The California Department of Fish and Wildlife Statewide Bank Swallow Colony Inventory Survey Methods

Survey Year 2021

About: This document was prepared in coordination with the Bank Swallow Technical Advisory Committee (BANS-TAC). Many of the definitions and basic colony survey methods illustrated in this document were developed by members of the BANS-TAC.

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Cover photo by Henry Lomeli, CDFW

Introduction and Background

Bank swallows (*Riparia riparia*) are a California threatened species that build burrows in friable, erosive soils generally along lowland rivers and coastal bluffs. Colonies can also be found, to a lesser extent, in coastal dunes, mid-elevation mountain meadows, abandoned stream channels, quarry sites, road cuts, and along lakeshores and reservoirs. Annual counts along the Sacramento and Feather rivers have indicated a steady decline in bank swallow populations, largely due to bank stabilization activities. Little information exists about the status of bank swallow ("BANS") populations outside the Sacramento and Feather rivers since the last statewide population assessment conducted in 1987. Thus, the California Department of Fish and Wildlife (CDFW) plans to conduct a statewide survey for BANS during the spring and summer months of 2021, with assistance from its bank swallow conservation partners. The goals for this project are:

1. Estimate the statewide breeding population size.
2. Determine the current distribution of BANS within the state of California.
3. Identify current threats to BANS populations.
4. Develop a long-term monitoring plan.

The procedures outlined in this document pertain to the 2021 survey year and are intended to accomplish the following objectives:

1. Locate active colonies to determine the statewide distribution of BANS.
2. Conduct burrow counts and develop a population estimate that is comparable with the 1987 surveys.

All documents and related information for the 2021 Statewide Survey can be found on the Bank Swallow Technical Advisory Committee (BANS-TAC) website under the Statewide Survey tab: https://www.sacramentoriver.org/bans/index.php?id=statewide.

Definitions and Identification

Before conducting a BANS survey, it is necessary to understand the terms and identifying characteristics related to BANS. Information provided in this section was compiled from Golet et al. (2017) and is presented here for surveyor reference, and to highlight any deviations in terminology. Surveyors should also read the "Required Reference Materials" located on the BANS-TAC website under the 2021 statewide survey tab to gain a better understanding of BANS related terminology and characteristics. The Required Reference Materials include:

- Golet et al., 2017., Bank Swallow Survey Methods for the Sacramento and Feather Rivers.
- Bank Swallow ID Quick Reference
- Identification and Survey Techniques PowerPoint

Swallow Identification: In general, swallows are small agile birds that can be difficult to distinguish in flight; however, only northern rough-winged swallows closely resemble BANS (note: juveniles tree swallows may also resemble BANS). Both species are a brown, drab color, which sets them apart from other adult swallow species. Table 1 provides a comparison between BANS and northern rough-winged swallows; however, for additional information, surveyors should refer to field guides and online resources, including the identification materials provided on the BANS-TAC website.

Table 1. Identifying characteristics of bank swallows and northern rough-winged swallows.

	Bank Swallow	**Northern Rough-winged Swallow**
Appearance:	Brown with white underparts and a *thick brown band across the chest*. Head is brown with a white chin. Slightly forked tail.	Entirely brown above with a dingy throat and *chest that fades to white*. Square tail. Slightly larger than BANS.
Nesting Habit:	Colonial nester "in bare or nearly bare, near-vertical banks."[3] Excavate burrows or reuse burrows from previous year.[3]	Nest singly or in small groups on "near-vertical banks" in burrows created by other animals, including bank swallows.[2] Can also use crevices.[2]
Burrows:	Typically, oval in shape, about 3 inches wide and 2 inches tall.[3] Organized along favorable strata.[3]	Burrows are variable in size and shape and when found in groups, are less organized than bank swallow burrows.[2]

Colony: "Colonies are typically clusters of burrows in bare or nearly bare, near-vertical banks; usually with more than 30 holes (but can have as few as 2 and more than 3,000), often somewhat horizontally arrayed along favorable strata. Burrows may be evenly dispersed throughout the length of the colony or may be more sporadic with different densities of burrow numbers within the colony length. Burrows within 0.10 miles of each other are considered part of the same colony unless marked by a significant natural break (e.g. tributary)."[3] Colonies are classified as either active or inactive:

- Active – At least one BANS is observed using a burrow in the colony. Burrows typically look fresh.[3]
- Inactive – BANS are not immediately apparent at the colony and additional observation time does not detect BANS at the colony.[3]

Burrow: Typically, oval in shape, about 3 inches wide and 2 inches tall; however, size and shape can vary.[3] Entrances may become eroded, or predators may attempt to raid the nest, in which case, the entrance may become "larger, rounded, and even taller than wide."[3] Golet et al. (2017) uses the terms "active" and "inactive" when categorizing burrow use; however, these can be easily confused with the active and inactive categories used for colonies. Instead, this protocol will use the following terms to describe burrow use:

- Fresh/potentially occupied ("Active") – Burrows "are clean and well-maintained and may have whitewash or guano at the entrance. Burrows appear inky black, because they are deeply dug, and in general they have a smooth, uniform appearance. They may have claw marks associated with them, either faint tiny swallow marks at the burrow entrance, or deeper marks of predators that attempted to dig out the burrows to prey on young and/or eggs."[3] Multiple burrow entrances may merge to create a single large entrance. Look closely to identify individual chambers within these large openings. Also, look for nesting materials, such as grass, feathers, and eggshells, at burrow entrances that have eroded back to the nest cup.
- Old ("Inactive") – Burrows "often appear rough or craggy and lack scrape marks and whitewash. They may appear grayish because they are shallow, incompletely dug or collapsed. Spiderwebs may crisscross burrows and should not be confused with root fringes which may occur at the edges of occupied burrows."[3]

Methods

There are existing protocols for monitoring BANS in California, including the previously mentioned Sacramento and Feather River Survey Methods (Golet et al., 2017) and a draft protocol for non-riverine/upland sites (Bratcher, unpublished). Both protocols provide detailed information for conducting BANS surveys; however, due to minor nuances, neither of these protocols will work perfectly for this project. The methods described in this document are intended to provide surveyors with a standardized method of conducting surveys for the purpose of this study. The colony inventory methods described later in this document were developed using a combination of techniques from both existing protocols. Surveyors should review Golet et al. (2017) because it contains valuable information about collecting BANS data and provides a detailed description of conducting surveys from a boat in riverine environments, which the following methods do not cover.

Survey Areas and Registration

Survey areas were identified using ArcGIS, aerial imagery, and basic knowledge of BANS habitat. These areas include major lowland river systems, coastal bluffs, coastal river mouths, lakeshores, reservoirs, and some mountain streams. The identified areas are not a comprehensive representation of potential BANS habitat, and surveyors should assess any additional potential habitat observed during the surveys. Areas that have been identified as high priority are areas that were surveyed in 1987 and should be prioritized over other areas if resources are limited (Figure 1). When surveying a watercourse, abandoned channels of that watercourse should be included in the survey if there is a high likelihood that persistent banks exist within the abandoned channel.

Survey areas vary widely in size, and in some cases, it will be necessary to divide the survey area among multiple surveyors. Only one surveyor can register for a survey area, but that person can coordinate additional surveyors to assist with the surveys as needed. The registered surveyor will be referred to as the primary surveyor throughout this document. Primary surveyors should document the names and backgrounds of participating surveyors on the Surveyor Background form (see Appendix A) and submit this form at the end of the field season

(see Data Submission, p. 11). Prior to conducting surveys, all non-CDFW participants are required to complete a volunteer form and email this form to project staff (see contact list on the BANS-TAC website). State employees that conduct surveys on their personal time must also complete a volunteer form. Volunteer forms are located on the BANS-TAC website. To view and register for survey areas, please use the statewide survey BANS map viewer and sign-up page found on the BANS-TAC website:
https://www.sacramentoriver.org/bans/index.php?id=statewide

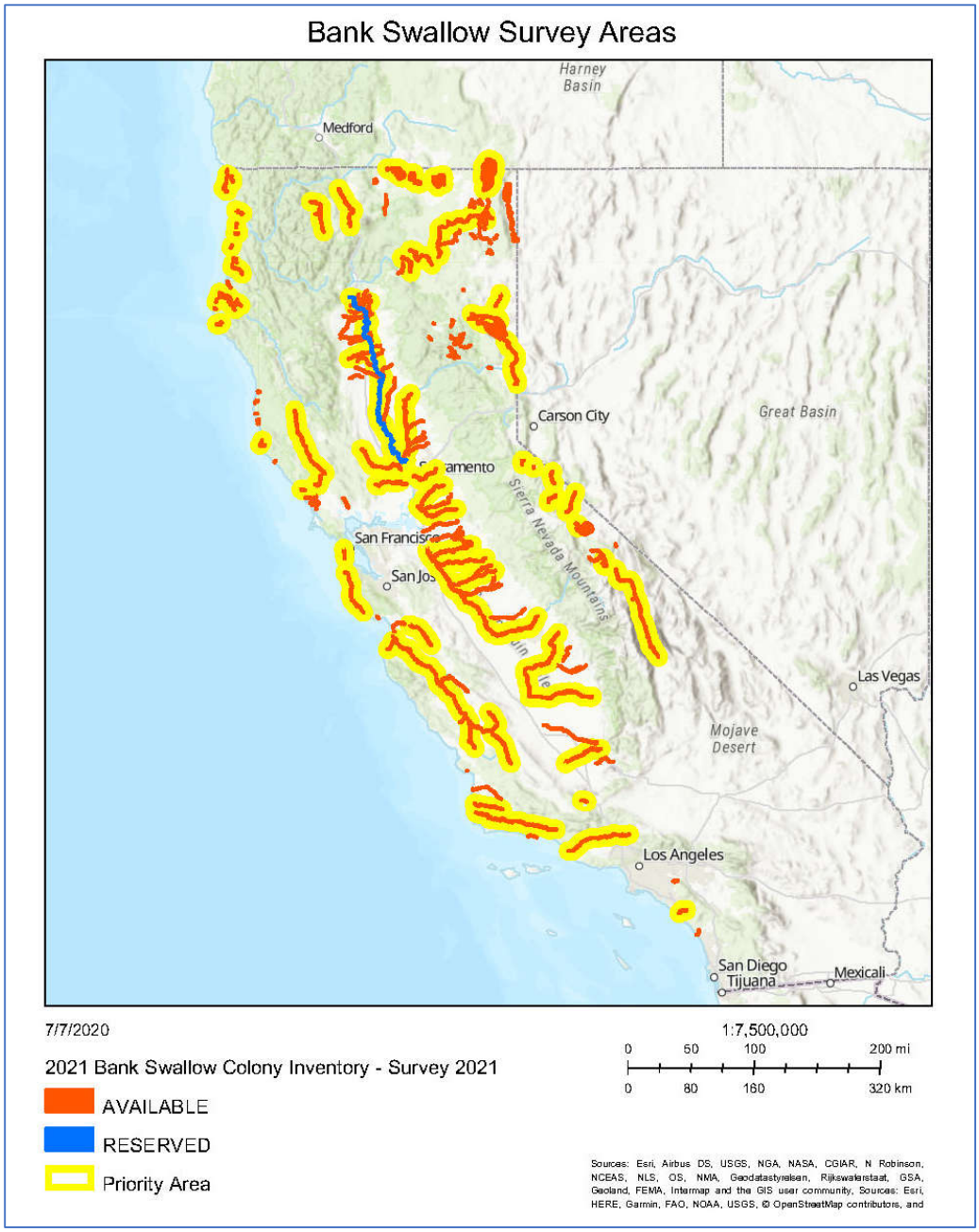

Figure 1. Potential bank swallow survey areas for the 2021 California bank swallow colony inventory. Features highlighted in yellow represent areas that were surveyed during the previous statewide inventory in 1987. Blue and Orange indicate whether the survey area has an assigned surveyor. This map can be viewed with the BANS map viewer located on the BANS-TAC website.

Survey Timing

The survey period for the 2021 season is April 27 to July 1; however, surveyors are strongly encouraged to complete surveys between May 1 and June 15. This survey window has the highest probability of detecting BANS at a colony, despite spatial variation in breeding activity.

Conducting Surveys

Surveys will be conducted in suspected suitable BANS habitat throughout California. There are two types of data collected during the surveys: data related to survey areas, and data related to BANS colonies. Record data related to survey areas on the Survey Log datasheet and record data related to BANS colonies on the Colony Inventory datasheet (see Appendix A). Surveys can be conducted by any of the following means: motorboat, kayak, vehicle, on foot, or desktop assessment (see method of survey, p. 6). A desktop assessment can be useful for planning surveys; however, we will also consider it a method of survey for areas that are difficult to access due to private property. Where private property limits survey access, surveyors should use aerial imagery to assess and document habitat within private property, recording relevant information in the survey log (see p. 6). If suitable habitat in the form of well-defined banks is identified from aerial imagery, contact the appropriate regional BANS coordinator listed on the contact list to coordinate property access. The contact list can be found on the BANS-TAC website. See Property Access on page ten for additional details. Once property access has been granted, field surveys can proceed.

Survey Log

Completing a survey area may take several days and may require help from additional surveyors. Therefore, it is important to document each survey effort, including who conducted the survey, when the survey occurred, what areas were surveyed or not surveyed, and where potential habitat exists, even if BANS are not found. This will provide a detailed account of each survey area from start to finish. Use the Survey Log to document survey progress and general observations about habitat. Maintain separate Survey Logs for separate survey areas. It is highly recommended that copies of the Survey Log are made after each outing to minimize the chance of losing data. Instructions for completing the survey log are detailed below:

Survey Area: Record the name of the survey area. Example: “Sacramento River” or “Lake Britton.”
Primary Surveyor: Name of the person that registered for that specific survey area. Do not list the names of observers. That will be recorded in a different location.
Counties: List the counties where the survey area (i.e. watercourse, lake, etc.) is located.
Habitat Type: Record the habitat type using the following categories: watercourse, natural waterbody, reservoir, coastal bluff, dune, or other (describe).
Date: Record the date when that portion of the survey area was surveyed.
Observer(s): Record the names of the observers that were involved with the survey on that day. The number of surveyors can vary from 1 to 4 depending on the habitat and method of survey

(see method of survey below). Note that burrow counts are conducted differently if there are 1 versus 2 observers (see Colony Inventory, Burrows, p. 8).
Weather: Record the daily temperature, cloud cover, wind speed, and precipitation. This information can be gathered from online resources.
Start: Record the start time and coordinates using latitude and longitude in decimal degrees.
End: Record the end time and coordinates using latitude and longitude in decimal degrees.
Method of Survey: The method of survey will be dictated by the habitat type, terrain, and property access.

- Boat – Surveys conducted from a motorized vessel are applicable in larger rivers or lakes (require 3 to 4 observers for safety and boat operation). Surveys should be conducted traveling in the downstream direction when applicable.[3]
- Kayak – Surveys conducted from a non-motorized vessel are applicable in smaller rivers or lakes (require 2 observers for safety). Surveys should be conducted traveling in the downstream direction. [3]
- Vehicle – Surveys conducted from a vehicle are applicable when a road parallels a watercourse or lakeshore (can be completed with 1 observer).
- On Foot – Surveys conducted on foot are applicable with smaller streams located on private property, in remote areas with few roads, or along the coast (can be completed with 1 observer).
- Desktop – A desktop review of aerial imagery is applicable for areas that are difficult to access due to private property. Some survey sections may be identified as unsuitable habitat due to the level of stream channelization or other anthropogenic impacts. If this is the case, record start and end coordinates as determined by google earth, record why the section was determined to be unsuitable, and include any additional notes. If suitable bank habitat is identified from aerial imagery, contact the regional coordinator about private property access permissions (see p. 10). Refer to training materials on the BANS-TAC website for more information about identifying habitat from aerial imagery.
- Not Surveyed – Due to property access issues, it may not be possible to survey some reaches or stretches of shoreline that contain otherwise good quality habitat. In this case, fill out a record in the survey log, record the start and end coordinates, and describe why this section was not surveyed.

# of Observed Colonies: Record the number of active and inactive colonies that are observed during the survey of each reach (see Definitions and Identification, p. 2).
Notes: Record the percent of the area surveyed that contains suitable habitat for BANS to burrow and nest. In general, suitable burrowing habitat is described as a vertical bank face with sandy, loamy, or otherwise friable, fine soil for burrowing. Soils with larger particle sizes are too difficult for burrowing and are not conducive to burrow construction. In addition, provide details about survey logistics, note dominant shoreline vegetation (particularly if vegetation consists of invasive species), and note anthropogenic impacts and surrounding land use.

Colony Inventory

During the survey, record the location of every colony encountered and collect information about the colony using the Colony Inventory datasheet. This data will provide a statewide population estimate that can be compared to the 1987 surveys. When a colony is encountered during a survey, follow these general procedures:

1. Record the time of arrival at the colony
2. Determine colony status as either active or inactive (see Colony Status, p. 8)
3. Estimate the number of adult BANS observed at the colony
4. Record all other colony data
5. Confirm colony status as either active or inactive (see Colony Status, p. 8)
6. Record the end time

Instructions for collecting colony data are detailed below:

HEADER

Date: Record the date.
Observers: Record the names of the observers.
Weather: Record the percent of cloud cover, the wind in miles per hour, and the type of precipitation at the time of the survey (none, mist, light rain, heavy rain, snow, hail).
Start and End Time: Record the time of arrival at the colony and the time of departure from the colony.

COLONY LOCATION

Survey Area: Record the name of the survey area and county that the colony is located within.
Riverbank: Record whether the colony is located on the left or right side of the stream when facing downstream. Not applicable (NA) to colonies located in other habitats.
Coordinates: When facing the colony, record the coordinates on the left and right ends of the colony using latitude and longitude in decimal degrees.
Photo #'s: Take pictures of every colony encountered and document the photo numbers. After returning from the field, download the photos and label each photo with the appropriate colony coordinates (for consistency, use the coordinates from the left side of the colony). If there are multiple photos, label the photos with the left side coordinates followed by a lower-case letter (a, b, c, etc.). For example, the file name for a colony photo at 39.123456, -121.123456 would be: 39_123456 -121_123456a

COLONY STRUCTURE

Total Bank Height: Estimate the height of the bank at the colony location. Total height is measured from level ground or water level to the top of the bank.[3] Estimate height in meters.
Height to First Burrow:

- From slope break – Height from slope break to the first row of burrows.[3] On steep banks, this may be the same as total height to first burrow.[3] Estimate height in meters.

- Total – Height from level ground or water level to the first row of burrows.[3] Estimate height in meters.

Refer to training materials on the BANS-TAC website.

Colony Length: Estimate the length of the colony. Estimate length in meters.
Bank Type: Note the bank type for the colony. In general, bank types will fall under the following categories: riverbank, stream/creek bank, off-channel bank, lakeshore, reservoir shore, coastal bluff, dune, roadcut, quarry, or sandpile. These are the most common nesting scenarios for BANS; however, BANS may also use other unexpected bank types. For instance, although it is rare, BANS have been known to nest in large sawdust piles. An important distinction to make when noting the bank type is whether the bank was formed artificially, as with a quarry, roadcut, or reservoir, or was formed as part of a more natural process, as with riverbanks, lakeshores, or coastal bluffs.
Are hydrologic processes likely to refresh burrows following annual highwater events: Active erosion of colonies by flowing water or wave action in large water bodies can dramatically influence breeding phenology and burrow occupancy. It is therefore important to note whether a colony is subject or not subject to these processes on an annual basis. This can often be determined by the colony's proximity to water. Colonies located in abandoned stream channels, significantly offset from the main water feature, or elevated well above the flood stage, would not be subject to the same annual erosion that colonies located on the river or lakeshore would experience. Keep in mind that bank erosion generally occurs during high spring flows, and water levels at the time of the survey may be substantially lower than earlier in the year. Do not consider large erosion events that occur on longer time scales, such as 50- or 100-year floods, as these events are unlikely to impact breeding phenology at a significant frequency.
Circle:

- **Yes:** if the colony bank is likely to slough or be resurfaced due to water movement.
- **No:** if the colony bank is not influenced by water movement and/or is generally located above the flood stage.

Refer to training materials on the BANS-TAC website.

BURROWS

Check Boxes: Check the box indicating whether one or two observers are conducting the burrow count.
# of Fresh/Potentially Occupied Burrows: This is the most **important** data collected at each colony and will be used to estimate population size. Only count burrows that appear to be in use in the current year (see Definitions and Identification, p. 2). Two burrow counts are required, and for active colonies, counts must be within 10 percent of each other before the counts are recorded.[3]

- Single Observer – For active colonies, the single observer conducts two separate counts. If the two counts are not within 10 percent of each other, the observer must repeat the

process until the two counts are within 10 percent. For inactive colonies, the single observer can disregard the 10 percent requirement.[3]

- Two Observers – For active colonies, each observer independently counts the burrows and the final counts are compared. If the counts are not within 10 percent, both observers must repeat the count until their numbers are within 10 percent of each other. For inactive colonies, observers can disregard the 10 percent requirement.[3]

Refer to training materials on the BANS-TAC website.

SWALLOWS

Colony Status: Record whether the colony is active or inactive (see Definitions and Identification, p. 2). This is another critical piece of colony information. Only one BANS is required for a colony to be considered active, and if observers are not vigilant, a single BANS may go unnoticed.

When approaching a colony, be quiet and pay attention to the burrow entrances. If a colony appears active but no birds are observed, spend additional time and effort to determine activity. This is particularly relevant for single observers that do not have the benefit of a second set of eyes. Clapping loudly may elicit BANS to exit their burrows.[3] If no activity is observed, mark the colony as inactive, record the end time and move on.

Estimate the # of Adult BANS Observed at the Colony: The intent of this estimate is to provide a coarse measure of BANS activity at the colony. For large colonies that cover a significant area, observers may need to estimate the number of BANS at multiple points during the survey, while simultaneously avoiding the potential for double counting. Include in the count birds that are flying, perched, and exiting burrows. Do not include fledglings located at the burrow entrances.

Yes or No Questions: Circle yes if any of the listed behaviors are observed.

VEGETATION

Vegetation Above Colony: Categorize the dominant vegetation structure directly above the colony as either tree, shrub, grass/herbaceous, agriculture, bare, or other (describe). Only indicate one type. Next, provide a brief description of the vegetation community and the dominant plant species present. List species in order of dominance, and keep in mind that trees generally play a larger role in shaping communities than shrubs, and shrubs play a larger role than grass/herbaceous species. For agriculture, describe the type of crop. Refer to training materials on the BANS-TAC website.

Vegetation Beyond Colony: Following the methods described in the previous paragraph, categorize the dominant vegetation structure beyond the bank edge. This may include the riparian zone or upland habitats depending on the colony location. Also include comments about nearby land use, such as grazing. Refer to training materials on the BANS-TAC website.

IMPENDING THREATS

Threat List: List any nearby threats that may affect the persistence of the colony. List potential threats in order of most threatening to least threatening. Examples are nearby housing developments, nearby riprap and stream stabilization, hikers compacting the bank, colony

located next to a road, encroaching agricultural fields, invasive plant encroachment, controlled flow, etc. Provide additional clarifying information as a comment if necessary.

NOTES
Provide additional information about the colony if necessary.

Safety and Engaging with the Public

Surveyors may occasionally encounter hazardous situations during surveys, particularly when conducting surveys along rivers. Moving water can present severe challenges and it is best to conduct surveys with someone who is experienced on the river. Take the necessary safety precautions when surveying from a boat or kayak, including wearing a life vest and informing someone of where you will be and how long you expect to be gone. In general, survey areas will include sections of river with relatively flat water. Some survey areas may include sections of rough water in their upper reaches. It is not necessary to survey these rougher reaches, especially if there is no bank swallow nesting habitat present. The intent is not to survey reaches of white water but to survey reaches of calmer water located in valley systems where suitable banks are likely to exist.

While conducting surveys, surveyors may encounter members of the public. If a member of the public is interested in the surveys, provide them with a copy of the informational flyer and briefly describe what you are doing. Copies of the informational flyer can be printed off the BANS-TAC website. If they have further questions, direct them to contact the Project Lead listed on the flyer.

Property Access

While reviewing survey areas, surveyors may find that a significant portion of their survey area is inaccessible due to private property. Stream habitats tend to cross numerous landownerships, presenting challenges to property access. In such situations, a thorough review of aerial imagery can be used to identify stream reaches with the best potential habitat (refer to training materials on the BANS-TAC website for information about identifying potential habitat with aerial imagery: https://www.sacramentoriver.org/bans/index.php?id=statewide). This will narrow the scope of the survey and limit the number of landowners that need to be contacted. Note that quality habitat cannot always be determined through the use of aerial imagery, and this method should be used as a last resort when attempting to complete surveys.

In order to assist surveyors with property access, regional BANS coordinators have been established in each CDFW region (see contact list on the BANS-TAC website). If a surveyor suspects private property in their survey area, contact the appropriate regional coordinator listed on the contact list. They can provide you with property access details if access has been established.

In cases where access has not yet been established, attempt to contact landowners, and provide them with the property access request letter which can be printed of the BANS-TAC website. If contacting landowners by phone or email, provide them with the following information:

1. Your name

2. Your affiliation
3. You are conducting surveys on behalf of CDFW
4. You are conducting surveys for a species of swallow

If landowners are then willing to grant access, have them sign the property access request letter. Do not proceed with surveys until a copy of the signed access request letter has been sent to one of the CDFW coordinators or the project lead. In most cases, CDFW coordinators will be able to provide surveyors with signed property access letters and landowner contact information prior to surveys. Carry the signed access letter with you during your survey and make sure to coordinate with landowners prior to conducting surveys. Do not enter private property without the permission of the landowner. Private property may or may not be well signed and may only be delineated by a dilapidated fence line. Do not enter any property or cross any fence line unless you are confident that the property is open to the public.

In cases where a waterway is navigable by boat or kayak, public access to that waterway is legally protected, and surveyors can launch upstream of the private property at a publicly accessible launch site and float downstream to complete the survey. Surveyors must remain below the mean high-water mark when conducting surveys, as required by law.

Data Submission

The following data and information will need to be submitted to CDFW at the end of the field season:

- Colony Inventory Datasheets
- Survey Logs
- Surveyor Background Form
- Colony Photos

Once surveyors have completed their survey areas, the data will need to be entered into the online data entry portal located on the BANS-TAC website. Scanned copies of the original datasheets and colony photos will also need to be submitted; however, this process will be determined at later date. Refer to the BANS-TAC website for updates and contact project staff for guidance.

Supplies

Minimum Required Supplies	Additional Safety Equipment and Supplies for Boat/Kayak Surveys
Colony Inventory Datasheet and Survey Log	Water
Statewide Survey Methods	Food
Informational flyer	Insect repellant
Property Access Letter (if applicable)	Sunscreen
Maps with aerial imagery	Protective clothing
Rite in the Rain notebook and pencils	Cell phone/emergency contact device
Binoculars	Approved personal floatation devices
GPS units (preferred) or cell phone	Dry bags
Spare batteries	Throw bags
Digital camera/phone	
Tally counters	

Literature Cited

[1]Bratcher, P. Bank Swallow Technical Advisory Committee – California Upland Bank Swallow Colony Survey Protocol, unpublished.

[2]De jong, M.J. 1996. Northern Rough-winged Swallow (*Stelgidopteryx serripennis*). *In* The Birds of North America, No. 234 (A. Poole and F. Gill, eds.) The Academy of Natural Sciences, Philadelphia, PA and the America Ornithologists Union, Washington, D. C.

[3]Golet, G., A. Henderson, J. Isola, R. Martin, R. Melcer, N. Seavy, J. Silveira, D. Tsao, and D. Wright. 2017. Bank Swallow Survey Methods for the Sacramento and Feather Rivers, California. Version 1.0, January 2017. Prepared by the Bank Swallow Technical Advisory Committee (BANS-TAC) Research and Monitoring Subcommittee. 12 pp. https://www.sacramentoriver.org/bans/publications/Bank_Swallow_Survey_Methods_Sacramento_Feather_Rivers_Ver%201.0_Jan2017.pdf

Appendix A

Bank Swallow Colony Inventory Datasheet

Date:	Observer(s):	%Cloud: Wind (mph): Precip:	Start Time (24hr)	End Time (24hr)

COLONY LOCATION

[1]Left and right when facing the colony.

Survey Area: County:	[1]Coordinates (decimal degrees) Left side:
Riverbank when facing downstream: **Left** or **Right** or **NA**	Right side:
Photo #'s:	

BURROWS

Burrow counts must be within 10% for active colonies

Record # of fresh/potentially occupied burrows Count 1:_____ Count 2:_____	How many observers are conducting the burrow count? ☐ One observer: make 2 counts ☐ Two observers: 1 count per observer

VEGETATION

[3]Structure: Tree, Shrub, Grass/herb, Agriculture, Bare, or Other

Veg above colony [3]Dominant structure: _____ Describe veg community and dominant species:
Veg beyond colony [3]Dominant Structure :_____ Describe veg community, dominant species, and land use:

COLONY STRUCTURE

Estimate distances in **METERS(m)**:

Total Bank Height: meters(m)	Height to first burrow: From slope break _____(m) Total _____(m)
Colony Length: meters(m)	Bank Type (river, quarry, roadcut, bluff etc.):
Are hydrologic processes likely to refresh burrows following annual highwater events (high spring flows, wave action, etc.)? **Yes** or **No**	

SWALLOWS

[2]Active = at least one BANS observed using burrows

[2]Colony Status: **Active** or **Inactive**
Estimate the # of adult BANS observed at the colony:

Adults observed digging at bank face?	**Yes** or **No**
Adults observed with nesting material?	**Yes** or **No**
Burrows observed with young at mouth?	**Yes** or **No**
Fledglings observed?	**Yes** or **No**

IMPENDING THREATS

1st:

2nd:

3rd:

Comments:

NOTES:

Project Lead: Jeff McFarland, jeffrey.mcfarland@wildlife.ca.gov, (916) 956-7044
Project Sci Aid: Kaitlin Kozlowski, kaitlin.kozlowski@wildlife.ca.gov

☐ Entire survey area surveyed/assessed in 2021

Survey Log

Survey Area:	Primary Surveyor:	Counties:	Habitat Type[1]:

Project Lead: Jeff McFarland, jeffrey.mcfarland@wildlife.ca.gov, (916) 956-7044; Project Sci Aide: Kaitlin Kozlowski, kaitlin.kozlowski@wildlife.ca.gov

Date	Observer(s)	Weather (°F, % Cloud, Wind (mph), Precip)	Start		End		Method of Survey[2]	# of Obs. Colonies
			Time (24hr)	Coordinates (decimal degrees)	Time (24hr)	Coordinates (decimal degrees)		
								Act: Inact:
		Notes[3]: % Suitable banks_____						
								Act: Inact:
		Notes[3]: % suitable banks_____						
								Act: Inact:
		Notes[3]: % suitable banks_____						
								Act: Inact:
		Notes[3]: % suitable banks_____						
								Act: Inact:
		Notes[3]: % suitable banks_____						
								Act: Inact:
		Notes[3]: % suitable banks_____						

[1]Habitat Type: Watercourse, Natural Waterbody, Reservoir, Coastal Bluff, Dunes, Other | [2]Method of Survey: Boat, Kayak, Vehicle, On Foot, Desktop, Not Surveyed

[3]Notes: Note the percent of possible burrowing habitat (i.e. suitable banks), describe the survey, describe overall habitat (dominant shoreline veg, human impact, etc.)

Surveyor Background Form

Instructions: Document the names and background information for all surveyors that participate in a bank swallow survey. At the end of the field season, submit the recorded information into the Surveyor Background data entry portal located on the BANS-TAC website (https://www.sacramentoriver.org/bans/index.php?id=statewide) and send a scanned copy to project staff.

Primary Surveyor: ______________________________ Email: ________________________________

Registered Survey Area(s): ____

Affiliation:____ Total Estimated Survey Time (h):________

Formal Education in Biological Sciences: ____

On a scale of 1 to 5 (1 being low) rate your experience in the following categories (circle one):

Bird Identification: 1 2 3 4 5 Methods of Estimation: 1 2 3 4 5

Bank Swallow Experience: 1 2 3 4 5

Supporting Surveyors

Name: ____ Affiliation:_____________________________________

Assisted with:____ Total Estimated Survey Time (h):________

Formal Education in Biological Sciences: ____

Bird Identification: 1 2 3 4 5 Methods of Estimation: 1 2 3 4 5

Bank Swallow Experience: 1 2 3 4 5

Name: ____ Affiliation:_____________________________________

Assisted with:____ Total Estimated Survey Time (h):________

Formal Education in Biological Sciences: ____

Bird Identification: 1 2 3 4 5 Methods of Estimation: 1 2 3 4 5

Bank Swallow Experience: 1 2 3 4 5

Name: ____ Affiliation:_____________________________________

Assisted with:____ Total Estimated Survey Time (h):________

Formal Education in Biological Sciences: ____

Bird Identification: 1 2 3 4 5 Methods of Estimation: 1 2 3 4 5

Bank Swallow Experience: 1 2 3 4 5

Name: ____ Affiliation:_____________________________________

Assisted with:____ Total Estimated Survey Time (h):________

Formal Education in Biological Sciences: ____

Bird Identification: 1 2 3 4 5 Methods of Estimation: 1 2 3 4 5

Bank Swallow Experience: 1 2 3 4 5

Name: ____ Affiliation:_____________________________________

Assisted with:____ Total Estimated Survey Time (h):________

Formal Education in Biological Sciences: ____

Bird Identification: 1 2 3 4 5 Methods of Estimation: 1 2 3 4 5

Bank Swallow Experience: 1 2 3 4 5

Name: ____ Affiliation:_____________________________________

Assisted with:____ Total Estimated Survey Time (h):________

Formal Education in Biological Sciences: ____

Bird Identification: 1 2 3 4 5 Methods of Estimation: 1 2 3 4 5

Bank Swallow Experience: 1 2 3 4 5

Name: ____ Affiliation:_____________________________________

Assisted with:____ Total Estimated Survey Time (h):________

Formal Education in Biological Sciences: ____

Bird Identification: 1 2 3 4 5 Methods of Estimation: 1 2 3 4 5

Bank Swallow Experience: 1 2 3 4 5

Name: ____ Affiliation:_____________________________________

Assisted with:____ Total Estimated Survey Time (h):________

Formal Education in Biological Sciences: ____

Bird Identification: 1 2 3 4 5 Methods of Estimation: 1 2 3 4 5

Bank Swallow Experience: 1 2 3 4 5