



Protocol Implementation Plan for Riparian Landbird Monitoring in Pinnacles National Park

Natural Resource Report NPS/SFAN/NRR—2017/1475



ON THE COVER

A Western Kingbird perched at Pinnacles National Park
Photo by Daniel George

Protocol Implementation Plan for Riparian Landbird Monitoring in Pinnacles National Park

Natural Resource Report NPS/SFAN/NRR—2017/1475

Diana L. Humple¹, Mark D. Dettling¹, Sarah M. Wakamiya², Daniel R. George²

¹ Point Blue Conservation Science
3820 Cypress Drive #11
Petaluma, CA 94954

² San Francisco Bay Area Network
NPS Inventory & Monitoring Program
San Francisco Bay Area Network
Fort Cronkhite, Bldg. 1063
Sausalito, CA 94965

July 2017

U.S. Department of the Interior
National Park Service
Natural Resource Stewardship and Science
Fort Collins, Colorado

The National Park Service, Natural Resource Stewardship and Science office in Fort Collins, Colorado, publishes a range of reports that address natural resource topics. These reports are of interest and applicability to a broad audience in the National Park Service and others in natural resource management, including scientists, conservation and environmental constituencies, and the public.

The Natural Resource Report Series is used to disseminate comprehensive information and analysis about natural resources and related topics concerning lands managed by the National Park Service. The series supports the advancement of science, informed decision-making, and the achievement of the National Park Service mission. The series also provides a forum for presenting more lengthy results that may not be accepted by publications with page limitations.

All manuscripts in the series receive the appropriate level of peer review to ensure that the information is scientifically credible, technically accurate, appropriately written for the intended audience, and designed and published in a professional manner.

This report received formal peer review by subject-matter experts who were not directly involved in the collection, analysis, or reporting of the data, and whose background and expertise put them on par technically and scientifically with the authors of the information.

Views, statements, findings, conclusions, recommendations, and data in this report do not necessarily reflect views and policies of the National Park Service, U.S. Department of the Interior. Mention of trade names or commercial products does not constitute endorsement or recommendation for use by the U.S. Government.

This report is available in digital format from the [San Francisco Bay Area Inventory and Monitoring Network website](#) and the [Natural Resource Publications Management website](#). To receive this report in a format that is optimized to be accessible using screen readers for the visually or cognitively impaired, please email irma@nps.gov.

Please cite this publication as:

Humple, D., M. D. Dettling, S. M. Wakamiya, D. R. George. 2017. Protocol implementation plan for riparian landbird monitoring in Pinnacles National Park. Natural Resource Report NPS/SFAN/NRR—2017/1475. National Park Service, Fort Collins, Colorado.

Contents

	Page
Figures and Tables	v
Acknowledgments.....	v
Introduction.....	1
Background.....	2
Conceptual Framework for Monitoring	5
Measurable Objectives.....	7
What’s Being Measured and How	7
Sampling Design and Monitoring Schedule	11
Sample Design.....	11
Site Selection.....	12
Monitoring Schedule	15
Data Management, Analysis, and Reporting	17
Processing and Workflow.....	17
Budget.....	19
Safety	21
Standard Operating Procedures.....	23
Preparation and Equipment Setup	23
Site Visits and Field Safety	23
Training Observers	23
Marking and Relocating Sampling Plots.....	23
Using the GPS Unit	23
Conducting VCP Point Count Surveys.....	23
Conducting Mist Netting and Banding.....	24
Data Management.....	24
Data Analysis.....	24
Data Reporting.....	24
Revising the Protocol	24
Literature Cited	25
Appendix A: Pinnacles National Park Riparian Point Count Transect Narratives	29

Figures and Tables

	Page
Table 1. Factors affecting riparian landbirds within Pinnacles National Park and potential measures for Vital Signs monitoring.	5
Table 2. Summary information for point count transects selected for long-term monitoring in Pinnacles National Park, California, through 2015.....	12
Figure 1. Locations of point counts stations, organized by transect, identified for long-term riparian landbird monitoring in Pinnacles National Park.	13
Table 3. Years in which riparian point count transects included in this PIP were surveyed during the breeding season, through 2015, in Pinnacles National Park, California.....	14
Table 4. Sampling and reporting schedule from 2011 to 2021 for riparian landbird monitoring in San Francisco Area Network National Parks, including Golden Gate National Recreation Area (GOGA), Point Reyes National Seashore (PORE), and Pinnacles National Park (PINN).	15
Table 5. Estimated budget for PINN Riparian Landbird Monitoring & Reporting, FY2018.	19

Acknowledgments

We are grateful to the authors of the Riparian Landbird Monitoring Protocol for Golden Gate National Recreation Area and Point Reyes National Seashore (Gardali et al. 2010; including Tom Gardali, Mark Herzog, Marcus Koenen, Dave Press, Bill Merkle, and Sarah Allen), and to those who, prior to that, helped develop point count protocols for Point Blue (including Grant Ballard and Geoff Geupel), as those protocols are the basis of this riparian landbird protocol implementation plan for Pinnacles National Park. We thank all the reviewers of this or an earlier version of the Pinnacles protocol (including Paul Johnson and Dawn Adams with the National Park Service [NPS]; and Tom Gardali and Nat Seavy with Point Blue Conservation Science) for their very helpful contributions. We also extend our thanks to the many biologists who collected historic landbird data in Pinnacles and were responsible for prior inventory and monitoring efforts there, as well as those individuals at NPS and Point Blue who supported those endeavors (including Paul Johnson, Jim Petterson, Marie Denn, Geoff Geupel, and Tom Gardali). This document represents Point Blue Conservation Science Contribution # 2068.

Introduction

This protocol implementation plan (PIP) details the monitoring plan for landbirds in riparian habitat in Pinnacles National Park (PINN) in the San Francisco Bay Area Network of parks (SFAN). The Riparian Landbird Monitoring Protocol for Golden Gate National Recreation Area and Point Reyes National Seashore (GOGA and PORE, respectively; Gardali et al. 2010), two other major parks in this Network, serves as the basis for this plan.

The purpose of a PIP to describe how a source published protocol will be used to meet Network monitoring objectives. This PIP outlines the means by which monitoring data will be collected, managed, and reported by Point Blue, in collaboration with NPS, for the *Landbirds* Vital Sign at PINN. This will be done in accordance with the approved and peer-reviewed protocols for GOGA and PORE (Gardali et al. 2010), with minor modifications to those methods and the associated Standard Operating Procedures (SOPs) as described herein. Specifically, implementation of the riparian landbird monitoring protocol at PINN will occur with the following modifications from GOGA and PORE:

- 1) Sampling at PINN will occur every third year, as it does at GOGA and PORE, but in a different year than in GOGA and PORE (see *Monitoring Schedule* below for details). It will not include the additional annual sampling done at a subset of points at Point Blue's intensive core long-term study sites in GOGA and PORE, where data was collected annually prior to development of the monitoring protocol (Gardali et al. 2010).
- 2) Timing of sampling will begin and end slightly earlier in the season at PINN than at GOGA and PORE (with the sampling window starting 1 week earlier and extending for 1.5 months instead of 2 months; see *Monitoring Schedule and Standard Operating Procedures* below for details) due to considerably higher temperatures late in the season at PINN compared to the other parks, and a concurrently-earlier reduction in bird activity (as observed by protocol authors and other biologists from Point Blue and PINN).
- 3) Sampling will be restricted to point count surveys, with no constant effort mist-netting program to be implemented in PINN, due to limited resources and the logistical constraints associated with the latter protocol. There is a 50-year legacy of mist-netting at GOGA and PORE that is done both at and out of a permanent Point Blue field station in PORE (Point Blue's Palomarin Field Station; see Porzig et al. 2011). As a result, assessments of survival and productivity, and abundance during non-breeding seasons, are outside the scope or objectives for monitoring in PINN, where the effort focuses on evaluating long-term changes in breeding bird abundance (see *What's Being Measured and How* below for details).
- 4) Sampling, which will occur at a combination of new and legacy point count transects, will include some non-riparian habitat, as many legacy transects are a mix of riparian and non-riparian habitat (see *What's Being Measured and How* below for details). At all three parks, non-riparian upland habitat is frequently sampled even at riparian points, due to the spatial structure of the often-linear riparian habitat corridor and the manner in which the area around each point is surveyed with the point count method.

Background

In 2003, riparian habitat and landbirds were selected as two vital signs indicators in SFAN (see Gardali et al. 2010 for summary). Vital signs are defined for the NPS as measurable features of the environment that 1) provide insights into changes in the state of the ecosystem, 2) are determined to be the most significant indicators of ecological condition of the resources of the greatest concern to each park, and 3) are intended to be tracked over time. In 2010, the riparian landbird monitoring protocol for GOGA and PORE was finalized (Gardali et al. 2010), based in large part on the legacy of continuous long-term data collection on landbird populations conducted by Point Blue Conservation Science (formerly PRBO; hereafter Point Blue) in both parks.

The vital signs and rationale of the 2010 landbird monitoring protocol at GOGA and PORE (Gardali et al. 2010) extends to PINN, which also has a legacy of landbird monitoring by Point Blue and NPS biologists, as well as a rich diversity of birds using the park (Emmons 2015). The park was originally considered in earlier drafts of the 2010 protocol and was included for network-wide vital signs assessment. Due to limited resources in 2010 and the geographical and ecological disconnect between PINN and the other SFAN parks, the Network science advisory committee recommended a stand-alone protocol for PINN riparian landbirds. A PINN monitoring protocol was first drafted in a non-PIP format in 2012 and reviewed in 2013. In spring 2015, site selection and implementation began with approval of the NPS I&M program even though the protocol was still in draft form (see Dettling and Humple 2016 for a summary of that effort). To expedite protocol development and leverage previous efforts made in the development of the GOGA/PORE landbird protocol, the protocol for PINN was finalized in the form of a PIP.

The history of landbird monitoring at PINN is relevant to understanding the development of this PIP and the sampling design. To study the local landbird community at Pinnacles National Park (then a national monument), point count surveys were first conducted in 1983-1985 by National Park Service (NPS) biologists Michael Avery and Charles van Riper III, and repeated in 1997-1999 by NPS biologist Shelley Buranek. In 2001-2002, Point Blue conducted a landbird inventory of PINN (Haff et al. 2003). In 2004-2006, a pilot long-term landbird monitoring effort was initiated at PINN by Point Blue and NPS; this effort included some of the study sites surveyed during the 2001-2002 inventory as well as some historic study sites from the 1980s and 1990s (Humple and Gardali 2004, 2006). As with earlier monitoring efforts in the other SFAN parks, riparian and scrub (specifically chaparral at PINN) habitats were prioritized for landbird monitoring in this pilot effort. An attempt was made at PINN to also include a reasonable sample size of point counts located within pine/oak woodland, although limited resources restricted how extensively that habitat could be monitored (Humple and Gardali 2004, 2006). This PIP is informed by pilot monitoring efforts; however, due to changes in monitoring objectives, it does not replicate it.

Following pilot testing and monitoring objective refinements, riparian habitat was selected as the priority habitat for future monitoring in all the SFAN parks to allow for monitoring of the greatest number of birds (richness and abundance). The decision was also made to focus on legacy sites for which historic data existed, to increase the potential to detect longer-term trends in abundance. This was applied first to GOGA and PORE (Gardali et al. 2010). For PINN, it was necessary to reassess

the study sites selected for the 2004-2006 pilot monitoring because: (1) the transects surveyed during the 2004-2006 pilot monitoring included some that were in exclusively non-riparian habitat types (chaparral and pine/oak woodland); (2) additional land acquisitions finalized in 2006 for Pinnacles National Park included riparian habitat, some substantial in extent, that had not previously been inventoried or monitored; and (3) there was a desire for consistency in sampling design objectives among all three SFAN parks for which long-term landbird monitoring was to be implemented. In the monitoring protocol that forms the basis for this PIP and is described herein, site selection included both (1) study sites that were surveyed in the previous efforts (hereafter legacy sites), and (2) new study sites within riparian habitat that were added to the park in recent (> 2006) acquisitions. In 2015, riparian landbird monitoring began in PINN at the combined legacy and new study sites.

Conceptual Framework for Monitoring

As with the GOGA and PORE riparian landbird monitoring objectives (Gardali et al. 2010), the objective of this monitoring program for PINN riparian landbirds is to evaluate ecosystem health (e.g., habitat degradation, invasive species, life-cycle risks for migratory species, climate change.) and thereby inform managers when management actions are warranted and research is needed. Such long-term monitoring is informative across multiple spatial scales, especially for migratory species that are also impacted by changes both inside and outside the park due to their life history, and is especially critical today given projections of potential impacts of climate change on birds in the region (Gardali et al. 2012, Seavy et al. *in press*). Although the monitoring program is not designed to specifically evaluate management actions, it may be possible under some circumstances to detect changes due to management actions. Ultimately, the uses of these data will depend on the magnitude of trend, the conservation status of individual species, current societal and cultural values, and the potential for management actions to effect change (Table 1).

Table 1. Factors affecting riparian landbirds within Pinnacles National Park and potential measures for Vital Signs monitoring.

Category	Management Issue(s) informed by monitoring	Potential Measures
Riparian Habitat Health	Visitor and administrative water use, reservoir management, prioritization of future research.	Stream channel wetland abundance ^b , changes in vegetation structure and species composition in California Buckeye Woodlands ^b , stream discharge ^b .
Invasive Bird Species	Pest management.	Landbirds population trends ^a , detection of species new to the area ^a .
Life-cycle Risks for Migratory Species	Trail maintenance and design, fire management, vegetation management, visitor use.	Resident species abundance change relative to Neotropical migrant species abundance change ^a .
Climate Change	Communications, park maintenance, visitor use.	Comparison of trends between species with varying life cycle requirements ^a .

^a Measures that have been selected for inclusion in SFAN landbirds monitoring.

^b Measures that are addressed through other monitoring initiatives by NPS or partners.

The selected monitoring approach has the advantage of being able to evaluate multiple landbird species (at the community level) in riparian and adjacent habitat, as well as individual species where sample sizes are sufficient. It also allows for examination of shared patterns across species with similar ecological requirements, including some that are common in GOGA and PORE (Gardali et al. 2010), which could in turn yield valuable information about the condition of different ecosystem attributes.

Measurable Objectives

The overarching goal of this PIP is to determine long-term trends in the abundance of as many riparian-associated breeding landbird species in PINN as possible. Specifically, the monitoring objective is the ability to detect a 50% change in abundance in a given species over a 20-year period, with an 80% probability of detecting change if it occurs (Bart et al. 2004, Siegel et al. 2007).

This objective is adopted from the Objective 1 in the source protocol for GOGA and PORE (Gardali et al. 2010).

Deviations in the measurable objectives for this PIP compared to the source protocol all stem from not conducting constant-effort mist netting at PINN. At PINN, this results in: (1) no comparison of breeding-season abundance between point count and mist-netting methods, or of different age classes during the breeding season, (2) no evaluation of fall and winter trends in abundance; and (3) the removal of Objective 2 (productivity and survival, which is only possible to evaluate by nest monitoring and/or mist netting). These changes result from the lack of a pre-existing constant-effort mist-netting program at PINN, and the lack of resources to establish a comparably-intensive mist-netting program to what is implemented at GOGA and PORE (see bulleted list in the *Introduction and Background* above for a summary of differences between the two protocols).

The primary objective of this monitoring regime will be best achieved with the following cumulative efforts: (1) using standardized point count methodology to monitor breeding birds at PINN, (2) focusing on the habitat type that supports the greatest abundance and diversity of breeding birds in much of western North America (RHJV 2004), and (3) including study sites for which our time series includes historic data. At GOGA and PORE, where there is more riparian area, it is estimated that the protocol would achieve this objective for 4 of 6 species examined (Gardali et al. 2010). At PINN, where there is less riparian habitat overall and consequently fewer study sites, we expect that the proportion of species that will meet this objective will be slightly lower or that it may take longer to do so (See *Sampling Design* below).

What's Being Measured and How

This landbird monitoring program in PINN focuses on measuring the abundance of breeding riparian-associated landbirds, which we define as passerines and near-passerines that have a predominantly-terrestrial life cycle (Rich et al. 2004). Intensive monitoring of condors and some diurnal raptors also takes place in PINN (Emmons et al. 2011, Wolstenholme et al. 2016) and is outside the scope of the monitoring effort described here. The breeding birds monitored include year-round residents as well as both Neotropical migrants and short-distance migrants that breed in the park. Species that are not appropriately sampled by the method employed here (e.g., shorebirds, waterfowl, wading birds, raptors) will be excluded from most analyses but are recorded by biologists during point count surveys, and observations of these species will be summarized in subsequent reports.

The landbird species prioritized for monitoring with this protocol are those associated with riparian habitat. Some of these species are not riparian obligates but are also associated with upland habitat, which will also be sampled by this protocol. The methodology used here does not restrict bird detections to only the often-narrow riparian corridor at the riparian point count stations, but rather is based on standardized distance bins and invariably includes detections of individual birds using adjacent non-riparian habitat types as well. This can include species that are not necessarily associated with riparian habitat, although many are associated with both upland and riparian habitat. In addition, in order to increase our sample size and ability to evaluate long-term trends in landbird abundance at PINN, we have chosen to monitor all points within legacy transects in which either some or all of the points of that transect are in riparian habitat; this results in the inclusion of some points that are exclusively in chaparral or oak woodland. The focus of this monitoring effort on landbirds associated with riparian habitat increases our sample size of individuals and species due to the high use of this habitat by birds in California (RHJV 2004). Monitoring landbirds in riparian habitat also provides a focus on a critical habitat in the region and allows for comparisons to long-term monitoring efforts in GOGA and PORE (Gardali et al. 2010). The fact that observations of birds using adjacent non-riparian habitat is also sampled results in a more comprehensive assessment of landbirds in the park.

Various types of riparian habitat exist at PINN. This plan focuses on the habitat types that contain conventionally-defined California riparian bird species (RHJV 2004), including Fremont cottonwood forest alliance, willow woodland alliances, and California-rose shrubland alliance (Sawyer et al. 2009). It excludes coast live oak woodland alliance and non-woody wetland habitat; even though those are associated with wet areas and/or riverbeds at PINN, they do not support any riparian-obligate landbird species, with the former supporting oak woodland bird species and the latter wetland species. This also serves to retain consistency with the general characteristics of the woody riparian habitats selected for monitoring in GOGA and PORE, although the alliances differ among the parks. If long-term changes in climate in the region result in changes or reductions in the riparian habitat at PINN, it will become necessary to re-evaluate monitoring objectives in the future and determine whether the primary objective is to evaluate long-term changes to bird communities at these specific study sites, even if the habitat is no longer riparian.

Landbird surveys at PINN will be conducted using the same point count method approved for GOGA and PORE (Gardali et al. 2010), and comparable to the method conducted historically in PINN. This involves conducting point count surveys at 77 Variable Circular Plot (VCP) point count stations (hereafter points) throughout the park (Appendix A). These points are organized in nine transects that each consist of multiple (2-12) points, typically located 200-250 m apart from one another, with one or more transects surveyed by an observer in a given morning. Transects are navigated on foot and are predominantly located along park hiking trails, or in some cases simply along the riparian corridor. The point count method involves having experienced surveyors, who are able to identify local birds by sight and sound, conduct five-minute counts at each point, and assign each individual bird detected at the point to species and to a variable distance bin dependent upon the bird's distance from the observer (0-10 m, 10-20 m, 20-30 m, 30-50 m, 50-100 m, and >100 m; or flyovers). Assigning birds to these bins allows for detections within standardized distances (e.g., 0-50m) to be

used in analyses, and can address potential detectability concerns. Although these exact bin widths were not used in all historic years, data across all years can easily be collapsed into broader distance categories for analyses, and using the bins defined above will provide comparability to the monitoring effort in GOGA and PORE (Gardali et al. 2010) as well as other monitoring efforts in the San Francisco Bay Area region (Cormier et al. 2014, Humple and Gardali 2015). A full description of this method can be found in SOP 6: *Conducting Variable Circular Plot Point Count Surveys* of the GOGA and PORE Riparian Landbird Monitoring Protocol (Gardali et al. 2010).

Sampling Design and Monitoring Schedule

Sample Design

Ultimately, there are many ways in which data from this monitoring effort may be used, and questions may eventually be asked of the long-term dataset that are not anticipated during its development (Johnson 2002). However, the stated monitoring objective is to have an 80% probability of detecting a 50% change in riparian bird abundance over a 20 year period. Typically a design balances the ability to make inferences about a study area (e.g., site, habitat, or park) with sampling effort. A design that takes too few samples will not be able to achieve the objectives and therefore place the resource at risk, whereas too many samples will waste time and money.

The selected study sites at PINN cover approximately 85% of the riparian area at PINN, and can be surveyed by a single observer in approximately one month. The relatively high proportion of the habitat that is sampled has multiple implications. First, it suggests that adding additional points is less important for increasing precision than identifying ways to increase the precision of the estimates where sampling occurs (e.g. by conducting two visits to all points). Second, it implies increased confidence in making inferences to all of the riparian habitat in PINN, rather than just a relatively small area that was sampled. Finally, it means that there is relatively little opportunity to increase coverage of riparian areas within the park (see *Site Selection* below). Another line of evidence demonstrating the coverage we expect to achieve comes from an earlier analysis by Haff et al. (2003). Using a sample of just 28 riparian points across PINN, the authors of that study used bootstrapping to evaluate the number of points that was needed to detect all of the landbird species that were detected at those 28 points. They found that 80% of species were detected after 13.65 points, and 100% after 26.68 points. Thus, given that the inclusion of additional legacy points as well as points in the expanded park footprint amounts to 77 points (see *Site Selection* below), this should be sufficient to thoroughly describe the landbird community. However, this does not suggest that restricting the number of points in this protocol to 27 points based on the above would be sufficient for detecting changes in population sizes; bootstrapping simply showed that the smaller sample size was sufficient for describing the community, not necessarily for assessing changes in it.

A power analysis for GOGA and PORE, which has significantly more riparian area and covers a much larger area, was done to evaluate whether the sampling design in those parks was adequate to achieve the objectives for that protocol (Gerrodette 1987, Purcell et al. 2005). It was demonstrated that a sample of 121 points (a subset of the 183 selected for long-term monitoring for which there was enough multi-year historical data for a power analysis; Gardali et al. 2010) was sufficient to achieve the same measurable objective for two-thirds of the riparian species examined (Gardali et al. 2010). Those results for GOGA and PORE give us insight into the efficacy of a similar sampling design at PINN, although at PINN we have a greater proportion of the habitat sampled and limited opportunity for expansion of the study design. Because power analyses have a number of limitations, it has alternatively been proposed that monitoring programs be assessed based on an emphasis on sampling design, assessment of coverage, and ability to detect sampling error (Seavy and Reynolds 2007).

At PINN, we will evaluate trends in riparian landbird species (e.g., Black-headed Grosbeak, Warbling Vireo, and Song Sparrow) as well as species that breed both in riparian and in adjacent chaparral and/or oak woodland (e.g., California Quail, Mourning Dove, Anna’s Hummingbird, Western Scrub-Jay, Oak Titmouse, Bewick’s Wren, House Wren, Bushtit, Wrentit, California Towhee, Spotted Towhee, Song Sparrow and Lesser Goldfinch). At GOGA and PORE, although predominantly riparian specialists were evaluated for the monitoring protocol (Gardali et al. 2010), additional species that are more generalists in their habitat preferences in the region were also evaluated in an Analysis & Synthesis Report, and a trend was identified for at least one species (Humple and Porzig 2014).

In summary, the expansion to 77 predominantly-riparian points at PINN, and coverage of approximately 85% of riparian habitat in the park, provides an appropriate study design for long-term monitoring at PINN while simultaneously considering constraints that make a more intensive monitoring protocol unrealistic.

Site Selection

The study sites sampled at PINN include a combination of legacy and newly-created study sites, totaling 77 points (Table 2 and Figure 1). In general, the strategy for selecting transects has been to (1) identify riparian habitat based on hydrological and vegetation characteristics, (2) identify grouping of multiple points that can be surveyed in a single morning, and (3) establish points spaced ~ 200-250 m apart within this area (establishment of historic NPS points in the 1980s likely followed a slightly different step-wise approach as they were not lumped into transects).

Table 2. Summary information for point count transects selected for long-term monitoring in Pinnacles National Park, California, through 2015. Surveys were done by NPS in 1984-85 and 1998-99; by Point Blue Conservation Science in 2001-02 and 2015; and collaboratively by both groups (and coordinated by Point Blue) in 2004-06.

Transect name	Station code	# total pts^a	# riparian pts^b	First year surveyed^{a,c}	Total # years surveyed^{a,c}
Balconies	BALC	10	6	1984	8
Grassy Canyon	GRCA	7	4	2001	2
Headquarters	HEAD	7	4	1984	8
Lower McCabe Canyon	LMCC	5	5	2015	1
North Fork Chalone Creek	NFCC	12	12	1984	9
Rose Canyon	ROCA	2	2	2015	1
Sandy Creek	SACR	11	11	2015	1
South Wilderness Trail	SWTR	11	11	2002	5
Upper Chalone	UPCH	12	6	2001	2
Total Points	–	77	61	n/a	n/a

^a For BALC, NFCC, and HEAD, not all points were surveyed in all prior years (for details see metadata in individual narratives; Appendix A); first year and total years surveyed includes the earliest years any points within the transect were surveyed.

^b For details of which points contain riparian habitat, see metadata in narratives (Appendix A).

^c Data for breeding seasons only are shown here (some winter surveys done in 1980s/1990s, including in 1983).

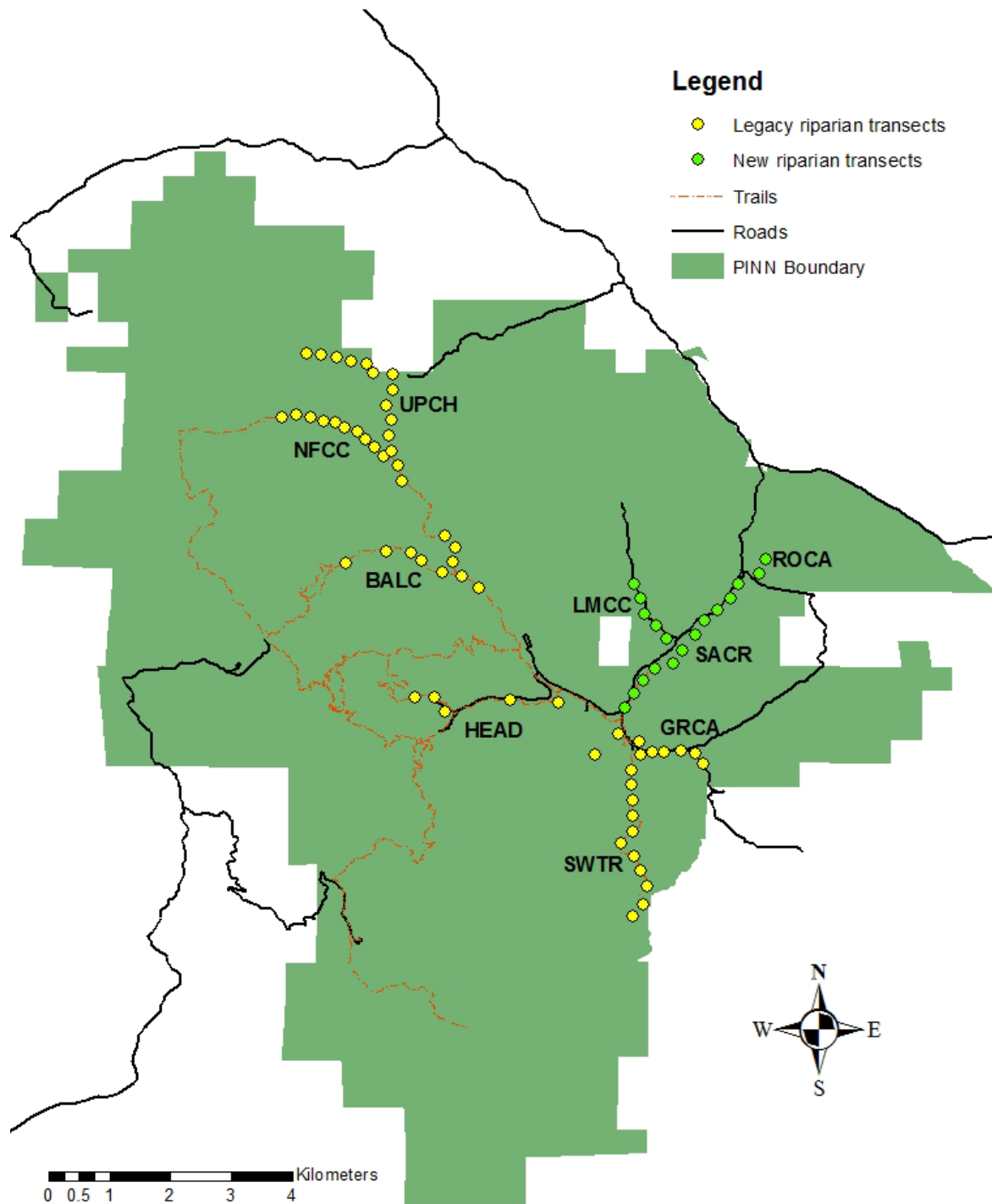


Figure 1. Locations of point counts stations, organized by transect, identified for long-term riparian landbird monitoring in Pinnacles National Park. Full transect names are in Table 1, and the metadata in Appendix A describes which and how many points are riparian. The new riparian transects were established by Point Blue Conservation Science in 2015.

In this PIP, we first selected the six legacy transects that contained some to all points within riparian habitat. This allows for the use of historic data (back to 1983 for some points), extending the time

series of our long-term analyses. These points already encapsulated an extensive amount of the riparian habitat at PINN prior to the more recent land acquisitions.

The six legacy transects selected consist of 59 points, of which 43 points have riparian habitat within 50m of the point (Table 2; see *What's Being Measured and How*, above, for explanation of non-riparian points). Four of these legacy transects were originally monitored during the 2001-2002 Point Blue inventory (Haff et al. 2003), and two were originally monitored by NPS in 1983-1985. Four of these six transects were then selected for pilot monitoring in 2004-2006 (Humple and Gardali 2004), with two individual points, which were originally monitored by NPS in 1983-1985, added in 2004 to one of the inventory transects (see Table 3 and Appendix A for monitoring history).

Table 3. Years in which riparian point count transects included in this PIP were surveyed during the breeding season, through 2015, in Pinnacles National Park, California. During a given year, study areas are indicated by a black dot if all points within the current transect were surveyed in that year; by a black dot in parentheses for those surveyed only in part (i.e., only a subset of the current points that make up the transect); and by dash marks if they were not surveyed. Surveys were done by NPS in 1984-85 and 1998-99; by Point Blue Conservation Science in 2001-02 and 2015; and collaboratively by both groups (and coordinated by Point Blue) in 2004-06. Winter surveys conducted in the 1980s/1990s are not indicated here as they are outside the scope of this monitoring plan.

Code	1984	1985	1998	1999	2001	2002	2004	2005	2006	2015
BALC ^a	(●)	(●)	(●)	●	—	—	●	●	●	●
GRCA	—	—	—	—	●	—	—	—	—	●
HEAD ^b	(●)	●	●	●	—	—	●	●	●	●
LMCC	—	—	—	—	—	—	—	—	—	●
NFCC ^c	(●)	(●)	(●)	(●)	(●)	—	●	●	●	●
SACR	—	—	—	—	—	—	—	—	—	●
ROCA	—	—	—	—	—	—	—	—	—	●
SWTR	—	—	—	—	—	●	●	●	●	●
UPCH	—	—	—	—	●	—	—	—	—	●

^a only 8 of 10 BALC point count stations were surveyed during breeding seasons of 1984, 1985, 1998, and 1999 (see Appendix A for details).

^b only 4 of 7 HEAD point count stations were surveyed during breeding season in 1984 (see Appendix A for details).

^c only 2 of 12 NFCC points surveyed in 1984, 1985, 1998, 1999, and 2001 (see Appendix A for details).

In addition to these legacy transects, we established an additional three transects in 2015 consisting of 18 points total. These new points accommodate the expansion of the park footprint that occurred since the previous landbird inventory and monitoring efforts in the mid-2000s. This included riparian habitat in lower McCabe Canyon, Sandy Creek (including at the Pinnacles Campground), and Rose Canyon that had never been surveyed for landbirds. These study sites were selected in the same manner as many of the legacy transects: we first identified areas of riparian habitat where one or more transects could be placed, and then spaced points along these study sites in 250 meter intervals (more if there was a break in riparian habitat), using a combination of GIS and ground truthing, and in most instances extending transects across the full extent of the riparian habitat.

Although some (<10) riparian points could have been added in a few areas within the old boundaries of the park, this PIP emphasizes and prioritizes (1) legacy riparian points within the historic park boundaries, and (2) the addition of points in riparian habitat in the recent (> 2006) acquisitions to the park. As stated above, this sampling design results in coverage of >85% of the sizeable riparian habitat in PINN. Points were not added in riparian habitat in the following locations: near the old Chaparral Ranger Station; by Juniper Canyon on the West Side; in Frog Canyon (on top of the pre-existing point at Frog Canyon mouth that is part of the Headquarters transect); Bear Gulch reservoir; and along Bear Gulch (on top of the pre-existing points there that are part of the Headquarters transect). Given the study design spacing of new points being at least 250 m from other points, in an effort to minimize repeated sampling of the same individuals, for all but one of the above riparian locations there was only enough habitat to add a single point (with 3-5 potentially fitting at Bear Gulch). The selected transects (Table 2 and Figure 1) thus represent fairly comprehensive coverage of the riparian habitat within the current boundaries of the park. Monitoring transects also adhere to logistical considerations, followed for both the pilot PINN monitoring and the current GOGA and PORE monitoring efforts, that the selected riparian habitat can be monitored as transects or as distinct groupings of multiple points that can be surveyed in one morning.

Monitoring Schedule

The monitoring interval in PINN will follow the same every-third-year design as has been implemented in GOGA and PORE (Gardali et al. 2010). It does not include additional annual sampling at a subset of points such as is done at GOGA and PORE, where Point Blue has intensive core long-term study sites. The every-third-year approach has also been implemented by Point Blue and agency partners at other long-term monitoring study sites in the region (Cormier et al. 2014, Humple and Gardali 2015). Future GOGA and PORE point count surveys are currently slated for 2017 and 2020 (with the first year of protocol implementation completed in 2011). Fiscal and logistical considerations, and the lack of a compelling biological reason to do otherwise, result in a preferred one-year offset of the PINN surveys (e.g., 2018 and 2021) with the first year of monitoring in 2015 implemented using the methods outlined here (Table 4).

Table 4. Sampling and reporting schedule from 2011 to 2021 for riparian landbird monitoring in San Francisco Area Network National Parks, including Golden Gate National Recreation Area (GOGA), Point Reyes National Seashore (PORE), and Pinnacles National Park (PINN). At the time of completion of this document, this has already been completed for 2011-2015.

Activity	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Mist Netting GOGA/PORE											
Point Count GOGA/PORE ^a											
Progress Report GOGA/PORE											
Point Count PINN											
Progress Reports PINN											
Analysis & Synthesis Reports											

^a for full array of point count transects; does not reflect annual surveys conducted at Point Blue's core study sites.

In survey years, point count transects will be surveyed twice per year during the peak landbird breeding season, with a minimum of 10 days between surveys of each transect. The timing of peak breeding season differs slightly between PINN and the protocol for GOGA and PORE due to the different weather (especially the higher daytime temperatures) at PINN and the resulting impacts to bird behavior and breeding phenology. Consequently, visits will be slightly earlier at PINN, occurring from the last week of April through the first week of June (in GOGA and PORE they are conducted early May through late June; see *Standard Operating Procedures* below for summary of differences in protocol). Note, in 2015 – a year of extreme drought and the third-consecutive drought year in California – biologists elected to complete surveys by the end of May at PINN instead of early June (still in accordance with the protocol) in case breeding dropped off precipitously-earlier than normal for the region. Long-term changes in climate and unusual annual weather conditions (e.g., drought), resulting in potential changes to breeding phenology, may result in the need to evaluate the survey timing in subsequent years. We expect surveys will still take place within the prescribed window and it not be necessary to move the window (just potentially to contract it, as was done in 2015). Given long-term projected changes in climate (Polley et al. 2013), it may be necessary to move the survey timing to match breeding phenology and peak activity levels (Seavy et al. *in press*).

Data Management, Analysis, and Reporting

The primary dataset being collected is that of point count surveys. Data management follows guidelines detailed in the Riparian Landbird Monitoring Protocol for GOGA and PORE (Gardali et al. 2010), *SOP 8: Data Management*. This includes entering, proofing, and managing, and certifying data via the California Avian Data Center (CADC); improving quality assurance /quality control of the data by additional validation of the entire dataset; archiving of raw data sheets; and making data available to others. Data are provided to the SFAN Inventory & Monitoring (I&M) program in the form of archival electronic datasets and metadata, scanned datasheets, and a revised table of GPS coordinates, if offsets are used.

Point Blue strongly encourages the sharing of data, and as such, databases are also available on CADC at Data Availability Level 5. This system and designation means that the data are: clean and project-leader verified (certified); shared and stored with the Avian Knowledge Network; used in publicly available maps and graphs; publicly available and downloadable; and shared, within larger data summaries, with bioinformatic centers (e.g., the Global Biodiversity Information Facility). However, data are managed (with errors fixed or species changed as taxonomic changes are made) exclusively on the CADC version.

Additionally, archival photographs that were taken at all points in 2015 – and are not meant to be repeated during each survey year – are stored on Point Blue’s server (with multilayered backup system in place) and with the I&M program via a Supplement to the progress report (Dettling and Humple 2016). Narratives for every transect were created that assist observers in more easily accessing study sites and finding individual points; include a written narrative, GPS coordinates, maps, and revision history; are maintained on Point Blue’s server, with the current version duplicated in this PIP (Appendix A); and will be updated in future versions after subsequent survey years as appendices to concurrent progress reports.

PINN progress reports will be completed and submitted within a year of completion of data collection for every year of surveys (i.e., every third year; Table 3). In addition, Analysis & Synthesis reports will be completed and submitted every six years and after every other survey year (Table 3). Timing of the six-year analysis and synthesis reports will likely change for GOGA and PORE from the timing provided in the original protocol (Gardali et al. 2010) so that a comprehensive report for all three parks can be generated. The results will not necessarily be combined for GOGA/PORE and PINN so in most cases will be analyzed separately. In most scenarios, data from PINN riparian points will be analyzed in combination with the non-riparian points.

Processing and Workflow

- 1) Point count databases are the core data products. These are geospatially linked to the GPS coordinates of the points where they were recorded via a study-area tree within the California Avian Data Center (CADC) that organizes study sites and encompasses location information for each transect and point.

- 2) Raw data are stored locally at Point Blue Conservation Science's Palomarin Field Station in Point Reyes National Seashore, with digital scans stored on the Point Blue server (with a multilayered backup system in place) and provided to the SFAN I&M program with each progress report.
- 3) Site narratives are updated every survey year in an electronic Word document, stored on the Point Blue server, and provided in each progress report (also as Appendix A to this PIP). Associated GPS coordinates are updated in these narratives, updated on CADC, and provided to the SFAN I&M program with each progress report in the form of a summary table. Archival point count photographs taken in 2015 are also stored on the Point Blue server and are provided to the SFAN I&M program with the progress report for that year.
- 4) Point count data are entered in CADC, and then proofed line by line, by the biologists who collected the given data. CADC has a highly sophisticated user interface that incorporates quality assurance settings to prevent most errors. Site conditions (weather at the beginning of the survey) is also entered and proofed in this fashion.
- 5) After completion of the entire season of data collection, validation of the data on CADC is done by one of the Point Blue project managers (e.g., verification of rare species and outlier dates; confirmation that two visits of survey data exist for every point on each transect). At the completion of this step, data on CADC are switched from restricted (by project users) to available to most users (Availability Level 5; see above) and those records are considered "certified." This is done prior to analysis, reporting, or sharing the datasets with the SFAN I&M program.
- 6) Databases shared with NPS, or downloaded by any user via CADC, are purely archival and no attempts will be made by Point Blue to replace those datasets with corrected versions as they come into existence. Instead, the CADC database is the single place where data are managed and modified (with modifications only to be made by Point Blue biologists). This includes, for example, taxonomic changes that take place with some frequency for species names and/or codes (following the American Ornithologists' Checklist of North American Birds; <http://checklist.aou.org/>, and its supplements, e.g., see Chesser et al. 2014 for the most recent one), and any errors in historic data that have been found and corrected. Key NPS partners are granted direct access to the CADC databases, but are not authorized to make modifications to the databases, and can access updated versions of the databases whenever desired.
- 7) Reports will be provided to the parks after each survey year based on the reporting guidelines prescribed in Gardali et al. (2010) for GOGA and PORE, and following the timeline described in Table 3 (Progress Reports every third year; joint Analysis and Synthesis reports with GOGA and PORE every sixth year). With these reports are provided the above-described electronic documents.

Budget

An estimated budget (Table 5) has been determined for the next year of data collection and progress reporting (2018), and the PINN component of the GOGA/PORE/PINN six-year Analysis & Synthesis report (2019). Note that the latter report will not be a component of the budget every third year, only every sixth year, so there will be a proportional decrease in the expenses for 2021. This presumes surveys are conducted by biologists otherwise working out of Point Blue's Palomarin Field Station in PORE; Point Blue staff will also be responsible for data management, progress reports, and analysis and synthesis reports. Estimated costs of field surveys, progress report, supplies & travel are based on the 2015 Field Season, and modified with estimated annual increases in salaries mostly resulting from anticipated cost of living increases. Estimated costs of an Analysis & Synthesis report are based on the 2012 GOGA and PORE report, including annual staff salary increases, projected overall decreases due to the efficiency of it writing a joint report, and PINN monitoring does not include mist-netting data. Due to the difficulty in forecasting costs in the future, all estimated costs are subject to slight change, especially projections for 2021 and beyond.

Table 5. Estimated budget for PINN Riparian Landbird Monitoring & Reporting, FY2018.

Category	Task	Description	Rate/month ^a	Number	Amount
Salaries	PINN Field Surveys	Point Count Senior Field Biologist	\$ 9,352	1.8	\$ 16,834
		Point Count Project Lead	\$ 11,548	0.5	\$ 5,774
	PINN Progress Report	Point Count Senior Biologist	\$ 9,352	0.5	\$ 4,676
		Point Count Project Lead	\$ 11,548	0.5	\$ 5,774
		Point Count Statistician	\$ 13,875	0.1	\$ 1,388
	PINN component of joint Analysis & Synthesis Report	Senior Report Lead / Statistician	\$ 12,749	1.5	\$ 19,124
		Point Count Project Lead	\$ 11,548	1	\$ 11,548
Total salaries and benefits		n/a	n/a	n/a	\$ 65,119
Supplies		Point Count supplies	At Cost	1	\$ 300
Travel		Mileage	At Applicable Federal Rate	1	\$ 1,400
Total direct costs		Total for salaries, supplies, and travel.	n/a	n/a	\$ 66,819
Indirect costs (25% of non-salary expenses) ^b		n/a	n/a	n/a	\$ 425
Total project costs		n/a	n/a	n/a	\$ 67,244

^a Point Blue staff salaries are stated in monthly amounts, which comprise a standard calculation of 173.34 hours per month. Rates provided are billing rates (includes salary, employee benefits, and indirect costs).

^b as per reduced agreed-upon rate between Point Blue and the Point Reyes National Seashore and other member parks of the San Francisco Bay Area Network of Parks.

Safety

Implementation of this protocol has some associated risks, most of which have been outlined in *SOP 2: Site Visits and Field Safety* of the GOGA and PORE Riparian Bird Monitoring Protocol (Gardali et al. 2010). Those that are unique to PINN are described below in the *Standard Operating Protocols* section of this PIP. Staff will continuously evaluate all risks at the programmatic, personnel and site level. Programmatic-level safety information is presented here, and procedures to mitigate risks associated with activities related to protocol implementation unique to this PIP and not shared with GOGA and PORE are addressed in *Site Visits and Field Safety* section of the *Standard Operating Protocols* section, below.

Specific safety concerns unique to PINN include:

- Crew members will spend many hours (and miles) hiking in areas where rattlesnakes occur and where temperatures may be high.
- Crew members will be regularly working in park areas outside of communication range (either by park radio or by cell phone). Some monitoring trips will require individuals to camp overnight, without office or email access for post-survey communications.

Safety procedures specific to these protocols at PINN include:

- Implementing all relevant components of *SOP 2: Site Visits and Field Safety*, in the GOGA and PORE Riparian Bird Monitoring Protocol (Gardali et al. 2010).
- All staff are required to take a Point Blue safety training (and annual refreshers), which includes a Heat Illness Prevention Program (HIPP) component.
- Surveyors will meet with the PINN Wildlife Biologist or another member of the Research and Resource Management Division in advance of performing surveys. PINN staff will coordinate backcountry communication tools, primarily portable radios, and establish check-in/check-out procedures to ensure that there is a means to verify surveyors exited the field near their estimate return times. Survey plans will also be communicated to other key PINN staff so that Point Blue surveyors can be included in emergency planning, such as when the park may be evacuated due to approaching fire. Communicating surveyor whereabouts will also be valuable since some survey points are within closed areas of the park and staff needs to know that passage in these areas is allowed. PINN staff will also provide a temporary visiting researcher vehicle pass for Point Blue surveyors to leave on their dash boards. Presence of this pass on dashboards while doing surveys will provide an additional means of verifying the location of the surveyor on any given day. In instances when there are more than one person conducting surveys, Point Blue staff will also communicate amongst themselves plans for each day and estimated times of return to rendezvous points.
- PINN staff will provide Point Blue surveyors snake gaiters for use on segments of fairly overgrown trail or off-trail segments where there is a higher risk of an encounter with rattlesnakes without good sight of the ground.

- Checking in with PINN natural resource staff on other safety considerations prior to field operations.

Standard Operating Procedures

This section describes the consistency with or deviation from any of the SOPs described in the Riparian Landbird Monitoring Protocol for GOGA and PORE (Gardali et al. 2010), available at <https://irma.nps.gov/DataStore/Reference/Profile/2124851>, as it pertains to this PIP and bird monitoring at PINN.

Preparation and Equipment Setup

See *SOP 1: Preparation and Equipment Setup* for a list of equipment needed, background on hiring and scheduling field crews, training, and preparing for the point count season. The only difference for PINN is that equipment listed in SOP 1 that is specific to mist-netting efforts is not needed; only preparation and equipment for point counting is required.

Site Visits and Field Safety

See *SOP 2: Site Visits and Field Safety*. Also see Safety section above for PINN-specific safety elements, which includes (1) Point Blue staff taking safety and heat illness prevention training, which was implemented since the GOGA and PORE protocols were finalized; (2) pre-and post-survey communications check-in procedures developed among Point Blue surveyors and with PINN natural resource staff; (3) surveyors carrying park radios and/or wearing snake gaiters, when appropriate; and (4) checking in on any emerging safety issues that may arise.

Training Observers

See *SOP 3: Training Observers*. All training requirements for the landbird monitoring protocol apply to PINN, except mist-netting components of the SOP.

Marking and Relocating Sampling Plots

See *SOP 4: Marking and Relocating Sampling Plots*. These instructions also apply to PINN (excepting mist-netting components), but site narratives are specific to transects within each park, so this lacks the PINN narratives for transects that are part of this PIP. Those narratives are included in this PIP (Appendix A), and will be updated after each field season, with versions stored on the Point Blue server and included in each progress report. Another minor protocol difference is that at PINN, point count locations are not flagged (given the precision of GPS coordinates, the utility of the narrative descriptions, the infrequency of surveys, and the fact that most points are on trails where flagging is frequently removed by hikers).

Using the GPS Unit

See *SOP 5: Using the GPS Unit*. The instructions on the use of GPS units are identical from the protocol to this PIP. Regular advances in the types of GPS units available for these projects, and to the programs used to interface between computers and the GPS unit may all result in slightly different procedures from year to year.

Conducting VCP Point Count Surveys

See *SOP 6: Conducting Variable Circular Plot Point Count Surveys*. The same approach described for GOGA and PORE will be implemented at PINN, with one exception (as described above in

Sampling Design and Monitoring Schedule): point count visits will be earlier at PINN, from the last week of April through the first week of June, whereas in GOGA and PORE they are conducted early May through late June. Additionally, unusual weather (resulting from climate change and/or extreme weather conditions, such as drought) and resulting changes to breeding phenology may result in the need to evaluate the survey timing in subsequent years (see *Sampling Design and Monitoring Schedule* above). It should also be noted that although the Variable Circular Plot distance bins described in SOP 6 for GOGA and PORE will also be used at PINN, this differs slightly from what was used historically at PINN (see *What is Being Measured and How* above for how this differs).

Conducting Mist Netting and Banding

SOP 7: Conducting Mist Netting and Banding does not apply to PINN.

Data Management

See *SOP 8: Data Management*. The same approach described for GOGA and PORE will be implemented at PINN, except no mist-netting data will be included and allowing for modifications (improvements) to the CADC system since 2010. Additional and specific details are provided above in *Data Management, Analysis and Reporting*. Eventually, historic data for the selected points that were monitored by NPS biologists in the 1980s and 1990s should be uploaded into CADC, after conversion into a comparable data framework, if possible. If funding allows and associated geospatial data exist, the rest of the historic data monitored in those same years could also be uploaded into CADC for archiving, depending on priorities.

Data Analysis

See *SOP 9: Data Analysis*. The same approach described for GOGA and PORE will be implemented at PINN, except no mist-netting data (mist-net trends in all seasons, productivity, and survival) will be included. PINN point count data will be analyzed separately from (but discussed together with) data from GOGA and PORE. Because the riparian systems are quite different between these disparate regions, and the PINN transects include some non-riparian habitat, combining the analyses for all three parks (as is the approach for GOGA and PORE) would not be appropriate, and might reduce the ability to detect patterns that are unique either to PINN or to GOGA and PORE. Analyses will include all points at PINN, and not be restricted to the subset of riparian points, with the ultimate goal of determining long-term trends of landbirds at PINN.

Data Reporting

See *SOP 10: Data Reporting*. The same approach described for GOGA and PORE will be implemented at PINN, except no mist-netting data will be included. Progress reports will be written separately for GOGA and PORE (and the same year as monitoring occurs), but Analysis and Synthesis reports will be done in combination with GOGA and PORE. See Table 3 above for timeline.

Revising the Protocol

See *SOP 11: Revising the Protocol*. The same approach described for GOGA and PORE will be implemented at PINN for this PIP.

Literature Cited

- Bart, J., K. P. Burnham, E. H. Dunn, C. M. Francis, and C. J. Ralph. 2004. Goals and strategies for estimating trends in landbird abundance. *Journal of Wildlife Management* 68:611-626.
- Chesser, R. T., R. C. Banks, C. Cicero, J. L. Dunn, A. W. Kratter, I. J. Lovette, A.G. Navarro-Sigüenza, P. C. Rasmussen, J. V. Remsen Jr, J. D. Rising, and D. F. Stotz. 2014. Fifty-fifth supplement to the American Ornithologists' Union check-list of North American birds. *The Auk*, 131(4), pp.CSi-CSxv.
- Cormier, R. L., N. E. Seavy, and D. L. Humple. 2014. Abundance Patterns of Landbirds in the Marin Municipal Water District: 1996 to 2013. A Point Blue Conservation Science report to the Marin Municipal Water District.
- Dettling, M. D., and D. L. Humple. 2016. Riparian landbird monitoring in Pinnacles National Park: Progress report for 2015. Natural Resource Data Series NPS/SFAN/NRDS—2016. National Park Service, Fort Collins, Colorado.
- Emmons, G., J. Petterson, M. Koenen, and D. Press. 2011. Prairie falcon monitoring protocol for Pinnacles National Monument: narrative-version 2.3. Natural Resource Report NPS/SFAN/NRR—2011/466. National Park Service, Fort Collins, Colorado.
- Emmons, G. 2015. A checklist of birds of Pinnacles National Park. Western National Parks Association, Tucson, AZ.
- Gardali, T., N. E. Seavy, R. T. DiGaudio, and L. A. Comrack. 2012. A climate change vulnerability Assessment of California's at-risk birds. *PLoS ONE* 7(3): e29507. doi:10.1371/journal.pone.0029507.
- Gardali, T., D. Humple, M. Herzog, M. Koenen, D. Press, W. Merkle, and S. Allen. 2010. Riparian landbird monitoring protocol for Golden Gate National Recreation Area and Point Reyes National Seashore: version 4.4. Natural Resource Report NPS/SFAN/NRR-2010/207. National Park Service, Fort Collins, CO.
- Gerrodette, T. 1987. A power analysis for detecting trends. *Ecology* 68, 1364–1372.
- Haff, T. M., G. Ballard, G. R. Geupel, and D. L. Humple. 2003. Landbird inventory of the Pinnacles National Monument: A final PRBO (now Point Blue Conservation Science) report to the NPS. Point Blue Contribution # 1063, available from Point Blue.
- Humple, D. L. and T. Gardali. 2015. The avian monitoring program for the Presidio of San Francisco. Version 1.1. A product of Point Blue Conservation Science and the Presidio Trust.
- Humple, D. L. and T. Gardali. 2006. Landbird monitoring in the National Park Service's San Francisco Bay Area Network: a summary report of the 2005 field activities for Golden Gate National Recreation Area, John Muir National Historic Site, Pinnacles National Monument and

- Point Reyes National Seashore. A PRBO (now Point Blue Conservation Science) report to the National Park Service.
- Humple, D. L. and T. Gardali. 2004. A report of the 2004 field season for Golden Gate National Recreation Area, John Muir National Historic Site, Pinnacles National Monument and Point Reyes National Seashore. A PRBO (now Point Blue Conservation Science) report to the National Park Service.
- Humple, D. L., and E. L. Porzig. 2014. Riparian landbird monitoring in Golden Gate National Recreation Area and Point Reyes National Seashore: Analysis report through winter 2011-12. Natural Resource Technical Report NPS/SFAN/NRTR—2014/908.
- Johnson, D. H. 2002. The importance of replication in wildlife research. *Journal of Wildlife Management* 66:919-932.
- Polley, H. W., D. D. Briske, J. A. Morgan, K. Wolter, D. W. Bailey, and J. R. Brown. 2013. Climate change and North American rangelands: trends, projections, and implications. *Rangeland Ecology and Management* 66:493–511.
- Porzig, E. L., K. E. Dybala, T. Gardali, G. Ballard, G. R. Geupel, and J. A. Wiens. 2011. Forty-five years and counting: reflections from the Palomarin field station on the contribution of long-term monitoring and recommendations for the future. *The Condor* 113: 713-723.
- Purcell, K. L., S. R. Mori, M. K. Chase. 2005. Design considerations for examining trends in avian abundance using point counts: examples from oak woodlands. *The Condor* 107, 305–320.
- RHJV (Riparian Habitat Joint Venture). 2004. Version 2.0. The riparian bird conservation plan: a strategy for reversing the decline of riparian associated birds in California. California Partners in Flight. (Conservation Plan Authors: G. Ballard, L. Comrack, G. Elliott, T. Gardali , G. Geupel, D. Humple, M. Lynes, and M. Pitkin). <http://www.prbo.org/calpif/htmldocs/riparian.html>.
- Rich, T. D., C. J. Beardmore, H. Berlanga, P. J. Blancher, M. S. W. Bradstreet, G. S. Butcher, D. W. Demarest, E. H. Dunn, W. C. Hunter, E. E. Iñigo-Elias, J. A. Kennedy, A. M. Martell, A. O. Panjabi, D. N. Pashley, K. V. Rosenberg, C. M. Rustay, J. S. Wendt, and T. C. Will. 2004. Partners in Flight North American Landbird Conservation Plan. Cornell Lab of Ornithology, Ithaca, NY.
- Sawyer, John O., T. Keeler-Wolf, and J. Evens. 2009. Manual of California vegetation. California Native Plant Society Press.
- Seavy, N. E., E. L. Porzig, R. L. Cormier, D. L. Humple, and T. Gardali. *In press*. Evidence of climate change impacts on landbirds in western North America: A review and recommendations for future research. *Western Birds*.
- Seavy, N. E. and M. H. Reynolds. 2007. Is statistical power to detect trends a good assessment of population monitoring? *Biological Conservation* 140:187-191.

- Siegel, R. B., R. L. Wilkerson, K. J. Jenkins, R.C., Kuntz II, J.R. Boetsch, J.P. Schaberl, and P.J. Happe. 2007. Landbird monitoring protocol for national parks in the North Coast Cascades Network: U.S. Geological Survey Techniques and methods 2-A6.
- Wolstenholme, R., A. Welch, J. Jones, S. Scherbinski, G. Emmons, A. Punzalan, R. King. 2016. Pinnacles National Park California Condor Reestablishment – Annual Report 2015. Pinnacles National Park, National Park Service, Paicines, California.

Appendix A: Pinnacles National Park Riparian Point Count Transect Narratives

Revision History Log for All SOPs^a

Previous Version #	Revision Date	Author	Changes Made	Reason for Change	New Version #
1.0 (although were not previously compiled into a single document)	Dec. 2015	M. Dettling, R. DiGaudio, D. Humple	Updated point count station narratives (locations and descriptions); created some that were missing or new.	GPS coordinate did not match landscape; changes to habitat since previously surveyed; vegetation or other feature prevented access to original station	2.0

^a Add rows to the table as needed to document updates over time.

Similar to *SOP 4: Marking and Relocating Sampling Plots* in the GOGA and PORE Riparian Landbird Monitoring Protocol (Gardali et al. 2010), here we explain the procedure for marking and locating point count stations. Detailed descriptions of all transects are provided, and are also stored individually on the Point Blue server.

Locating Point Count Stations

All pre-existing point count stations (points) are located with a combination of means: (1) GPS coordinates; (2) a narrative that is written for each transect describing any details and important features useful for locating the points; and (3) maps showing location of entire transect and individual points.

New points were established in 2015 by a biologist experienced in point count methodology and regional bird identification. Points were located within riparian habitat and were placed 250 m from the nearest point (whether in the same or adjacent transect) or slightly further if there was a break in riparian habitat at 250 m. GPS coordinates were recorded and a narrative written for each new point and transect.

Modifying and Marking Point Count Stations

Points are already established and selected. Consideration to add new points will require modification of the Protocol Implementation Plan.

Occasionally biologists will encounter previously established points for which (1) the GPS coordinates do not appear as accurate as possible (due to suboptimal conditions when coordinates were originally recorded), (2) physical features have changed and therefore the narrative is either misleading or requires updating, or (3) conditions warrant slight modification to the point location. If coordinates appear inaccurate or modifications need to otherwise be made, the biologist will record the updated coordinates and update them on CAD/C, provide them to and the SFAN I&M Data Manager, and change the coordinates on the narrative. When site conditions warrant the narratives to be updated, the biologist will make sure this is changed in the current version of the narrative (keeping the now-retired version in an electronic folder specifically for this purpose), and updated narratives will be included in each progress report.

Balconies (BALC), Pinnacles National Park, San Benito County, CA

Revision history log for Balconies sites^a

Previous Version Year	Revision Year	Author	Changes Made	Reason for Change
2004	2005	Humple	Changed/improved details of narrative	Needed improvement
2005	2006	Humple	Complete re-do	New format
2006	2015	Humple/Dettling	Added map & metadata; descriptions updated	Veg changes

^a Add rows to the table as needed to document updates over time.

Project: Pinnacles National Park (PINN)

No. Points: 10 points

Metadata: Established winter 1983; in 2004, lumped into a transect and narrative created. Only 8 of 10 points appear to have been surveyed during breeding seasons of 1984-85 and 1998-99 (no record of historic data in those years for BALC 8 and BALC 9, originally called RM98 and RM99, respectively). Points 1, 2, 5, 8, 9, 10 are in riparian habitat (other points and part of these in chaparral and oak/pine woodland).

Getting There: Park at end of road at Old Pinnacles Trailhead, ~10 minute drive from campground. Head straight (north) up main trail, Old Pinnacles Trail (turning right at T intersection). BALC 1-7 are on this trail in direction of Balconies area; 8-10 are on North Wilderness Trail. It's ~700 m to first point (10 minute walk).

Notes: If don't have park pass be sure to leave note in car indicating you are doing surveys for the park. Points range from 180-340 m apart, with two that are 600 m apart. GPS works well. Points not flagged.

Site-specific notes, GPS coordinates, and a map showing site locations are provided below.

BALC01—On rocky wall/bridge footing just before crossing bridge at creek bed edge. Pt. is on top of flat wall adjacent to creek ~10-15m before bridge.

BALC02—On trail, 5m NW of willow branch that overhangs trail.

BALC03—Follow trail and when close to point, drop down into creek bed. Point next to a 1-2 ft diameter dead/downed log that spans the creek bed in an open broad channel.

BALC04—Continue up trail, point on east side of trail in 1 m tall juniper sapling immediately next to 15" diameter downed log w/ decayed end. There is a *Ceanothus* bush 2 m up from trail.

BALC05—Continue up trail, point is on trail 5 m west of large blue oak growing right next to trail. North side of trail has a mtn. mahogany (*Cercocarpus*) bush (might be there in 2015, but I don't know what the species looks like).

BALC06—Continue up trail. When GPS says 80-90m from point, cross creek, climb up hill into blue oak woodland, gaining 25 m elevation in the process. Point next to snapped off, double trunked blue oak snag (2m tall). ~80 m off-trail.

BALC07—Go back to trail and continue along it, this time for about 600m! When close to point, climb east out of creek bed uphill into blue oak woodland. Point is at base of small rocky outcrop. ~30 m off-trail.

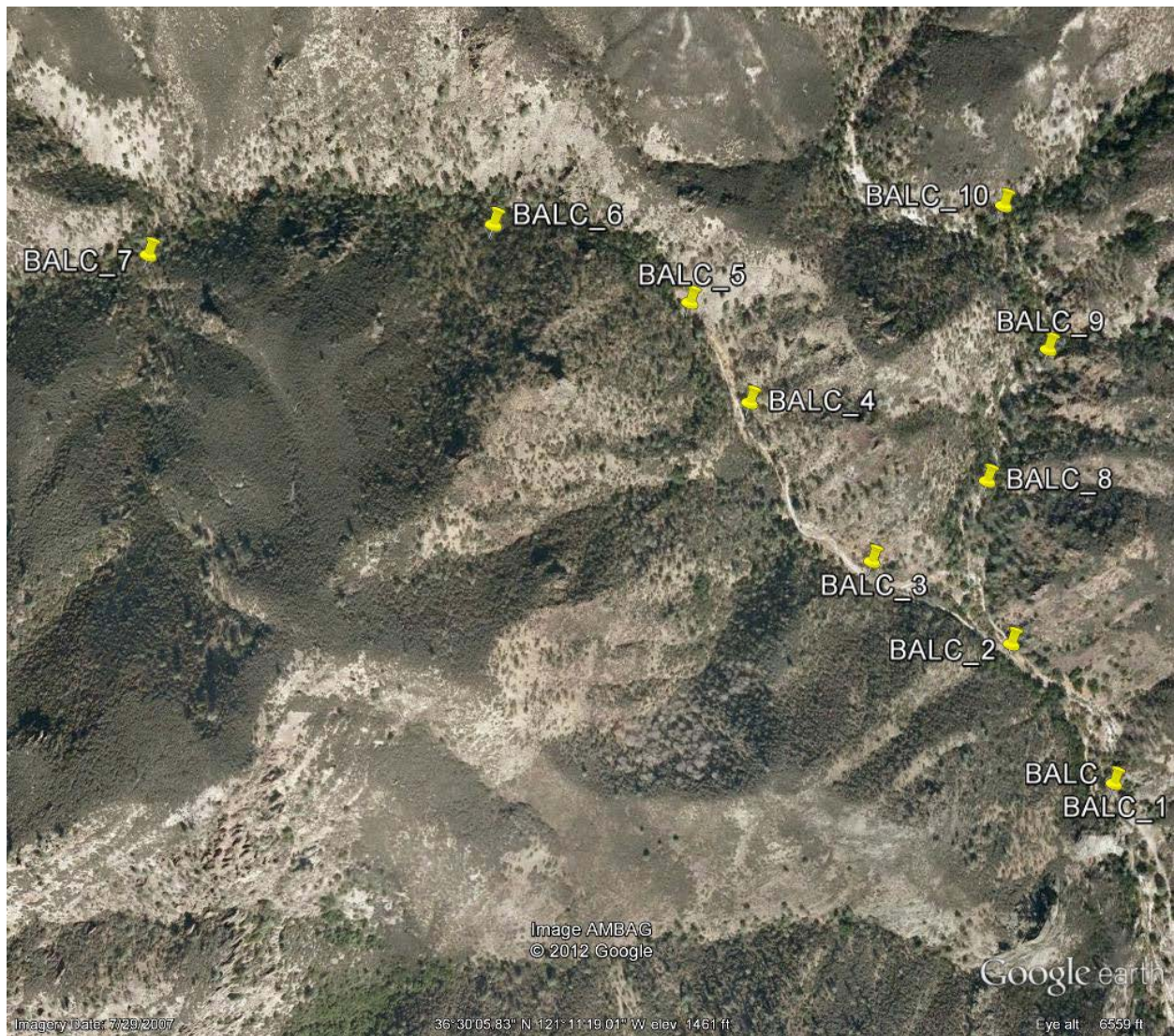
BALC08—Head back on trail from way that you came. Take North Wilderness Trail, which is between pts 2 and 3. Point on west side of creek, on the trail near 3 poison oak bushes.

BALC09—Continue up trail. Look for base of steep, rocky outcrops, with a 3-branched, 20 m tall dead gray pine that lies 2 m east of trail/point.

BALC10—Look for small clearing on north (uphill) side of trail (point is 5 m off trail) w/ downed tall gray pine. Point is next to root ball. A large live oak lies above gray pine.

Coordinates for Balconies sites, WGS84, decimal degree

Site	Latitude	Longitude
BALC01	36.49978	-121.17801
BALC02	36.50136	-121.18058
BALC03	36.50197	-121.18346
BALC04	36.50373	-121.18643
BALC05	36.5049	-121.18799
BALC06	36.50513	-121.19176
BALC07	36.50337	-121.1976
BALC08	36.50358	-121.18183
BALC09	36.50567	-121.18146
BALC10	36.5075	-121.18298



Map of Balconies sites

Grassy Canyon (GRCA), Pinnacles National Park, San Benito County, CA

Revision history log for Grassy Canyon sites^a

Previous Version Year	Revision Year	Author	Changes Made	Reason for Change
None	2002	Cody Martz	Created narrative	–
2002	2015	Humple/DiGaudio	Added map, coordinates, revision history log, metadata; descriptions updated	A lot can happen in 13 years

^a Add rows to the table as needed to document updates over time.

Project: Pinnacles National Park (PINN)

No. Points: 7 points

Metadata: Established in 2001. Points 1, 2, 6, and 7 riparian (3-5 not riparian).

Getting there: Park at the Peaks View parking lot (~5 min drive from campground), and head towards the S. Wilderness Trail. Keep left on the “Service Access Road” (S. Wilderness trail bears right) and follow GPS to starting point. The first point you come to is GRCA07, which is ~15-20 minute walk from parking.

Notes: If don’t have park pass be sure to leave note in car indicating you are doing surveys for the park. Points are approximately 250m apart. Points not flagged.

Site-specific notes, GPS coordinates, and a map showing site locations are provided below.

GRCA07—Point is ~90 m off the road in the creek bed (was dry in 2015), at a sharp bend in the creek in the middle of a clump of large willows on the NW side of the creek.

GRCA06—From point 7, walk back to the road and continue SE down the road. At creek crossing (or just before it) follow the west bank south. The point is on an elevated bench overlooking the creek bed, between large gray pine and a mostly dead large live oak that’s broken off near the top.

GRCA01—Return to the service road and follow GPS to point along road. Point is at relatively large, 3 trunked lone live oak on N side of road.

GRCA02—Continue up Rd. Point is on N. side along pig fence at “area closed” sign.

GRCA03—Continue up Rd. cross over fence stay on Rd. Point is on the S. side of the road, across from group of fallen dead and burned pine logs.

GRCA04—Continue up trail, you will come to a Y in the Rd stay R or E Continue up point is on the SW side of Rd in a Live Oak close to the Rd.

GRCA05—Continue up Rd. Point is NE side of Rd. just before (~10m) red and white post next to the rd.

Coordinates for Grassy Canyon sites, WGS84, decimal degree

Site	Latitude	Longitude
GRCA01	36.47541	-121.15236
GRCA02	36.47544	-121.15061
GRCA03	36.47574	-121.14811
GRCA04	36.47526	-121.14611
GRCA05	36.47368	-121.14489
GRCA06	36.47502	-121.15414
GRCA07	36.47709	-121.15432



Map of Grassy Canyon sites

Headquarters (HEAD), Pinnacles National Park, San Benito County, CA

Revision history log for Headquarters sites^a

Previous Version Year	Revision Year	Author	Changes Made	Reason for Change
2004	2005	Humple	Updated narrative details (many)	Updates needed
2005	2006	Humple	Modified to fit new narrative format	New format
2006	2015	Dettling	Descriptions updated; metadata added	Veg changes

^a Add rows to the table as needed to document updates over time.

Project: Pinnacles National Park (PINN)

No. Points: 7 points

Metadata: Established in winter 1983; lumped into transect and narrative created 2004. Only 4 of 7 points surveyed during breeding season in 1984 (there is no record of data in 1984 for HEAD 1, 2, or 3, originally called HC01, BO02, AND BO01, respectively). Points 4-7 riparian, 1-3 oak woodland.

Getting there: Go to the Visitor Center parking lot on the East side of the park (~10 minute drive from campground).

Notes: If don't have park pass be sure to leave note in car indicating you are doing surveys for the park. Points 1-2 are up Condor Gulch Trail across from the visitor center. Point 3 up spur road from restroom across from visitor center. Take Bear Gulch Trail in direction of park exit to get to points 4-7. You can walk the entire transect or break it up and drive to couple spots. For the driving option, you can park at the visitor center to access points 1-4, for point 5 there is small parking area on the side of the road south of the intersection with the Old Pinnacles trailhead road, and for points 6-7 park at the Peaks View parking lot. GPS works well. Points not flagged.

Site-specific notes, GPS coordinates, and a map showing site locations are provided below.

HEAD01—Go up the Condor Gulch trail about 580 m (as the Acorn Woodpecker flies, so more than that when you are walking it) from the trailhead. Point is on trail ~15m some rock outcroppings that are on both the right and left side of the trail and that project well above your head. You will pass point 2 on your way to this point.

HEAD02 - Go up the Condor Gulch trail about 350 m (as the Acorn Woodpecker flies, so more than that when you are walking it) from the trailhead. Point is at a spot with 2 medium sized oaks on right (uphill) and a small oak on the left (downhill). Point 1 is further up the trail.

Go back down Condor Gulch Trail to main road

HEAD03 - Walk down spur road that passes by rock foundation bathroom, and climb uphill (relatively steep) about 75 m elevation. Follow GPS to point in oak savanna type habitat.

Walk back to main road and parking area.

HEAD04—Walk down trail past administrative buildings along Bear Gulch trail. Look for large downed oak log above trail in a small clearing. Follow GPS to point which is on the trail. You can then walk to point 5 or go back to your car and drive to parking area near that point.

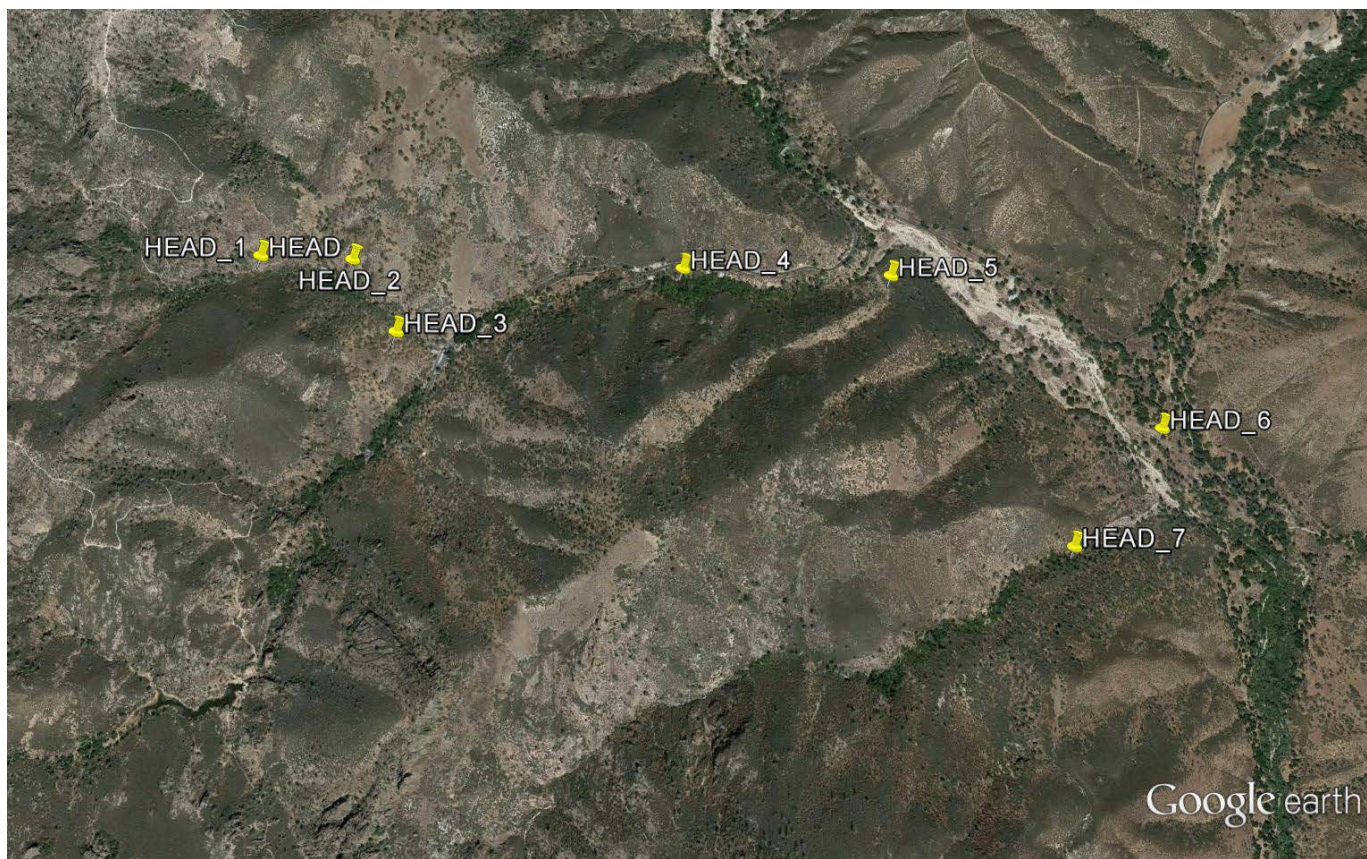
HEAD05—As you continue down Bear Gulch Trail, look for wooden bridge that crosses the (usually) dry creek bed. Then look for the drainage that comes in from your SE side. Leave the trail and go up the drainage. The point is on top of the fairly steep sided E wall of the drainage. Either go back to the Bench trail and walk towards Peaks View parking or drive there.

HEAD06—Go quite a ways (about $\frac{3}{4}$ mile) from point 5, passing Peaks View parking lot in the process. When you are ~200m from the point, the trail curves left (wooden fence here too), and you should go off trail at this spot. Point is on NE side of Chalone creek, at a low spreading willow.

HEAD07—Point is located in thickly vegetated mouth of Frog Canyon. From point 6, head SW, looking for the canyon and follow the creek bed until you reach the narrow mouth, which has a small pool in springtime. A buckeye hangs over the pool.

Coordinates for Headquarters sites, WGS84, decimal degree

Site	Latitude	Longitude
HEAD01	36.48362	-121.18747
HEAD02	36.48351	-121.18451
HEAD03	36.48143	-121.18304
HEAD04	36.4831	-121.17346
HEAD05	36.48274	-121.16631
HEAD06	36.47817	-121.15748
HEAD07	36.47506	-121.16092



Map of Headquarters sites

Lower McCabe Canyon (LMCC), Pinnacles National Park, San Benito County, CA

Revision history log for Lower McCabe Canyon sites^a

Previous Version Year	Revision Year	Author	Changes Made	Reason for Change
None	2015	Humple/Dettling	New transect and narrative	New transect

^a Add rows to the table as needed to document updates over time.

Project: Pinnacles National Park (PINN)

No. Points: 4 points

Metadata: Established in 2015. Differentiated from the transect McCabe Canyon (MCCA), a pine/oak woodland portion of the canyon immediately to the north.

Getting there: Across from Pinnacles Campground. Go up driveway across Hwy 146 from RV camping area, with mailbox (this may change) and old metal gate; it's the first dirt road heading west off 146 after you turn south from main campground entrance headed towards main part of park. Do not climb on gate to cross (climb over/under barbed wire).

Weekendability: No problem (hikers do not access).

Notes: Goes through former inholding (no current residents). Rubber boots might be needed in a wet year. In a normal year, snake gaiters helpful for snakes (since some walking is off-trail) and grass seeds (or regular gaiters for the latter). Can combine survey with Rose Canyon or with southern SACR points (e.g., 1-3). Points not flagged.

Site-specific notes, GPS coordinates, and a map showing site locations are provided below.

LMCC01—head up driveway (on foot) from Hwy 146 and then veer left towards riparian and follow GPS unit. Point is ~5m back from streambank, on far (south; or left, when facing stream bank) side of triple-trunked gray pine.

LMCC02—go back to dirt road and continue North along it. Go through former inholding area to ~100m north of buildings. Point is ~15-20m left (west) of trail, at top of steep stream bank amidst coyotebush.

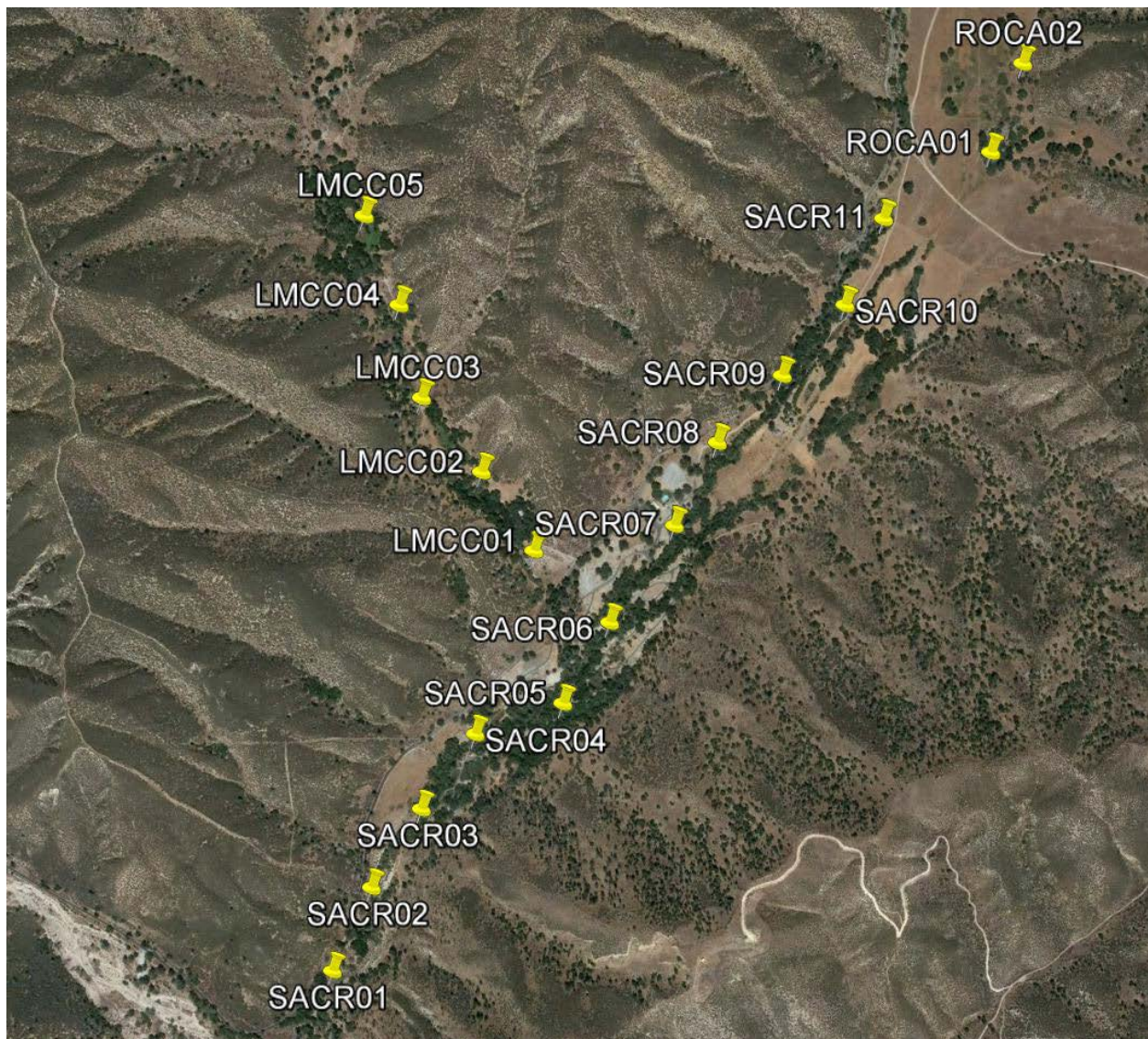
LMCC03—continue North on dirt road/trail. Just before pig trap on the right (east), go to left (west) of road ~20m; point is at lone gray pine above bank.

LMCC04—continue North on dirt road/trail. Point is ~25m to left (west) of road, just in from 2nd (northern) trunk of 2 large oaks with trunks right near each other along road. ~4m from bank, near mid-sized double-trunked oak.

LMCC05—continue North on dirt road/trail. Point is on dirt road itself, left (west) side. Is also 250m from MCCA01 (other transect in different habitat to north of here).

Coordinates for Lower McCabe Canyon sites, WGS84, decimal degree

Site	Latitude	Longitude
LMCC01	36.49226497	-121.1502034
LMCC02	36.49415453	-121.1517325
LMCC03	36.49592122	-121.1534768
LMCC04	36.49812113	-121.1540944
LMCC05	36.50021862	-121.1550829



Map of Lower McCabe Canyon sites.

North Fork Chalone Creek (NFCC), Pinnacles National Park, San Benito County, CA

Revision history log for North Fork Chalone Creek sites^a

Previous Version Year	Revision Year	Author	Changes Made	Reason for Change
2004	2005	Humple	Updated narrative details (many)	Updates needed
2005	2006	Humple	Modified to fit new narrative format	New format
2006	2015	Humple/Dettling	Added map and metadata, descriptions updated	New format

^a Add rows to the table as needed to document updates over time.

Project: Pinnacles National Park Monitoring / San Francisco Bay Area Network Monitoring

No. Points: 12 points

Metadata: Transect established in 2001 (although misnamed that year “West Fork Chalone Creek”, WFCC, including in report; Haff et al. 2003), with 2 additional historic points (that were surveyed winter 1983 and originally called BO17 and CC08) added in 2004 based on location and habitat, and renamed points 11-12.

Getting There: If don’t have park pass be sure to leave note in car indicating you are doing surveys for the park. Park at parking lot at end of road at Old Pinnacles trailhead, ~10 minute drive from campground. It’s about 50 minutes from trailhead to first point (point 11); can hike this in the morning if you leave early enough. Head out on Old Pinnacles Trail, turning right pretty early on when you reach a T-intersection. 15 minutes from parking lot turn right onto another trail at a *small* sign for the North Wilderness Trail. Points 11 and 12 are closest; then 1-10 follow. In years with multiple surveyors, can hike in to first point in conjunction with person surveying UPCH.

Notes: Some points are less than 200m apart. GPS works well. Points not flagged. Site-specific notes, GPS coordinates, and a map showing site locations are provided below.

NFCC11—About 50 min. from Old Pinnacles trailhead. On trail when crossing streambed.

NFCC12—At S side of a live oak, with a pine next to it, that is in flood plain, and about 10 meters before rock cairn.

NFCC01 -- From Confluence, approx. 200m up main trail on W side of creek. Just past spreading blue oak tree with three main trunks. Point is next to rock cairn.

NFCC02 -- Stay on trail, proceed to GPS point, point is next to rock cairn, by a large blue oak amidst chamise.

NFCC03—Continue up trail to GPS point near large gray pine.

NFCC04—Continue up trail to GPS point near large gray pine in an interior live oak.

NFCC05—Continue up trail to GPS point at partly dead gray pine with poison oak growing on it and a moss covered rock on other side of trail.

NFCC06—Continue up trail to GPS point just after trail crosses creek near large Int. Live Oak (~3m off trail).

NFCC07—Continue up trail, cross creek, proceed to GPS point just before next crossing. Trail on small embankment, between 3 medium gray pines and 1 small willow.

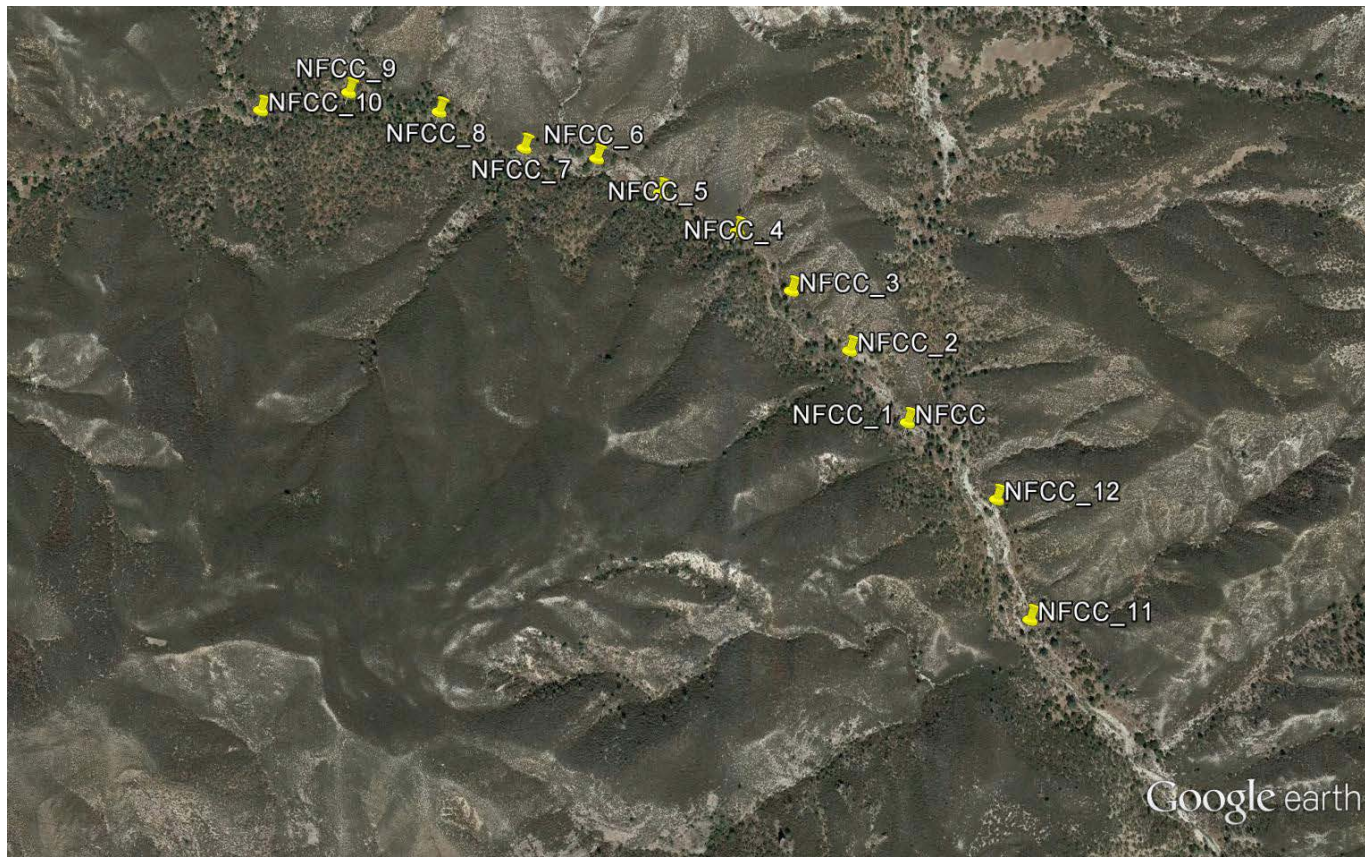
NFCC08—Continue up trail to GPS point. Any distinguishing features?

NFCC09—Continue up trail to GPS point above creek cut-bank.

NFCC10—Continue up trail, cross creek, to GPS point near Interior Live Oak (~3m off trail).

Coordinates for North Fork Chalone Creek sites, WGS84, decimal degree

Site	Latitude	Longitude
NFCC01	36.51917	-121.19205
NFCC02	36.52051	-121.19337
NFCC03	36.52163	-121.19471
NFCC04	36.52275	-121.19596
NFCC05	36.52348	-121.19775
NFCC06	36.52413	-121.19925
NFCC07	36.52432	-121.20094
NFCC08	36.525	-121.20293
NFCC09	36.52536	-121.20504
NFCC10	36.52501	-121.20708
NFCC11	36.51555	-121.18931
NFCC12	36.51775	-121.19002



Map of North Fork Chalone Creek sites.

Rose Canyon (ROCA), Pinnacles National Park, San Benito County, CA

Revision history log for Rose Canyon sites^a

Previous Version Year	Revision Year	Author	Changes Made	Reason for Change
None	2015	Humple/Dettling	New transect and narrative	New transect

^a Add rows to the table as needed to document updates over time.

Project: Pinnacles National Park Monitoring/San Francisco Bay Area Network Monitoring

No. Points: 2 points

Metadata: Established in 2015.

Getting there: Just north of Sandy Creek transect, so if splitting that transect in half, can combine points 4-11 with ROCA 1-2 (and SACR 1-3 with LMCC); that serves to not require driving if coming from campsite, and these points are very close to SACR 11 so it works well. Otherwise, can combine with Lower McCabe Creek transect; drive to pullout as close as can get to site, but do not walk through restoration area (can see signs on other side facing other direction asking people not to walk there). To access from SACR point 11: just keep going north and will see big riparian patch; head NE (crossing fence and field) to point.

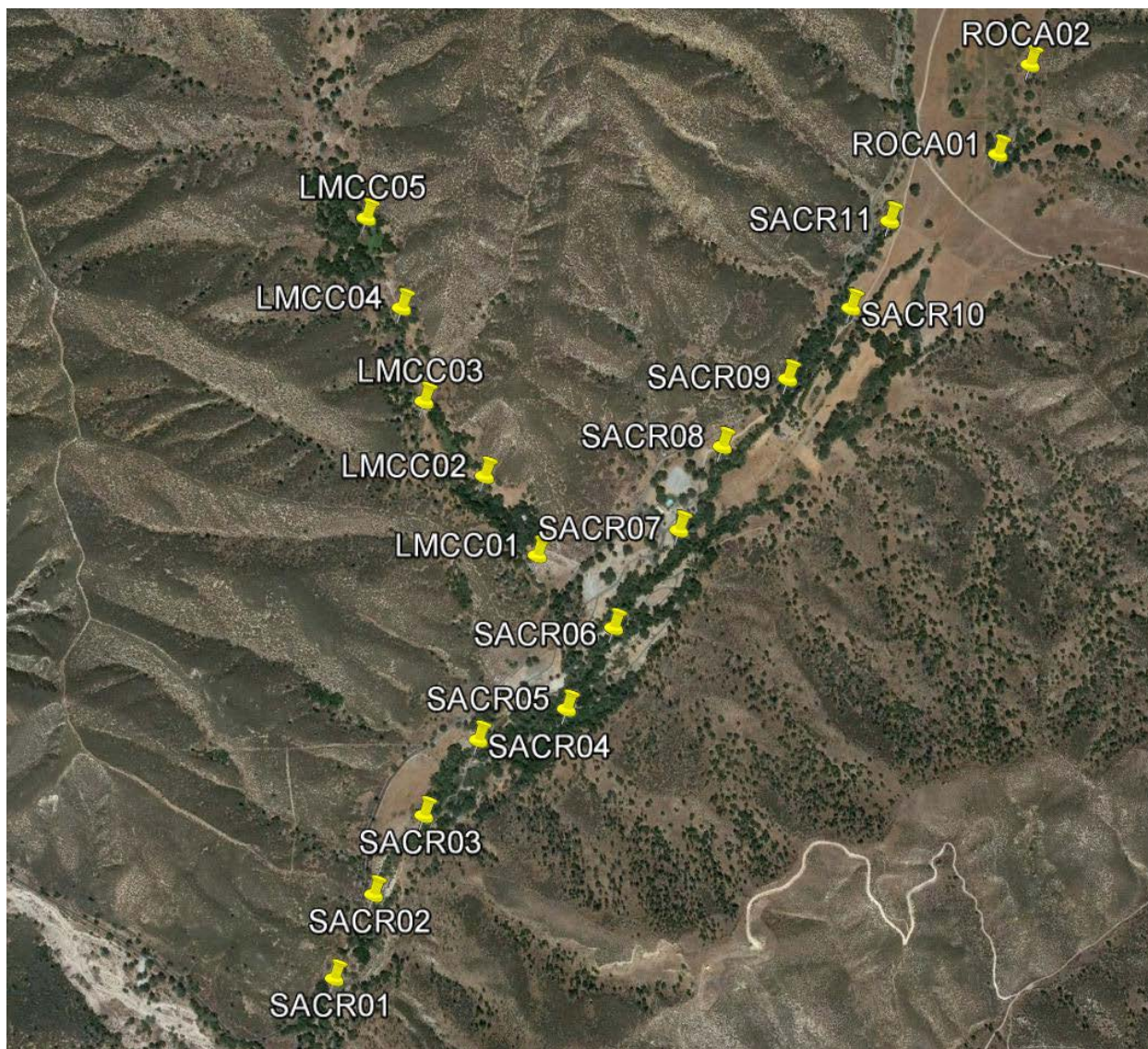
Notes: Snake gaiters helpful because off-trail and also for grass seeds (or regular gaiters for the latter). Points not flagged. Site-specific notes, GPS coordinates, and a map showing site locations are provided below.

ROCA01—point is at west edge of willow patch near tall oak, and ~20m from south terminal edge of the riparian patch.

ROCA02—continue along west side of riparian patch to area with a lot of low rose patches; have to cross fence. Point is 5m west of fence, across which is young live oak.

Coordinates for Rose Canyon sites, WGS84, decimal degree

Site	Latitude	Longitude
ROCA01	36.50180528	-121.1365451
ROCA02	36.50391778	-121.1356013



Map of Rose Canyon sites.

Sandy Creek (SACR), Pinnacles National Park, San Benito County, CA

Revision history log for Sandy Creek sites^a

Previous Version Year	Revision Year	Author	Changes Made	Reason for Change
None	2015	Humple/Dettling	New transect and narrative	New transect

^a Add rows to the table as needed to document updates over time.

Project: Pinnacles National Park Monitoring/San Francisco Bay Area Network Monitoring

No. Points: 11 points

Metadata: Established in 2015.

Getting there: Transect includes the Bench Trail south of the Pinnacles Campground (points 1-3), the campground (points 4-7), and a portion of Sandy Creek extending north of the campground mostly along a dirt road parallels 146 which is directly west of transect (points 8-11). It is linear if you are able to cross the creek at secret pseudo-trail near point 4 at campsite 64 (or if coming from W side, b/w site 134 and Bench Trail gate, 50m from gate) that's not always accessible (due to higher water conditions or campers in cut-through campsites). Can otherwise backtrack and cut through at pt 6 (if no campers at site 122) or on main road if needed. Also, half of this transect can be paired with Rose Canyon and half with Lower McCabe Canyon transects (e.g., SACR 1-3 or 1-6 with LMCC 1-5; and SACR 4-11 or 7-11 with ROCA 1-2). Bench Trail points are accessed on the W side of creek by walking the campsites 124-134 loop, then taking the trail that continues S from there and going through metal gate on trail.

Weekendability: Avoid as much of this is in the campground.

Notes: Much walking is on trail/road, but often go off trail to reach point (so may want snake gaiters for snake / grass seed protection or regular gaiters for latter). Not flagged. Points 250m apart unless noted.

Site-specific notes, GPS coordinates, and a map showing site locations are provided below.

SACR01—on W side of creek / E. side of Bench Trail (take trail until near then cut in). Point on other side (E) of a tight copse of oaks along trail, and is near edge of small willows and beneath eastern most branches of a huge oak.

SACR02—Continue N on Bench Trail; point on W side of creek / E. side of trail next to rose/willow edge. Even with small live oak that is next to small gray pine between Bench Trail fence and Hwy 146.

SACR03—Continue N on Bench Trail; point on W side of creek and E. side of trail. Point 15m E off trail, just into riparian and near edge, and beneath willow tree on edge (near gray pine sapling).

SACR04—continue N on Bench Trail until can cross creek (shortcut if can do it—see Notes above). Point on E side of creek / W. side of road, between campsites 63 and 64. Towards main creek (W) from what looks like a historic campsite, now with rectangular wooden barriers. Point at bare spot above creek bed (in creek bed is marshy area and large cottonwood).

SACR05—continue N on road. Point on E side of creek / E side of road, 10m N of sign for campsite 53, but on other (E) side of road, and on road edge.

SACR06—continue N on road then take left loop; between campsites 41 + 42 follow amphitheater sign down trail. Point on middle of bridge over creek. From other (W) side of creek, trail to bridge is via campsite 122. 315m from point 7 to avoid campsites and amphitheater.

SACR07—continue N on campground road on either side of creek (W side quicker if no campers at site 122). Point is on W side of creek / E side of road, along SE edge of RV turnaround. ~10m before bear canisters of campsite 1, at willow, and ~5m before top of creek bank. 315m from point 7.

SACR08—walk N from visitor center / campground store / pool area on paved campground road to W of creek (becomes dirt). Point is on W of creek / E of road, above creek bank, on other (E) side of giant fallen oak from road.

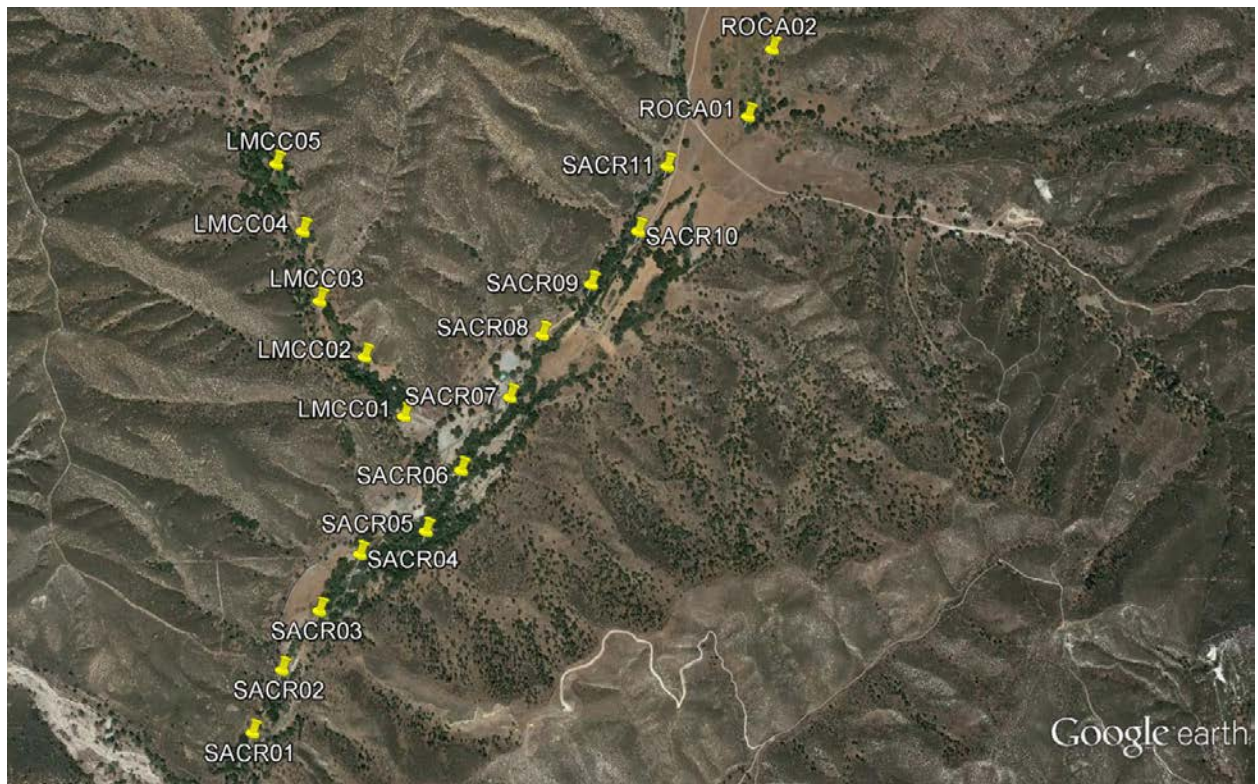
SACR09—go back to road and continue N on it. When road turns right and crosses bridge, instead stay on W side of the creek and walk off-trail to point. Point is above creek bank under oaks by a super steep spot of the bank and close to where fence board is attached to a small oak.

SACR10—walk back way you came and this time cross bridge, and continue N on road. Point on E side of creek / W of road, above creek bank and ~3m in from road, amidst coyotebrush.

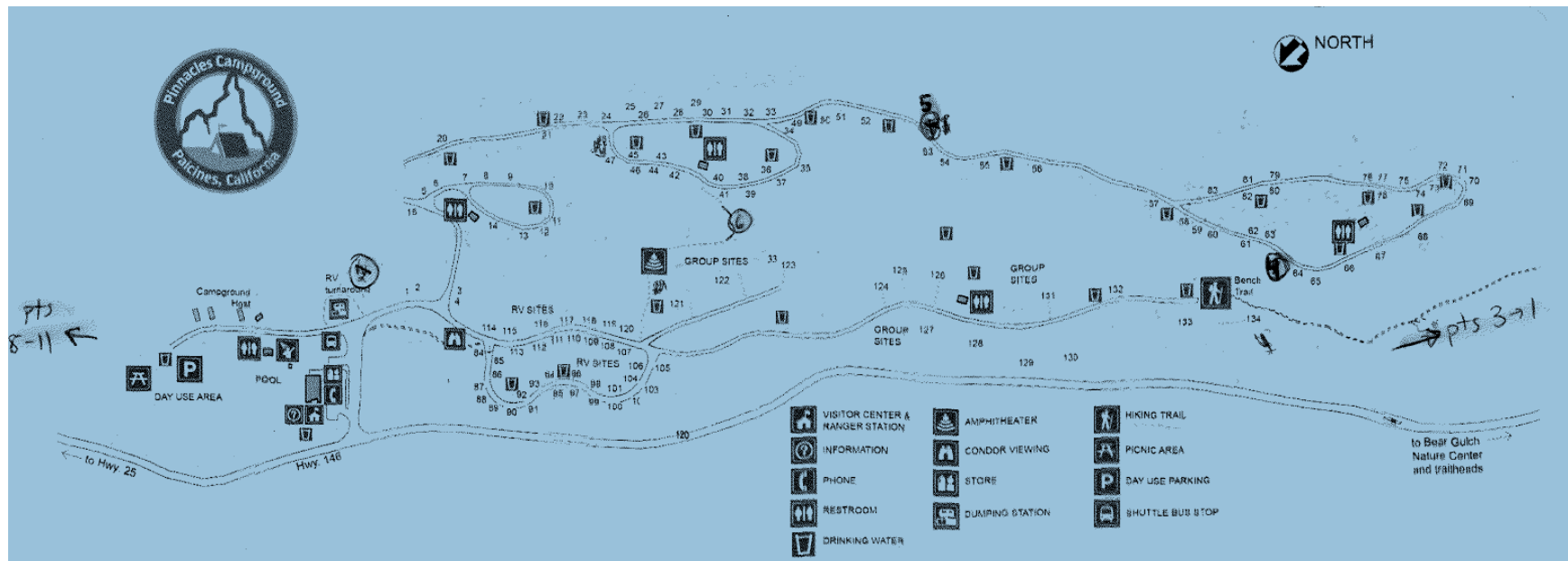
SACR11—continue N on road. Point on E side of creek / W of road, ~25m in from road and ~5m before creek bank edge at fallen willow.

Coordinates for Sandy Creek sites, WGS84, decimal degree

Site	Latitude	Longitude
SACR01	36.48207519	-121.1563393
SACR02	36.48410298	-121.1551526
SACR03	36.48600862	-121.1536451
SACR04	36.48783106	-121.1520056
SACR05	36.48858316	-121.1493533
SACR06	36.49053533	-121.1479449
SACR07	36.49287098	-121.1459951
SACR08	36.49486568	-121.1447047
SACR09	36.49647297	-121.142761
SACR10	36.49815899	-121.140886
SACR11	36.50022102	-121.139738



Map of Sandy Creek sites.



Map of Pinnacles campground.

South Wilderness Trail (SWTR), Pinnacles National Park, San Benito County, CA

Revision history log for South Wilderness Trail sites^a

Previous Version Year	Revision Year	Author	Changes Made	Reason for Change
2004	2005	Humple	Updated narrative details (many)	Updates needed
2005	2006	Humple	Modified to fit new narrative format	New format
2006	2015	Humple/DiGaudio	Added map & metadata, descriptions updated	Veg changes

^a Add rows to the table as needed to document updates over time.

Project: Pinnacles National Park Monitoring / San Francisco Bay Area Network Monitoring

No. Points: 11 points

Metadata: Established in 2002. In inventory report (Haff et al. 2003), 8/11 points called riparian; but in subsequent report ((Humple and Gardali 2006), as is currently, the entire transect considered riparian.

Getting there: These points are along the riparian area of the South Wilderness Trail, accessed from the east side of the park. Park at Peaks View parking area just into park (a 5 minute drive from the campground). Hike on Bench Trail taking it east (towards trail entrance) a few hundred meters; turn right (south) on fire road; then continue on South Wilderness Trial, for which you will see a marker. 25 minute walk from Peaks View parking area. Another option is just to take the riparian directly from the Peaks View parking area; in this case it's a shorter distance, and while you aren't on a trail it's fairly easy walking, especially with your GPS unit. Points not flagged.

Notes: If don't have park pass be sure to leave note in car indicating you are doing surveys for the park. Points are approximately 250m apart. Site-specific notes, GPS coordinates, and a map showing site locations are provided below.

SWTR01 - About ¼ mile from the trailhead, where the path begins to diverge from the creek bed. Point is next to two coast live oaks on east side of trail (point is on trail) 50m before left turn in trail.

SWTR02 - The point just off the trail (east side) on embankment, ~5m off trail.

SWTR03 - You come to an open, grassy area. The point is on the east side of the trail between a large living sycamore and a fallen dead sycamore. The living sycamore is ~5m away from point.

SWTR04 - Point is near creek bed between willows and the embankment. To get down there pass the point on the trail (trail is up on the embankment overlooking floodplain), then follow side gully down to floodplain and to point.

SWTR05 - Point is on the trail in a coast live oak patch, across from burned blue oak woodland/chamise.

SWTR06 - The trail opens up into the creek bed, and the point is on the (west side) right side (~2m off trail) if coming from point 5. Near two small rock cairns, one on either side of trail.

SWTR07 - To find this point, follow the trail past a cairn along a long stretch of sandy creek bed. Point is on the west side of the trail next to an arroyo willow and cottonwood, on small mounded embankment.

SWTR08 - Point is on the trail next to a large, wide sycamore tree, just before you go uphill past a bunch of buckeye.

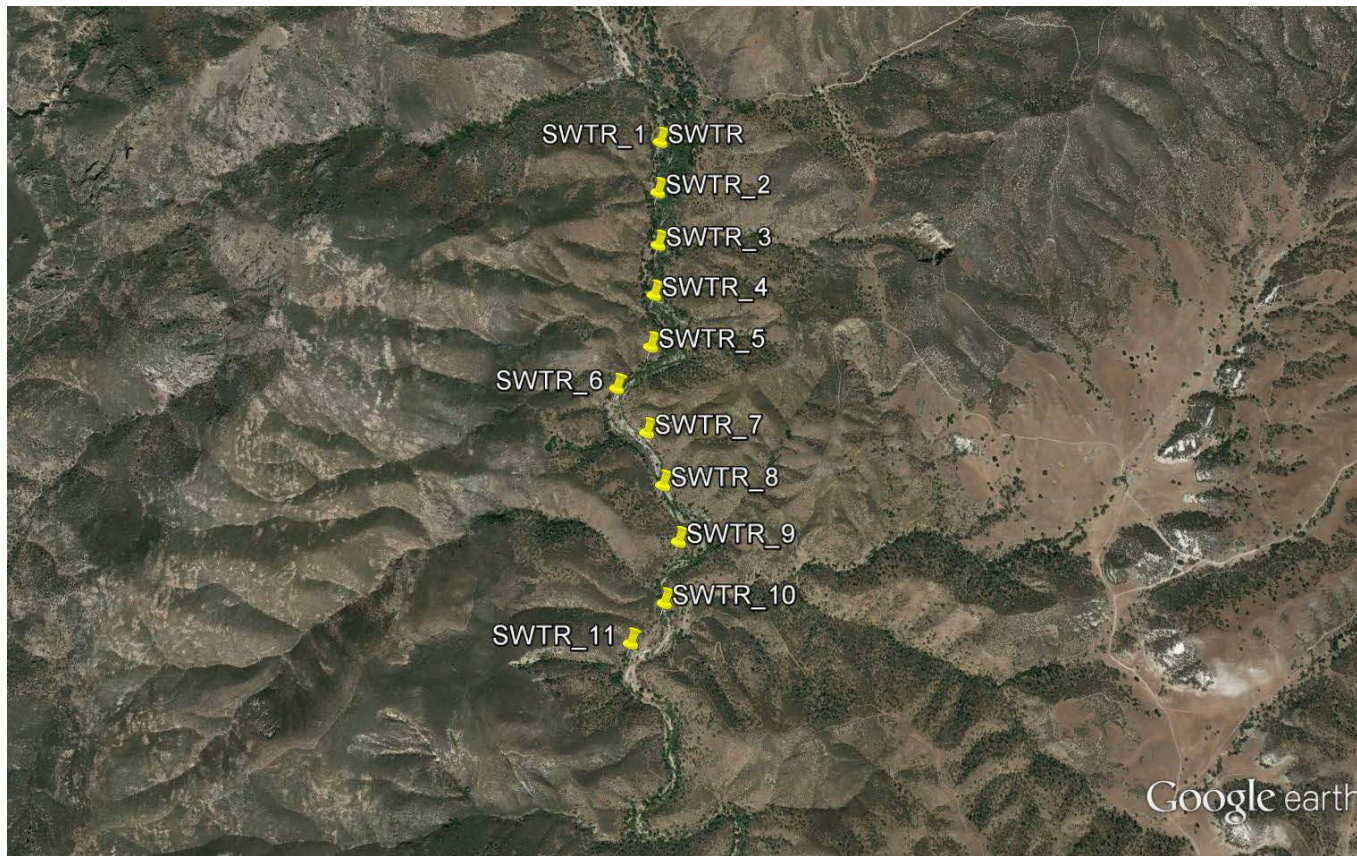
SWTR09 - Follow the trail over the hill and around the bend. Point is off the east side of the trail, by the riparian, next to a buck brush (*Ceanothus*), about 10m before a grey pine.

SWTR10 - The trail cuts up from the riparian area and into chamise scrub. At the end of the row of chamise, about 20 meters before the sturdy pig fence, cut east: point is off the east side of the trail (~15-20m) next to a young coast live oak.

SWTR11 - Point is where the trail ends and the terrain becomes very steep. The point is between an elderberry bush and the fenceline. To get there, just follow the pig fence until you arrive. There is a large coast live oak northwest of the point.

Coordinates for South Wilderness Trail sites, WGS84, decimal degree

Site	Latitude	Longitude
SWTR01	36.47283	-121.15552
SWTR02	36.47057	-121.15546
SWTR03	36.46825	-121.15525
SWTR04	36.46602	-121.15528
SWTR05	36.46379	-121.15528
SWTR06	36.4619	-121.15692
SWTR07	36.46009	-121.15517
SWTR08	36.45791	-121.15414
SWTR09	36.45559	-121.15313
SWTR10	36.45301	-121.15366
SWTR11	36.45127	-121.15526



Map of South Wilderness Trail sites.

Upper Chalone (UPCH), Pinnacles National Park, San Benito County, CA

Revision history log for Upper Chalone sites^a

Previous Version Year	Revision Year	Author	Changes Made	Reason for Change
2002	2002	Jill Harley	Original narrative	—
2002	2015	Humple/DiGaudio	Added map, metadata, and revision history log; descriptions updated; pt 3 moved due to thick veg, now along fence like others (unclear if coordinates had been off).	Things change in 13 years.

^a Add rows to the table as needed to document updates over time.

Project: Pinnacles National Park Monitoring / San Francisco Bay Area Network Monitoring

No. Points: 12 points

Metadata: Established in 2001. Six of the first seven points (among points 1-7; **2018 surveyor: please assess which!**) of transect are riparian; riparian habitat somewhat patchy; pts 8-12 in chaparral.

Getting there: If you don't have a park pass be sure to leave note in car indicating you are doing surveys for the park. Park at the Old Pinnacles Trailhead (~10 min from campground), and follow trail towards the Balconies and take a right (North) on to North Wilderness Trail (heading out on Old Pinnacles Trail, turn right pretty early on when you reach a T-intersection towards the Balconies; 15 minutes from parking lot turn right onto another trail at a *small* sign for the North Wilderness Trail). From the parking lot it's about a 1hr hike to the first point, UPCH07. In years with multiple surveyors, can hike in to first point in conjunction with person surveying NFCC. Be prepared to sweat. Points not flagged.

Notes: UPCH04-07 are along creek south of point 1; i.e., coming from south, you would hit 7, 6, 5, 4, 1, 2, 3, and then the other points (8-12) in the chaparral along the “not unsteep” dozer line.

Site-specific notes, GPS coordinates, and a map showing site locations are provided below.

UPCH07—Leave the North Wilderness Trail when near the entrance to canyon transect is in. In 2015 was able to follow a deer or infrequently used trail for the first couple points. Follow GPS to point which is on interior live oak with poison oak and willow underneath. (NOTE: NFCC-1 is 124 m away)

UPCH06—Continue north up trail/creek. Point is on west side of creek bed.

UPCH05—Continue north up trail/creek. Point is on north side of large pine in middle of wash.

UPCH04—Continue north up trail/creek (NOTE: GPS indicated point was under a low, dense blue oak; for the point count I stood ~4m from GPS point in the open, NW side of tree).

UPCH01—Continue north up trail/creek. Point is on east side of creek, on *Ceanothus*, up embankment against chamise thicket. Could only get 4-3m away from point. *Ceanothus* wall and group of gray pines to the south, chamise to the east.

UPCH02—Continue north up trail/creek. Point is against the pig fence, behind a clump of chamise.

The following points are all along the pig fence which has a swath cleared of veg next to it where the points are located.

UPCH03—Head back a little bit south, then west up the next drainage back to the pig fence, then along the fence uphill to the point. You can also go directly along the fence from pt 2 to pt 3, but you needlessly go up and over a small hill. Point is at a set of two wooden posts.

UPCH08 (changed from UPCH0A)—Continue along the fence, down into and back up out of a small drainage. Follow GPS to point.

UPCH09 (changed from UPCH0B)—Continue along the fence and uphill to GPS point.

UPCH10 (changed from UPCH0C)—Continue along the fence and uphill to GPS point.

UPCH11 (changed from UPCH0D)—Continue along the fence and uphill to GPS point.

UPCH12 (changed from UPCH0E)—Continue along the fence and uphill to GPS point.

Coordinates for Upper Chalone sites, WGS84, decimal degree

Site	Latitude	Longitude
UPCH01	36.52895	-121.19078
UPCH02	36.53123	-121.19067
UPCH03	36.53155	-121.19354
UPCH04	36.5267	-121.19169
UPCH05	36.52449	-121.19084
UPCH06	36.52222	-121.19127
UPCH07	36.51985	-121.19091
UPCH08	36.5328	-121.19463
UPCH09	36.53331	-121.1968
UPCH10	36.53371	-121.199
UPCH11	36.53413	-121.20127
UPCH12	36.53439	-121.2035



Map of Upper Chalone sites.

The Department of the Interior protects and manages the nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its special responsibilities to American Indians, Alaska Natives, and affiliated Island Communities.

NPS 114/139049, July 2017

National Park Service
U.S. Department of the Interior



Natural Resource Stewardship and Science
1201 Oakridge Drive, Suite 150
Fort Collins, CO 80525

www.nature.nps.gov

EXPERIENCE YOUR AMERICA TM