A.3 BANK SWALLOW (*RIPARIA RIPARIA*)

photo courtesy Carol Davis

A.3.1 Legal and Other Status

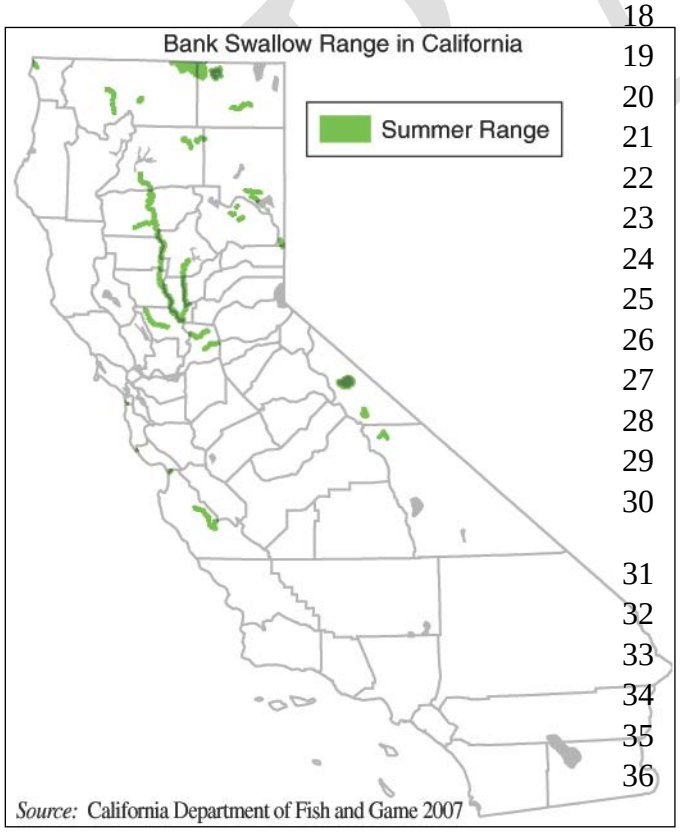
The bank swallow (*Riparia riparia*) is listed as a threatened species under the California Endangered Species Act. The bank swallow has no federal regulatory status.

A.3.2 Species Distribution and Status

A.3.2.1 Range and Status

The bank swallow occurs throughout most of the northern United States, Canada, and Alaska, with a disjunct breeding population in southern Texas and northern Mexico (Garrison 1999). In California, the species historically occurred as a localized breeder along coastal areas and rivers in central and Southern California (Grinnell and Miller 1944). Most Southern California populations are now considered extinct and only a few central California populations remain extant. Southern and central California extirpations were due to channelization and other modifications of rivers and streams that disrupted the natural hydrological conditions responsible for creation of suitable banks for nesting.

Currently, the species is a locally common to uncommon breeding season resident in portions of northern and central California (Garrison 1999). Breeding distribution is primarily a function of the presence of alluvial soils suitable for nesting. As a result, breeding areas within the current range of the species are widely dispersed throughout Northern and central California in major lowland valleys and coastal areas where these conditions still exist. An estimated 75 percent of California's breeding population is confined to the Sacramento and Feather Rivers and their major tributaries from their confluence north to Redding along the Sacramento River and northeast to Oroville along the Feather River.



Source: California Department of Fish and Game 2007

Laymon et al. (1988) reported a total of 111 colonies (including 66 [59.4 percent] along the Sacramento River and 18 [16.2 percent] along the Feather River) and consisting of 45,045 burrows (an index of population abundance) during surveys

conducted in 1987. Since then, populations have reportedly decreased, apparently due to ongoing bank stabilization projects along the Sacramento River and elsewhere (Schlorff 1995). Schlorff (1995) reported a 42 percent decline in the number of active colonies and a 44 percent decline in the number of burrows along the Sacramento River between 1986 and 1994. Since 1994, the number of active colonies reached a reported decline of 62 percent in 1998, followed by a recovery to approximately 1994 levels the following year and resulting in a recommendation to reclassify the species as state endangered (Hight, pers. comm.).

A.3.2.2 Distribution and Status in the Plan Area

Humphrey and Garrison (1987) report 17 colonies along the Sacramento River within or immediately adjacent to the Plan Area (nine on the eastern bank and eight on the western bank). Hight (pers. comm.) indicates an estimated 47 percent reduction in the number of colonies in this area between 1986 and 1994, followed by a gradual increase through 1999 when the number was similar to that found in 1986. Colony size (as number of burrows) in this stretch of the Sacramento River ranged from 21 to 3,192 in 1986 (Humphrey and Garrison 1987) for a total of 8,982 burrows supporting an estimated 5,019 breeding pairs. Hight (pers. comm.) reports an estimated 27 percent decline in the number of burrows along this stretch between 1986 and 1999, indicating that while the number of colonies rebounded to near 1986 levels, the number of burrows per colony decreased.

Laymon et al. (1988) also report 23 colonies along the Feather River between the confluence with the Sacramento River and Oroville. Several of these colonies occur within the Plan Area and are considered extant. Despite an apparent continuing decline in local populations, the Butte County stretch of the Sacramento and Feather Rivers remains a key area for the bank swallow nesting population in California. California Natural Diversity Database (CNDDB) occurrences are shown in Figure A-3.

The species is on its breeding grounds from late March through mid-August and is absent from the state between September and February.

A.3.3 Habitat Requirements and Special Considerations

Bank swallow nesting colonies only occur in vertical banks or bluffs of friable soils (e.g., sandy loam soils) suitable for burrowing. Banks or bluffs must be at least 3 feet tall to deter predators. Suitable soil characteristics are typically maintained through bank erosion, and some source of continual erosion is almost always present where colonies occur. Thus, most colonies occur along rivers, streams, lakes, and ocean coasts; however, the proximity to water is a function of the presence of alluvial soils, the erosive action of water, and because these sites often afford greater vertical flying space around nesting burrows (Hjertaas 1984).

The size of breeding colonies is also varied depending on site characteristics and range from 5 to over 3,000 pairs. Larger colonies, which are generally associated with larger banks, tend to persist longer than smaller colonies (Garrison 1999).

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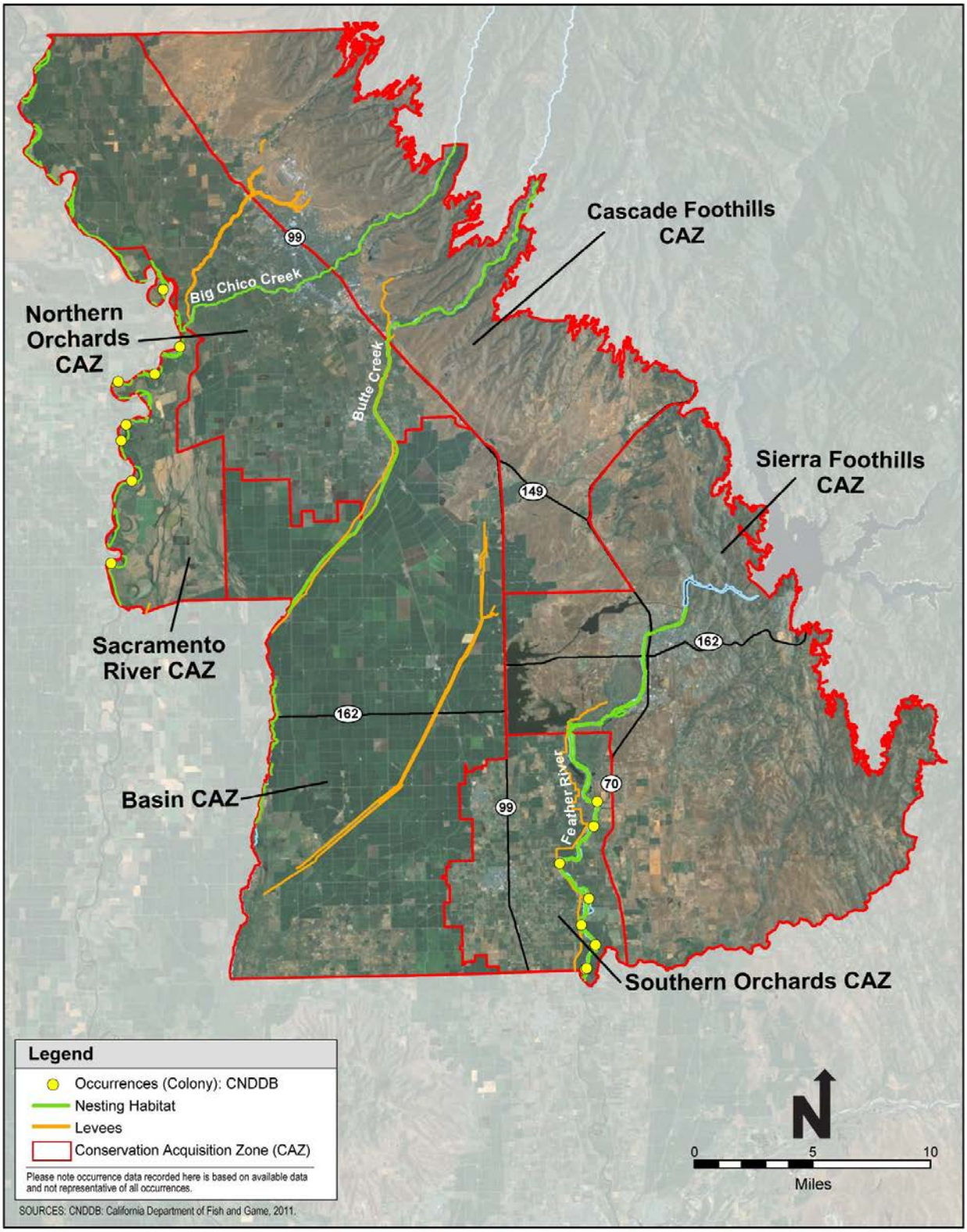

Figure A-3. Bank Swallow Modeled Habitat and Recorded Occurrences

Vegetation associated with breeding sites is varied because breeding sites are selected primarily for the suitability of the nesting bank (Garrison 1999).

The vertical faces of banks and bluffs are typically devoid of vegetation around nesting burrows, but the vegetation surrounding the colony varies depending on location. Garrison (1989) determined that soil type, height, and slope are the primary factors determining whether sites will be used for nesting and that specific vegetation communities were not factors used in site selection.

Most colonies are associated with lowland vegetation types such as riparian forests and coastal grasslands; however, the few higher elevation colonies are associated with coniferous forests or desert shrub habitats. Most extant colonies in California, particularly those occurring along the Sacramento and Feather Rivers, are associated with narrow bands of riparian forests dominated by willow (*Salix* spp.) and Fremont cottonwood (*Populus fremontii*). These sites occur in association with cultivated croplands, including irrigated row crops, grain crops, and orchards. Garrison (1999) notes that bank swallows generally nest in 40 to 60 percent of the total number of banks that are suitable for nesting in any given year along the Sacramento River, and suggests that bank swallow populations may require some habitat surplus in order to remain viable over the long-term.

A.3.4 Life History

A.3.4.1 Seasonal Patterns

Bank swallows begin arriving on their North American breeding ground in late March to early April. Nesting occurs between April and July. Breeding colonies are generally devoid of swallows by late July to mid-August, coinciding with juvenile dispersal. Fall migration occurs from August to mid-September. Swallows are at Central and South American wintering grounds from approximately October through February. Spring migration occurs from approximately mid-March to early May.

A.3.4.2 Nest Site Selection

Nest sites are selected on the basis of soil type, slope, and height. Soils must be friable for burrowing, slopes are generally vertical, and, along the Sacramento River, the height of vertical banks at nesting colonies is 10 feet (Humphrey and Garrison 1987). Once a suitable site is selected, nesting burrows are dug into the friable soils. Most burrows are typically in the upper one-third of the bank – likely for predator avoidance purposes – and burrows are dug parallel to the ground surface. Average burrow length at Sacramento River sites was 24.2 inches (Humphrey and Garrison 1987). The nest cavity is at the terminal end of the burrow and at the same level as the burrow floor (Hickman 1979 in Garrison 1999).

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A.3.4.3 Reproduction

Clutch size averages four to five eggs. Females do most of the incubation, which averages 13 to 15 days. Following hatching, young remain at the nest from 18 to 21 days before fledging.

A.3.4.4 Foraging Behavior and Diet

Bank swallows forage almost exclusively on flying or jumping insects. While occasionally taking food on the ground, aerial foraging is the primary mode of food capture. Foraging generally occurs within 650 feet of the colony – often over water – but also over agricultural fields and other upland sites.

A.3.5 Threats

Available bank swallow nesting habitat was substantially reduced in California due to channelization of streams. This practice eliminated nesting habitat and prevented formation of new nesting habitat by preventing natural erosional processes. Along the Sacramento and Feather Rivers and other Sacramento Valley nesting areas, the most significant current threat is the direct loss of suitable colony sites due to continuing bank protection and flood control projects (Garrison et al. 1987). Bank protection projects are designed to stabilize banks and prevent bank erosion by engineering banks to a 2:1 or 3:1 slope of length to height and placing riprap (boulder-sized rock) on the new slope. This practice eliminates the nesting habitat, and over time has reduced and continues to reduce available bank swallow nesting habitat along the Sacramento and Feather Rivers and their tributaries.

A.3.6 Relevant Conservation Efforts

Creation of vertical banks in friable sandy soils and road cuts can benefit bank swallow if large rocks (rip-rap) are not placed on the slopes. Artificial banks and enhanced natural banks were built along Sacramento River to mitigate loss of colony sites from flood control projects (Garrison 1991). They provided some initial success in that bank swallows occupied artificial and enhanced sites for a few years following construction, where nestlings were produced at levels similar to natural sites. However, these colonies were abandoned after 3 years because maintenance activities such as vegetation removal and bank maintenance were conducted on the sites, thereby rendering them unsuitable as bank swallow habitat (Garrison 1991).

Habitat enhancement is feasible, but the sites must be maintained to ensure suitable quality of artificial banks. Habitat enhancement is currently considered inappropriate for the long-term maintenance of bank swallows because maintenance, such as excavation with hand tools, is costly to maintain and monitor over time (Garrison 1991, Schlorff 1992).

A recovery plan written for bank swallow in California proposed long-term strategies to preserve habitat including developing set-back levees and a riverine meander-belt, preserving major portions of remaining habitat, and developing reach-by-reach habitat maintenance strategies

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based on the results of a population analysis of the Sacramento River population outlined in the recovery plan (Schlorff 1992).

The population of bank swallows inhabiting the Sacramento River and its major tributaries are the core of the state's population. Therefore, these areas provide the most important habitat for the long-term maintenance and recovery of bank swallows (Schlorff 1992). The population analysis in the recovery plan (Schlorff 1992) indicated that "the risk of low numbers in some years was substantial for the Sacramento River bank swallow population and, under most modeled conditions, was considerably higher than the risk of near local extinction."

The bank swallow is a covered species or a proposed covered species in several regional conservation plans in the Central Valley region of California. These include the Placer County Conservation Plan, the San Joaquin County Multi-Species Habitat Conservation and Open Space Plan, the Natomas Basin Habitat Conservation Plan, the Yolo County Natural Heritage Program Plan and the Bay Delta Conservation Plan.

A.3.7 Species Habitat Suitability Model

A.3.7.1 Nesting Habitat

Nesting habitat for the bank swallow includes banks that are within the Plan Area that are located along unleveed and unchannelized portions of the following waterways:

- Sacramento River;
- Feather River;
- Big Chico Creek; and
- Butte Creek.

In addition, banks of the waterways listed above were included in the model where levees are set back at least 50 feet from the channel banks.

A.3.7.2 Assumptions

Bank swallow nesting colonies occur only in vertical banks or bluffs of friable soils (e.g., sandy loam soils) that are suitable for burrowing (Humphrey and Garrison 1987). Suitable soil characteristics are typically maintained through bank erosion, and some source of continual erosion is almost always present where colonies occur; thus, most colonies occur along rivers, streams, lakes, and ocean coasts (Humphrey and Garrison 1987). Channelization of streams, as well as bank stabilization and flood control projects lead to direct loss of suitable colony sites (Garrison et al. 1987). Given these habitat preferences and constraints, suitable nesting habitat in the Plan Area is defined as banks along unleveed and unchannelized portions of the Sacramento and Feather Rivers, and of Big Chico and Butte Creeks. Levees setback from channels at least 50 feet (as measured from the channel bank to the centerline of the levee) were also assumed to

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support nesting habitat because they likely have enough floodplain material and space to allow for meandering and natural river processes to occur. These areas were therefore included in the model as nesting habitat for the bank swallow. Known occurrences are present along both the Feather and Sacramento River, while no known occurrences are present along either Big Chico or Butte Creek (CNDDB 2007).

A.3.8 Recovery Plan Goals

A recovery plan was prepared by the California Department of Fish and Game in 1992 (Schlorff 1992). The primary recovery goal for the bank swallow is the maintenance of a self-sustaining wild population. No numerical or population goals are provided. Objectives are to ensure that: (1) the remaining population of this species does not suffer further declines in either range or abundance; and (2) sufficient habitat is available to ensure that the species will be able to survive as a member of California's avifauna.

A.3.9 References

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Personal Communications

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