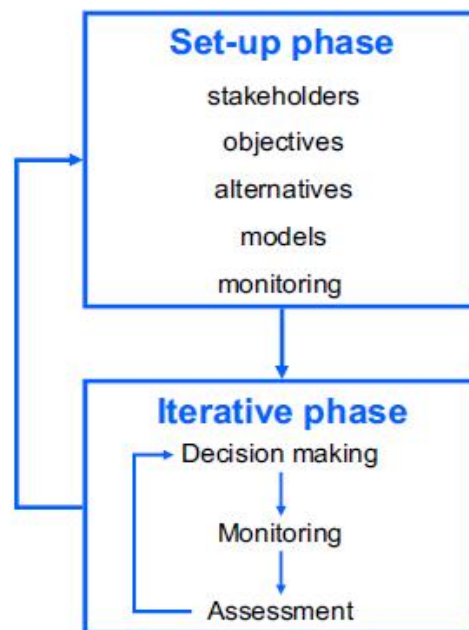


Adaptive Management discussion doc. (Evan Sawyer)

“Adaptive Management is a framework and flexible decision making process for ongoing knowledge acquisition, monitoring, and evaluation leading to continuous improvement in management planning and implementation of a project to achieve specified objectives” (California Water Code, section 85052). Adaptive management is a learning cycle and feedback loop that when applied to resource management decisions, resource managers may make management decisions while concurrently gathering further knowledge and information about a single resource or set of natural resources. Adaptive management is inherently collaborative, requiring *“communication and transparency among all interest groups as well as a willingness to overcome the institutional barriers to collaborative decision-making,”* (Luoma et al. 2015). Starting in the late 70’s a general framework for adaptive management has emerged as a structured decision-making process that incorporates uncertainty by recognizing there are different possible outcomes to management actions (Holling, 1978; Walters and Hilborn, 1978). Adaptive management then relies on flexible decision-making that is adapted according to the outcomes of management actions and other events and so as to incorporate increased understanding. How then do biologists incorporate the acknowledged uncertainty of resource management decisions into ESA Section 7 consultations? And what does an “Adaptive Management Program” provide to Section 7 Biologists in terms of understanding and certainty?

The Department of the Interior’s Adaptive Management: Applications Guide (Williams and Brown 2012) outlines a two-phase adaptive management process that could provide the necessary certainty regarding the outcomes (effects) of resource management decisions but this process relies on a considerable commitment of resources during the initial “set-up phase.” It appears, however, that in the 2019 OCAP Biological Assessment, Reclamation is focused on the second “iterative phase” presumably to retain decision-making authority without the need to confer with other agencies (?). The iterative phase described by Williams and Brown is more akin to real time operations and annual planning and would not incorporate a full adaptive management cycle (see figure from Williams, 2011 for “two phases”). Ultimately, the goal of any adaptive management program is to incrementally reduce uncertainty and management risks by learning more about how the target resource responds to the management regime being evaluated. The challenge becomes how to use the flexibility provided by an adaptive management approach in a way that balances gaining knowledge to improve future management decisions with achieving the best near-term outcome possible (Allan and Stankey, 2009).



If it is Reclamation’s desire to focus on the second, iterative phase of an adaptive management process, it must still be preceded by the first, set-up phase of the process. At a minimum (and according to Williams and Brown, 2012) Reclamation would need to provide a framing of the resource problem in terms of stakeholders, objectives, management alternatives, models, and monitoring protocols. Specifically, the following would need to be done for each programmatic and Adaptive Management project component/element:

Stakeholder involvement. It is important to have at least some stakeholder engagement in all the set-up elements of a project, and to continue that engagement throughout the project. Failure to engage important stakeholders,

and disagreement about how to frame a resource problem and identify its objectives and management alternatives, are common stumbling blocks. ***For ESA section 7 consultation a common/shared understanding (among agencies and stakeholders) of the resource issue at hand is important for trying to avoid future disagreements/conflicts, especially at critical times that require expeditious/efficient decision making (e.g. “Tier 4 years,” Drought etc.).***

Objectives. Successful implementation of adaptive management depends on a clear statement of project (or PA component) objectives. Objectives represent benchmarks against which to compare the potential effects of different management actions, and serve as measures to evaluate the effectiveness of management strategies. ***Defining objectives based on our current understanding of the biological needs of the species provides 1) a defensible justification for the management alternatives and 2) the biological rationale to measure/base success.***

Management alternatives. Adaptive decision making requires the clear identification of a set of potential alternatives from which to select an action at each decision point. Some actions might affect the resource directly; others might have indirect effects. Learning and decision making both depend on our ability to recognize differences in the consequences of different actions, which in turn offers the possibility of comparing and contrasting them in order to choose the best action. ***In the context of ESA, identifying the range of alternatives under consideration also provides the bounds (or sideboards) of the potential effect of the action based on our current (hopefully shared) understanding.***

Predictive models. Models play a critical role in adaptive management, as expressions of our understanding of the resource, as engines of ecological inference, and as indicators of the benefits, costs, and consequences of alternative management strategies. Importantly, they can represent uncertainty (or disagreement) about the resource system. Models are used to characterize resource changes over time, as the resource responds to fluctuating environmental conditions and management actions. ***The Windell et al. (2017) conceptual models included in the BA by offer a (scientifically justifiable) framework around which management decisions may be made and evaluated with regard to their effect on the species (Winter-run). In analyzing the effect of the PA in the face of management uncertainty (programmatic actions and range of alternatives) the conceptual life-cycle model provides a context for the potential effects of the management actions.***

Monitoring protocols. Monitoring provides the information needed for both learning and evaluation of management effectiveness. The value of monitoring in adaptive management is inherited from its contribution to decision making. To make monitoring useful, choices of what ecological attributes to monitor and how to monitor them (frequency, extent, intensity, etc.), must be linked closely to the management situation that motivates the monitoring in the first place, as well as practical limits on staff and funding. ***Clearly identifying the monitoring necessary to evaluate the effects of a management action, provides the assurance that those effects will be either limited to the expected range evaluated in the BA/BO, or if shown to exceed the expected range that an adequate response is prepared/considered.***

Alternatively, the steps of the “set-up” phase that are necessary for each of the Adaptive Management and/or programmatic components of the PA could be accomplished through a more generalized Adaptive Management Program. For instance, the first phase of the Adaptive Management Program for the California Water Fix and Current Biological Opinions on the Coordinated Operations of the Central Valley and State Water Projects (CWF AMP) covers the breadth of the “set-up” phase presented by Williams and Brown (2012). Furthermore, the CWF AMP provides the explicit synthesis of new or refined understanding in the third and fourth phases of “Integrate” and “Adapt” which is critical step that is somewhat understated in DOI’s Adaptive Management: Applications Guide (identified as “institutional learning”).