

## WORKING DRAFT

### Section 5.10 Adaptive Management Plan

*[Note to Reviewers: This working draft section on adaptive management will be part of the Conservation Strategy chapter. The adaptive management plan describes the elements of the Yolo NHP that are subject to adaptive management and the adaptive management decision making process. The adaptive management decision making process is largely dependent on information developed through implementation of the monitoring and research plan that will be described in Section 5.9 of Chapter 5.]*

This section describes the adaptive management process that will be conducted by the Implementing Entity to improve the effectiveness of the conservation measures (see Section 5.4) and the monitoring and research plan (see Section 5.9) in achieving the biological goals and objectives over the term of the Yolo Natural Heritage Program HCP/NCCP (Yolo NHP). The adaptive management process is consistent with the guidance for adaptive management provided in the USFWS's and NMFS's Five-Point Policy for HCPs (65 FR 106, June 1, 2000) and California's Natural Community Conservation Act (NCCPA) (Fish and Game Code Sections 2800-2835). The Five-Point Policy broadly defines adaptive management "...as a method for examining alternative strategies for meeting measurable biological goals and objectives, and then if necessary, adjusting future conservation management actions according to what is learned". The NCCPA defines adaptive management as "...to use the results of new information gathered through the monitoring program of the plan and from other sources to adjust management strategies and practices to assist in providing for the conservation of covered species".

The conservation measures described in Section 5.4 were developed based on the best scientific and commercially available information and, as crafted, provide the Implementing Entity with a road map for initial implementation of the Conservation Strategy. The conservation measures are directed primarily towards the protection, enhancement, and restoration of natural communities and the covered species habitats they support. There is a relatively high certainty regarding the effectiveness of protecting existing, functioning natural communities and associated covered species habitat to achieve covered species conservation goals. The adaptive management approach is focused on addressing those conservation actions whose effectiveness is more uncertain. These conservation actions include habitat enhancement, restoration, and management techniques. , Ongoing modifications to implementation of the Conservation Strategy are expected to be needed over the term of the Yolo NHP as new information is developed that addresses the uncertainties regarding the nature and magnitude of the response of covered species to habitat enhancement, restoration, and management techniques. Modifications also are likely to be needed to address the potential for altered future conditions that may result from climate change (e.g., change in the hydrology of Plan Area watersheds, temporal shifts in the wet season, change in wildfire risk). Consequently, adaptive management is a key element of Yolo NHP implementation that provides the Implementing Entity with the flexibility needed to modify Yolo NHP

1 implementation to address uncertainties as knowledge accumulates about ecological  
2 processes, natural communities, and covered species. As such, the adaptive management  
3 process provides the Implementing Entity with the ability to modify conservation  
4 measures, implementation techniques, and monitoring elements of the Conservation  
5 Strategy to improve their effectiveness. This new information will come from the results  
6 of the Yolo NHP monitoring and research and from relevant monitoring and research  
7 data collected by other entities.

8  
9 Elements of the Yolo NHP subject to adaptive management include all program aspects  
10 related to implementation of conservation measures and the monitoring plan. Elements  
11 of conservation measures subject to adaptive management include:

- 12       ▪ habitat restoration design and implementation methods;
- 13       ▪ habitat management tools and techniques;
- 14       ▪ changes to, elimination of, and addition of conservation measures;
- 15       ▪ shifting of funds among conservation measures; and
- 16       ▪ research and adaptive management experiments conducted to inform  
17       implementation.

18 Elements of the monitoring plan subject to adaptive management include:

- 19       ▪ the subjects of monitoring,
- 20       ▪ duration and scope of monitoring,
- 21       ▪ monitoring methods and metrics, and
- 22       ▪ analytical tools and methods.

23 Adaptive management decisions will be an important factor in the Implementing Entity’s  
24 annual and long-term budgeting and funding decision making. While this section defines  
25 and provides a framework for the major components of the adaptive management plan, it  
26 is expected that adaptive management will permeate the implementation of the Yolo NHP  
27 as part of the “culture” of the Implementing Entity to ensure that the best new scientific  
28 information will be used to improve the effectiveness of the Conservation Strategy over  
29 time.

### 31 **5.10.1 Adaptive Management Decision Making**

32 The basis for adaptive management decision making is the Implementing Entity’s  
33 analysis, synthesis, and review of Yolo NHP monitoring and research data (see Section  
34 5.9, *Monitoring and Research Plan*) and other relevant information developed by others  
35 (e.g., results of DFG and USFWS species monitoring). Yolo NHP implementation,  
36 monitoring, research, and adaptive management are all part of a feedback loop process  
37 that is illustrated in Figure 5.1. The adaptive management process will be administered  
38 by the Implementing Entity and will operate at two levels: project-level and plan-level  
39 adaptive management. The adaptive management decision making process for each level  
40 is illustrated in Figure 5.2. The decision making process describes how the Implementing

1 Entity will coordinate with the Permitting Agencies (i.e., DFG and USFWS) (Figure 5.2,  
2 Boxes 2, 4, 10, 11). Key decision points in the determination of an adaptive management  
3 response are at the project-level or the plan-level as defined below. Adaptive  
4 management roles and responsibilities among the Implementing Entity, the Permitting  
5 Agencies, and stakeholders are described in Chapter 7, *Implementation Structure*.

### 6 7 **5.8.1.1 Project-Level Adaptive Management**

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9 Project-level adaptive management provides for ongoing adjustments in the  
10 implementation of the conservation measures and adjustments to the monitoring program  
11 by the Implementing Entity. Project-level adaptive management responses include  
12 adjustments to techniques used to manage, enhance, and restore habitat.

13 Project-level adaptive management will not require participation or concurrence by the  
14 Permitting Agencies. Adjustments will be described in the Implementing Entity's annual  
15 report (see reporting requirements in Chapter 6, *Plan Implementation*) and the Permitting  
16 Agencies may provide input on those adjustments following review of the report. The  
17 Implementing Entity may coordinate with the Permitting Agencies at the project-level to  
18 better inform its adaptive management decision making.

19 Project-level adaptive decision making will apply to all aspects of implementing  
20 conservation measures that do not change the commitments described in the conservation  
21 measure and that do not increase costs beyond the level of funding appropriated for the  
22 conservation measure. For example, under the project-level adaptive management  
23 process, the Implementing Entity could modify methods for implementing a conservation  
24 measure based on new information that would improve its effectiveness. Changes by the  
25 Implementing Entity to the monitoring plan would include adjusting monitoring protocols  
26 to improve their effectiveness or to comply with new monitoring standards established by  
27 the Permitting Agencies (e.g., the establishment of new monitoring protocols for listed  
28 species). The purpose of the project-level adaptive management process is to provide for  
29 timely and effective implementation decision-making by the Implementing Entity.  
30

### 31 32 **5.8.1.2 Plan-Level Adaptive Management**

33  
34 Plan-level adaptive management provides for large adjustments to the Conservation  
35 Strategy, including:

- 36     ▪ revisions to conservation measures, including removal from the Conservation  
37         Strategy;
- 38     ▪ the addition of new conservation measures to the Conservation Strategy;
- 39     ▪ shifting of funds among conservation measures or other elements of the  
40         Conservation Strategy (i.e., adaptive management and monitoring);
- 41     ▪ and

- 1           ▪ major modifications to the monitoring plan, including discontinuing a monitoring  
2           effort, changing monitoring metrics, and adding new monitoring efforts.

3 All plan-level adaptive management changes will require input from and concurrence of  
4 the Permitting Agencies. Some plan-level adaptive management changes may require a  
5 Plan amendment to implement. Plan-level changes are not expected to be common over  
6 the term of the Yolo NHP, but the process provides the Implementing Entity with the  
7 flexibility to implement such changes if needed to ensure that the biological goals and  
8 objectives are achieved.

## 9 **5.8.2 Adaptive Management Decision Making**

10 The Yolo NHP adaptive management process is illustrated in Figure 5.3.

### 11 **Yolo NHP Objectives and the Knowledge Base**

12 The starting point for the adaptive management process are the hypotheses that underlie  
13 the biological goals and objectives and the conservation measures. These hypotheses are  
14 a reflection of the existing ecological knowledge base. The knowledge base is the totality  
15 of current scientific understanding of the ecological and biological processes and  
16 conditions of species and natural communities in the Planning Area (see large shaded box  
17 underlying the right side of Figure 5.3). The existing knowledge base supported the  
18 development of the Conservation Strategy, including the biological goals and objectives,  
19 conservation measures, conservation metrics and targets, and monitoring actions.  
20 Information and analysis derived through monitoring and research conducted under the  
21 Yolo NHP (see Section 5.9, *Monitoring and Research Plan*) and other programs will  
22 supplement and expand the knowledge base over the term of Yolo NHP implementation.

### 23 **Collect and Manage Data**

24 Critical to the adaptive management process is the collection and management of data (see  
25 Figure 5.3, Box 1) to assess conservation measure performance and the achievement of  
26 biological goals and objectives. Data collection and management will be conducted  
27 through monitoring and research (see Section 5.9, *Monitoring and Research Plan*)  
28 following the initial implementation of conservation measures. Monitoring requirements,  
29 metrics and targets for conservation measures and biological objectives are described in  
30 Section 5.9, *Monitoring and Research Plan*. In addition, results of research conducted  
31 under the Yolo NHP or by other entities will contribute to the knowledge base to support  
32 understanding of ecological cause and effect relationships. Monitoring data and research  
33 results will provide the Implementing Entity with information to help determine the  
34 effectiveness of conservation measures in providing benefits to species and habitats,  
35 including the effectiveness of habitat enhancement, restoration, and management actions.  
36 Decisions by the Implementing Entity to modify implementation of conservation measures  
37 will be guided by information gathered through the monitoring and research program and  
38 other research sources. The monitoring and research plan is designed to establish cause  
39 and effect relationships between implementation of specific conservation actions and the  
40 type and magnitude of species responses to those actions.

1 **Analyze Data, Assimilate Information, and Develop and Recommend Adjustments**  
2 **to Implementation.**

3 Collected data will be analyzed, synthesized, and evaluated to inform the Implementing  
4 Entity of the cause and effect relationships between conservation measures and ecological  
5 processes, covered species, and natural communities; the status of ecosystem conditions  
6 and covered species; and the effectiveness of the conservation measures and the monitoring  
7 program (Figure 5.3, Box 2). Information gained through the analysis may indicate the  
8 need to redefine hypotheses underlying biological objectives and conservation measures;  
9 refine, discontinue, or expand conservation measures; or develop and implement new  
10 conservation measures within limits set by the Yolo NHP and its regulatory authorizations.  
11 New data and analytical results will also be used to update models (e.g., conceptual,  
12 statistical, and process models) and other analytical tools that may be used to assess the  
13 performance of conservation measures in achieving the biological goals and objectives.  
14 Based on assimilation of new information, the Implementing Entity will formulate new  
15 approaches for implementation to improve their effectiveness in achieving the biological  
16 objectives (see Figure 5.3, Box 4).

17 **Follow a Decision Making Process**

18 The Implementing Entity will follow a defined decision-making process before making  
19 significant adaptive management changes (Figure 5.3, Box 5). This adaptive  
20 management decision making process is illustrated in Figure 5.2.

21 **Implement Modified Conservation Measures, Tools, Metrics, and Targets**

22 Outcomes of the adaptive management decision making process can include, within the  
23 limits set by authorizing permits, changes to conservation measures, monitoring program,  
24 analytical tools, metrics, and targets as indicated in Figure 5.3, Boxes 6-11.

25 **5.8.3 Internal Scientific Review and Implementation of Changes**

26 The Implementing Entity will establish an internal process of review by technical experts  
27 within the Implementing Entity or retained (e.g., biologists, restoration ecologists,  
28 physical scientists, habitat managers) to assess, on a regular basis, the adaptive  
29 management program, including the results of effectiveness monitoring, selection of  
30 research and adaptive management experiments, appropriateness of analytical tools and  
31 techniques, and relevance of new scientific information developed by others (e.g.,  
32 universities) to determine whether changes in the implementation of the conservation  
33 measures and the monitoring program would be desirable to improve effectiveness of the  
34 Yolo NHP in achieving biological goals and objectives (see Figure 5.2, Box 2a). The  
35 Implementing Entity may also request the assistance of the Permitting Agencies and  
36 knowledgeable outside scientists and experts in the review process (see Figure 5.2, Box  
37 2b).

38 Recommendations made through the internal science review process will be documented  
39 and will include a description of the recommended change in implementation; a  
40 description of the justification for the recommended change; an assessment of effects the  
41 change may have on other elements of Yolo NHP implementation, if any; and any other  
42 relevant information in support of the recommendation. Recommendations adopted by

1 the Implementing Entity will be described in the Implementing Entity’s annual work  
2 plan. The Implementing Entity will document the rationale for any rejection of adaptive  
3 management recommendations made through the internal science review process.

#### 4 **5.8.4 External Independent Scientific Review**

5 The Implementing Entity will from time to time seek additional science input on specific  
6 adaptive management-related issues. The Implementing Entity may convene, at its  
7 discretion, experts in selected topic areas that are not affiliated with the Implementing  
8 Entity, permit holders, or Permitting Agencies (see Figure 5.2, Box 2b).

#### 9 **5.8.5 Adaptive Management Actions**

10 [Text to come.]

11 [*Note to Reviewers: This section will describe how adaptive management actions will be*  
12 *conducted and the relationship of these actions to the monitoring and research plan.*]

#### 13 **5.8.6 Program Status Reviews**

14 [Text to come.]

15 [*Note to Reviewers: This section will describe program status reviews that may be*  
16 *conducted by the Implementing Entity at longer time intervals (e.g. 5-year). Status*  
17 *reviews would focus on review of technical elements of Yolo NHP implementation*  
18 *procedures (e.g., administrative reviews of the effectiveness of Implementing Entity*  
19 *processes and procedures, agreements with other parties, need for updates to guidance*  
20 *documents [e.g., monitoring protocols and plans], implementation infrastructure [e.g.,*  
21 *data bases, computer systems].) and species status reviews. Program status reviews*  
22 *provide for ongoing improvement in the Implementing Entity’s effectiveness by providing*  
23 *for periodic critical and methodical review of its implementation procedures. Changes in*  
24 *Yolo NHP implementation resulting from program status reviews would be implemented*  
25 *through the adaptive management decision making process.*]

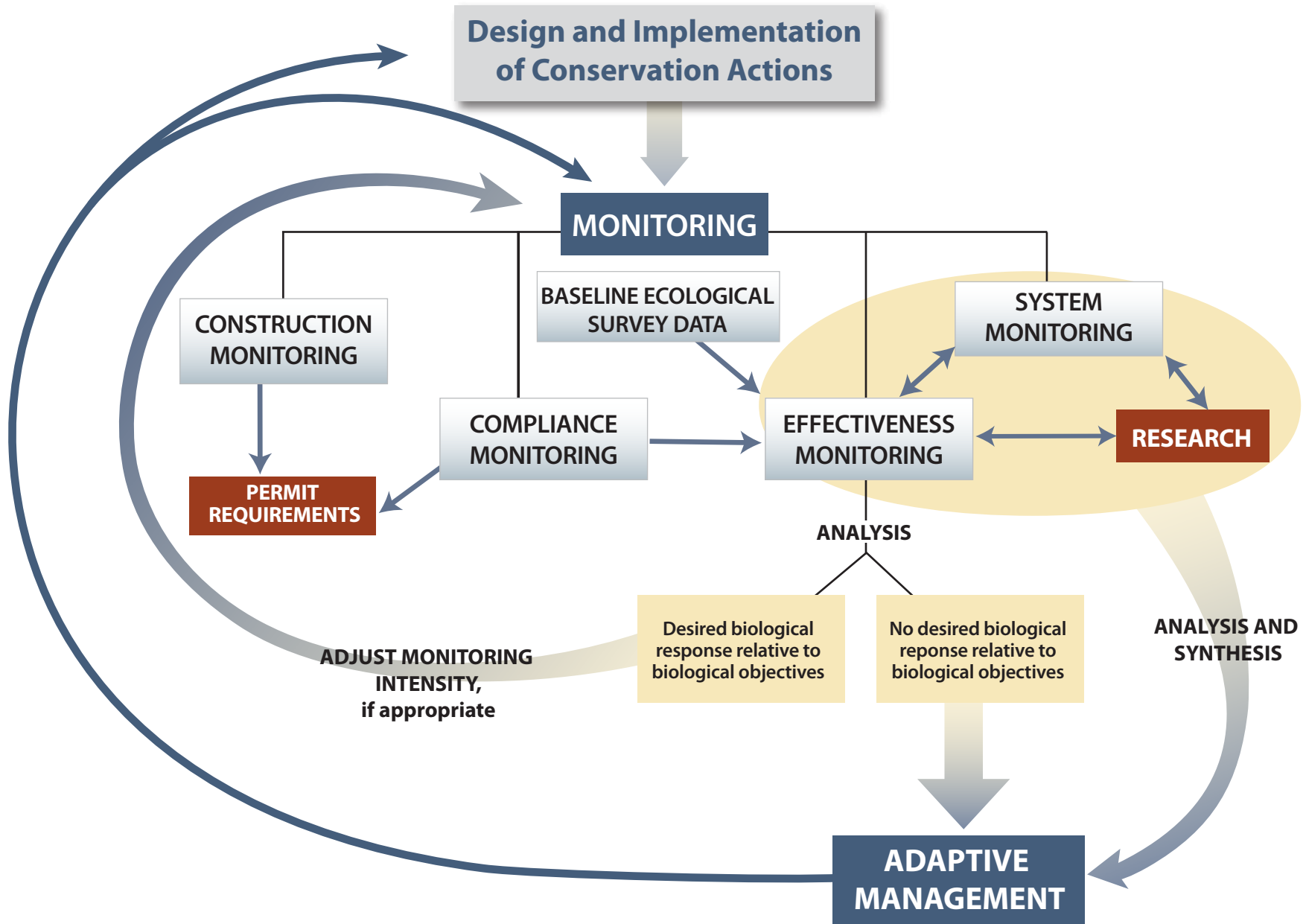
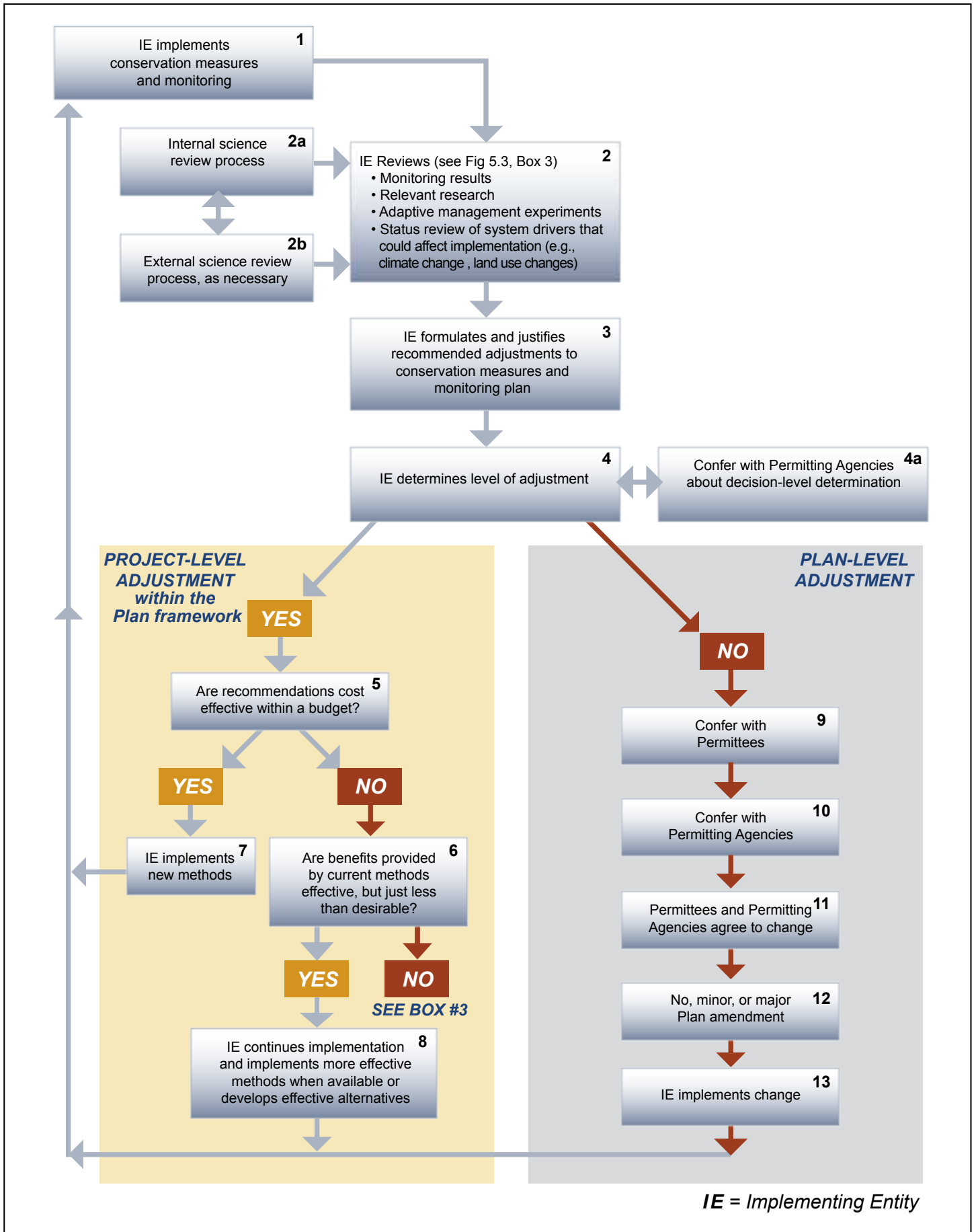
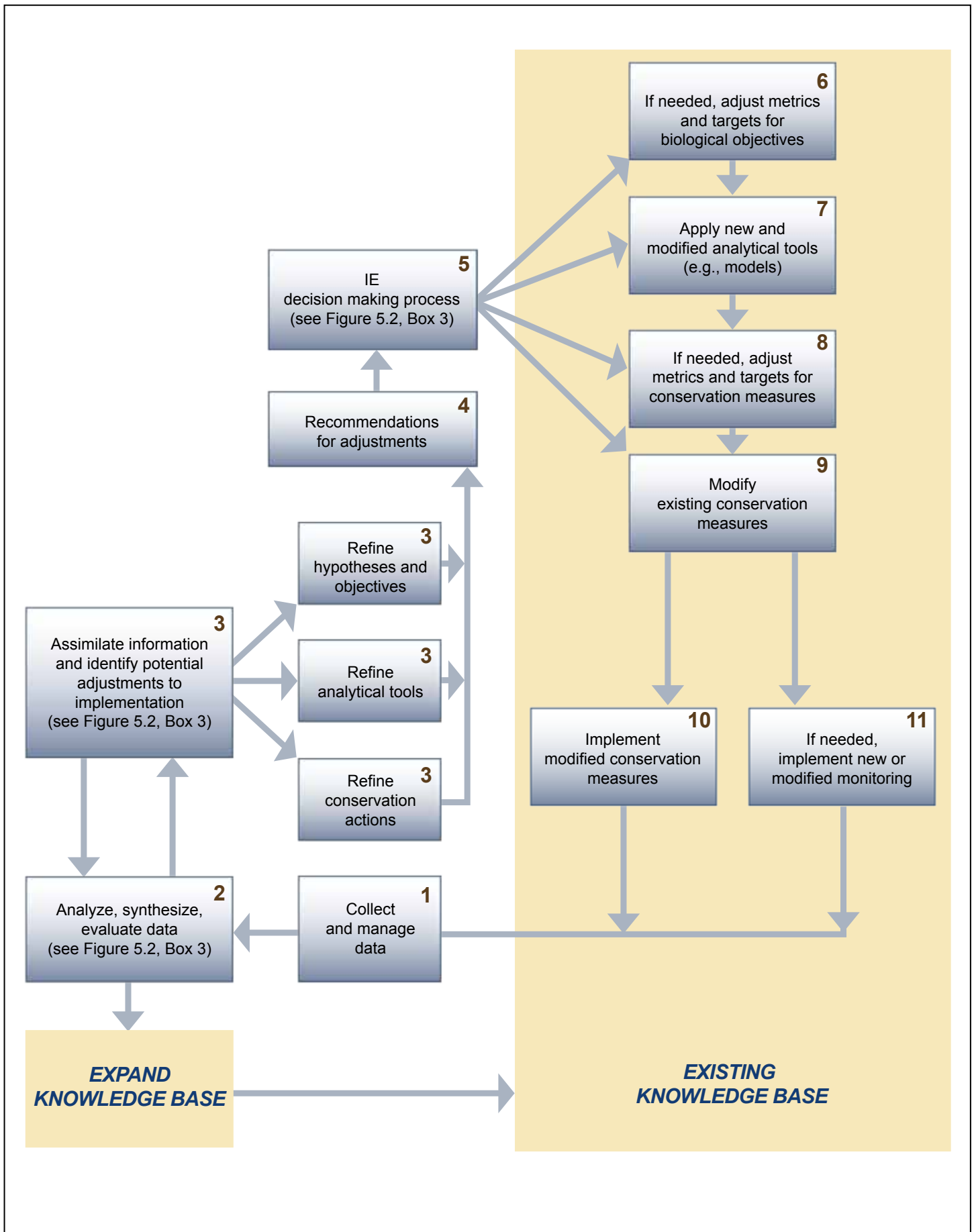


Figure 5.1 Yolo NHP Implementation, Monitoring, Research, and Adaptive Management Feedback Loop 07/06/10



**Figure 5.2 Adaptive Management Decision Making Process**



**Figure 5.3 Adaptive Management Process Framework**