008:**	River Mile		**2009:**
282.5	L	95	282.5	L	70
279.9	L	862	279.9	L	726
271.2	L	167	271.2	L	206
271.1	R	24			
270.5	R	58	270.5	R	28
			269.9	R	127
263.7	R	154			

Five colonies were counted in 2009, down one colony from 2008, with a total of **1,157 burrows**. Burrow numbers declined by 15 percent from 1,360 burrows in 2008. Using 45 percent as an estimate of burrow occupancy, we estimate 520 bank swallow pairs inhabited this reach in 2009.

In addition to colonies on the Sacramento River proper, **one** bank swallow colony of **96 burrows** was surveyed on Cow Creek not far from Sacramento RM 280.2.

Sacramento River, Red Bluff to Colusa (core survey section)

This long reach (RM 243 to 144) has been surveyed approximately annually since the 1980's. The 2008 summary report found that, "With the exception of a worrisome dip in 2005, the count on the Sacramento River has hovered in the vicinity of 9,000 pairs since 1999 or 2000" (corresponding to roughly 20,000 burrows). The 2009 survey counted **48 colonies** and **16,259 burrows**, or an estimate of slightly over 7,300 pairs. This represents roughly an **8 percent drop** from the approximately 17,720 burrows counted in 2008. Results are presented by river mile in the following table* and further analyzed in the Summary section, below.

River Mile	Bank	Burrows	LocName	Ownership
233.3	L	443	Craine Orchards	Private
236.4	R	357	Mooney Unit	USFWS
231.2	L	160		
230.7	R	4	Flynn Unit	USFWS
226.4	R	762		Private
224.9	L	316		Private
221.6	L	733		Private
218.8	L	155	Woodson SRA	CDPR

212.2	L	1046		Private
211.1	R	888	Foster Island Unit	USFWS
210.3	L	308		Private
208.8	R	90		Private
205.3	R	43	GCID	
205.4	L	813		Private
202.6	L	26	Wilsons Landing Unit	CDFG
201	R	180	McIntosh Landing South Unit	USFWS
198.8	L	773	Pine Creek Unit	USFWS
195.4	L	68	Pine Creek East Unit	CDFG
194.9	R	412	Pine Creek West Unit	CDFG
191.9	L	23	maybe M and T	
189.6	R	942	mitigation site for RM 182	Private
187.5	R	108	Shannon Slough Unit	CDFG
184.9	L	252	Dead Mans Reach Unit	USFWS
182.5	L	2533	Llano Seco Riparian Easement	Private
181.3	R	680	Jacinto Unit	CDFG
175	L	427	Hartley Island (TNC), Oxbow Unit (CDFG), Llano Seco Unit (USFWS)	TNC,CDFG, USFWS
173.9	R	125		Private
172.5	R	841		Private
172.1	L	13		Private
171.2	R	172	Beehive Bend Unit	CDFG
170.3	L	394		Private
168.3	R	205	Gaines	Private
166.4	L	123	Afton Unit	USFWS
166	R	28	Princeton North Unit	CDFG
164.9	L	474	Drumheller North Unit	USFWS
162.7	L	106		Private
161.9	R	93	Princeton South Unit	CDFG
161.6	L	80		
158.1	L	103		
156.6	R	129		Private
156	R	269	Moulton Weir South Unit	CDFG
155.5	R	250	Moulton Weir South Unit	CDFG
154.8	R	58	Moulton Weir South unit	CDFG
154.7	L	41		Private
154	R	91		Private
146.5	L	66		Private
145.6	L	48		Private
144.8	R	8		Private

* Exact locations will change in each year's survey, due to colony shifts and river migration

Sacramento River, Colusa to Feather River confluence

With multi-office, multi-agency cooperation we were able to survey this reach during the 2009 survey, although it is outside the usual annual survey area (because of time constraints and because in the past it has yielded a lower number of burrows). Below the 2009 numbers are compared to 2008 projections for the reach, which were based on the last actual survey of the reach during 2000.

	Number of Burrows		
River Mile	**2008 estimated:**	River Mile	**2009 actual:**
ca. 131.5	80**	130.9 L	84
ca. 130.0	290**	130.2 R	248
ca. 129.0	90**	129.3 L	28
ca. 128.0	140**	128.3 L	84
		125.7 L	142
		121.4 R	62
		116.7 L	179
		116.5 L	11
ca. 100.0	190**	100.4 L	200
		87.6 L	126
ca. 87.0	130**	86.9 L	inactive
ca. 83.0	20**	82.9 R	200
ca. 82.0	120**		
TOTAL	1060 burrows		1361 burrows

**Estimated from the 2000 survey

While the number of burrows in this reach may appear to have increased about 30%, too much should not be made of this since the 2008 “data” are an extrapolation and not from an actual survey.

In some areas in this reach, active burrows were observed within 0.5 m of the waterline on June 11, 2009, within the wave-wash zone from passing boats.

Lower Feather River (contributed by Ryan Martin, DWR)

Survey results from the June 9-10, 2009 Feather River bank swallow survey showed a drop in overall population estimate for bank swallows using the Feather River system. The June 2009 survey counted **20 colonies** with **2808 burrows**, representing an estimated 1263 bank swallow pairs. This is an overall population decrease of 26 percent from 2008.

River Mile	River Bank	Burrows
55	L	308
47.3	L	32
46	L	110
45.6	R	140
44.8	L	239
44.3	R	393
43.5	L	249
40.2	R	111
37.7	L	188
34.3	L	311
31	L	23
25.8	R	43
25.6	R	33
20.7	R	129
19.4	L	15
16.3	R	158
15.2	L	6
14.2	L	87
12.8	R	52
11.5	L	183

A trend of decreasing colony size continued with an average colony size during 2009 of 140 burrows, versus 151 burrows average per colony during 2008.

Other colony locations noted

While not part of the formal survey, on June 18, 2009, DFG biologists noted five bank swallow colonies in Shasta County, as follows (P. Bratcher, personal communication):

1. near Fall River in the town of Fall River Mills (DFG land): 131 burrows; adults and chicks
2. ~½ mile W of Highway 299 at Hat Creek : 237 burrows; 1 pair observed
3. ~1 mile WNW of Highway 299 at Hat Creek : 390 burrows; adults
4. Another colony roughly 0.1 mile from number 3 above: 990 burrows; adults. Active sand mining ongoing at this site.
5. Pit River/upper end of Lake Britton: 7 burrows

Some of these locations were upland, non-riparian sites, but all were within ½ mile of a permanent watercourse.

2009 BANK SWALLOW SURVEY RESULTS SUMMARY

Sacramento River

Red Bluff to Colusa: total colonies counted = **48** Total burrows = **16,260**
Redding to Red Bluff: total colonies counted = **5** Total burrows = **1,160**
Colusa to Feather R.: total colonies counted =**11** Total burrows = **1,360**
Survey Total Colonies = **64** Survey Total Burrows = **18,180** (rounded)
Average Burrows per Colony = **290** (rounded to nearest 10)
Assumed burrow occupancy rate = **0.45**
2009 Estimated Number of Pairs (0.45 x 18,180) = **8,180** (rounded to nearest 10)
2008 Estimated Number of Pairs = **9,060**
2007 Estimated Number of Pairs = **9,070**
Population trend = **DOWN 10** percent from 2007-8; **DOWN 38** percent from 1986 baseline of **13,170** pairs.
2009 Colony count (**64**): **DOWN 11** percent from 1986 (**72**).
Average colony size has **Decreased** from **410** burrows/colony in 1986 to the current **290** burrows/colony (**71** percent of baseline figure).

Feather River

Thermalito outlet to mouth: total colonies = **20** Total burrows = **2808**
Average Burrows per Colony = **140** (rounded to nearest 10)
2009 Estimated Number of Pairs = **1,260**

Adding the Feather River to the Sacramento River totals for 2009, the combined estimated number of pairs was 9440, with the Sacramento comprising **87** % and the Feather **13** % of the combined population. A caveat to remember is that this survey falls outside the standard Sacramento River population survey, and does not represent an increase in that population estimate.

The 2009 Feather River estimate of 1260 pairs **declined** from 2008 and 2003 estimates of 1700 and 1620 pairs, respectively, and is **less than half** of a 1988 Feather River estimate of 2970 pairs.

2009 Sacramento River Reach Data (annual survey core is RM 144-243)

River Reach	Burrow Count Summary (avg. figures rounded to nearest 10):			
RM 244-295	1,157 burrows	5 cols.	Avg. =	230 burrows per col.
RM 200-243	6,324 burrows	16 cols.	Avg. =	400 burrows per col.
RM 169-199	7,763 burrows	15 cols.	Avg. =	340 burrows per col.
RM 144-168	2,172 burrows	17 cols.	Avg. =	130 burrows per col.
RM 80-143	1,361 burrows	11 cols.	Avg. =	120 burrows per col.
Totals:	**18,777 burrows**	**64 cols.**	**Ave. =**	**290 burrows per col.**
Core:	**16,259 burrows**	**48 cols.**	**Ave. =**	**340 burrows per col.**

Summary of past 14 years of Sacramento River Bank Swallow Survey Data (Redding to Verona)

Year	Burrow Count	Pair estimate	Number cols.	Ave. Col. Size
1996	**12,820**	**5,770**	**52**	**250**
1997	**11,540**	**5,190**	**52**	**220**
1998	**11,090**	**4,990**	**42**	**260**
1999	**18,250**	**8,210**	**57**	**320**
2000	**20,470**	**9,210**	**46**	**450**
2001	**21,520**	**9,680**	**51**	**420**
2002	**18,500**	**8,330**	**57**	**320**
2003	**21,300**	**9,590**	**61**	**350**
2004	**19,410**	**8,730**	**56**	**350**
2005	**16,390**	**7,380**	**52**	**300**
2006	**Survey aborted after 6 colonies counted, due to boat problem**			
2007	**20,150**	**9,070**	**51**	**400**
2008	**20,140**	**9,060**	**65**	**310**
2009	**18,780**	**8,180**	**64**	**290**

SUMMARY AND DATA INTERPRETATION

Results of the 2009 bank swallow population survey on the Sacramento River indicated a decline in estimated pair numbers, of about 8 percent within the core survey reach (Red Bluff to Colusa) and apparently higher in outlying areas (Redding to Red Bluff; lower Feather River), with an overall decline of 10 percent. Before 2009, with the exception of a dip in 2005, the count on the Sacramento River hovered in the vicinity of 9,000 pairs from about 1999 to 2008. Last year's report suggested that bank swallow recovery in California survey area was stalled at about 9,000 pairs. The 2009 decline is a step in the wrong direction, and although causes are unknown, is an indication that conditions impairing the species' recovery remain. The most obvious significant impairment is bank-protection modifications preventing use of many miles of habitat along the Sacramento River, and other state rivers.

Average colony size was approximately 290 burrows during the 2009 Sacramento River survey. Only 2 of 64 colonies had 1,000 burrows or more. Nine colonies had 500-1000 burrows . Large (1000+ burrows) colonies may indicate general health of the population and function as breeding centers to re-populate former range. However, they represent a potentially risky concentration of the population at a small number of sites; for example, some of these colonies could be threatened by bank protection work. We need not only big colonies but many of them to increase the population toward recovery levels of approximately 50,000 pairs.

The bank swallow population still is threatened by activities that reduce its habitat. New bank protection sites continue to be planned and implemented on the Sacramento River. Cumulative effects of progressive bank armoring have been to severely curtail available habitat on the Sacramento River for the bank swallow and other species. Armoring also contrains options for habitat restoration and recovery of the bank swallow. Many colonies in this year's survey were located on Sacramento River National Wildlife Refuge lands and are thus afforded a measure of security and protection. Additional colonies are located on State lands of the Department of Fish and Game. However, a large number of colonies still exist on other lands and are not protected from habitat alteration due primarily to bank protection.

The status of the bank swallow population remains of concern. This is particularly true since the population declined noticeably in 2009 and has not shown any substantial sustained growth since 1999. Annual monitoring of the species should continue. According to the Population Viability Analysis we conducted on this species in 1992, bank swallows on the Sacramento River continue to be in danger of further population declines or eventual extirpation. The trend of government and privately financed bank protection, and other bank stabilization and erosion control projects, if they continue to impact nesting habitat, could further degrade the population status of the bank swallow in California. Overall, the bank swallow's depleted conservation status underscores the need for stronger measures to protect and restore the species and its habitat.

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LITERATURE CITED

Garrison, B. A., J.M. Humphrey, and S. A. Laymon. 1987. Bank swallow distribution and nesting ecology on the Sacramento River, California. Western Birds 18:71-76.