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**SSHCP CHAPTER 8: MONITORING & ADAPTIVE
MANAGEMENT**

8.1 Introduction.....1

8.1.1 Overview.....1

8.1.2 Regulatory Framework2

8.1.3 Definitions and Principles.....2

8.1.4 Biological Goals and Objectives.....10

8.2 Plan Implementation and Administration11

8.2.1 Super-regional Coordination.....11

8.2.2 Plan Implementation and Supervision Responsibilities.....12

8.2.3 Implementation Phases and Schedules13

8.2.4 Reporting.....17

8.3 Compliance Monitoring.....22

8.3.1 Compliance Tracking.....22

8.3.1 Tracking Data Standards and Data Management.....23

8.4 Preserve Operations and Maintenance.....24

8.4.1 General Provisions of Preserve-Specific Operations and Maintenance24

8.4.2 Operations and Maintenance Requirements25

8.5 Adaptive Management and Monitoring.....30

8.5.1 Principles Guiding Adaptive Management and Monitoring.....30

8.6 Changed and Unforeseen Circumstances.....31

8.6.1 Listing of New Species34

8.6.2 Listing of Covered Species34

8.6.3 Designation of Critical Habitat35

8.6.4 Damage to the Preserve System Caused by Flooding35

8.6.5 Damage to the Preserve System as a Result of Fire.....38

8.6.6 Species and Habitat Lost to Drought39

8.6.7 Species Impacted by Invasion of Invasive Species.....40

8.6.8 Loss of Species or Habitat to Disease.....42

8.6.9 Loss of Species or Habitat to Expose to Pesticides/Herbicides.....43

8.6.10 Loss of Species or Habitat to Expose to Toxic/Oil Spills.....44

8.6.11 Vandalism That Damages the Preserve System or Structures46

8.7 Funding for Changed Circumstances.....47

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SSHCP CHAPTER 8: MONITORING & ADAPTIVE MANAGEMENT

8.1 Introduction

The SSHCP provides for the conservation of 41 covered species and their 18 habitat cover-types through preserve formation; acquisition, restoration, and management. The purpose of this Chapter is to provide a Monitoring and Adaptive Management Program framework plan to meet the conservation goals of the of the SSHCP once preserve lands are acquired and to ensure the preserve program is in compliance with the SSHCP

Inventory, management and monitoring are essential components of this Monitoring and Adaptive Management Program (MAMP). The inventory components will establish important baseline and conditions for monitoring. The monitoring component of the program will track the progress of SSHCP plan implementation as well as the efficacy of management activities on preserve lands in meeting the conservation goals (conserving species, habitats, and ecosystem functions) of the SSHCP. Formulating management activities (including scientific studies) and monitoring the results of these activities are important components of the adaptive management approach. Adaptive management components of the program will establish strategies for identifying and modifying management activities to better meet the conservation strategy of the SSHCP, including those undertaken as a reaction to natural or manmade perturbations to the preserve system.

8.1.1 Overview

Development of detailed management and monitoring plans will occur after SSHCP implementation when important data regarding preserve attributes are known, studies are conducted, and resource inventories are completed. These detailed plans will be adjusted and expanded during the span of the SSHCP as preserve configurations are amended and the scope of our scientific and experiential comprehension expands. The purpose of this document is to provide guidance, a framework and processes for formulating important components of these detailed plans to assure long-term success of the plan's conservation strategies. These components include compliance monitoring, ecological (effectiveness) monitoring, and preserve management. The MAMP also provides a framework for tracking

conservation goals, reviewing management activities, and applying educated, science-based adaptive management strategies to meet the overall biological goal of sustainable habitat and species conservation.

This MAMP addresses monitoring at multiple levels and contexts, including biological and non-biological. Compliance monitoring addresses the tracking of plan compliance, collection of biological baseline data, and biological monitoring and management that comply with the permit requirements. Effectiveness monitoring and adaptive management include monitoring and management tools that are appropriate if threats to those conserved resources are manifest. The levels of monitoring include landscape, habitat, and species-specific strategies.

8.1.2 Regulatory Framework

Compliance with the HCP permitting procedures mandates the use of adaptive management via the federal Five-Point Policy Guidance (USFWS 2000).

The USFWS has published a Habitat Conservation Planning Handbook, which provides directions for “take” permit applicants in preparing HCPs. In an addendum to this document known as the Five-Point Policy Guidance (65 FR 35242-35257), direction is provided on the inclusion of Adaptive Management and Monitoring programs in HCPs in order to improve conservation planning efficiency, effectiveness, and consistency. The Five-Point Policy Guidance emphasizes the necessity for adaptive management in situations where uncertainty in ecological knowledge, a species’ response to management actions, or effects of the permitted activity could lead to significant risk to the species. It also defines standards and suggests protocols for compliance and effectiveness monitoring, and emphasizes the role of the latter in a comprehensive adaptive management plan.

The Monitoring and Adaptive Management Program described in this chapter is intended to fulfill the HCP requirements for covered species as well as incorporate recommendations provided by the U.S Geological Survey Biological Resources Division, CDFG and USFWS (Atkinson et. al. 2004).

8.1.3 Definitions and Principles

Ecological management and monitoring are imperative to resources conservation in our anthropogenic environment in which natural resources have been disturbed to the extent that they can no longer sustain themselves in perpetuity without external control. While monitoring implies checking a natural ecosystem to evaluate success, management is

necessary to sustain success over time, despite changes that may occur to the ecosystem. Adaptive management implies that management activities are conducted as deliberate experiments, in which monitoring consists of data collection which informs the manager to what extent the system requires management, and how the system may respond to specific management actions (Wilhere 2002).

Adaptive management is complex and often misunderstood and misapplied. To better understand this concept, definitions and principles of monitoring and management appear in chronological order in the following section. Baseline studies (including pre-acquisition surveys) are performed as the first step to developing monitoring and management plans and directives. Baseline studies are necessary to understand the ecological relationships of the system that is to be monitored and managed, including identifying the presence or absence of species, documenting habitat conditions, gaining an understanding of the species' biology and population density, and filling knowledge gaps. Baseline studies inform monitoring strategies, while monitoring results inform management strategies. Monitoring and management is often performed simultaneously. Once the current conditions of the resources are known, conceptual models can be developed to explain the relationships between ecosystem components and to simplify very complex processes and systems. Conceptual models are not comprehensive in that they often only show the interactions between relevant components. However, they assist in identifying those system components that are necessary to devise adaptive management strategies and principles.

The adaptive management approach outlined in this MAMP is based on the best scientific understanding including basic principles of conservation biology and management. As new relevant scientific information becomes available, this management plan will be updated to reflect the state-of-the-art knowledge base.

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Baseline Studies

Baseline studies (also called baseline or status monitoring, or pre-acquisition surveys) document existing biological conditions and consist of an initial inventory of biological and physical/chemical characteristics of potential or newly acquired preserve sites.. Initial

inventory data can then be used as the benchmark against which change in the site can be quantified, whether due to management actions or natural variation in the environment. Baseline studies can be conducted during a single visit, or over a longer duration, depending on the nature of the resources and the type of data needed.

Compliance Monitoring

It will be impossible to determine if conservation will be successful as planned, and actions taken based on the Conservation Strategy and Implementing Agreement are achieving their stated goals without monitoring. Compliance monitoring (or often called implementation monitoring) is essential to verify that permit requirements are fulfilled as stated in the plan. It involves recording land acquisitions and losses, documenting preserve boundary adjustments, determining the level of incidental species take, and tracking that management and monitoring is implemented. The resulting data and reports are used by the Wildlife Agencies to verify that the agreement is being enacted as planned.

Preserve Operations and Maintenance

Preserve Operations and Maintenance (O&M), or implementation management, includes all management and maintenance activities needed to operate the preserve and counteract or prevent the degrading/disturbing influences acting on preserve areas. Preserve Operations and Maintenance is the most basic level of management and should be performed for all preserves at some level.

Basic O&M includes such operational activities as establishing and maintaining property boundaries with fencing and gates, and posting signs that indicate preserve rules and whether or not public access is allowed. Additional preserve management actions may include removal of non-native vegetation, providing nesting, perching, or roost sites for birds, trash and debris removal or the implementation of Best Management Practices (BMP), horse manure removal programs, and the maintenance of recreational trail systems. Preserve management may also contribute to providing compatible recreational opportunities for the public and may include monitoring trails and public use facilities, if any.

It must be noted that O&M will vary from site to site and between lands owned in fee title versus land protected under a conservation easement. While all acquisitions made under the SSHCP whether fee title or conservation easement are part of the SSHCP preserve system, they will be treated differently. Privately owned property such as working ranches

and farms will in large part continue to operate as they normally would with any O&M items mutually agreed upon by the landowner and the HCP implementing entity. Lands owned by the implementing entity will be rigorously held to the protocols outlined in this Chapter.

Adaptive Management

Adaptive management is defined, according to Atkinson et al. (2004), as a

...scientific approach to resource management that rigorously combines management, monitoring and research to effectively manage complex ecosystems in the face of uncertainty. Adaptive management tackles uncertainty about the system head-on by identifying clear objectives, developing conceptual models of the system, identifying areas of uncertainty and alternative hypotheses, testing critical assumptions, monitoring to provide feedback about the system and actions, learning from the system as actions are taken to manage it, and incorporating what is learned into future actions.

The intent of adaptive management practices is to evaluate effectiveness of ongoing or completed conservation measures to achieve conservation goals, to propose additional or different conservation measures if goals are not being met or as additional data become available, to answer scientific questions and fill data gaps in order to refine conceptual ecosystem models and to inform management approaches to changed or unforeseen circumstances, if needed. Management directives rely on information gained from the evaluation of conceptual models that illustrate relevant relationships between ecosystem components and on monitoring results that inform critical changes in ecosystem processes. While enough data may not be available now to base management activities on scientifically sound research results, adaptive management practices are designed to eventually attain that goal through the implementation of pilot or target studies, or experimental design.

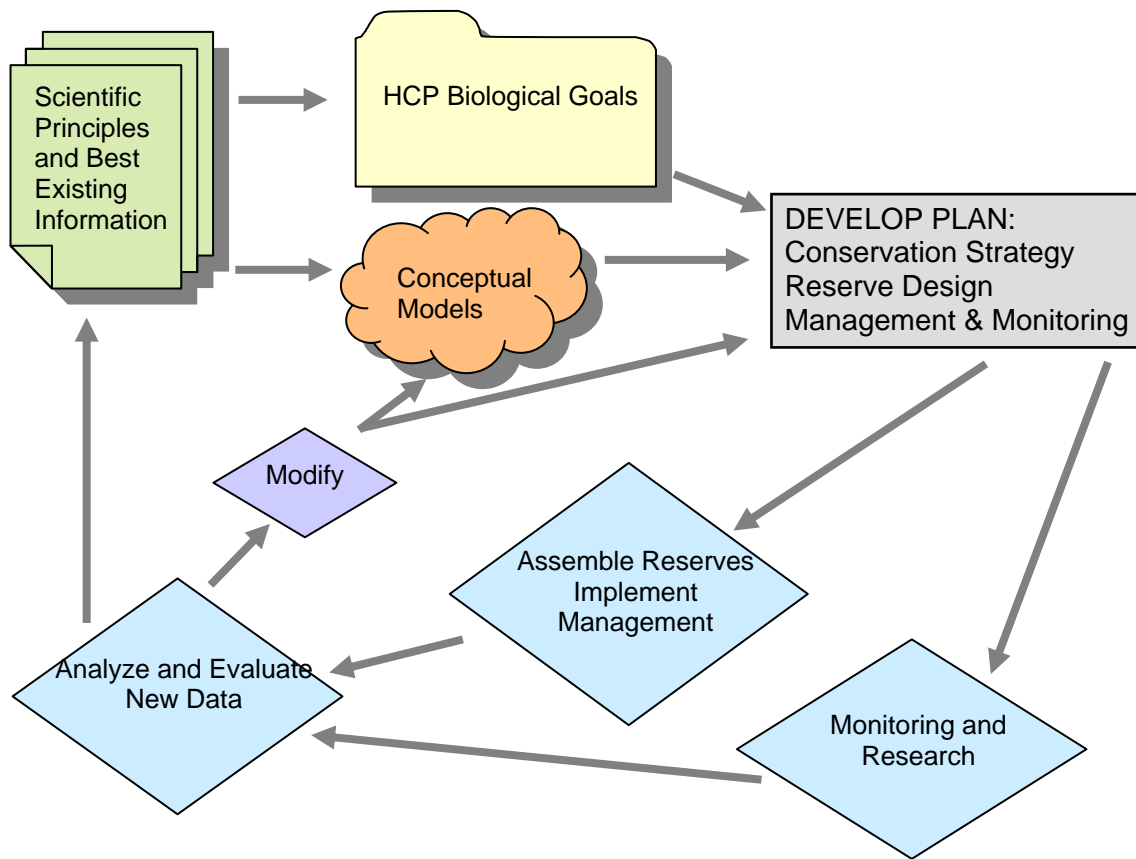


Figure 8.1 Diagram of Adaptive Management Information Flow and Feedback Loops

Adaptive management in the SSHCP area can be divided into the following management levels:

Preserve-specific Monitoring and Management consists of species-specific and habitat-specific monitoring and management. Preserve-specific management activities include focused species surveys, species/habitat-specific protection measures, and habitat enhancement projects. These activities will be established as SSHCP preserves and easements and are required and secured. The Implementing Entity will be responsible for ensuring that preserve-specific management and monitoring is implemented.

Regional Monitoring and Management consists of monitoring vegetation communities, wildlife movement, and species population trends across the SSHCP Plan Area (and beyond) and devising management directives accordingly. The Implementing Entity will be responsible for standardizing monitoring protocols and data collection, acquiring and synthesizing data from across the region, and managing the data in a spatial GIS database. Regional monitoring and

management will likely occur as a voluntary effort between participants of regional plans once these move into the implementation phase of their individual HCP/NCCPs respectively.

Conceptual Models

Conceptual models are an important component of successful adaptive management and monitoring programs (Atkinson et al. 2004). Their purpose is to summarize and clearly diagram existing information about ecological requirements of individual species, natural and anthropogenic pressures on species or target habitats, possible management actions, and to highlight critical data gaps. Conceptual models will document, given current best knowledge, the sensitivity of each of the proposed covered species to each recognized threat. Although the format and level of detail of the models can vary greatly from program to program, the overall goal is to use the conceptual model to drive management planning and to communicate understanding of the system to all stakeholders (Atkinson et al 2004).

Good conceptual models focus only on relevant factors and explicitly state assumptions and hypotheses about how the system works (Margoluis and Salafsky 1998). In addition, conceptual models can help provide a linkage between the conservation strategy and management and monitoring actions, by translating biological goals, such as “increase population size by X”, into specific actions, such as “provide Y nest sites.” The adaptive management feedback loop is also facilitated by the conceptual modeling process because when new data are incorporated, needed changes to management of target species will be suggested by revision of the conceptual model, much as the original management actions were determined by the model in the first place (Atkinson et al 2004).

Effectiveness Monitoring

Effectiveness monitoring is a basic component of adaptive management. It is defined as a systematic action for periodically collecting specific data to document habitat and species conditions over time. Monitoring is critical to management in general and to adaptive management in particular because the data collected is needed to evaluate the response of the ecosystem to the management actions. Deutschman et al. (2007) best describe different types of monitoring and data collection approaches and the rationale behind monitoring design that is statistically rigorous.

A principal goal of monitoring programs is to estimate rates of change (trend) in addition to measures of current status (Deutschman et al. 2007). The appropriate sampling design,

sampling efficacy, and statistical rigor are of utmost importance and designing meaningful management and monitoring programs. Monitoring and adaptive management programs must be approached the same way any experiment is designed, with attention to:

1. appropriateness of selected response variables,
2. temporal/spatial scales of measurement,
3. frequency/timing of measurements,
4. precision and accuracy of measurements,
5. ability to detect a change if it happens (Noss and Cooperrider 1994).

In addition, data analysis methods, statistical metrics, and plans to adapt management actions based on monitoring results and outcomes should be considered before the first measurements are taken to avoid inconclusive monitoring results. It is also important to establish monitoring time frames and durations of tests and experiments to answer pertinent questions; some monitoring results will not provide conclusive answers for multiple years. Simpler, less expensive and easier to implement monitoring programs are preferable to high-tech, expensive and complicated methods as long as they provide useful data (Deutschman et al. 2007).

Initial monitoring protocols will be as intensive as biological resources require. As data are collected, refining protocols to provide more useful data with less effort will be attempted. Using a multistage approach to population monitoring can effectively combine previously collected data and ongoing new data from varying levels of intensity of sampling (Philippi et al 2001). If the results of the compliance monitoring or effectiveness monitoring programs indicate that conservation targets are not being met, a research team will be established and a remedial management program and integrated effectiveness monitoring program will be implemented within one year. At a minimum, the research team will include the management area or preserve manager, field staff, a qualified statistician or biometrician, and a qualified biologist trained in the field for which conservation targets are not being met. The statistician will be actively involved and will develop a study design, survey protocols, sampling techniques, statistical analysis, graphical and tabular presentation of the data, and data archive design. The participation of the expert biologist and preserve manager will help to ensure that the study can be implemented as designed. As the preserve system grows, it may be possible to use the results of demographic and

habitat studies on other management units or preserves to identify common or unique threats to a species population. The analysis of the data combined with the results of the studies in the habitat goals section described in Section 5 will be used to determine the appropriate management actions.

Effectiveness monitoring (also often called ecological or validation monitoring) is the statistically sound program that evaluates success of restoration and management activities in meeting the stated biological goals and objectives (Atkinson et al. 2004) of the South Sacramento HCP, and tracks and informs ecological trends within the Plan Area and beyond. Monitoring plans must be carefully designed so that they can provide the information needed to detect meaningful changes over time. These monitoring actions are designed to test assumptions made in the conceptual models that drive management actions or to test the effectiveness of specific management regimes. Effectiveness monitoring is often used in the context of adaptive management and will be used as a component of adaptive management in this document.

Two special types of monitoring are subsets of effectiveness monitoring:

Threat monitoring is used to observe new and changed threats to species and incorporate responses to these threats in the management plan before they become problems. Threat monitoring involves planning a routine assessment of identified potential threats, such as non-native plants that have not yet established in the area but are spreading rapidly in nearby areas. The management plan includes specific measures and/or initiates processes to respond to novel threats before they become irremediable problems. For the overall landscape, it will be necessary to be on the alert for threats in perpetuity, because there seem to be a continually increasing number of non-native plants, animals, and diseases that are invading and require active management to minimize their impacts. For threats that seem to be controlled, increasing the monitoring interval from annually to every 5 years, and again to every 10 years, will be possible if populations are stable over the shorter intervals.

Targeted Studies are designed to test hypotheses about ecological functions related to management targets for which there are data gaps. Measuring response variables may be incorporated into a routine monitoring program or may be done separately, depending on the experimental design and how it relates to other data collection

activities. The results of targeted studies and data from other monitoring are used to modify management activities as needed.

Trigger Points and Feedback Loops

One of the key issues in a monitoring and adaptive management program is determining trigger points and feedback loops; the latter is incorporated into reporting as described in Section 2. Trigger points indicate when management actions are either adequate or need to be changed based on monitoring results. The challenge is to distinguish natural oscillations from negative trajectories caused by threat-induced habitat alteration. Trigger points are thus defined by multiple year declines in targeted species, species associations, or natural communities that cannot be explained by environmental variation and dynamics. Often, trigger points cannot be predetermined, but may evolve during the process of monitoring and management, as more about the target ecosystem is understood. Plan Implementation and Administration

8.1.4 Biological Goals and Objectives

The primary goal of the MAMP is to ensure that the species and natural communities and ecological functions covered under the SSHCP are conserved. Overall biological goals and objectives for the SSHCP are outlined in Section 5 of Chapter 7, Conservation Strategy.

The MAMP is primarily concerned with Goals 1 and 6. Once habitat areas are preserved and protected, management and monitoring are needed to assess if these actions are in fact sufficient to “maintain viable populations of covered and common species in the SSHCP area”. Management and monitoring activities outlined in this plan therefore focus on population and community level endpoints, and include habitat restoration and enhancement, restoration of lost linkages, land use changes to benefit covered species, and monitoring of habitat conditions, ecological trends and threats to habitats and species. These management and monitoring activities are informed by the habitat or species status and level of threat and recovery as identified in the conceptual models that have been developed for each habitat type, and for some covered species or a combination of species (species associations).

Specifically, the MAMP addresses the following monitoring and management processes to meet the stated goals of the SSHCP:

- Verify conceptual models:

- Verify species and habitat assemblages and biology and physical processes of the ecosystem conserved under the SSHCP;
- Identify target species for monitoring and management;
- Identify threats to covered species and habitats that inform monitoring and management protocols and metrics;
- Define monitoring goals:
 - Develop specific measures to monitor threats at landscape, habitat, and species levels;
 - Recommend monitoring protocols, and outline potential management responses and target/pilot studies:
 - Use adaptive monitoring and management protocols;
- Develop survey protocols that meet the following:
- Use tested and accepted monitoring protocols to provide sufficiently robust data to allow for change detection between sampling periods;
 - Encourage to refine and quantify species distribution models, if necessary;
 - Require to identify trigger points for remedial management actions based on multi-year data collection.

8.2 Plan Implementation and Administration

8.2.1 Super-regional Coordination

The Northern California Conservation Planning Partners combines efforts from a number of regional conservation plans and programs, including

1. East Contra Costa County HCP/NCCP
2. Placer County HCP/NCCP
3. San Joaquin County HCP
4. Santa Clara Valley HCP/NCCP
5. Solano County HCP
6. South Sacramento County HCP

7. Yolo Natural Heritage Program
8. Yuba/Sutter County HCP/NCCP.

The planning partners hold workshops that educate multiple interests and explore creative solutions to specific conservation issues. They also work together on projects of common interest and share information and problem solving. Future activities could improve baseline scientific information through partnered research and information gathering, as well as address monitoring across plan boundaries, thus enabling better decision on permitting, conservation, management and monitoring.

8.2.2 Plan Implementation and Supervision Responsibilities

Though the Plan Participants of the SSHCP are ultimately responsible for the successful implementation of the plan and its monitoring and management strategies, the Implementing Entity (IE) will be responsible for day to day activities. Other stakeholders, including conservation and environmental watchdog organizations, land managers, land owners, and members of the public may also contribute valuable information and implementation strategies. The U.S. Fish and Wildlife Service and California Department of Fish and Game have the ultimate regulatory oversight. The role and responsibilities of the Implementing Entity are detailed in Chapter 10 of the SSHCP.

The Implementing Entity will be responsible for the implementation of the following check list of tasks for all landscape-level, habitat-based and species-specific monitoring and management SSHCP-wide:

1. Assess all lands brought under protective status for the present condition, suitability for covered species, and enhancement needs and opportunities by each land cover type.
2. Develop comprehensive planning and site acquisition survey protocols;
3. Develop Preserve Management Plans on lands owned in fee title and negotiates the terms of Management Plans with land owners who enter into conservation easements;
4. Amend and adapt Preserve Management Plans for properties owned in fee title subsequently in conjunction with the three-year re-evaluation of each management plan;
5. Monitor compliance with Preserve Management Plans;

6. Complete and review individual restoration plans and specifications under the auspices of this HCP and MAMP within one year of preserve acquisition or retention of conservation easement;
7. Conduct baseline surveys prior to (pre-acquisition surveys) or within one year of preserve acquisition or retention of conservation easement. All baseline surveys must be conducted at the appropriate time of year to locate and identify covered species. If recent (less than 3 years-old) baseline data are available, review baseline data and determine any data gaps. Surveys should be conducted as follows:
8. Conduct surveys for covered species and habitats using appropriate and accepted protocols (see Deutschman et al. 2007; USFWS protocols for listed species; CNPS Rapid Assessment Method, etc);
9. Determine data gaps;
10. Determine effectiveness monitoring and pilot studies necessary to fill data gaps.
11. Conduct and monitor general preserve management activities;
12. Annually report to the Wildlife Agencies the following, at minimum:
13. Covered habitat gains and losses;
14. Covered species gains and losses;
15. Monitoring and management results;
16. Data gaps;
17. Recommendations for future studies.

8.2.3 Implementation Phases and Schedules

Biological Monitoring and Management of the MAMP will be implemented in phases, from the initial establishments of the preserve system to long-term ecological monitoring in the Plan Area. Some monitoring must occur annually, other studies may occur in a more infrequent sequence. Compliance monitoring endpoints will change as the preserve system is established. Management targets may be at different phases at the same time.

The long-term monitoring program includes more intensive, but less frequently spaced monitoring and sampling to take advantage of unusual events. While annual monitoring requires simple presence/absence surveys, periodic monitoring endpoints may include more labor-intensive or expensive methods, such as measuring nest productivity. These periodically-monitored endpoints can then be staggered in time, with different end points monitored each year. Any endpoints that can be monitored together will be done in the same years to save resources. The protocols for opportunistic sampling of unusual events (e.g. multi-year drought, disease outbreaks, fire) will be planned in advance, with budget set aside to allow for their execution when conditions permit.

As preserves are being assembled, the Implementing Entity will ensure that a Preserve or Management Unit plan will be prepared and will contain preserve-specific conservation objectives for the covered species and habitats it is intended to conserve. For lands that are brought into the preserve system, the management and monitoring plan will be negotiated between the landowner and the Implementing Entity. For properties owned in fee title Plans will be reevaluated every five years after the initial completion date of the Preserve or Management Unit Plan to determine if both preserve-specific and HCP-specific conservation goals are being met. Additionally, all conservation actions, schedules, and goals specified in the appropriate Preserve or Management Unit Plan will be met or appropriate management action taken to correct the deficiencies. Management and monitoring plans for lands that are protected by a conservation easement can only be renegotiated if all parties agree to do so.

For all lands brought within protected status, each land cover type will be assessed for its existing condition, its suitability for covered species habitats, and any habitat or management limitations or restrictions. These assessments must be completed during planning surveys or within one year of acquisition. Lands that are protected under a conservation easement must include a basic management and monitoring plan as a condition of the easement. The terms of the management and monitoring plan will be negotiated between the landowner and the Implementing Entity and may include only a subset of the actions listed below for each phase.

Phase I: Acquisition and Planning

Responsibility: Implementing Entity and their designated Preserve Manager(s) or designee. Newly designated preserves will enter the plan at Phase I as follows:

- Compile information from the SSHCP and other sources (e.g., existing species models, GIS data layers, aerial photos, maps, plans and data from adjacent regional parks, USFWS recovery plans, critical-habitat designations, technical reports, monitoring methods) that will inform the development of a comprehensive monitoring strategy. These will be reviewed periodically (see Long-term Monitoring Phase).
- Develop conceptual ecological models for the natural community types in the inventory area. The relevance of these conceptual models is described in the section on Conceptual Models below.
- Determine monitoring priorities within each natural community by identifying key threats to covered species, covered species that may be declining, or changes to key ecological processes.
- Not every covered species may require individual monitoring. Based on conceptual models, identify target species or groups of species such that monitoring of covered species can be carried out efficiently and cost-effectively.
- Identify the indicators (or variables) for natural community function and, if appropriate, for covered species and develop performance indicators for the conservation measures.
- Develop preliminary strategies for monitoring species and natural communities (protocols, schedules, time intervals for monitoring, multispecies approaches) and landscape-level processes.
- Use aerial photos or satellite imagery to update land cover mapping in inventory area to track condition of natural communities.

Phase II: Inventory and Status Assessment

Responsibility: Implementing Entity and designated Preserve Manager(s) or designee.

- Identify resources, determine locations of covered species populations, estimate population size, and identify threats and management targets
- Conduct inventories of the resources as the preserve system is assembled. The results of the surveys for land acquisition (i.e., pre-acquisition surveys) will be the

first source of baseline data. Surveys may be more frequent in the first three to five years of preserve acquisition and will taper off once the populations (covered species and habitats) are stable.

- Use pre-acquisition or baseline survey data to validate and refine species models as lands are surveyed and acquired; surveys on lands not acquired by the Implementing Entity will be kept confidential to the extent allowable by law.
- Use aerial photos and ground surveys, as needed, to assess quality and location of habitat linkages between unprotected natural areas and adjacent protected lands.
- Refine conceptual ecological models at all scales and species-habitat models based on inventory data and other new information.
- Conduct relevant surveys and planning for sites considered for enhancement, restoration or creation. Develop criteria for measuring success.
- Prioritize and begin enhancement, restoration, and creation efforts.
- Prioritize, design, and initiate pilot projects to test management and monitoring methods.
- Conduct post-acquisition biological inventories. Additional surveys may be needed to provide more resolution and detail than gathered in pre-acquisition surveys.
- Conduct compliance monitoring; ensure that lands are acquired and incorporated into the SSHCP system on pace with take, collection of data and reporting take place as scheduled, and management activities are done per RMP guidelines
- Initiate management actions and management planning as described in Section 5.
- Develop pilot studies to test key assumptions and determine effective management actions for most pressing threats.

Phase III: Long-term Monitoring

Responsibility: Implementing Entity, Wildlife Agencies.

- Update GIS layer of land cover at intervals that will detect substantive changes in land use (i.e., every five years) through aerial photos or satellite imagery. Assess status and trends at the landscape and natural community levels.
- Monitor species (covered species or indicator species) response to enhancement, restoration, and habitat creation.
- Monitor status of covered species/habitat types to determine natural variation regimes
- Monitor restoration sites for success; remediate sites if initial success criteria are not being met.
- Conduct pilot projects and directed research and assess results.
- Refine conceptual species-habitat models and management-oriented ecosystem models as more information becomes available.
- Monitor focal covered species using methodologies developed in monitoring design phase. Assess status and trends of covered species by monitoring covered species populations, groups, or guilds of species or indicators over time.
- Continue to evaluate and modify monitoring protocols as necessary.
- When restoration projects are complete and meet final success criteria, scale back monitoring effort to be consistent with the rest of the Preserve System.
- Work with other individuals and organizations (e.g., EBRPD, local universities) to facilitate research on the Preserve System that will improve management.
- Undertake regional and super-regional monitoring and coordinate monitoring results with neighboring counties.

8.2.4 Reporting

A system of annual and periodic reporting and review cycles is required as part of compliance monitoring, and also ensures closure of the adaptive management loop. The purpose of these reviews is to ensure that monitoring data are properly evaluated. The Implementing Entity will be responsible in ensuring that reporting is conducted in a competent and timely manner.

The basic units of the HCP are the individual preserves. Each preserve will have its own area-specific preserve management plan (or Land/Habitat/Resource Management Plan) that is consistent with the overall framework of this MAMP. Work plans detailing management actions and monitoring programs will be prepared annually and reports and data from the last year will be submitted with the new plan. Monitoring tasks that are planned annually will be of modest scope and expense but designed to collect informative and analyzable data. Preserve Managers are encouraged to review their own data and comment on the effectiveness of management methods and the overall success of their programs. Any recommended changes in management from the last year will be reviewed by the Implementing Entity and the Agencies before being implemented.

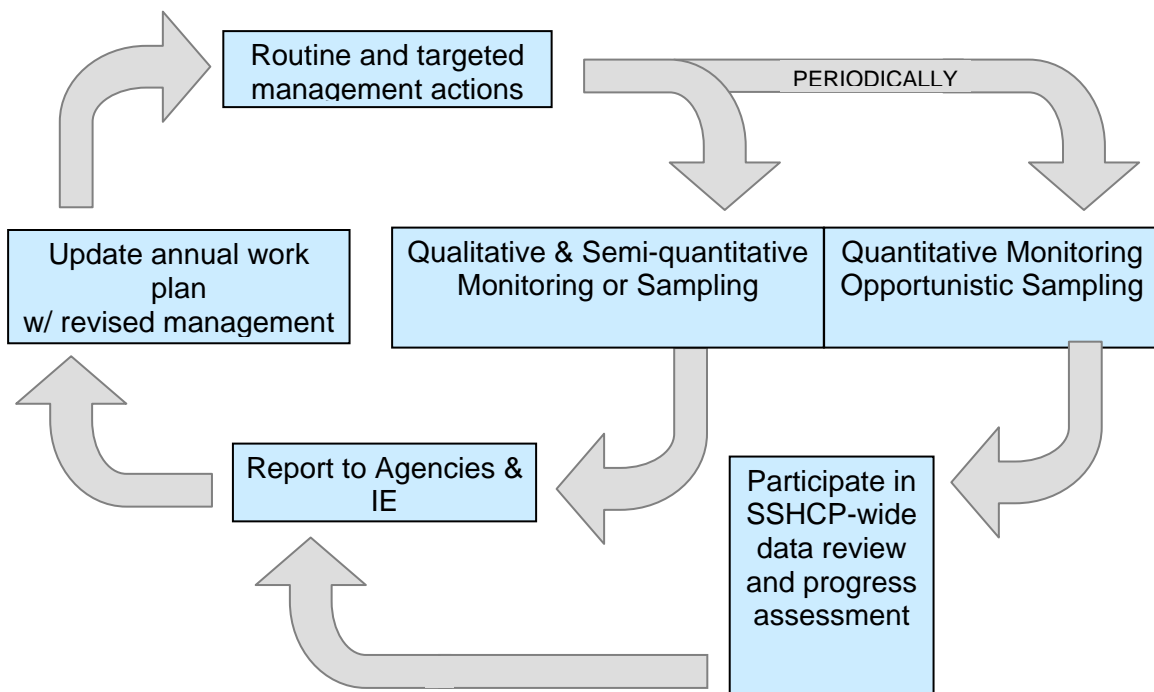


Figure 8.2 Diagram of Management and Monitoring Cycle

The Implementing Entity will obtain information from all of the Preserve Managers and convey both the individual work plans and reports and an integrative review of regional-wide progress and issues to the Wildlife Agencies. Additional review and analysis of data may be performed by the Agencies and submitted for review to the Technical Advisory Committee (TAC), as needed. Review by the TAC will be most effective during periodic intensive data reviews when any trends or patterns will be detectable. Annual summaries of data prepared by the Implementing Entity will be distributed to all interested parties. The

only exception to this recommendation is the inspection of preliminary data to determine if it meets the assumptions of planned statistical tests. If it does not, the monitoring program should be changed appropriately.

Periodic reviews of the overall success of the SSHCP program will be held on the order of every 5 years or at the discretion of the Agencies and Implementing Entity. A key objective of these reviews, which will include Preserve Manager(s), TAC, County and City representatives, will be to assess monitoring data and integrate site-specific information into a regional perspective. Implementing Entity-equivalents from neighboring counties, such as Yolo, Placer, and San Joaquin Counties will also be invited to participate in these reviews. Objectives for these meetings include determining if data collected in monitoring efforts are adequate, analyzing monitoring data for trends, determining success/failure of restoration activities, and reviewing threat management strategies and planning for changed circumstances. The Implementing Entity will, with the contribution of other interested parties, compile a summary of the discussion and results of the reviews, including recommendations for changed management actions, and distribute them to review participants and other interested participants.

Compliance Monitoring

Data on compliance needs to be reported at several levels, among them from the Preserve Manager(s) to the Agencies and the Implementing Entity, from the Implementing Entity to the Agencies and County and cities, and from the County and cities and Agencies to the public. Overall reports on compliance will be made available on the SSHCP web site and presented at annual public meetings.

Effectiveness Monitoring

The Preserve Manager(s) is responsible for annually reporting results of biological monitoring and making adaptive management changes based on that information for lands that they administer. The Preserve Manager will work with the Wildlife Agencies and the TAC in developing adaptive management changes. As projects and studies are completed, results will be submitted to the scientific literature as appropriate.

Every 5 years, the Implementing Entity and all participating entities will aggregate preserve-level reports and system-wide monitoring and targeted study reports and prepare SSHCP-wide reports summarizing the resource status. These reports will describe how the SSHCP is progressing toward its biological conservation goals, the effectiveness of management

actions taken, and the status of target habitat types and covered species. Compiling and assessing data from across the region periodically is an important step in identifying sub-regional trends and potential problem areas. These reports may result in recommendations to change management practices based on integrated data from multiple preserves, re-prioritization of management actions, and recommendations for new targeted studies to fill in knowledge gaps. These reports will be made available to all participating entities, stakeholders, and university faculty through the SSHCP website, as well as to the general public via community meetings.

Targeted Studies

Results of targeted studies sponsored by or facilitated by the SSHCP will be reported to the TAC and Implementing Entity in periodic progress reports and a final report at the conclusion of the research. If appropriate, manuscripts presenting the research should be presented at scientific conferences or workshops and submitted to the peer-reviewed literature for publication. Results of research not sponsored financially by the SSHCP but related to SSHCP goals and objectives should be obtained by the Implementing Entity if possible, in the form of reports or publications.

Feedback Loop

Feedback loops are important to inform management actions based on these triggers and make educated decisions on future monitoring and management actions; feedback loops are built into the reporting requirements.

Current scientific information will be obtained by periodic review and research of relevant literature, attendance at scientific conferences, and frequent contact between the Implementing Entity, Preserve Manager(s), Agency personnel, TAC, other research scientists and knowledgeable local experts. New information will also be generated by SSHCP-initiated targeted studies. Under the paradigm of adaptive management, all of this data will be incorporated into conceptual models and used to update and revise management plans at annual or 5-year review periods.

Limitations

Management and monitoring recommendations in this MAMP are based directly on the conservation analysis prepared for the SSHCP though data gaps exist relevant to the biology and distribution of some covered species and habitat types, ecology of individual

species and community ecology. Therefore, one of the initial objectives of the plan is to collect baseline data on species distributions, and to continue collecting such data through time to understand the natural patterns of variation over time and to answer key ecological questions about some species and communities.

Baseline data collection will occur as new preserves and preserve components are acquired. The adaptive management strategy outlined in this MAMP will ensure that changed understanding of the ecosystem processes and species biology will lead to changes in management and monitoring protocols as appropriate. In addition, monitoring plans will be based on sampling programs that are limited by available resources, and will therefore need to be extrapolated to other locations and even other species. Although power analyses can be used to quantify uncertainty in such extrapolation, uncertainty will still be an inescapable fact of management and monitoring actions.

Public Outreach and Education

A public outreach program will build broad support for the SSHCP by providing information about the preserve system, developing educational materials, providing limited access to certain preserve areas, providing volunteer opportunities, and coordinating with other interested groups in the area.

The public outreach program should identify the main issues in open space management, provide education and outreach to reach specific target audiences, and utilize/maximize existing resources. Active public participation will be encouraged – to increase knowledge, change attitudes, develop skills and take action. In addition, the use of written materials, a website, and public service announcements as well as workshops, presentations, outdoor experiences, education programs and community activities can be used to help accomplish public outreach goals. Coordination between city and county governments, resource agencies, nonprofit organizations, and other stakeholders will help extend the message. The specific goals for the outreach program are as follows:

1. Develop education and outreach to reach appropriate target populations, and raise knowledge and awareness of the issues related to Sacramento preserves and open space management.
2. Maximize existing resources by partnering with the public, resource agencies, commercial/industrial businesses, academic institutions, non-profits, utility districts, and local jurisdictions.

3. Foster stewardship to encourage citizens to take responsibility for and action in their environments and surrounding natural lands.
4. Minimize the behaviors of citizens that negatively impact preserve habitats or species, and encourage behaviors that support a sustainable and healthy ecosystem.
5. Facilitate compliance with best management practices at residences and businesses that are adjacent to preserve lands.

8.3 Compliance Monitoring

8.3.1 Compliance Tracking

As the preserve system is assembled and development occurs in the plan area, the conservation and loss of vegetative communities and targeted species must be tracked. Compliance monitoring includes tracking SSHCP-specific conservation requirements as spelled out in the implementing agreement, including project-related impacts, preserve acquisitions, and ensuring that Project Proponents follow through on best management practices, minimization and mitigation activities. Compliance monitoring also includes tracking acquisition of preserve habitat type, acreage, target species occurrences, restoration activities, species introductions, and any other specific tasks with quantifiable goals. Where entities are not compliant, the Implementing Entity must have authority to enforce remediation of deficiencies to obtain compliance.

Specific biological compliance monitoring requirements are detailed in Table X and Section X>X>X below.

Table X. Compliance Monitoring Tasks and Schedules

Monitoring Type	Location	Task	Responsibility	Schedule
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Responsibilities for Tracking Actions

Responsibilities of the Implementing Entity include maintaining and updating a database of impacted lands and targeted species. An integrated GIS program such as HabiTrak being used by the Multiple Species Conservation Program (MSCP) and Multiple Habitat Conservation Program (MHCP) in San Diego County can track changes in habitat. Currently, CDFG is exploring the adoption and tailoring of this database to suit the need for regional NCCP/HCP data tracking.

The Implementing Entity is responsible for ensuring compliance with Best Management Practices on project development sites. Responsibilities of Preserve Manager(s) and the Agencies include maintaining and updating annually a database of lands preserved prior to SSHCP implementation, lands conserved through SSHCP implementation, and a database of conserved species locations and population boundaries. In addition, the Implementing Entity is responsible for integrating data and distributing updated information to the Wildlife Agencies and the public. The Implementing Entity is responsible for overseeing the performance of the Preserve Manger(s) or designee and ensuring that preserves are adequately managed and monitored to meet all permit conditions. The Implementing Entity is responsible for coordination across SSHCP participating entities so that monitoring data are collected consistently, using the same sampling techniques and sampling intervals. For protocols not provided in this MAMP, the Agencies will work with the Implementing Entity to develop the required data sheets, sampling protocols and sampling intervals.

8.3.1 Tracking Data Standards and Data Management

Data Standards

All data collected for SSHCP-related purposes will be appropriately collected, recorded, and reported according to standard quality assurance measures. Data will be assessed during the year it is collected to insure precision and quality. Any data associated with a specific location will be identified using a digital Geographic Information System (GIS) format in a known coordinate system, to a precision appropriate to the spatial scale of the subject. All data will be supplied to the Preserve Manger(s) in a digital format compatible with entry into a regional database, such as Excel, or other compatible databases (e.g., BIOS).

Database Management

Preserve management and monitoring will generate a large amount of data on biological resources pertaining to spatial locations as well as myriad quantitative and categorical variables for each preserve area and the HCP plan area overall. The Implementing Entity will oversee the creation of a suitable database structure, which will include a numerical, relational database as well as a GIS component for spatially-explicit data. The Implementing Entity will also oversee the maintenance and documentation of the database on a continual basis. The Implementing Entity will be responsible for facilitating extraction of data for analysis and reporting, as well as for preparation of maps, reports, and presentations. The Implementing Entity will be responsible for inputting data into the database, implementing quality assurance/quality control measures, and extracting data from the database for analysis. The Implementing Entity will make the database information available to the public in an appropriate format through the HCP web site.

Ideally, data collection and reporting should eventually be done on a super-regional scale, incorporating monitoring data from neighboring counties and conservation programs, including San Joaquin, Placer, El Dorado, Contra Costa, Amador, Yolo County and Solano County.

8.4 Preserve Operations and Maintenance

8.4.1 General Provisions of Preserve-Specific Operations and Maintenance

The overall SSHCP plan area will include numerous preserve areas, owned and managed by many different entities. The following provisions apply primarily to lands owned in fee title. Provisions applied to lands protected under a conservation easement will be negotiated between the landowner and Implementing Entity.

The Implementing Entity will be responsible for ensuring that baseline surveys are conducted. Under the Implementing Entity's direction, the Preserve Manager or Implementing Entity designee will conduct annual monitoring surveys, perform routine patrol and enforcement actions, and actively participate in ongoing identification of threats to biological resources and will develop plans to address current threats and prepare for possible future threats. The Implementing Entity will ensure that management actions are designed and undertaken to meet biological goals, and the result of the action is monitored allow necessary revision or adaptation to the management plan as needed.

8.4.2 Operations and Maintenance Requirements

Fundamental to the management of dedicated preserves is physical integrity of the parcels and basic infrastructure. Preservation and enhancement of biological resources cannot be accomplished without fencing, signage, periodic removal of trash, and coordination with city and county officials regarding public health and safety issues such as fire prevention and vector control. Public outreach is an important part of routine preserve management because it improves success of enforcement and using volunteers can be an important tool for achieving preserve goals. It is recommended that a simple check list be prepared by the PM so that all required preserve management tasks can be approved and included in the annual monitoring plan submitted to the Agencies.

Each preserve management plan must address the following preserve and property management tasks, as applicable:

- Remove trash or yard waste dumping
- repair altered hydrology or flooding, if necessary
- repair the sources of erosion and sedimentation (apply for agency permits, if necessary)
- eradicate invasive species
- provide appropriate pest management (per individual Preserve Management Plan guidelines)
- prevent off road vehicle use (with the exception of maintenance vehicles) and maintain recreational trails
- maintain fences, gates, access points, and legacy structures such as foundations, or other surface or buried debris.
- identify and map all wells, springs, or other sources of water
- request a clearance from the Underground Service Alert program to identify locations of buried utility services
- identify and map the type and locations of known easements.

Preserve-specific management tasks are detailed below.

Fencing and Signage

Public access points should be controlled, and access to sensitive habitats must be limited to ensure success of management activities. Fencing and signs should be established, and trails should be closed or redirected to protect habitat or species populations from trampling or other adverse, direct impacts. Preserve boundary fencing is necessary to exclude unwanted traffic and/or trash dumping by motorized off-road vehicles, bicyclists, pedestrians, and domestic animals. Fences will be built along perimeters of currently unfenced parcels. Fences should be designed to allow for continued wildlife movement. Parcels contiguous to adjacent parcels with entirely compatible land use practices may not need to be fenced at this time. Provision for fencing these boundaries will be made should adjacent land uses change in the future. Periodic inspection of fencing and gates will be scheduled and immediate repairs will be made as needed.

Voluntary compliance with preserve boundaries makes fencing easier to maintain and more effective. Educational signage explaining the purpose of the preserve and why no trespassing is allowed will be placed every 250-500 ft along fences that border roads and neighborhoods where public access is likely. Signs will include a phone number or web site where more information about the preserve is available, and when and where public access is allowed. In addition, educational signs and kiosk should be installed as feasible to explain the conservation context, sensitivity of biological resources, and need for monitoring and management. For aquatic habitats, for example, information should be provided explaining why the introduction of bullfrogs and or other nonnative species to ponds, marshes, or streams is prohibited.

Trash and Debris Removal

Besides being an eyesore, trash and debris can cause harm to wildlife and be a vector for pollution and non-native plants. Trash can be introduced to the preserve by recreational users, trespassers, as windblown debris from passing vehicles, and from dumping near fences and around gates. Trash cans with lids and recycling bins should be provided at access points and emptied regularly. Any personnel visiting preserve sites should remove any trash they find in the course of their activities. Periodic fencing inspection visits (see above) will include inspection for trash and illegal dumping. Trash clean-up may be done by preserve staff if minimal or by volunteers on scheduled clean-up days (as needed) if warranted.

Fire Management

The preserve areas fall under the jurisdiction of the [XXX] Fire Protection Districts. Each preserve must prepare a Fire Management Plan addressing fire ecology of the site, adjacent and onsite human and natural fire processes, and fire history of site. Fire control and response measures must be detailed as well. The fire management plan should identify appropriate fire suppression practices for preserves and prioritize areas for fire suppression and, where appropriate, for prescribed burns. Evaluate the need for prescribed burns (or alternative, mechanized methods) to revitalize senescent stands of habitat or promote germination of fire-adapted covered plant species (note: prescribed burns likely will be limited except for larger areas of the preserve). Fire breaks must be maintained according to appropriate guidelines. Where existing fire breaks are not required, they will not be maintained but rather be actively restored to native vegetation. Fire breaks requiring continued maintenance on preserve lands will be mowed rather than disked. Protocols for creating fire breaks during prescribed burns are described in Section XX. If fuel management zones are required, they will be created outside preserve boundaries.

Diseases and Vector Control

One of the potential threats to wildlife populations is disease outbreaks. Diseases, such as *Trichomoniasis*, which affects pigeons and doves, *plague*, which infects ground squirrels, and *West Nile virus*, have all been found in birds in Sacramento County. As risks to public health and wildlife, these diseases are generally carefully monitored by various county agencies, including the County Environmental Management Department, Sacramento/Yolo Mosquito Vector Control District, and the County Public Health Officer. Emerging diseases that have not yet reached the US, such as *avian flu*, are monitored by the Centers for Disease Control and Department of Food and Agriculture. The Planning Department, Implementing Entity and Preserve Managers should routinely coordinate with any relevant Agency to stay informed of disease situations.

Mosquito abatement is an important component to overall ecosystem health in that it can help preventing mosquito-borne diseases in wildlife. Such prevention is strongly preferred to treating diseased individuals. The trade-off is that pesticides can be harmful to covered species, especially the insects, and to other species via bioaccumulation. Preserve managers should be notified by local Vector Control District if any abatement procedures are being conducted in the area to coordinate efforts and minimize negative impacts. This will be

especially important in the event that West Nile Virus or another mosquito-borne disease becomes an emotionally-charged issue with the public (see *Threat Monitoring*).

Mosquito abatement on private lands is an important component of an overall regional plan. Countywide efforts to encourage landowners to help control mosquito populations should be augmented by contributions by the Implementing Entity's office. Web sites and informational materials distributed to individuals interested in helping to attain the goals of the HCP should include instructions for controlling mosquitoes on their property, including eliminating stagnant water sources such as old tires and pails, putting up bat houses, or installing CO₂ traps. Residents should be discouraged from putting mosquito fish in any waters that potentially overflow or connect to natural waters, using "bug zappers", which kill a multitude of beneficial insects, or spraying pesticides.

Vernal pools should not normally need any mosquito abatement. Mosquito larvae are not common or abundant in natural, undisturbed vernal pools. Pond hydroperiods are mostly not long enough for mosquito development and natural predators also control their numbers. Abatement should not be necessary in naturally-functioning or restored preserve ponds. Restoration of ponds with abnormally long hydroperiods or poor predator diversity should be the primary management action for mosquito abatement. Application of pesticides and introduction of the non-native mosquito fish (*Gambusia affinis*) have been shown to be detrimental to sensitive species (fairy shrimp) so will be discouraged on preserve lands (Ripley et al 2000/2001).

Unauthorized Uses

Public off-road vehicle use is not compatible with conservation goals in preserve areas because it causes habitat degradation, erosion, noise, pollution, and disturbance to animal behavior. Unauthorized vehicle access will be prevented via fencing, locked gates, large boulders, or locked, removable posts. Checking for evidence of unauthorized vehicle access will be part of routine preserve surveys, and if evidence is found, access control measures will need to be implemented to prevent such access. Patrols for illegal uses in the preserve should be conducted.

Erosion and Sedimentation

Identify erosion and sedimentation problems and their sources that have the potential to impact wetlands and covered plant populations, and install bio-engineered (as feasible) reinforcements to slow erosion and sedimentation. Installation of BMPs according to

County standards is required. Erosion and sediment control devices or realignment of trails or dirt roads that are causing excessive erosion will be required as a high-priority management action. Erosion control may include planting native plant species as well as installation of state-of-the-art anti-erosion matting, berms, water bars, or other man-made devices.

Human-adapted Mesopredator/Scavenger Control

Human-adapted generalist such as crows, skunks, opossums, rats, and raccoons have increased in numbers beyond the natural carrying capacity of the environment throughout the urban/wildland interface. Suburban landscapes provide resources for these species through trash, pet food, road kill and gardens, and thus homeowners can take certain steps to prevent conflicts with animals by limiting access and removing attractants. Public education, habitat modification and reducing the access to food sources can limit the resources available to wildlife.

To reduce wildlife access to food sources in residential areas next to preserve, the following recommendations should be communicated to the public:

- Secure garbage cans by fastening lids and tying the handle to a stake driven into the ground.
- Don't leave dog or cat food outside.
- Dispose of especially attractive food wastes such as meat, cheese, and eggs by adding a small amount of ammonia to the bag to deter animals. If it will be several days before garbage pick up, temporarily freeze these wastes until they can be properly disposed of. When composting, use enclosed bins rather than exposed piles. Avoid adding dog or cat waste, meat, milk or eggs, and any food containing these products, to compost. These measures may help prevent conflicts with and growth of human-adapted wildlife.

Feral and Stray Cats and Dogs

Preventing disturbance and mortality due to domestic dogs and cats is a component of many of the conceptual models for many covered species. Feral cats are a significant source of mortality for many species of birds, including covered species (Lepczyk et al 2003), and compete with raptors for small mammal prey. Dogs are more likely to disturb small animals rather than cause direct mortality, but they can destroy nests and burrows, or cause

abandonment of chicks. Regular trapping and removal and/or spaying of feral cats are strongly recommended, as are capture and removal of kittens and dogs by Animal Control. Preserve Managers should notify Animal Control if they observe evidence of feral animals. Where stray dogs are a problem, fencing to exclude them may be a necessary management step.

Literature and information distributed to residents in the community should strongly encourage them to prevent their pets from wandering into preserved lands by keeping cats indoors and keeping dogs in securely-fenced yards and walking them on-leash only. Residents should also be encouraged to spay or neuter all pets in order to help prevent unwanted strays as well as to minimize roaming behavior, especially in male pets. County veterinarians should be advised to strongly encourage pet-owners to control fleas and ticks on pets using prescription systemic products such as Advantage. Pets should also be vaccinated for rabies and other preventable diseases. These measures will help prevent the spread of disease to pets from wildlife, and vice versa, which should be noted in HCP informational literature.

8.5 Adaptive Management and Monitoring

8.5.1 Principles Guiding Adaptive Management and Monitoring

As described above, ecological or effectiveness monitoring is required to gauge whether the SSHCP is overall successful in maintaining ecological processes, biodiversity, habitats and species in perpetuity. The management and monitoring program needs to be adaptive to changing conditions in the environment (including global climate change) and provide an early warning system to allow managers to react when threats are evident. This requires continuous efforts to gain a better understanding of natural resource dynamics and the identification of indicators that are sensitive to incremental changes in the environment and the manifestation of threats. The program must look at all aspects of the ecosystem and not single out one species or habitat; individual species may not provide early warnings as to the condition of their habitat by themselves. They may be either in such low densities that they preclude the appropriate use of statistical trend determinations, or they have such long generation times that by the time their reaction to threats can be unequivocally documented, it may be too late to employ corrective actions. Also, the causes of the species' declines may not be clear from monitoring programs focusing only on species abundance.

8.6 Changed and Unforeseen Circumstances

Habitat Conservation Plans (HCPs) must include strategies and measures that address the possibility that conditions within the planning area may change over the course of implementation. HCPs must include strategies or measures to address significant changes within the planning area that are not certain to occur but are nonetheless reasonably foreseeable. The HCP must identify these “changed circumstances” (e.g., floods, fire, or drought) and identify contingent strategies or actions that will be implemented if they occur. If a changed circumstance arises, the strategy or action(s) identified in the HCP must be implemented in response. The strategies or actions identified to address changed circumstances are part of the HCPs operating conservation program.

Section 10 regulations [50 CFR 17.22 (b)(2)(iii)] require that an HCP specify the procedures to be used for dealing with unforeseen circumstances that may arise during the implementation of the HCP. In addition, the Habitat Conservation Plan Assurances (No Surprises) Rule [50 CFR 17.22(b)(5)-(6) and 17.32(b)(5)-(6); 63 F.R. 8859] defines unforeseen circumstances and changed circumstances and describes the obligations of the Permittee and USFWS.

Changed circumstances are changes that affect a species or geographic area covered by the SSHCP that can reasonably be anticipated by developers of the SSHCP and for which a response can be planned. The SSHCP must address changed circumstances and identify measures that can be taken to respond to those changes. If additional conservation and mitigation measures are required to respond to changed circumstances and these measures have not been identified by the SSHCP, then they cannot be required by the USFWS without the consent of the permittee, provided the plan is being properly implemented.

The regulations also require that the SSHCP identify procedures for addressing unforeseen circumstances that could arise during the course of implementation of the Plan. Unforeseen circumstances are changes that affect a species or geographic area covered by the HCP that could not reasonably be anticipated by plan developers at the time of the plan’s negotiation and development and that result in a substantial and adverse change in status of the covered species. However, per Section 10 regulations, unforeseen circumstances will not require the commitment of additional land, water, or financial compensation or additional restrictions on the use of land, water, or other natural resources beyond the level otherwise agreed upon for the species covered by the conservation plan without the consent of the permittee.

If the USFWS makes findings of unforeseen circumstances and requires additional mitigation, and a permittee is in compliance with the obligations of the SSHCP, the additional mitigation must be consistent with the original terms of the Plan. Any changes to the SSHCP must be limited to modifications within conserved habitat areas or to the conservation plan's operating conservation program for the affected species consistent with the easement agreements in place. Any additional mitigation will not require the payment of additional compensation or apply to land or the natural resources identified under the plan for development per the original terms of the Plan without consent of the permittee.

The federal "No Surprises" regulations are an essential component of the SSHCP. Except as otherwise required by law or provided for under the SSHCP no further mitigation for the effects of the proposed project on covered species may be required from a Permittee, as long as the SSHCP is being properly implemented. The SSHCP will be properly implemented if the commitments and provisions of the HCP and the permit have been or are being fully implemented by the Permittees.

The USFWS has the burden of proving that unforeseen circumstances exist by using the best scientific and commercial data available. Findings must be documented and based upon reliable technical information regarding the status and habitat requirements of the affected species. The USFWS will consider, but not be limited to, the following factors:

- Size of the current range of the affected species;
- Percentage of range adversely affected by the HCP;
- Percentage of range conserved by the HCP;
- Ecological significance of that portion of the range affected by the HCP;
- Level of knowledge about the affected species and the degree of specificity of the species' conservation program under the HCP; and
- Whether failure to adopt additional conservation measures would appreciably reduce the likelihood of survival and recovery of the affected species in the wild.

Nothing in the "No Surprises" regulation limits or constrains the USFWS, or any other governmental agency, from taking additional actions at its own expense to protect or conserve a species included in a conservation plan.

Except where there is substantial threat of imminent, significant adverse impacts to a Covered Species, the USFWS shall provide the Permittees at least sixty (60) calendar days written notice of a proposed finding of Unforeseen Circumstances, during which time the USFWS shall meet with the SSHCP Permittees to discuss the proposed finding, to provide any affected Permittee with an opportunity to submit information to rebut the proposed finding, and to consider any proposed changes to the conservation strategies for the HCP Area.

Adaptive Management

Adaptive management will play a crucial role in guiding the long-term goals and objectives of the SSHCP. As such, the monitoring, management and adaptive management protocols already in place as part of this Plan will in part address many of the changed circumstances identified below should they occur. For instance if an invasive species should invade a preserve system the SSHCP Implementing Entity will react to this event by following the suggested protocol found under changed circumstances but will also carry out adaptive management strategies recommended under the Plan.

Technical Advisory Group

The Technical Advisory Group will identify appropriate responses to changed circumstances to assist the Implementing Entity in crafting a response to changed circumstances. The TAC (s defined in Chapter 10) will be a multi-agency, multi-discipline team of experts to serve in the event that a changed circumstance occurs. The Implementing Entity will convene the TAC, which will include as appropriate to the changed circumstance, TAC, USFWS and USACE biologists, Department of Pesticide Regulation, local wildlife rehabilitation centers, the U.C. Davis Raptor Center, Agricultural Commissioner, Mosquito and Vector Control District, etc. The TAC is not responsible for implementing proposed responses to changed circumstances. The primary purpose of the TAC is to provide recommend proposed responses to changed circumstances that will then be employed by the SSHCP Conversancy. Not all members would be called on in the event of an incident. For example, it is unlikely that the Department of Pesticide Regulation would be needed after a fire. An initial TAC roster shall be created upon adoption of the SSHCP and updated at least every two years or more frequently if necessary to keep contact information current in the event of an emergency.

Changed circumstances often have far reaching effects beyond the operation of an HCP. It is understood that during certain disasters, infrastructure, resource considerations and

public safety concerns may preclude the immediate assembly of the TAC. For the purpose of this document, the term “Emergency Status” will refer to that time after a changed circumstance has occurred but before the TAC is convened where it is not feasible or appropriate to meet because the changed circumstance, wildfire, for example, is not controlled or due to infrastructure damage or resource demands that a majority of the offices of the team participants are closed or operating emergency operation centers linked with the Governor’s Office of Emergency Services (OES).

8.6.1 Listing of New Species

Changed Circumstance: If a species not covered by the SSHCP is proposed for listing or becomes listed as endangered or threatened under FESA or CESA during the lifetime of the permit, the Permittee may request that the USFWS or DFG cover the species under the SSHCP’s Section 10(a)(1)(b) and/or Section 2081 permits. If the request is made, the permits issued to the permittees of this plan will be reevaluated by the USFWS and DFG and the HCP-covered activities may be modified, as necessary, to ensure that the activities covered under the HCP are not likely to jeopardize or result in take or adverse modification of any designated critical habitat of the newly listed species. The Plan participants will implement the modifications to the HCP-covered activities identified by USFWS and DFG as necessary to avoid the likelihood of jeopardy to, take, or adverse modification of the designated critical habitat of the newly listed species. Plan applicants shall continue to implement such modifications until such time as Plan Applicants have applied for and USFWS and DFG have approved an amendment of the section 10 permit or 2081 Permit, in accordance with applicable statutory and regulatory requirements, to cover the newly listed species, or until USFWS notifies Plan Participants in writing that the modifications to the HCP-covered activities are no longer required to avoid the likelihood of jeopardy or adverse modification of designated critical habitat of the newly listed species.

Unforeseen Circumstance: There are no unforeseen circumstances associated with the listing of new species.

8.6.2 Listing of Covered Species

Changed Circumstances: The SSHCP covers 30 species of plants and animals that are not currently listed as threatened or endangered under the FESA or CESA. Each non-listed species covered under the SSHCP has been treated as though they are listed so in the event that a covered species does become listed, the permit will immediately become effective for that species. The SSHCP Participants request that the Section 10 and Section 2081 permit

issued under the SSHCP cover these non-listed species and offers the same assurances as if they were listed. The SSHCP also covers nine plant species which cannot be covered for take under a Section 10 permit. The SSHCP Plan participants are requesting that these nine plant species be included on the federal permit and are also offered the same no surprise assurances as other covered species. No additional changes or amendments to the Permit, Biological Opinion, Implementing Agreement or HCP will be required if covered species become listed.

Unforeseen Circumstance. There are no unforeseen circumstances associated with the listing of covered species.

8.6.3 Designation of Critical Habitat

Changed Circumstances: If critical habitat for a species that is covered by the SSHCP and may be modified by activities covered by the SSHCP is designated under ESA during the term of the section 10 permit, USFWS may consider this to be a changed circumstance. In such case, the Section 10 permit will be reevaluated by USFWS and the HCP-covered activities may be modified, as necessary, to ensure that the activities covered under the HCP are not likely to jeopardize or result in take or adverse modification of any designated critical habitat of any covered listed species. The SSHCP Implementing Entity will implement the modifications to the HCP-covered activities identified by USFWS as necessary to avoid the likelihood of jeopardy to, take, or adverse modification of the designated critical habitat of any covered listed species. The SSHCP Implementing Entity shall continue to implement such modifications until such time as the SSHCP Implementing Entity has applied for and USFWS has approved an amendment of the section 10 permit, in accordance with applicable statutory and regulatory requirements, to cover the newly listed species, or until USFWS notifies the SSHCP Implementing Entity in writing that the modifications to the HCP-covered activities are no longer required to avoid the likelihood of jeopardy or adverse modification of designated critical habitat of any covered listed species.

Unforeseen Circumstance. There are no unforeseen circumstances associated with the designation of critical habitat.

8.6.4 Damage to the Preserve System Caused by Flooding

Changed Circumstances: A flood event occurs when a stream's capacity to hold water is exceeded by high water flows resulting in water coming out of the stream bank and

entering the floodplain. For purpose of this document a flood is defined to mean the 100-year flood event as well as any high water event below the 100-year flood event that causes damage or alteration to habitats, species or ecosystems covered by the plan. According to FEMA, a 100-year flood is, “the flood elevation that has a 1% chance of being equaled or exceeded each year”. The term flood can also apply to localized flooding events caused by levee breaks, pipeline breaks, dam breaks, drainage blockages and equipment failure.

According to the Sacramento Area Flood Control Agency (SAFCA), “Sacramento’s risk of flooding is the greatest of any major city in the country.” Five record floods have occurred in the Sacramento area in the past half century these were in 1951, 1956, 1964, 1986 and finally in 1997. The primary reason for this high risk of flooding is the area’s topological position in the Central Valley and a reliance on outdated, deteriorating and insufficient levees.

Since flooding is common in some portions of the Plan Area it is understood that some plant and animal species have adapted to this type of disturbance regime and many species and their ecosystems thrive after a flood event has occurred. Flooding can deposit soils rich in nutrients and biological materials, which can enhance habitat, expand a species range and even increase biological functions over time. Most flood events that occur in the Plan Area will have minimal negative impacts on native species or their habitats. However; flooding could destroy newly established restoration or creation sites, impact preserves by depositing debris or sedimentation, downing trees, scouring vegetation from stream banks etc. The severity of impacts caused by flooding will vary depending on several factors including flood duration, intensity and type of habitat that is affected. A changed circumstance will have occurred if a flood or multiple floods within a single season impact up to 25% of the preserve system and it is deemed by the TAC that the flood event has caused significant harm to covered species or covered species habitat.

Should flooding occur that disturbs restoration or creation sites or results in other damages the following actions will be taken:

- Within 48 hours of securing from emergency status, the Implementing Entity will attempt to convene the TAC to determine if there were adverse effects to a covered habitat or species within areas protected by the SSHCP. This will involve site reconnaissance, sampling or surveying and the preparation of a disturbance assessment report. Specific issues to be addressed should include but not be limited to damage to irrigation, pumping or security equipment, direct mortality of

- species, erosive forces, materials deposition including sand, gravel or invasive species (especially floating type seeds or plants), and the potential for damaging actions by good Samaritans (i.e. re-vegetation using invasive plant species).
- Initiate erosion control measures where appropriate and repair structures necessary to secure and maintain the preserve such as fences and irrigation facilities.
 - Convene the TAC to develop measures that address immediate recovery of the preserve; such actions could include additional erosion control measures or reseeded the area to prevent the establishment of invasive species.
 - Within one year after the changed circumstance occurs re-convene the TAC to prepare an assessment report to determine if natural processes are acting to resolve the problem. If not, develop response measures to remediate the disturbance.
 - If restoration of habitat is deemed necessary, actions to repair the site must be completed within two years from the date of the occurrence of the changed circumstance.

The Implementing Entity will set up proper monitoring protocols for the site in accordance with the monitoring plan as established in Chapter 8 if restoration is necessary.

Unforeseen Circumstances: Disturbance caused by flooding can be very expensive to repair and could potentially exceed the operating budget of the SSHCP. For purpose of this plan any single event or cumulative events that exceed X% of the operations and management budget in any year is an unforeseen circumstance. If the event or cumulative events does exceed X% per year the Implementing Entity has the option of seeking funding from other sources to properly implement the control program.

In addition, new structures could be built on streams or rivers that are outside of the Plan Area. These new structures such as dams or weirs have the ability to alter downstream flows or could fail impacting preserves within the SSHCP study area. Such events that are caused by actions outside of the local jurisdictions control are unforeseen circumstances.

A flood event greater than the 100-year event has not occurred within the Plan Area. Therefore, a flood and the damage resulting from an event greater than a 100-year event shall be considered an Unforeseen Circumstance.

8.6.5 Damage to the Preserve System as a Result of Fire

Changed Circumstances: Historically, wildfires were a common occurrence throughout the Plan Area and native species, in particular, are well adapted to fire events. Wildfires help to control the buildup of thatch and woody material as well as the cover of exotic species and are a beneficial part of the natural cycle of historic California grassland landscapes. Wildfires, especially grassland fires, have become less frequent in the plan area as our ability and desire to control and manage fires has increased. This has allowed thatch and woody materials to build-up overtime, which in turn increases the fuel load beyond what is historically considered to be natural. When a fire event does occur the high fuel loads can result in fires that burn at greater intensities, spreads quickly and usually covers larger areas. While periodic fire has been shown to be beneficial to ecosystem health, uncontrolled, unplanned fires can have detrimental impacts to the ecological balances in the habitats of the SSHCP.

A changed circumstance will have occurred if a fire or multiple fires within a single season occurs that impacts up to 25% of the preserve system and it is deemed by the TAC that the fire event has caused significant harm to covered species or covered species habitat.

Prescribed burning to control buildup of thatch and woody debris are important tools for ecosystem management and will be addressed in the SSHCP management plan. In addition preventative measures such as fuel breaks will be included as best management practices in the Conditions Chapter. Should a wildfire occur in the HCP plan area the following actions should be taken:

- Within 48 hours of securing from emergency status, the Implementing Entity will attempt to convene the TAC to determine if there were adverse effects to a covered habitat or species. This will involve site reconnaissance, sampling or surveying and the preparation of a disturbance assessment report. Specific issues to be addressed should include but not be limited to damage to irrigation, pumping or security equipment, direct mortality of species, access points generated by the fire fighting effort, contamination from fire retardants, and the potential for damaging actions by good Samaritans (i.e. the planting of non-native and potentially invasive vegetation to reduce the potential for soil erosion).
- Initiate erosion control measures where appropriate and repair structures necessary to secure and maintain the preserve such as fences and irrigation facilities.

- Convene the TAC to develop measures that address immediate recovery of the preserve; such actions could include additional erosion control measures or reseeding the area to prevent the establishment of invasive species.
- Within one year after the occurrence of the changed circumstance re-convene the TAC to prepare an assessment report to determine if natural processes are acting to resolve the disturbance. If not, develop response measures to remediate the disturbance.
- If restoration of habitat is deemed necessary, actions to repair the site must be completed within two years from the date of the occurrence of the changed circumstance.

The Implementing Entity will set up proper monitoring protocols for the site in accordance with the monitoring plan as established in Chapter 8 if restoration is necessary.

Unforeseen Circumstances: Disturbance caused by fire can be very expensive to repair and could potentially exceed the operating budget of the SSHCP. For purpose of this Plan any single event or cumulative events that exceed X% of the operations and management budget in any year is an unforeseen circumstance. If the event or cumulative events does exceed X% per year the Implementing Entity has the option of seeking funding from other sources to properly implement the control program.

8.6.6 Species and Habitat Lost to Drought

The threshold used by the Department of Water Resources (DWR) in identifying drought is considered to be runoff for a single year or multiple years in the lowest ten percent of historical range, and reservoir storage for the same time period at less than 70 percent of average. Droughts lasting more than three years are relatively rare in Northern California according to the DWR. Over the past century there have been eight multi-year drought events, five of which lasted three or more years and two of which lasted six years.

Drought is a natural, cyclical weather phenomenon that generally occurs over a period of several years which may allow plants and wildlife to adapt to the new conditions. However, given the state of our disturbed landscapes due to, increased competition from invasive species, development pressures, pollution, and habitat loss the adaptation of the covered species and habitats in the SSHCP area can not be counted on as certain. Therefore it can

be anticipated that species may not be able to adapt to future drought conditions. If adverse effects are observed the following actions should be taken:

- Upon evidence that drought is occurring the Implementing Entity will convene the TAC to determine if there are adverse effects to a covered habitat or species within areas protected by the SSHCP. This will involve ongoing site reconnaissance, sampling or surveying while drought conditions persist and the preparation of a disturbance assessment report.
- The TAC is to prepare an assessment report each year while drought conditions persist to determine if natural processes are acting to resolve the problem. If not, develop response measures to remediate the disturbance if necessary; such actions should include securing alternative sources of water.
- If restoration of habitat is deemed necessary, actions to repair the site must be completed within two years from the date of the occurrence of the changed circumstance or once conditions have stabilized, whichever is later.

The Implementing Entity will set up proper monitoring protocols for the site in accordance with the monitoring plan as established in Chapter 8 if restoration is necessary.

Unforeseen Circumstances: Disturbance caused by drought can be very expensive to repair and could potentially exceed the operating budget of the SSHCP. For purpose of this plan any event that exceeds \$500,000 in any year is an unforeseen circumstance. If the event does exceed \$500,000 per year the Implementing Entity has the option of seeking funding from other sources to properly implement the control program.

A drought event lasting longer than 6 years has not occurred in recorded history for the Sacramento or American River Basins, in the vicinity of the Natomas Basin. The potential damage from such a drought is not foreseeable, nor predictable. Therefore, a drought and the damage resulting from such event lasting longer than 6 years shall be considered an Unforeseen Circumstances.

8.6.7 Species Impacted by Invasion of Invasive Species

There are a number of invasive species already present within the SSHCP Study Area and it is unlikely that these invasive species will be eradicated within the foreseeable future. As invasive species are likely to be present on SSHCP established preserves, the SSHCP has a monitoring and management program (Chapter 9) designed to track, control and reduce

all known occurrences of invasive species on SSHCP preserve lands (See section X of Chapter 9 for detailed control measures of known invasive species). There is however, the potential for new invasive species to become established within the SSHCP Study Area or for invasive species to move from one location to an area where they had not occurred in the past. If this occurs it is essential that immediate action be taken to contain and eliminate the invasive species threat.

In the event that an invasive species becomes established within the SSHCP preserve system the following actions will be taken:

- Within 48 hours of discovery of the invasive species the Implementing Entity will attempt to notify appropriate agencies of the location and extent of the infestation and convene the TAC to determine if there are adverse effects to the preserve.
- Within two weeks the TAC will prepare a damage assessment report and action plan that outlines implementation measures that are necessary to control or eliminate the invasive species threat. See Chapter 9 for detailed control measures.
- Monitoring protocols for the invasive species will be implemented on all preserves operated by the SSHCP implementing entity. If the invasive species is found on additional preserves, the actions outlined in the action plan will be implemented to control or eliminate the invasive species threat.
- If restoration of habitat is deemed necessary, actions to repair the site must be completed within two years from the date of the occurrence of the changed circumstance.

The Implementing Entity will set up proper monitoring protocols for the site in accordance with the monitoring plan as established in Chapter 8 if restoration is necessary.

Unforeseen Circumstances: Control of exotic species can be very expensive to implement and could potentially exceed the operating budget of the SSHCP. For purpose of this plan any event that exceeds \$500,000 in any year is an unforeseen circumstance. If the event does exceed \$500,000 per year the Implementing Entity has the option of seeking funding from other sources to properly implement the control program.

8.6.8 Loss of Species or Habitat to Disease

Outbreaks of disease are a naturally occurring phenomenon and can take place frequently within plant and animal communities. The significance of such phenomena is dependent on a number of factors such as timing, community type, and species of concern. Diseases that may affect covered species in the plan area include Chytrid Fungus and Ranaviruses which is known to contribute to amphibian declines, and could be spread via infected organisms or contaminated equipment. Trichomoniasis, a digestive tract disease in raptors is a source of mortality in nestling and fledgling Cooper's Hawks in some urban populations. Also, West Nile virus and avian cholera are responsible for mortality in bird species found within the Plan Area.

Additionally some diseases could be transmitted from species inhabiting the SSHCP area to humans, livestock or other HCP covered species by direct means or vectors. A vector is an organism, such as a mosquito or tick that carries disease-causing microorganisms from one host to another. The habitats of the SSHCP could also provide a home for these vectors. This provides a multi-faceted problem of disease among covered species but also the potential to be a reservoir for vectors or diseases affecting humans. Studies show that a healthy vernal pool ecosystem, for example, is actually a sink for the disease carrying mosquito, however public outcry against an HCP preserve must be planned for and a close relationship with the Sacramento-Yolo Vector Control District will need to be fostered especially given the arrival of the Nest Nile Virus to Sacramento County. Other diseases that may be encountered are rabies, encephalitis, plague and the bird flu.

In most areas, population levels of Covered Species typically occur in equilibrium with normal disease and predation, even if populations are occasionally experiencing severe, but localized reductions in numbers. However, the spread or introduction of diseases could adversely affect the populations of some covered species.

Should a disease, vector or nuisance organism adversely impact a covered species or create a situation whereby public outcry or public health considerations may call for an action that may adversely affect covered species the following steps shall be taken:

- Within 48 hours of discovery of an outbreak of disease the Implementing Entity will attempt to notify appropriate agencies of the location and extent of the infestation and convene the TAC to determine if there were adverse effects to the preserve.

- The TAC will attempt to work cooperatively with the Sacramento-Yolo Mosquito and Vector Control District, County Health Officer, County Veterinarian, State Wildlife Labs of Fish and Game, County Media and Communication Office and other necessary partners to identify issues, risks and actions steps to deal with the threat as well as to prepare media information to educate the public.
- Within two weeks the TAC will prepare a report of recommend actions that need to be taken to control or eliminate the outbreak. Such actions should include shifting funding to facilitate vector control or implementing predator control programs.
- If restoration of habitat is deemed necessary, actions to repair the site must be completed within two years from the date of the occurrence of the changed circumstance.
- Monitoring protocols for the invasive species will be implemented on all preserves operated by the SSHCP implementing entity.

The Implementing Entity will set up proper monitoring protocols for the site in accordance with the monitoring plan as established in Chapter 8 if restoration is necessary.

Unforeseen Circumstances: If disease or predation results in a greater than 50 percent increase in normal disease or predation levels in a population of a Covered Species and threatens to jeopardize the continued existence of the Covered Species within Sacramento County, an Unforeseen Circumstance will have occurred.

8.6.9 Loss of Species or Habitat to Expose to Pesticides/Herbicides

Changed Circumstances: It is conceivable that pesticides or herbicides will be applied by neighboring landowners and that the application methods used, such as aerial spraying, could result in accidentally over spraying and impacting adjacent preserves. While it is anticipated that in most cases a species occurrence will recover from this action, a changed circumstance will have occurred when damage to plants or animals occurs that require remediation efforts. Should accidental spraying of pesticides or herbicides occur on preserves protected by the Plan, the following actions shall be taken:

- Upon discovery/notification of the application of the pesticide or herbicide, the Implementing Entity will attempt to identify the pesticide, applicator, environmental conditions and elapsed time from exposure.

- Within 24 hours of discovery/notification of the application of the pesticide or herbicide, the Implementing Entity will attempt to convene the TAC and present an interim damage report and summary of critical action steps taken since exposure. The TAC will then recommend actions to address the continuing threats, if any, resulting from the unanticipated pesticide/herbicide exposure and prepare a monitoring and recovery plan to address direct mortality.
- Within one year after the changed circumstance occurs re-convene the TAC to prepare an assessment report to determine if natural processes are acting to resolve the problem. If not, develop response measures to remediate the disturbance.
- If restoration of habitat is deemed necessary, actions to repair the site must be completed within two years from the date of the occurrence of the changed circumstance.
- Monitor the response of species/habitats to the action(s) taken, paying special attention to reproduction and morphology problems arising from pesticide exposure.

Unforeseen Circumstances: Clean-up and remediation of impacts that result from exposure to pesticides or herbicides could potentially exceed the operating budget of the SSHCP. While it is the intent of the SSHCP to recuperate expenses of remediation efforts by the violator, any single event or cumulative events that exceed X% of the operations and management budget in any year is an unforeseen circumstance. If the event or cumulative events does exceed X% per year the Implementing Entity has the option of seeking funding from other sources to properly implement the control program.

8.6.10 Loss of Species or Habitat to Expose to Toxic/Oil Spills

Changed Circumstances: While unlikely, it is conceivable that a pipeline, vehicle, aircraft or train accident, point source pollution discharge or illegal dumping of toxic waste could result in a hazardous substance affecting preserves established by the Plan. The areas of highest risk would be in the vicinity of Highways 99 and 5, Mather Field and the Union Pacific railroad tracks. A changed circumstance occurs when a toxic substance harms species or vegetation and the cost to remediate the damage does not exceed more than X% of the SSHCP's operations and management budget. In the event a HCP established preserve area is exposed to a hazardous substance, the following actions shall be taken:

- Within 24 hours of an event the Implementing Entity will attempt to notify appropriate agencies of the occurrence and convene the TAC to determine if there were adverse effects to the preserve.
- If possible the Implementing Entity will work with appropriate agencies to first contain and then remove the toxic substance. This action will only be undertaken by appropriate emergency response personnel trained to handle toxic chemicals.
- The TAC will identify what agency, if any, has regulatory jurisdiction over the accident and in coordination with them conduct a damage assessment report and formulate a response plan to address direct mortality, mitigation and monitoring.
- The Implementing Entity will carefully detail all costs and damages associated with the accident, and any monitoring and mitigation plan in order to facilitate a recuperation of costs from the responsible party.
- Within one year after the changed circumstance occurs re-convene the TAC to prepare an assessment report to determine if natural processes are acting to resolve the problem. If not, develop response measures to remediate the disturbance.
- If restoration of habitat is deemed necessary, actions to repair the site must be completed within two years from the date of the occurrence of the changed circumstance.
- Monitor the response of species/habitats to the action(s) taken, paying special attention to reproduction and morphology problems arising from exposure to hazardous materials.

Unforeseen Circumstances: Clean-up and remediation of impacts that result from exposure to toxic substances could potentially exceed the operating budget of the SSHCP. While it is the intent of the SSHCP to recuperate expenses of remediation efforts by the violator, any single event or cumulative events that exceed X% of the operations and management budget in any year is an unforeseen circumstance. If the event or cumulative events does exceed X% per year the Implementing Entity has the option of seeking funding from other sources to properly implement the control program.

If one of the situations described above occurs and damages greater than 50% of the total impacted lands an Unforeseen Circumstance will have occurred.

8.6.11 Vandalism That Damages the Preserve System or Structures

Structures used by the Implementing Entity such as fences, gates, irrigation systems, or other equipment used to manage the preserves could be damaged by vandalism. There is also the potential that preserves could be vandalized by off road vehicles or other illegal trespass actions. A changed circumstance occurs when vandalism results in equipment loss or failure that is critical to ongoing operations of the preserve system or when physical damage to a preserve occurs by trespass. A few examples of changed circumstances include vandals removing copper wire or pipe from irrigation systems, off-road vehicle enthusiasts cutting fences to gain access to preserves, theft of construction equipment used to maintain preserves or wanton destruction of newly restored habitat areas. Should vandalism occur in the HCP plan area the following actions should be taken:

- Within 48 hours the Implementing Entity will attempt to convene the TAC to determine if there were adverse effects to a covered habitat or species. This often will involve site reconnaissance, sampling or surveying. Specific issues to be addressed should include but not be limited to damage to irrigation, pumping or security equipment, direct mortality of species.
- Within one year after the changed circumstance occurs re-convene the TAC to prepare an assessment report to determine if natural processes are acting to resolve the problem. If not, develop response measures to remediate the disturbance.
- If restoration of habitat is deemed necessary, actions to repair the site must be completed within two years from the date of the occurrence of the changed circumstance.

The Implementing Entity will set up proper monitoring protocols for the site in accordance with the monitoring plan as established in Chapter 8 if restoration is necessary.

Unforeseen Circumstances: Clean-up and remediation of impacts that result from vandalism could potentially exceed the operating budget of the SSHCP. While it is the intent of the SSHCP to recuperate expenses of remediation efforts by the violator, any single event or cumulative events that exceed X% of the operations and management budget in any year is an unforeseen circumstance. If the event or cumulative events does exceed X% per year the Implementing Entity has the option of seeking funding from other sources to properly implement the control program.

8.7 Funding for Changed Circumstances

Funding for changed circumstances must be accounted for under the operating budget of the SSHCP. Local jurisdictions will not be expected or required to provide funding from General Fund operating budgets or any other sources of money controlled by local jurisdictions to cover actions that are required within this chapter.

Adjacent land owner assurances – If a changed circumstance occurs through no fault of a their own, a private party who has an easement enrolled within the SSHCP program can recoup costs of the damage if it can be shown that there is an adverse effect to a covered species or habitat. An example includes theft of copper wire or pipe used to operate irrigation systems. If irrigation equipment is destroyed it is in the best interest of the SSHCP to assist the property owner in repairing the damaged equipment to ensure the success of the crops which in turn provide foraging habitat.

Adaptive management entails management activities conducted as deliberate experiments in which the results details the extent the system requires management and how the system may respond to specific management actions (Willhere 2002). In general, natural resources today have been disturbed to the extent that they are no longer self-sustainable and require external control. In this context, adaptive management and monitoring are imperative to ensuring resource conservation.

Baseline studies (including pre-acquisition surveys) are performed as the first step in developing monitoring and management plans and directives. Baseline studies are necessary to understand the ecological relationships of the system that is to be monitored and managed, including identifying the presence or absence of species, documenting habitat conditions, gaining an understanding of the species' biology and population density, and filling knowledge gaps. Baseline studies inform monitoring strategies, while monitoring results inform management strategies. Monitoring and management if often performed simultaneously. Once the current conditions of the resources are known, conceptual models can be developed to explain the relationships between ecosystem components and to simplify very complex processes and systems. Conceptual models are not comprehensive in that they often only show the interactions between relevant components. However, they assist in identifying those system components that are necessary to devise adaptive management strategies and principles.