Chapter 9: HCP Conservation Strategy

9.0 Introduction

The conservation strategy of a habitat conservation plan is the foundation upon which the rest of the HCP is built. The conservation strategy defines what the HCP is trying to accomplish through biological goals, how the applicant will track progress through the monitoring program, and how the applicant will adjust implementation of the HCP through adaptive management and changed circumstances. The conservation strategy must be founded on the biological needs of species, a structured and logical approach to problem solving, forward thinking to anticipate future changes, and it must be developed to fit into the larger conservation context occurring around the HCP.

An applicant should consider the amount and degree of uncertainty in the HCP when developing goals, objectives, and conservation measures. For example, a complicated HCP with a high degree of uncertainty should have goals and objectives that account for that uncertainty while still being protective of species and meeting the issuance criteria. On the other hand, a simple and straightforward HCP, with little uncertainty, may not need to have in-depth goals and objectives, and may need to account for uncertainty to a much smaller degree, if at all.

Because of the dual nature of HCPs (providing both an avenue for activities that may impact species and an avenue to implement conservation of species) the applicant must consider how the proposed covered activities affect conservation. Applicants should consider adjusting the proposed covered activities to avoid as many impacts as possible, while those impacts that cannot be avoided should be minimized through best management practices, and consider other mitigation activities. In addition to offsetting the impacts of the taking, applicants should be encouraged to provide conservation actions that will contribute to the long-term conservation of the covered species. Ultimately, the applicant must develop a conservation program that includes both minimization and mitigation measures in a manner that fully offsets the impacts of the taking.

The November 3, 2015, Presidential memo regarding mitigation (80 FR 68743) (see the HCP Handbook Toolbox) sets goals for federal agencies "to leave America's natural resources in better condition than when we inherited them." To summarize the relevant practices that are addressed in the memo:

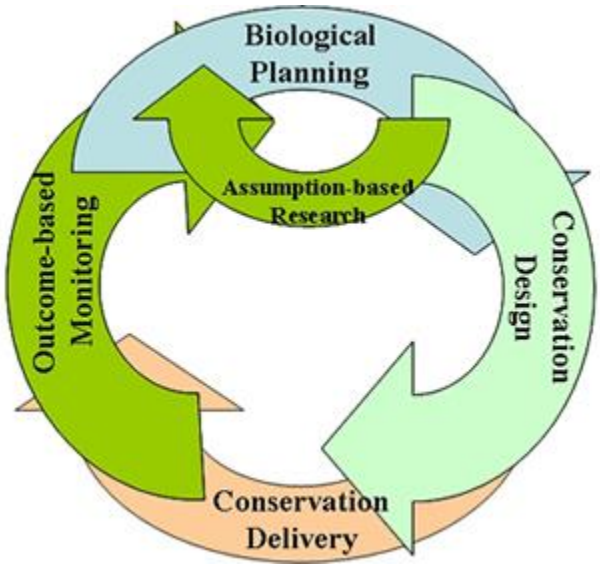
> "Section 1. Policy. It shall be the policy of the Departments of Defense, the Interior... to avoid and then minimize harmful effects to land, water, wildlife, and other ecological resources (natural resources) caused by land- or water-disturbing activities, and to ensure that any remaining harmful effects are effectively addressed, consistent with existing mission and legal authorities…
>
> Large-scale plans and analysis should inform the identification of areas where development may be most appropriate, where high natural resource values result in the best locations for protection and restoration, or where natural resource values are irreplaceable."
>
> Section 2. Definitions. For the purposes of this memorandum:
> (f) "Mitigation" means avoiding, minimizing, rectifying, reducing over time, and compensating for impacts on natural resources... These three actions are generally applied sequentially, and therefore compensatory measures should normally not be considered until after all appropriate and practicable avoidance and minimization measures have been considered.
>
> Section 3. Establishing Federal Principles for Mitigation.
> (b) Agencies' mitigation policies should establish a net benefit goal or, at a minimum, a no net loss goal for natural resources the agency manages that are important, scarce, or sensitive, or wherever doing so is consistent with agency mission and established natural resource objectives. When a resource's value is determined to be irreplaceable, the preferred means of achieving either of these goals is through avoidance, consistent with applicable legal authorities…"

The goal of every HCP should be to fully offset the impacts of take, and every HCP must minimize and mitigate the impacts of take to the maximum extent practicable. The HCP planning process can be used to develop plans that enhance connectivity and protect larger blocks of land that have value beyond the acres protected: these areas can be large enough to sustain species, and/or can connect areas needed to maintain genetic diversity and sustain metapopulation dynamics. For example, larger scale plans can provide a landscape scale conservation vision and programmatic approach which can confer a net benefit to conservation by their scale and strategic approach to conservation design. Likewise, small scale plans can contribute to larger conservation design by adding to existing protected land or by protecting key linkage areas.

The discussion on developing the conservation strategy of HCPs will be framed around the tenets of Strategic Habitat Conservation (SHC): a general approach to thoughtful conservation. The FWS adopted Strategic Habitat Conservation – a landscape-scale, collaboratively oriented framework in 2005. Strategic Habitat Conservation represents a strategic, accountable and adaptive approach to conservation. It starts by working at larger spatial and temporal scales, across programs and with our partners and stakeholders, in a more focused way that links our actions to outcomes, with learning as an explicit objective of our conservation actions (see the HCP Handbook Toolbox). As with SHC, keys to developing a successful conservation strategy are:

1. having an integrated framework to develop biological goals and objectives,
2. developing a monitoring framework to measure results,
3. developing an evaluation process to assess results, and
4. outlining a systematic learning process to use what will be learned to improve future decisions.

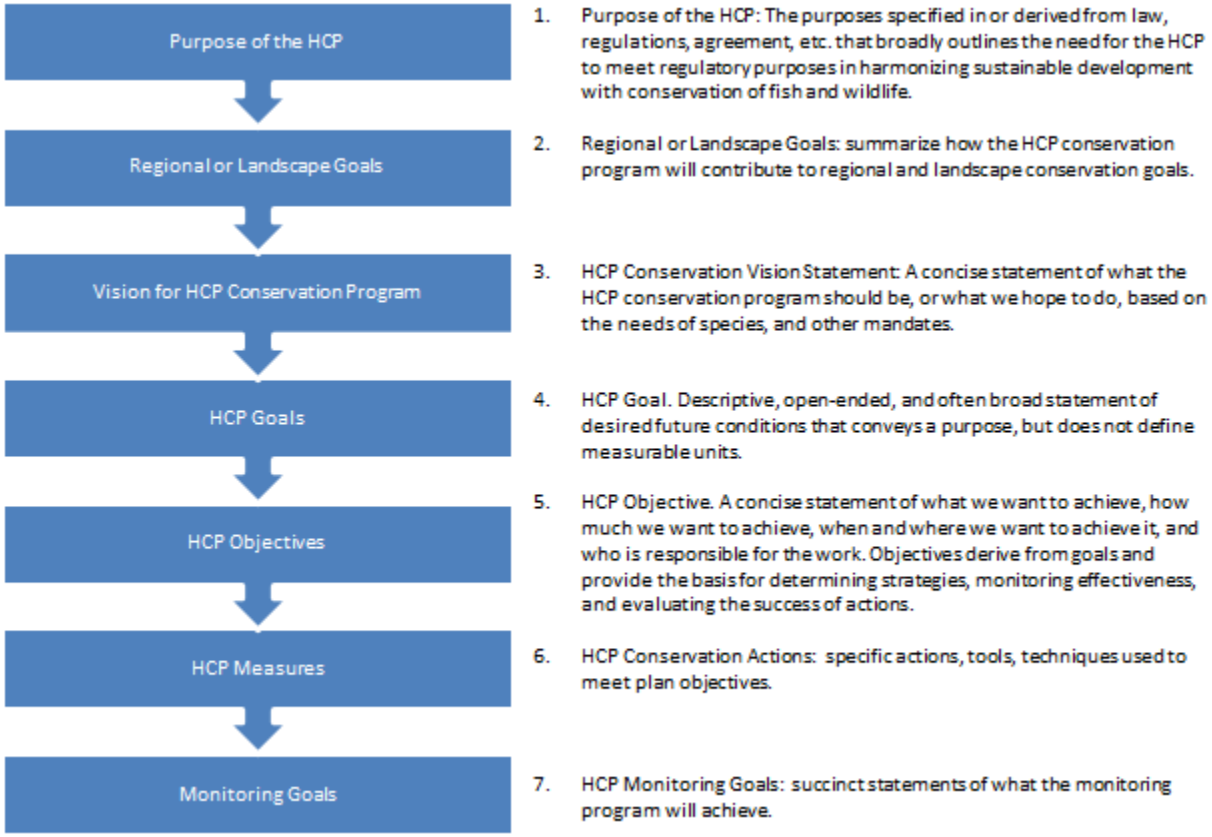
Figure 9.0a: Strategic Habitat Conservation



9.1 HCP Biological Goals

HCPs are but one conservation tool implementing conservation across different geographies at different sizes and scales. Development of the conservation strategy, including its goals, should be framed within this broader wildlife conservation context. HCP goals are built on the foundation of broader conservation efforts occurring at larger scales. Building upon the existing hierarchy of goals and purposes will improve conservation of species by allowing even modest implementation efforts to contribute to something bigger. See figure 9.1e.

Figure 9.1e: Hierarchy of Goals and Purposes



By framing HCP goals within the context of larger conservation efforts it should become clear how the HCP may:

- affect recovery of species,
- further progress on large scale planning efforts like Landscape Conservation Cooperatives (LCCs) and State Wildlife Action Plans,
- help build more resilience and adaptive capacity for species to withstand future climatic change,
- help protect large scale migration or movement corridors.

Helpful Hint: Consistent with agency policies and the use of the best available science, we integrate adaptation strategies for climate change effects into our planning, programs, and operations. As goals and objectives are developed we must ask if they are still attainable given the projected down-scaled effects of climate change in the HCP plan area. For example, the *Climate-Smart Conservation* guide calls for developing an initial set of goals through the lens of assessing climate impacts and vulnerability, and reviewing/revising conservation goals as needed. (See also section 9.3.2, below.)

Biological goals broadly describe the desired future conditions of an HCP in succinct statements. Each goal steps down to one or more objectives that define how to achieve these conditions in measurable terms. A well-written goal directs work toward achieving the vision and purpose of an HCP.

It takes careful thought to develop productive and meaningful goals, and it is a critical step. In a few concise statements, goals comprise the HCP's effort in pursuit of its vision and lay the foundation from which all conservation activities arise. Management activities result from goals, and not the other way around. Goals must be developed *before* developing objectives and conservation measures to orient management direction, both during plan development and throughout implementation.

Ideally, the applicant should develop HCP goals and objectives in close coordination with the Services as they are the foundation upon which the HCP is built. An excellent resource on developing goals and objectives is the FWS's document: "Writing Refuge Management Goals and Objectives: A Handbook" (see the HCP Handbook Toolbox).

Goals and objectives guide management actions taken for an HCP to meet its conservation vision. Well-developed goals and objectives are key in focusing actions to efficiently and effectively manage the landscape to achieve the desired condition and to ultimately conserve species.

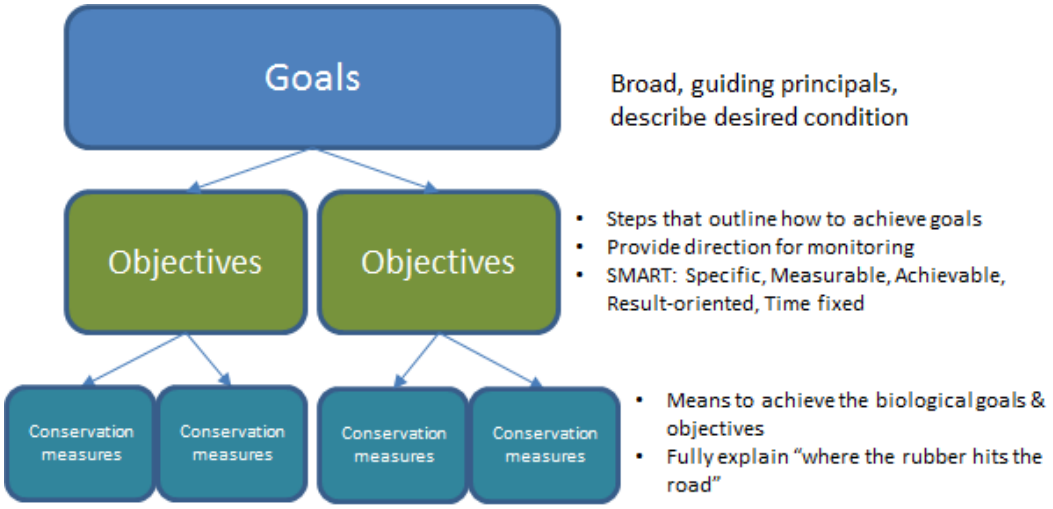
The first consideration when developing biological goals and objectives for an HCP is the scale of the plan. A biological goal for a small HCP (e.g., a single family residence) may be obvious (a well-known recovery plan objective) and simple – contributing to conservation. For example, a goal may be to contribute to the conservation of the covered species by either leaving and protecting (with a conservation easement in perpetuity) 8 acres of a 10-acre property in its natural state for the species or by purchasing the appropriate number of credits from a conservation bank before clearing and construction begins (objectives). Goals and objectives for a bigger HCP will likely require more consideration.

When developing biological goals and objectives, use existing conservation information to guide them, like: species recovery plans or outlines, 5 year status reviews, spotlight species actions plans, State Wildlife Action Plans, species status assessments, candidate conservation plans, and any other existing documents with conservation strategies for the covered species that are the best scientific information available. These plans often evaluate species' status and make recommendations about what it will take to get the population to a desired condition. To develop the most effective goals and objectives, relevant expertise (e.g., species experts, listing/recovery team members, climate change specialists, and State wildlife agencies) should be sought and included in their development.

The development of vision statements, goals, and objectives is iterative, and they may need to change during the HCP development process as the plan changes or as new information becomes available. However, it is critical that you initiate the process at the beginning and preserve the hierarchical nature of the relationship. It is important not to choose measures without objectives, develop objectives without goals, or establish goals without first articulating a vision for the HCP's conservation program. Building from the hierarchy of purpose and goals will allow you to

identify existing and future efforts that may need to be refocused or eliminated. Figure 9.1a shows the relationship between goals, objectives, and measures.

Figure 9.1a: Biological Goals and Objectives



9.1.1 Developing Useful Goals and Objectives

The applicant and the Services should collaborate to develop goals. These goals serve as the foundation of the conservation strategy and should be used to guide how the rest of the plan is developed and implemented.

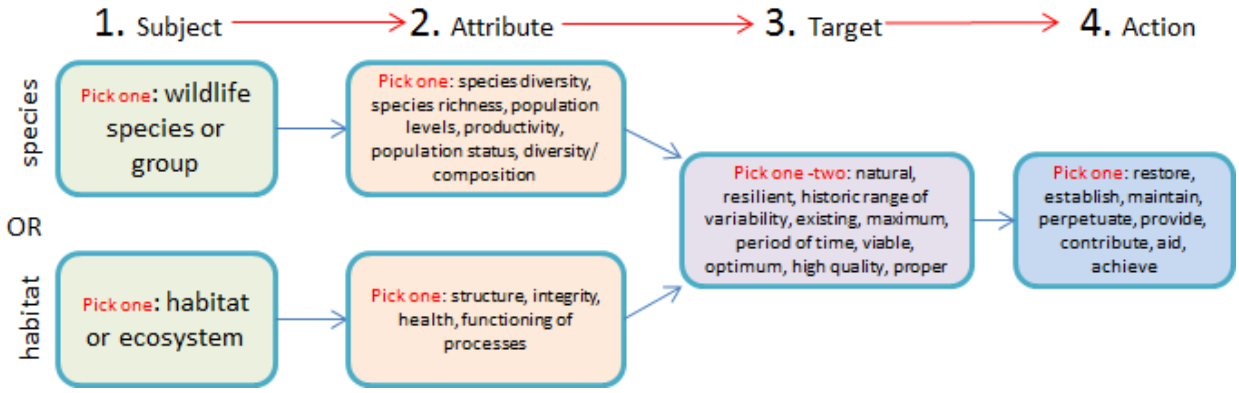
Goals must:

- broadly state desired future condition,
- be descriptive, and
- be clear and understandable to all, not just to those at the table developing them.

Figure 9.1b serves as a guide for developing and assessing biological goals. Each biological goal should contain these four elements:

1. the key **subject** of concern (e.g., a particular species or guild, a biotic community, or a habitat type);
2. the **attribute** of interest for that subject (e.g., population size, physical area covered, species composition);
3. the **target** or condition for the attribute (e.g., a number, period of time, historic condition). In selecting this, keep climate change effects in mind, since depending on the situation and timeframe for the HCP, it may or may not make sense for the target to involve the historic range of variability or existing conditions; and
4. the **action** or effort (e.g., restore, provide) that will be made to achieve the target.

Figure 9.1b: Four Elements of a Biological Goal



HCP goals should address the broad biological needs of the species. They can be focused on a number of species needs or reducing threats, such as:

- maintaining a specific species life history characteristic,
- providing conditions necessary for an important life history characteristic, or
- restoring something to historic or more desirable conditions, or establishing desirable conditions that facilitate transformation in response to effects of climate change or other stressors that cannot be addressed using traditional restoration approaches

All of these examples should be based on the specific needs of species in the plan area, but contribute to broader species needs.

These goals need to be forward thinking and "truthed" with a reasonableness of likely future climatic conditions. Depending on the local situation and time period covered, future-oriented goals can vary along a continuum from managing for persistence to managing for transformation, and shift over time from persistence to transformation. With climate change effects in mind, are the goals still achievable? If not, consider adjusting them to make them achievable with future climatic conditions in mind.

Example Goals:

Example goal 1: Bogus Bat: self-sustaining population of bogus bats in the preserve system that can withstand threats, is genetically representative of neighboring populations, and contributes to the overall recovery of the species.

Example goal 2: Swamp habitat: hydrologic integrity of the Mucky Swamp within the natural state of variability and function maintained within future climatic constraints.

9.1.1.1 Habitat-Based Goals vs. Species-Based Goals

HCPs that use habitat as a surrogate for species impacts can express conservation goals in terms of habitat area trends (objectives), but there must be an established correlation between species numbers, reproduction, and/or distribution and its habitat. In addition, there must be some way to reliably determine how effective the mitigation is for covered species.

For example: a species based goal might set specific population or life history targets for a covered species, such as percent of nestlings fledged or over-winter survival. In a habitat-based approach, the goal would be based on protecting, restoring, and establishing a specific type or amount of habitat for a covered species. In the case of the habitat based goal, the connection between habitat and covered species is really important to understand. Usually, protecting unoccupied habitat for a covered species does little for the species, however protecting a corridor that connects two important habitats can be important for the species' conservation.

Example habitat-based goal:

> Goal: Maintain and enhance functional grassland communities that benefit covered species and promote native biodiversity.
>
> Goal: Improve the quality of streams and the hydrologic and geomorphic processes that support them to maintain a functional aquatic and riparian community to benefit covered species and promote native biodiversity.
>
> Goal: Maintain a functional riparian forest and scrub community at a variety of successional stages and improve these communities to benefit covered species and promote native biodiversity.

Considerations for inclusion with or as goals:

- building in fire resiliency for an area and covered species affected by increased fire
- connectivity to important habitat or populations
- climatic refugia for climate sensitive species/habitats
- building in resilience to extreme changing conditions (e.g. vegetative buffers against storm surge, restoration to stabilize habitat prone to flooding, etc.)

Example species-based goal:

> Goal: Swainson's hawk: maintain or increase population size and distribution of Swainson's hawk in the inventory area
>
> Goal: foothill yellow-legged frog: protect, maintain, or increase populations of foothill yellow-legged frog

9.1.2 Responsibility for Developing Biological Goals and Objectives

Development of goals and objectives should be done jointly with the Services and the applicant. Field Office staff should be involved and engaged in the process to develop goals and objectives as the goals and objectives will be used to guide development of the entire plan.

9.1.3 When to Develop Goals and Objectives

Once the applicant and the Services have completed the 'Getting Started Questionnaire' or similar guiding document, they should start developing the hierarchy of goals and purposes. Maintaining the order of the hierarchy is important in building a strong foundation for the HCP.

9.1.4 Number of Biological Goals

There must be sufficient specificity in the articulated goals to guide the conservation strategy development and implementation. In some cases, goals will be needed for each covered species. In other cases, groups of covered species can fall under the umbrella of a single goal. Each plan will be different.

9.2 Biological Objectives

Objectives are the incremental steps taken to achieve a goal. Objectives are derived from goals, and they provide a foundation for determining conservation measures, monitoring direction, and evaluating effectiveness of the conservation strategy. The number of objectives per goal will vary, but there should be enough to adequately describe how to achieve the goal. An implementation schedule may be beneficial if a goal has several objectives.

9.2.1 SMART

SMART is an important acronym for reminding us of the essential elements of a good objective. Objectives need to be:

- **S**pecific
- **M**easurable
- **A**chievable
- **R**esult-oriented
- **T**ime-fixed

Specific: Objectives must clearly articulate what is to be achieved. Avoid ambiguity by phrasing objectives clearly. A clearly phrased objective is easy to understand and the meaning is difficult to misinterpret. Be as specific as possible. WHO will do the action? WHAT will they do? WHEN and WHERE will they do it? Avoid phrases that are subject to interpretation, like "maintain high-quality habitat." "High-quality habitat" can be interpreted in many ways.

Measurable: Objectives should contain a measurable element that we can readily monitor to determine success or failure. First ask, "What would we monitor to assess progress toward achieving this objective?" Then ask, "How do we quantify it?" For example, to determine progress toward "high-quality habitat," identify what defines "high quality." That may mean having certain plant community composition, vegetative structure and density. Then to further define "high quality habitat," quantify each component. In this example, you might list the desired proportion of each plant species, the height of a plant type, and number of individuals in a specified unit of area. The nature of the measurable element may vary, as might the difficulty in measuring it. Still, you must have something to indicate progress. While evaluating a water

depth objective may only require gauge readings, monitoring a component of vegetative structure may require systematic surveys of vegetation density or composition.

Achievable: Objectives must be achievable. If you cannot determine how to achieve an objective, you must discard or rewrite it. Do not ask more of the land or wildlife than it can deliver, and use sound professional judgment to develop reasonable expectations of time, staff, and funds available to pursue the objective. Goal and objective development should be based on biological needs for meeting the permit issuance criteria and insulated from other pressures.

Result-oriented: Objectives should specify an end result. For example, a habitat objective that is result-oriented will provide a detailed description of the desired habitat conditions expected. We should be able to envision the result of achieving the objective.

Time-fixed: Objectives should indicate the time period during which they will be achieved, and not to be open-ended. It is acceptable to include a range of completion dates to provide some degree of flexibility. Consider developing an implementation schedule for objectives or strategies, perhaps in 5-year increments.

The development of conceptual models to lay out hypotheses for how the ecosystem works and what the relationship is between species and threats can be extremely helpful in linking objectives to species needs. See Table 9.3a below for examples.

Examples of objectives:

Example goal 1: Bogus Bat: self-sustaining population of bogus bats in the preserve system that can withstand threats, is genetically representative of neighboring populations, and contributes to the overall recovery of the species.

> *Objective 1*: Preserve 50% of hibernacula and all maternity roosts of the bogus bat, in the plan area during the permit term
> *Objective 2*: Enhance roosting habitat by protecting and restoring any abandoned mine, cave, or building in the Preserve System and, if feasible, creating 5 artificial hibernacula during the permit term.

Example goal 2: Swamp habitat: hydrologic integrity of the Mucky Swamp within the natural state of variability and function maintained within future climatic constraints.

> *Objective 1*: preserve all area within 2500 feet of the 1900 high water line of Mucky swamp within 10 years of permit issuance through conservation easements and acquisition in fee title.
> *Objective 2*: restore historic contours and elevations of Mucky swamp to increase retention and infill of sediment within 3 years of land preservation.
> *Objective 3*: restore vegetation to historical conditions on preserved lands to increase infill into the Mucky Swamp from Stinky Creek and Curvey Creek within 20 years of permit issuance.

9.2.2 Considering Climate Change Effects in the Development of Goals and Objectives

It is important to consider climate change effects while developing biological goals; an excellent resource is *Climate-Smart Conservation: Putting Adaptation Principles into Practice,* (see the HCP Handbook Toolbox).

There are different ways climate change may affect the process of developing goals and objectives, but the key is to make sure the goals and objectives are evaluated with the effects of climate change in mind. The approach taken will vary depending on local conditions, the geographic scope and time period covered by an HCP, and the nature and extent of projected climate change and related impacts in relation to the climate sensitivity of the species and its habitat. The ways that climate changes and related effects can interact with other stressors (e.g., habitat fragmentation, spread of invasive species, risk of wildfire) also may be important in some situations (Chapter 8.2.1). Rely on the best available science on the likely impacts and responses of species and habitat to effects of climate change. If such science is lacking, consider resources that are available to conduct assessments necessary to help make better decisions about selecting goals and objectives.

Consider asking questions like the ones below during the development of goals and objectives:

- How might effects of climate change affect the likelihood of success in achieving goals and objectives? Are they achievable with such effects in mind?
- Are there already assessments of climate change effects, or climate change projections associated with the species, habitats, or communities affected by the HCP?
- What can be done to increase the likelihood of success given the expected effects of climate changes?
- Are the goals and objectives forward thinking in that they anticipate changing conditions?
- Which management tools may be affected by climate change? Are they all still appropriate with the expected effects of climate change?

The absence of detailed, climate change specific information on climate change is not a sufficient reason to ignore consideration of potential effects of climate change. Available information is usually sufficient to at least start evaluating whether or how species and habitat are sensitive to climatic variables. For example, a covered trout species that relies on cold water for many stages of its life cycle may be in an area where unsuitably warmer water temperatures are expected; this could lead to an objective for managing streamside conditions that will help retain suitable water temperatures.

9.3 Conservation Measures

Conservation measures describe the specific actions that the permittee will implement to achieve the objectives in support of the HCPs goals. There may be multiple conservation measures associated with each objective. Conservation measures can be any of the avoidance, minimization, or mitigation actions taken to meet the goals and objectives of the HCP.

Conservation measures can take many forms, but in all cases must be based on the biological needs of covered species. HCPs often combine these measures to meet the needs of species. Conservation measures implemented in HCPs usually take one of the following forms:

- avoiding the impact through project design
- minimizing the impact through best management practices
- minimizing the impacts of the taking by reducing or eliminating other threats
- mitigating (offsetting) impacts, by:
    a. restoration of degraded habitat
    b. enhancement of functional habitat
    c. preservation of habitat
    d. creation of new habitat
    e. translocating or repatriating species

9.3.1 Avoidance

Avoidance of take of individuals or habitat is an important component of HCPs. Avoidance generally occurs by siting and designing the project in a way that avoids impacts to covered species. Avoidance should be the first step in minimizing project impacts on covered species. In some instances, it may be possible to avoid all project impacts so there is no need to develop an HCP. Conducting surveys prior to implementation of a covered activity helps to determine where the species or important habitat elements occur. These surveys provide valuable information so implementation of covered activities can be modified to avoid or minimize effects that could not have been done without the survey information.

Examples of avoidance measures include:

Seasonal Restrictions: If the species or important habitat elements are present, the applicant may restrict covered activities during specific times of year to minimize impacts to individuals or habitat elements. Such seasonal restrictions may occur during courtship, nesting, fledging, dispersal, or migration periods. Restrictions may also minimize impacts to forage resources, such as during the blooming or fruiting period of an important food source.

Reduction of the Extent of the Covered Activity: An applicant may reduce the extent of the covered activity to avoid the effects of the activity. For example, reducing the density of development, or not developing a portion of the project that contains an important habitat element may avoid the impacts of the taking from that project.

9.3.2 Minimization

Minimization measures are actions that will reduce the impacts of the taking that have been identified during the development of the HCP.

Examples of minimization measures include:

Establishment of Buffer Zones: Applicants may minimize impacts from covered activities by establishing adequate buffers around occupied areas (e.g., nest sites, dens, riparian areas, etc.) or around important habitat elements (e.g., caves, burrows, cavities, limited forage resources, etc).

Maintenance of Habitat Connectivity: If a covered activity is proposed in or adjacent to large areas of important species habitat and the proposed activity would increase fragmentation of that habitat, the maintenance of habitat linkages is important to facilitate the use and movement of individuals moving between populations. Movement of individuals between populations will help preserve genetic diversity. Also, since individuals of many species adjust their geographic ranges to track shifting areas of climatic suitability (culminating in range shifts for the species as a whole), providing habitat connectivity with climate corridors in mind may be an important consideration for some HCPs.

9.3.3 Mitigation

Mitigation measures in the HCP must be based on the biological needs of covered species and should be designed to offset the impacts of the take from the covered activities to the maximum extent practicable. Some of the major categories of mitigation measures frequently found in HCPs are:

- restoration of degraded habitat to natural condition/function, or to a condition likely to be resilient to projected changes (e.g., in response to ongoing and projected climate change effects)
- land preservation (e.g., buy and protect, place conservation easements on land) of areas threatened by development
- enhancement of habitat (e.g., increase specific function of habitat)
- creation of new habitat or new populations
- threat reduction or elimination (e.g., management of non- native species)
- translocation of affected individuals or family groups to establish new or augment existing populations
- repatriation of species (or important resources) to formerly occupied and still suitable or enhanced habitat

These measures are often combined to meet biological goals.

When thinking about offsetting the impacts of the taking, the duration of the outcome of the mitigation measures should be considered. The necessary duration of the mitigation outcome should be based on the biological value of what is lost. There are a couple considerations:

- If habitat will be permanently lost, alternative habitat must be protected in perpetuity to offset the loss and the appropriate habitat conditions at the mitigation site must be maintained in perpetuity.
- If the temporary loss of habitat has long-term consequences to the species that uses that habitat, then the mitigation must account for the long-term consequences. Some species

are more susceptible to temporal impacts, which must be accounted for in the plan. In this case, additional or permanent mitigation may be required to offset impacts.

9.3.3.1 Restoration of Degraded Habitat

Restoration is focused on returning habitat to its natural or historic state. Restoration may be re-establishment of a former resource or improvement of a degraded resource to natural and/or historic structure and function. Restoration goals and objectives may need considerations for maintaining the desired functional state through projected effects of climate change, even though it may involve different habitat components (e.g., different composition of plant species) than were present in the past. Restored habitat should be protected through legal mechanisms discussed below in 9.4.3.2 Land Preservation.

9.3.3.2 Land Preservation

Land preservation is a mechanism for preventing the impacts of development threats to covered species and their habitats on a particular property. If the preserved number of acres is the same as the impacted acres, it does not result in a net gain in acreage, but protects what is already occupied and functional (unless other management actions will increase conservation value of the land preserved). Typically, land preservation in HCPs takes three forms:

- land set-asides within the permit/HCP area that are protected and managed for the species' benefit, followed by recording a conservation easement on that portion of the permit area;
- purchase of land specifically for HCP conservation, followed by recording a permanent conservation easement on that land and permanent management for the species' benefit, and
- permanent conservation easements placed on lands not owned by the permittee, but through the easement, the landowner agrees to manage the land for the purposes of conservation.

To manage and monitor the land being preserved, funds are needed to ensure they maintain their biological value. Preserved lands should either have their own management plans or follow the HCP if it is specific enough.

Applicants must ensure sufficient control of the land to achieve mitigation objectives. The land preservation tool is important in making sure those objectives are met. To express this, consider all the resources in the area: access rights, mineral rights, hunting rights, water rights, cropping rights, etc. Which resources need to be protected to ensure that HCP goals and objectives will be met? If water quality is critical to the success of the mitigation project, yet acquisition of the mitigation property would have little effect on the quality of water entering the property (e.g., from the neighboring land), then the applicant should acquire enough of an interest in the neighboring land to safeguard the quality of water entering the mitigation land. Are there existing easements that could affect a conservation easement or the ability to protect wildlife? If there are existing easements that will affect conservation, the applicant may need to conduct some alternate form of mitigation to offset their impacts.

If a land preservation tool does not achieve mitigation objectives, then the land cannot be credited toward meeting mitigation obligations until it meets the stated purpose. Even if the land is sufficiently protected from development threats, it must be managed in a way that is compatible with the mitigation objectives per the HCP in order to count toward meeting the stated purpose.

When developing a conservation easement, make sure to:

- build in flexible management options that can change through time to continue to meet species needs;
- include access for monitoring in the easement. Right of access means Services staff, or other persons we designate, evaluate whether easement restrictions are being adhered to (50 CFR 13.47);
- right to enforce easement restrictions by the appropriate parties;
- have legal counsel/solicitor help develop and review the conservation easement;
- start with the correct State-specific conservation easement template;
- ensure that the easement is granted only to an entity allowed under State law to hold conservation easements;
- accurately delineate in the field all conservation easement boundaries and provide a legal description;
- list allowable actions on the property;
- list prohibited actions that would be incompatible with the mitigation property's primary function as habitat for species.
- If sub-surface mineral rights are severed, it is preferable that the surface property owner negotiates a purchase of the mineral rights, or surface access to the minerals. If purchase of the mineral rights are not feasible, and the mineral rights owner has access to the surface, obtain a minerals assessment report ("remoteness letter") to determine the likelihood of minerals development before determining whether an easement on the property would be acceptable for mitigation
- Identify ITP in the easement document as the legal basis for the conservation easement.

9.3.3.3 Creation of New Habitat

Sometimes creation of new habitat is the most biologically appropriate way to offset the impacts of the taking from covered activities. Creation of new habitat is intended to develop a population or habitat condition that did not previously exist on a site. Creation of new habitat can result in a net gain in population or acreage. Creation involves the conversion of an area into useful and beneficial habitat that did not previously exist. This approach may be particularly appropriate as a climate change adaptation measure for areas where habitat transformation already is beginning or is likely to occur due to climate change effects. For example, in some situations it may be biologically appropriate to facilitate transformation to shrublands by replanting with scrub plants rather than trees in response to increasing temperatures drought condition. Another example is establishing new wetland or estuary habitat in coastal areas, slightly inland of current habitat that is becoming submerged or eroded due to sea level rise and storm surge impacts.

9.3.3.4 Habitat Enhancement

Habitat enhancement usually involves manipulation of the physical, chemical, or biological characteristics of a resource and is intended to increase or improve specific habitat functions. Manipulating one component of an ecosystem will sometimes cause other components of the ecosystem to change: care is needed to understand how the ecosystem will change.

9.3.3.5 Threat Reduction or Elimination

This option includes removal or reduction of threats to improve the health of the system or reduce direct effects on covered species. Non- native species may be the primary driver of population declines for certain species. In these situations non-native removal can be an extremely important part of the conservation strategy. Conceptual models (discussed in depth in Chapter 10) can be used to help identify conservation measures to implement as part of the conservation strategy. Threat reduction could also include: managing land to prevent certain uses, protection of a historic hydrologic regime, fire management prescriptions, predator control, resilience to increased drought, etc.

9.3.3.6 Translocation

Impacts to certain species can be mitigated by removing the affected individuals from a project area and placing them into suitable protected habitat that has been enhanced or restored, as long as that habitat is unoccupied, or under-utilized by the covered species. In the case of gopher and desert tortoises, for example, the affected individuals are excavated and moved. In the case of red-cockaded woodpeckers, fledgling young are removed once a year during a certain period and moved to a new location so that a new nesting territory is established. In light of some climate change effects, there are a number of conservation programs considering “assisted migration” which involves moving individuals to cope with the effects of climate change. However, note that not all species can be successfully translocated. Moving animals is a tool with many implications and should be used sparingly.

9.3.3.7 Repatriation

If a species has been extirpated from an area, a permittee may work with the Services and State wildlife agencies to reintroduce them if the habitat is still suitable, or suitability has been restored and is expected to remain suitable.

9.3.4 Putting Goals, Objectives, and Conservation Measures Together

Well-written goals, objectives, and conservation measures should flow from general to specific and should ultimately provide a clear vision for conserving species. The culmination of this hierarchy is the conservation measures that will lay out the actions needed to meet the objectives. See Table 9.4a where we continue the example used previously.

Example goal 1: Bogus Bat: self-sustaining population of bogus bats in the preserve system that can withstand threats, is genetically representative of neighboring populations, and contributes to the overall recovery of the species.

Objective 1: Preserve 50% of hibernacula and all maternity roosts of the bogus bat, in the plan area during the permit term

Measure 1: acquire property x, y, z following the HCP conservation implementation schedule

Measure 2: place conservation easements on property a,b,c following the HCP conservation implementation schedule

Objective 2: Enhance or restore roosting habitat in abandoned mines, caves, trees, or building in the Preserve System and, if possible, create artificial hibernacula

Measure 1: enhance sites 1, 2, 3 by improving vegetative sheltering or by modifying lighting at existing structures to improve roosting habitat to naturally functioning levels

Measure 2: create artificial habitat at sites 4, 5, 6 to increase the quantity of hibernacula sites

Example goal 2: Swamp habitat: hydrologic integrity of the Mucky Swamp within the natural state of variability and function maintained within future climatic constraints.

Objective 1: preserve all area within 2500 feet of the 1900 high water line of Mucky swamp within 10 years of permit issuance

Measure 1: acquire property x, y, z following the HCP conservation implementation schedule

Measure 2: place conservation easements on property a,b,c following the HCP conservation implementation schedule

Objective 2: restore historic contours and elevations of Mucky swamp to increase retention and infill within 3 years of land preservation

Measure 1: using mechanical means, regrade and resurface the contours and elevation of mucky swamp to match historic elevation data

Objective 3: restore vegetation on preserved lands to increase infill into the Mucky Swamp from Stinky Creek and Curvy Creek within 20 years of permit issuance.

Measure 1: with the assistance of botanists, revegetate the preserved area around mucky swamp to match historic density and diversity of appropriate plants, shrubs, and trees to stabilize soils and restore hydrologic condition to historic levels

How complex the plan is will dictate how many and how detailed the goals/objectives/measures hierarchy needs to be.

9.3.5 How Much Minimization Compared to Mitigation?

The applicant decides during the HCP development phase what conservation measures to include in the HCP, often in light of discussions with and recommendations from the Services. In many cases, the Services recommend following a sequential approach where the initial effort should be to determine whether impacts of the proposed project can be avoided, then minimize unavoidable impacts, and finally mitigate for the remaining impacts. Based on the specific project details, and in concert with the biological needs of the affected species, the conservation program should include an appropriate level of minimization and mitigation to achieve the best biological outcome for the covered species. Often, minimization provides the best biological outcome for the covered species, particularly when the impacts of take pose a significant risk to the species status and probability of offsetting those impacts is low. For example: for projects that will result in mortality of long-lived species with low recruitment potential to the population, minimizing take to the maximum extent practicable may be most appropriate.

However, there are also circumstances where mitigation with little or no minimization may provide more of a benefit to the species, as when a small-scale HCP for a single family residence may have few if any opportunities to provide minimization measures that will provide a practical benefit to the covered species, so participating in a larger-scale mitigation program, such as a conservation bank may be preferable. A clear tipping point of whether more minimization is warranted versus more mitigation is warranted is when additional minimization measures offer only diminishing (insubstantial) returns in addressing the impacts of the take. In which case, the conservation strategy would turn to mitigation to offset the remaining impacts of the taking. If the benefits of the mitigation measures are uncertain or cannot be demonstrated to offset the impacts, then additional minimization measures may be warranted to further reduce the impacts of the take. In summary, to meet the issuance criterion, the applicant must develop a conservation program that includes both minimization and mitigation measures in a manner that offsets the impacts of the taking to the maximum extent practicable.

9.4 Mitigation Implementation

Who does the mitigation? There are a few general ways responsibility for mitigation implementation can be approached:

- permittee-implemented mitigation or permittee responsible mitigation,
- conservation banks, or
- in-lieu fee mitigation.

In each of these, the permittee is responsible for meeting issuance criteria, which includes insuring impacts of the taking are offset through implementation of mitigation.

9.4.1 Permittee-Implemented Mitigation

The applicant may use their own contractors, funding, and long-term management to provide mitigation to offset incidental take. The permittee is responsible for the completion and success of the required compensatory mitigation. Permittee-implemented mitigation may provide the applicant with a management or economic advantage (e.g., could be less expensive than other

options). Examples include an applicant hiring a vendor to take measures to augment populations (i.e., to replace lost recruitment), or an applicant acquiring and directly managing land for the benefit of covered species and to offset their impacts.

9.4.2 Conservation Banks

Conservation banks are sites, or suite of sites, established under a conservation bank instrument, approved by the Services, that are conserved and managed to provide ecological functions and services expressed as credits for specified ESA listed species, candidates for listing, or other at-risk species. Conservation banks restore, create, and enhance habitat and place land use protections on it, so the biological value is protected in perpetuity. Standards and requirements are species-specific, but generally the habitat:

- is of high quality,
- is occupied,
- excludes developed areas or other areas that cannot be restored,
- restricts activities that would interfere with the function of the habitat for the species the bank was created for, and
- is buffered from outside influences so the bank maintains ecological integrity.

Credits are based defined units representing the accrual or attainment of ecological functions and/or services at the bank site (e.g., one credit for each acre of high quality habitat occupied by the species) and released as the bank site meets the performance criteria. Permittees may purchase the credits from the bank sponsor, with Services approval, to offset impacts of their actions covered by an incidental take permit. Often additional land is included within the bank's boundary that is not credited when the bank is established, but may be credited after restoration when habitat becomes suitable.

Conservation banks function to offset adverse impacts to a species that occurred elsewhere, sometimes referred to as off-site mitigation. Developers or other project proponents who need to compensate for the adverse impacts their projects have on species may purchase a designated number of credits from conservation bank owners to mitigate their impacts, depending on the conservation strategy for the species and mitigation ratios.

To approve an applicant's purchase of credits from a bank, we must determine that the bank's management plan, management assurances, monitoring, and adaptive management measures will meet the HCP's conservation standards. Conversely, if there is an existing bank in an area where an HCP is being developed, the HCP should strive to meet the same conservation standards and approach to conservation as the bank. In accordance with Department of Interior policy (600 DM 6.7) (see the HCP Handbook Toolbox) all mechanisms for compensatory mitigation (e.g., conservation banks, in-lieu fee programs, permittee-responsible mitigation) used to offset unavoidable impacts should be held to high and equivalent standards.

A bank's service area that encompasses the HCP's plan area will allow the bank to serve the biological goals of the HCP. It may be helpful to look at the bank's established management plan and evaluate its measures as if they had been written into the applicant's HCP. In a typical applicant-banker transaction, the bank operator and bank property owner assumes the ongoing

conservation obligations on behalf of the applicant. Once an applicant receives an incidental take permit and closes a sales contract with a banker, we will, assuming all mitigation is handled through a conservation bank, oversee the banker rather than the permittee to ensure the bank is maintained and to coordinate circumstances that may change.

As the Services advise applicants developing programmatic HCPs, we should tell the applicant about any existing conservation banks in the HCP's plan area and encourage them to consider purchasing credits from the banks into their HCP's mitigation strategy. An applicant for a programmatic HCP could choose to use banks as one of several mitigation options; they might "buy out" the bank for their own use, or HCP applicants might choose to develop their own conservation areas. Programmatic HCPs can complement conservation banks because they facilitate individual landowner incidental take authority via certificates of inclusion. We should encourage a complementary, cooperative relationship between applicants and bankers. The Services encourages development and use of conservation banks as effective mitigation mechanisms, and bankers rely upon the technical support of the Services when they make the investment to establish a bank that satisfies our conservation banking standards. However, Applicants for incidental take permits are not obligated to use conservation banks if they can otherwise satisfy issuance criteria. While an applicant decides whether or not to use a conservation bank in their HCP, the Services' role is to assist them in making a well-informed decision. Conservation banks are just one option that they can use to meet their mitigation needs.

There may be combined Clean Water Act mitigation banks and ESA conservation banks jointly approved by the US Army Corps of Engineers and the FWS in areas where HCPs are proposed. Wetland mitigation banks and in-lieu fee programs will be subject to requirements of the 2008 Compensatory Mitigation Rule for Clean Water Act section 404 permits (33 CFR Parts 325 and 332; 40 CFR Part 230). The inter-agency review teams overseeing implementation of wetland mitigation banks or in-lieu fee programs are chaired by the US Army Corps of Engineers. Coordination with the interagency review team will be needed to employ combined wetland and ESA banks.

Conservation banks are protected in perpetuity by legally binding conservation bank instruments, conservation easements, and endowments for long-term management that are consistent with state laws. As promoted in the FWS's ESA Compensatory Mitigation Policy, bank operators and bank property owners are responsible should be held to the same standards for monitoring, reporting, and adaptive management that are required for HCPs. Credit sales from conservation banks often have a clause that releases the purchaser from future obligations or liabilities for their mitigation, in which case the liabilities remain with the banker rather than the purchaser. This is another reason purchasing bank credits to fulfill an HCP's mitigation requirements can be an advantage for the permittee over implementing a mitigation project on their own. The permittee does not have to expend time and effort to protect and restore habitat, monitor for success, or take steps to rectify any failures, because these responsibilities remain with the bank operator and bank property owner.

Implementing small-scale and low-effect HCPs that require the permittee to acquire, restore, and manage listed species habitat in perpetuity can be daunting and costly for the permittee who often lacks the knowledge and experience to fulfill these responsibilities themselves. The ability to purchase credits from a Service-approved conservation bank that has biological goals and

objectives that are compatible with their HCP instead of implementing permittee-responsible mitigation lifts this burden from the permittee and usually reduces their mitigation costs. In addition, the use of conservation banks can add habitat to existing conserved lands to protect larger blocks of habitat, which often has higher conservation value.
Applicants who are writing large-scale HCPs may also purchase credits from a conservation bank, but because of the economy-of-scale, these applicants tend to develop their own land protection and management infrastructure.

Additional information on conservation banks can be found in the HCP Handbook Toolbox.

9.4.3 In-Lieu-Fee Mitigation

In-lieu-fee mitigation occurs when a permittee provides funds to an in-lieu-fee sponsor, acting on behalf of the permittee, instead of completing project-specific mitigation themselves or purchasing credits from a mitigation bank. In-lieu fee mitigation typically involves the restoration, establishment, enhancement, or preservation of natural resources and may consist of a single project or a group of projects. The in-lieu fee program is responsible for the completion and success of the compensatory mitigation associated with permits that provide funds to that program. An in-lieu fee program instrument (similar to a conservation banking instrument) governs the use and operation of an in-lieu fee program. Under an in-lieu-fee agreement, a mitigation sponsor collects funds from an individual (or a number of individuals) who are required to complete compensatory mitigation. The sponsor, under the ultimate supervision of the permittee, directs the funds to one or a number of projects authorized by the instrument to satisfy the permittees' mitigation obligations. A failure of the sponsor to carry out the permittee's mitigation obligations is attributed to the permittee. Additional information on in-lieu fee mitigation can be found in the HCP Handbook Toolbox.

In-lieu-fee mitigation can be effective, but there are potential pitfalls Services staff must be aware of before agreeing to this type of mitigation for a particular HCP. If the funds paid to a sponsor do not result in on-the-ground conservation in advance or contemporaneously with impacts, there could be temporal impacts to the species and there is the possibility that the mitigation may not occur. Therefore, development of an in-lieu fee program agreement must be carefully crafted as a safety net for the species. The agreement should be time-limited. If the sponsor cannot get conservation on-the-ground according to the agreement, the sponsor must report this to the permittee and to the Services immediately. If the agreed-upon conservation cannot be accomplished in a timely fashion, the permittee may have to pay additional fees to offset those temporal impacts. In the case of the Natomas Basin HCP, a 200-acre cushion of mitigation must be in place before additional impacts are authorized. If the conservation cannot be accomplished because there are no suitable lands to purchase, the applicant must use another mitigation method. The process to resolve this situation must be memorialized in the HCP and IA.

Usage of in-lieu-fee varies across the nation: check with your Regional HCP Coordinator before proposing this to applicants.

9.4.4 Dealing with Uncertainty in Goals, Objectives, and Conservation Measures

The development of an HCP's conservation program, including goals and objectives, is based on assumptions using current understanding. Conceptual models articulate this understanding by depicting the hypothesized relationships between species populations, habitat conditions, and various biotic and abiotic variables that are of known or presumed importance to the conservation target. Because even simple models can identify multiple potential threats and stressors to the conservation target, one of the reasons to develop a conceptual model is to help identify SMART objectives and prioritize where to focus management actions based on the hypothesized strength of those relationships. We then monitor and analyze data to validate the efficacy of those actions at achieving plan goals. When implementing the HCP, it may become necessary to change objectives and measures to best achieve conservation biological goals and offset the impacts of the taking. This is not a task to be taken lightly in the regulatory context of HCPs, where permittees are held accountable for achieving goals and objectives. If the ability to make future changes to the plan's objectives and measures is deemed prudent, it should be built into the HCP to stay consistent with No Surprises assurances. Likewise, changes to the measures needed to accomplish goals and objectives need not require a plan amendment, so long as this option is built into the plan. Potential changes to implementation of the plan should be built in into the plan's operating conservation program or, where specific foreseeable events or circumstances could trigger a need to modify the plan, addressed through the changed circumstances provisions in the HCP. It is important to make sure expectations are clear in the HCP about how changes will be made.

If the plan needs to be changed, we need to consider updates to effects analyses. If the proposed changes are within the scope of what has already been analyzed, the changes may be fine and not require updating analyses. If the effects of the changes are outside of what has already been analyzed, updates to the analyses may be needed. See Table 9.5a and Chapter 17.4.

Table 9.4a: Summary of Changes to Goals and Objectives and Amendment Requirements

what to change	**plan amendment required?**
biological goals	yes, in all cases
biological objectives	yes, unless built into the plan
conservation measures	no, should be specified in the plan to meet the same goals and objectives without causing additional take. Approval process must be spelled out.
Note: changes to the HCP that result in physical changes to the environment that were not addressed in the original analyses may trigger updates to NEPA/BO/Findings documents (see Chapter 17.4).	

9.4.5 Determining Location for Mitigation Projects

Permittees can use on-site mitigation when opportunities for offsetting the impacts occur in very close proximity to the covered activities (typically on the same parcel). On-site mitigation may include restoration of disturbed areas temporarily impacted by covered activities (e.g., revegetation of equipment staging areas), best management practices for recurring activities, or operation standards for development in habitat used by the covered species (i.e., feral pet control). Connectivity to other conservation lands (i.e., the need to avoid isolated populations) may override the possible value of on-site measures which may be important in situations where a species is expected to undergo a range shift in response to climate change. The applicant would normally be expected to retain ownership of the on-site mitigation areas. Regardless of ownership, mitigation assurances must be provided by deed restrictions or easements, as appropriate, or by other legally acceptable mechanisms.

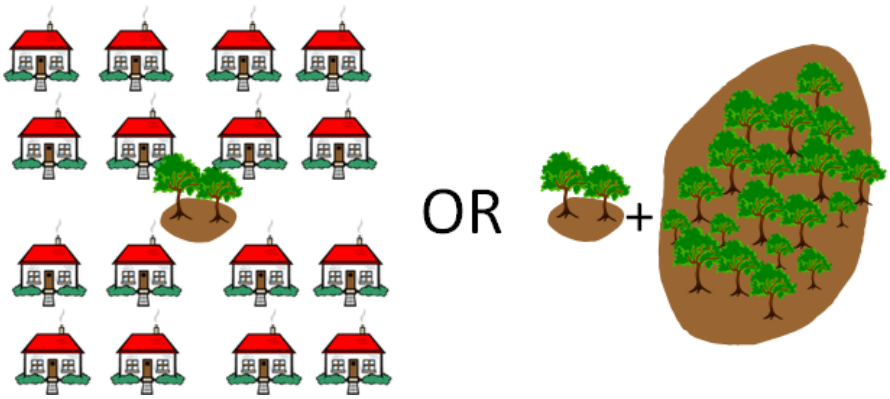
Off-site mitigation is when the permittee implements conservation (mitigation) measures away from the impact site. Off-site mitigation may be preferred when:

- it is better for the species,
- there are not opportunities to mitigate on-site,
- it is easier to buy credits at a bank.

Off-site mitigation should in most cases be connected to the impacts, and the populations impacted, in order to offset the impacts of the taking, i.e., the mitigation should be in the area where it will ensure conservation offset is applied to the population impacted. Finding the balance of proximity of conservation to proximity of impacts is done on a case-by-case basis, but in each case must ultimately offset the impacts of the taking.

In limited cases, it may be appropriate to mitigate off-site in an area that is not close in proximity to the impacts. For example: if the impacted population is considered secure in status, applying the mitigation to a nearby off-site population may provide more benefit to the species. Another example: if applying the mitigation onsite protects isolated habitat it may be more beneficial to the species to apply the mitigation in an area of contiguous habitat that is off-site.

Figure 9.5a: Illustration of On-site Versus Off-site Mitigation



9.4.6 Planning for Inflation

HCPs must plan for today's and future costs. How much will it cost to do the same activities over the life of a permit that may be for 20 years? Generally, inflation is factored into plan costs: for fee-based plans, provisions are included to ensure fees are reevaluated periodically to ensure they are adequate to meet plan implementation costs. Adjustment of fees in accordance with a standard inflation index is typically required where fees will be collected over time to implement the HCP. Where the plan involves land acquisition it is particularly important to include provisions requiring periodic reassessments of land acquisition costs and corresponding fee adjustments to ensure that the fees necessary to implement the plan are collected. Similarly the costs of land management and services may also change at a rate that differs from overall inflation changes. The HCP should include a requirement for periodic adjustment to fees to ensure adequate funding to implement the plan is maintained over time.

For example, the Florida scrub-jay general conservation plan has periodic adjustments to the in-lieu fee based on State data on agricultural land values. The Natomas Basin HCP also requires periodic reviews and adjustments to fee components to account for changes in land values/acquisition costs, management costs, and to meet endowment requirements. Another example is the Alabama Beach Mouse HCP, where they built in management fee adjustments for homeowner/condo association requirements in anticipation of rising costs of HCP implementation.

9.4.7 Conservation Design

The following principles of conservation design are all useful to consider when developing and acquiring a preserve system in an HCP.

- **Buffer urban areas**: These areas protect preserve land from the impacts of nearby urban areas. The size of the buffer depends on topography, the intensity of adjacent urban development, the natural community being separated from the development, the condition of the buffer lands, and whether covered species are or will be present in the area.
- **Ecological diversity**: The preserved land should include ecological diversity (e.g., species composition, dominant species, physical and climatic factors) to maintain sufficient habitat diversity and species and population interactions.
- **Environmental gradients**: Diverse topography, elevation, soil types, geologic substrates, and slopes allow for shifting species distributions in response to catastrophic events (e.g., fire, prolonged drought) and effects of a changing climate.
- **Management needs**: Management of preserves (e.g., livestock grazing, prescribed burning, or exotic species control) must be feasible in the places needed or it is not viable.
- **Maximize size**: The preserve land should be as large as possible within funding and management limits. Large preserves tend to support more species for longer periods of time than small preserves. Large preserves are also generally easier to manage on a per-acre basis because a large preserve reduces conflicts that may arise when managing for covered species with very different habitat requirements. Large preserves also better

allow for large-scale management treatments such as prescribed burning and grazing and the maintenance of natural disturbance regimes such as flooding.

- **Minimize edge**: the preserve land should minimize the amount of edge habitat exposed and unprotected to non-preserved land. Edge habitat generally exposes species to more threats than areas insulated by other protected areas. In some cases, it may be appropriate to protect linear features such as streams, riparian woodland, valley bottoms, or ridgelines.
- **Protected land linkages**: Consider the value to covered species of protecting land between existing and proposed protected areas inside and outside the HCP area. These linkages can help the species move between protected areas, and increase the integrity of the network of preserves. Consider climate gradients when assessing the quality of land linkages. For example, ensure the linkages involve projected climate gradients/conditions the covered species are considered likely to tolerate, and that the linkage habitat is likely to remain suitable.
- **Protect the highest-quality habitat**: The Preserve System should preserve the highest-quality habitat for covered species in the HCP area. Higher quality habitat tends to be more ecologically intact, resilient, and of more value to covered species.
- **Watersheds**: When possible, protect entire watersheds, sub watersheds, and headwater streams that are not already in protected status to maintain ecosystem function and aquatic habitat diversity.

Checking with local experts is a good way to identify regionally and locally-based tools and guides for conservation planning, including many that incorporate considerations of climate change effects. For more information on the general topic of conservation design visit the HCP Handbook Toolbox.

These references are great sources of information on conservation design:

- Stein, B.A., P. Glick, N. Edelson, and A. Staudt (eds.) 2014. *Climate-Smart Conservation: Putting Adaptation Principles into Practice*. National Wildlife Federation. Washington, DC.
- Groves, et al 2012 Incorporating climate change into systematic conservation planning. *Biodiversity Conservation*. 21: 1651-1671.
- Soule, M. E., and B. A. Wilcox, eds. 1980. Conservation Biology: An Ecological-Evolutionary Perspective. Sinauer Associates, Sunderland, MA.
- Soule, M. E., M. E. Gilpin, W. Conway, and T. Foose. 1986. The millennium ark. Zoo Biol., In press.
- Primack, R.B. 2014. Essentials of Conservation Biology 6th edition. Sinauer Associates, Sunderland, MA.
- Meffe, G. K. and C. R. Carroll. 2006. Principles of Conservation Biology, 3rd Edition. Sinauer Associates, Sunderland, MA.
- Noss et al. 1997. The Science of Conservation Planning: Habitat Conservation Under the Endangered Species Act. Island Press, Washington, D.C.

9.4.8 Permittee Responsibilities: Meeting Goals and Objectives, or Specific Actions in the HCP

The permittee is responsible for meeting goals and objectives. However, the goals and objectives have to be expressed in the HCP and permit in terms of specific actions, potential adaptive measures, or procedures to develop adaptive measures. The permit conditions are the primary legal obligations placed on a permittee. As we guide the development of HCPs, the Services should work with the applicant to ensure that all the measures in the HCP, if fully implemented, would meet the biological goals and objectives.

9.4.9 Timing of Mitigation

The HCP must provide a clear timeline for implementing the mitigation. The timing of implementing mitigation should prevent any lag time between the occurrence of the impacts of the taking and the realization of the mitigation benefits to offset the impacts. Otherwise, the lag time between impacts and offset can result in additional impacts to the species which can affect the amount of mitigation needed to fully offset impacts and may affect the survival of the species at the site. An example is when development destroys breeding habitat for a covered species, but successfully protecting and restoring habitat as mitigation elsewhere may take two years to achieve. In that case, the species loses recruitment for two breeding seasons in that area. Therefore, the HCP should provide for implementation of mitigation such that the offset would be achieved before the impacts of the taking occur. If this is not possible, then the mitigation activities should be implemented concurrent with or as soon as possible after the impacts of the taking occur. In these cases, we must determine the type and level of additional impacts that would occur during the time lag and ensure that the proposed mitigation would also offset those impacts. We also must include the temporal impacts and offsets for them in our effects analysis in the biological opinion.

Another reason mitigation should occur before the impacts, is to avoid the risk that circumstances might prevent the mitigation from being implemented, leaving the covered species in worse condition than before the HCP. Providing appropriate contingency responses for this type of timing will result in more complexity and time to develop the HCP. If the HCP's mitigation cannot be implemented until after impacts, the applicant needs to include acceptable instruments in the HCP for ensuring implementation of the mitigation, such as bonds, letters of credit, or similar funding assurances. An example: a bridge spanning a river is constructed. The bridge building impacts both aquatic and terrestrial habitat. In this case, it would not make sense to restore the area before the bridge is built and then to build the bridge. The restoration will have more biological value if the restoration occurs after the ground disturbing activities are completed. Another example is related to timber plans: trees are harvested (causing impacts), but other trees are left standing to grow into habitat for wildlife (the trees are left as part of the mitigation). In this case, impacts and mitigation are happening simultaneously throughout the plan area. Strong financial assurances are needed for: long term monitoring, adaptive management, and contingency funding to ensure certain minimization and mitigation actions perform as expected (e.g. erosion control near a stream).

9.4.10 Mitigation and "Stay Ahead" Provisions

To ensure that timing of mitigation actions occurs before (or at least concurrent with) the taking, some HCPs incorporate a "stay ahead" provision or phasing of conservation and impacts. In these instances specific components of the overall conservation strategy are implemented in stages in advance of specific phases of the covered activities. Each stage of mitigation and development activity must have milestones. For example: an applicant acquires X number of acres of habitat for conservation before Y number of acres can be impacted by covered activities. There is often a 'cushion' of conserved lands or conservation actions to ensure conservation stays ahead of impacts.

9.5 The Maximum Extent Practicable Standard

The discussion in this section is not intended to change the existing ESA standards, Services' regulations or policies, but rather to clarify the meaning of minimize and mitigate to the maximum extent practicable, and to provide guidance on how to determine when the standard has been met, a key step in issuing a permit.

Because the meaning of the term mitigation can have different interpretations, we define mitigation for the purposes of this Handbook as to offset impacts of taking on the species (see Chapter 8.3). We use the term fully offset to mean completely mitigating any impacts expected to remain after avoidance and minimization measures are implemented. In other words, fully offset means the biological value that will be lost from covered activities will be fully replaced through implementation of conservation measures with equivalent biological value. Fully offset also means the mitigation is commensurate (equal) with the impacts of taking. The statutory standard of minimizing and mitigating the impacts of the take "to the maximum extent practicable" under ESA Section 10(a)(2)(B)(ii) will always be met if the HCP applicant demonstrates that the impacts of the taking will be fully offset by the measures incorporated into the plan. However, the statutory standard will also be met where the applicant demonstrates that while the HCP will not completely offset the impacts of the taking, the minimization and mitigation measures provided in the plan represent the most the applicant can practicably accomplish.

To issue an incidental take permit, the ESA requires the Services to make a finding that "the applicant will, to the maximum extent practicable, minimize and mitigate the impacts of such taking." To meet this issuance criterion, the applicant must:

1. estimate the type and amount of take expected from covered activities, and the impacts of such taking on the species and/or its habitat;
2. determine from a biological perspective how conservation measures in the HCP will minimize the impacts of the taking on the species' status and/or its habitat; and
3. determine from a biological perspective how conservation measures in the HCP will mitigate the remaining impact of the taking on the species' status and/or its habitat.

Using the analyses in steps 1-3 above, the applicant must show that their HCP will minimize and mitigate the impacts of the taking to the maximum extent practicable because either:

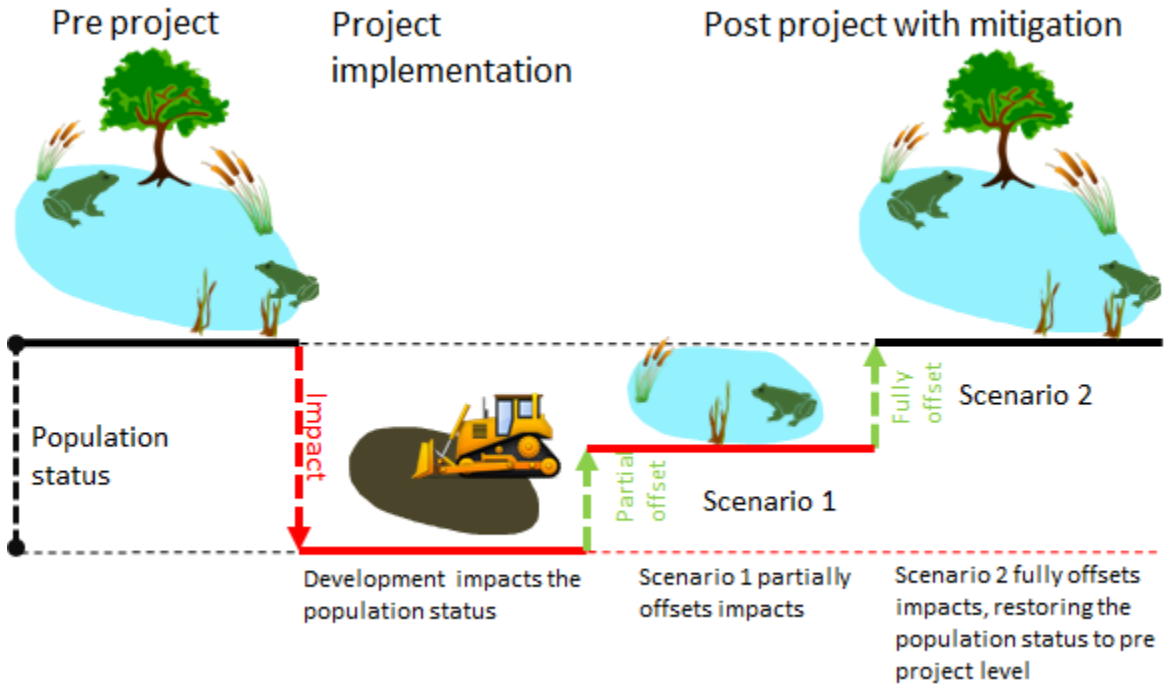
- The combination of minimization and mitigation in the HCP leaves no remaining impacts of the taking on the species that could be further mitigated or minimized, that is all impacts will be fully offset.

OR

- If the applicant cannot fully offset the impacts of the taking, they must demonstrate that it is not practicable to carry out any additional minimization or mitigation.

The applicant should strive to fully offset their impacts through implementation of the conservation strategy (see figure 9.1b). The greater the impacts of take that remain after minimization and avoidance, the more mitigation the applicant will be responsible for implementing. This is a key point to emphasize when discussing avoidance and minimization with applicants because the amount of mitigation is directly related to the amount of and significance of the impacts of the taking that remain after minimization.

Figure 9.1b: Shows impacts compared to the degree of offset (partial vs. fully).



Ultimately, the Services must provide a clear rationale (supported in the record) for concluding that the minimization and mitigation measures are adequate, and if the impacts of the taking are not fully offset, to determine whether additional minimization and mitigation is practicable (how to determine this is explained more below).

9.5.1 How to Demonstrate That an HCP "Fully Offsets" the Impacts of the Taking

It is not just the quantity of take that needs to be minimized and mitigated, rather it is the 'impacts of the taking' that must be minimized and mitigated. Biologically, these are not necessarily the same. Impacts of the taking depend on the specific situation and could include more than just the loss of individuals or loss of habitat. This standard requires us to think more

deeply about how those impacts will affect the species. What are all the purposes the habitat that will be lost serves for the species? Foraging? Connecting habitat? Breeding grounds? Similarly, for the loss of individuals, what are all the ways losing these individuals is going to affect the species or local population? Is a source population going to be lost? Is there important genetic diversity that could be lost? Is there a particular life stage that will be lost? What value is this life stage to the population (e.g., in long-lived species, the loss of adults can have a disproportionately high effect on the entire population)?

For us to determine that the proposed HCP minimization and mitigation measures meet the "maximum extent practicable" standard, we must be able to define "impacts of the taking" for the particular situation we are analyzing. Consider the impacts of the taking in a manner that is biologically sound and based on the best available science. Some examples of fully offsetting impacts include:

Habitat example:

- Loss: 100 acres of habitat type x are permanently lost.
- Measure to offset impacts: restore and protect in perpetuity (at least) 100 acres of habitat type x that is of (at least) equal biological value to the covered species before impacts occur.
- Key questions: what value did the habitat lost have to the covered species? What value does the replacement habitat have to covered species (e.g., did the replacement habitat provide for the same life stage of the covered species as that lost)? Does the replacement ratio need to be greater than 1:1 to compensate for the lag time between impacts and full eco-function of the replacement habitat, to allow for restoration uncertainties, or is consistent with previously-defined recovery objectives? Is the identified conservation habitat likely to remain suitable in reasonably anticipated future climate scenarios? Is there more value to the species by replacing the habitat that is lost with a different habitat type (e.g. breeding vs. foraging habitat)?

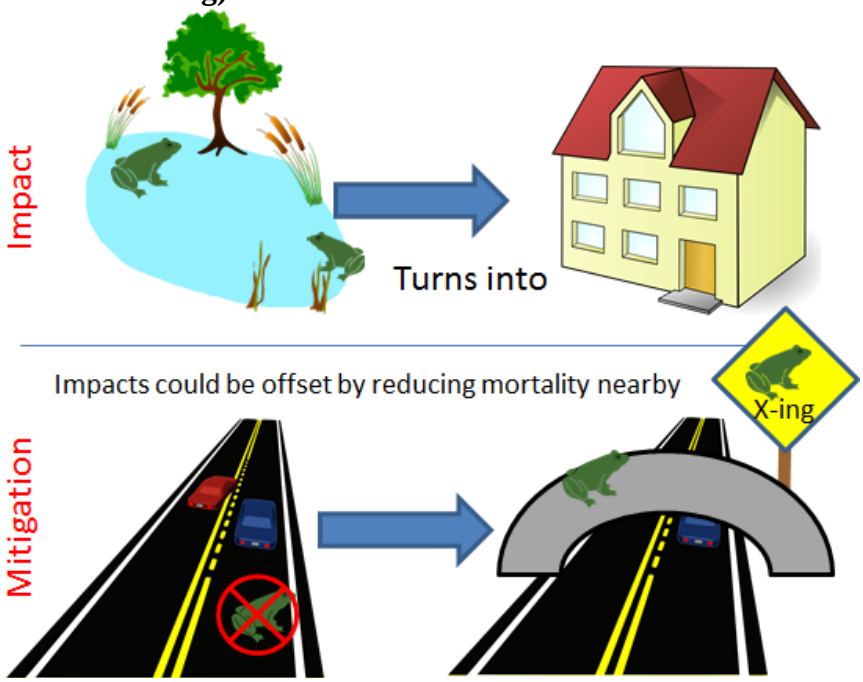
Loss of individuals example:

- Loss: 100 individuals will be taken.
- Measure to offset impacts: measures should be implemented to fully offset the effects to the population or species from the loss of those 100 individuals (e.g., removal of non-native species, restoration, etc.). Conservation measures could affect the population by increasing carrying capacity (through improving habitat), or increasing population growth rate (by reducing threats) for instance.
- Key questions: what life stage of individuals would be lost? In a long-lived species, loss of adults may have a much higher effect on the species or population than loss of juveniles, which may require actions to replace the loss of 100 adults with 400 juveniles, since many juveniles will die before reaching the adult (reproductive) stage. What is the value to the population of the life stages that would be lost? What is the significance to the population or species to lose 100 individuals? Is it an important population loss? What is the expected reproductive value that could be lost before being replaced? Is the lost reproductive value factored into the mitigation requirements?

Helpful Hint: the Resource Equivalency Analysis (REA) process may be useful for HCPs in helping to determine impacts of the taking and how to appropriately compensate for it. REA involves determining the amount of "natural resource services" that the affected resources would have provided had it not been lost, and it equates the quantity of lost services with those created by the proposed compensatory mitigation projects that would provide similar services. See chapter 7.7 for more on REA and other tools.

In some circumstances, impacts from loss of individuals can be offset with mitigation focusing on habitat conservation (and vice versa), but care should be given to compare and document the value of what is lost and the expected value of measures to replace what would be lost. Demonstrating the biological justification for measures that will fully offset the impacts can be complicated. Conceptual models, quantitative models, and published research are all useful tools to help understand the net effects and how those effects can be fully offset.

Figure 9.1c: Mixing and matching forms of take and mitigation (to offset the impacts of the taking)



Below are examples where the applicant fully offset their impacts of the taking:

Golden-cheeked warbler

FWS estimates a total loss of approximately 55 territories of 110 golden-cheeked warblers (55 pairs) as a result of the proposed project through habitat destruction from residential development. However, because of uncertainty in occupancy estimates, it may be more appropriate to state the losses in terms of habitat lost. Four hundred acres of high quality occupied habitat and 400 acres of low quality occupied habitat will be lost to the species.

To fully offset the impacts of the taking in this case, the project proponent could purchase credits from a conservation bank at a mitigation ratio (based on research) of 3:1 for high quality habitat, 2:1 for medium quality habitat, and 1:1 for low quality habitat.

3 acres high quality purchased for each 1 acre of *high* quality habitat lost:
400 acres lost x 3 = 1,200 acres

+

1 acre of low quality habitat purchased for each 1 acre of *low* quality habitat lost:
400 acres lost x 1 = 400 acres

---

total credits needed to offset impacts 1,600 acres

The purchase of 1,600 acres from a conservation bank is needed to fully offset the loss of habitat for 55 pairs of golden-cheeked warblers. Using the framework above was found to fully offset the impacts of the taking by protecting more habitat (of equal or greater quality) than was impacted. The conserved habitat in the example will have to be maintained for conservation purposes in perpetuity.

Southwestern willow flycatcher

Covered activities for an agricultural focused HCP that covers Southwestern willow flycatcher include: routine agriculture, small community infrastructure construction and operation, and riparian habitat conservation and restoration activities within the plan area. Implementation of the covered activities over the permit term is expected to result in temporary and permanent impacts to habitat.

Mitigation actions include: establishment of conservation easements, habitat restoration or enhancement, and development and implementation of management agreements. Habitat permanently lost (expected to be primarily marginal habitat for the covered species) will be mitigated at a 1.25:1 ratio. Habitat temporarily altered (also expected to be primarily marginal habitat) will be mitigated at a 0.75:1 ratio.

Over the permit term, the status of the flycatcher is expected to benefit from implementation of the HCP through protection and management actions in riparian habitats. Furthermore, the habitat that is expected to be lost or degraded is primarily marginal for the flycatcher, while the amount of habitat to be conserved as mitigation will be of good quality for the species. Therefore, the mitigation and minimization measures would more than fully offset the habitat expected to be unavailable, modified, or lost due to the covered activities in the HCP area over the permit term. If we have underestimated the extent of habitat that may be unavailable, modified or lost, the HCP includes a mechanism for additional mitigation. Thus, the HCP will provide a benefit to the status of the flycatcher by more than fully offsetting their impacts.

The applicant must include and document the analysis and the achievement of the "maximum extent practicable" standard, such as, by demonstrating that the impacts have been fully offset.

If it is infeasible for the applicant to fully offset the impacts of the taking, the applicant must demonstrate that the extent of offset (i.e. their efforts to minimize and mitigate the impacts of take) is the maximum extent that can be practicably implemented.

9.5.2 Demonstrating Additional Minimization and Mitigation Measures Are Not Practicable

If the applicant cannot fully offset the impacts of the take the Services must conduct an analysis to independently determine if the proposed conservation measures minimize and mitigate the effects of the applicant's actions to the maximum extent practicable. Maximum extent practicable means, within their available means, the applicant can feasibly do no more to minimize or mitigate the impacts of the taking (see and National Wildlife Federation v. Norton, 2000 WL2175874 (E.D. Cal., 2000). As noted above, one way to demonstrate this standard has been met is to demonstrate that the impacts of the taking have been fully offset. Where this approach is taken, the Services should provide a finding noting that "maximum extent practicable" has been achieved because the combination of minimization and mitigation provided by the HCP fully offsets the impacts of the taking or provides a net benefit.

Where "fully offset" will not be achieved, such a finding may be supported using two broad categories:

- **Insufficient implementation options**: If there are rigid restrictions on how a project can be developed and there are insufficient options for implementing additional mitigation, then this path to demonstrating maximum extent practicable may be appropriate. Specifically, if there is insufficient habitat to fully offset the impacts of take (in particular where geopolitical boundaries constrain where conservation/mitigation can occur), or if the measures necessary to fully offset the impacts of take cannot be implemented due to physical constraints, then the applicant must demonstrate with supporting documentation that the level of mitigation proposed is the most that can practicably be accomplished and that there is no way to further minimize or mitigate their impacts. For example: if a city's proposed covered activities would result in take of species X through habitat loss but there is no more habitat for species X within its jurisdictional boundary to offset the loss of habitat, the city might attempt to acquire mitigation habitat within surrounding jurisdictions. If the other jurisdictions are unwilling/unable to allow that option, then the City should document the impracticability of providing such habitat for species X as a means of offsetting the impact of take. The City should, however, propose an alternative form of mitigation to offset the impacts of take to the maximum extent practicable. This option should be used infrequently and only in situations where there truly are no other options.

- **Financial:** Financial constraints can also limit the ability of the applicant to practicably do more. The applicant should be able to continue operating at a reasonable financial standing comparable to other like individuals/companies/ municipalities. This option should only be used infrequently and only in situations where there truly are no other options. This option requires the applicant to share financial information with the Services to justify their claim so that the Services can make the maximum extent

practicable finding. This information could be released pursuant to the Freedom of Information Act unless exemptions apply to it.

Where the minimization and mitigation measures do not fully offset the impacts of the taking, the applicant must provide the Services with sufficient documentation and justification to support the "maximum extent practicable" finding. The Services must then conduct an independent analysis of the information provided by the applicant to make the required finding.

Examples where the applicant could not fully offset the impacts of their taking (but still met issuance criteria):

Alabama beach mouse

Conservation opportunities in coastal habitats is limited, this leads FWS to emphasize minimization and avoidance measures implemented throughout the life of a proposed project or activity. For beach mouse habitats, the permittee minimized construction so that as much native vegetation as possible is retained, and some habitat remains contiguous with adjacent properties. The permittee implemented permanent management prescriptions for landscaping, trash collection, feral animal control, and keeping pets indoors to minimize adverse effects on sensitive wildlife. They also supplemented the minimization measures with an in-lieu fee arrangement that accumulates funds for habitat acquisition. These minimization and mitigation measures have been demonstrated to be effective in maintaining linkages and conserving the species in the plan area.

Sea turtles

In Volusia and St Johns Counties, Florida, the permittees implemented HCPs to mitigate the effects to nesting and hatchling sea turtles from vehicular beach access and parking by the public. Direct harm of nesting females and emerging hatchlings is minimized by the delineation of "no-drive" zones, marking of nests, moving nests from high traffic areas, smoothing tire ruts, and keeping beaches clear of recreational gear overnight. The opportunities to compensate sea turtle habitat impacts off-site are limited, so Volusia County enhances the population (and mitigates for effects) by constructing and operating an aquarium with a sea turtle hospital. The Services accepted this as a form of compensatory mitigation because the new facility improved capacity for treating stranded adult sea turtles and significantly reduced the travel time from rescue to veterinary care. Adult sea turtles typically are not subject to injury by vehicles, and very few sea turtle nests are lost due to vehicular operation. No nest losses are known for over 10 years due to nest surveys, marking nests, and moving nests from highest traffic zones. Still, the numbers of eggs and hatchlings potentially injured or killed can exceed 100 per nest. Conserving the number of breeding age adults is expected to contribute to sea turtle recovery because the future breeding potential of a rehabilitated adult sea turtle exceeds that of any given hatchling.

9.5.3 The Burden of Proving Maximum Extent Practicable

If the proposed minimization and mitigation will leave impacts that are not fully offset, the applicant must provide a clear justification to the Services documenting the reasons no more

mitigation is practicable. In the applicant's justification for less than fully offsetting their impacts, the applicant should follow the steps below.

Financial: If the applicant is making a financial case, they need to demonstrate they cannot afford more mitigation by taking the following steps:

1. demonstrating that they cannot adjust their project to reduce impacts,
2. showing their books, which means showing what profits:
    a. are currently and projected (without the HCP)
    b. will be (projected) with the proposed HCP
    c. will be (projected) with increased mitigation
    d. will be (projected) if applicant fully offsets take
3. demonstrating why additional mitigation or minimization measures would impair their ability to sustain a reasonably profitable business or put them at a significant competitive disadvantage to other similarly situated businesses.

**The financial approach would be greatly strengthened by an independent third party (e.g., accountant or economist) contracted (by the applicant) to study the applicant's financial books and offer their own conclusion.*

Insufficient implementation options: If the applicant is making a case for insufficient implementation options, they need to demonstrate there are no more practicable options by:

1. demonstrating that they cannot adjust their project to reduce impacts and still maintain project purposes;
2. documenting all the minimization and mitigation options currently proposed in the HCP;
3. documenting their effort and process to secure other minimization and mitigation options;
4. documenting that there are no more reasonably available or practicable minimization and mitigation options that would fully offset the impacts of the take; and
5. explaining their conclusion, with supporting documentation, that additional measures to fully offset the impacts of the take are impracticable.

9.5.4 Services Conduct an Independent Analysis of Practicability

When evaluating an applicant's maximum extent practicable case, ask for the assistance of the regional HCP coordinator and solicitor or general counsel. If the justification contains information outside the expertise of Services staff, the regional HCP coordinator can help determine appropriate resources to assist staff in the evaluation. The regional HCP coordinator and solicitors or general counsel must also review the justification and the Services' staff conclusion. There are a number of questions that could be useful when assessing the applicant's practicability case:

- Does the MEP justification make sense?
- How does the proposed mitigation compare to similar HCPs?
- For a financial case:
    - Did they provide adequate documentation?
    - Do the numbers seem reasonable?

- For an insufficient implementation options case:
    - Did the applicant look at all the options?
    - Did they put appropriate effort into asking for assistance?
- Do the Services agree with the conclusion?

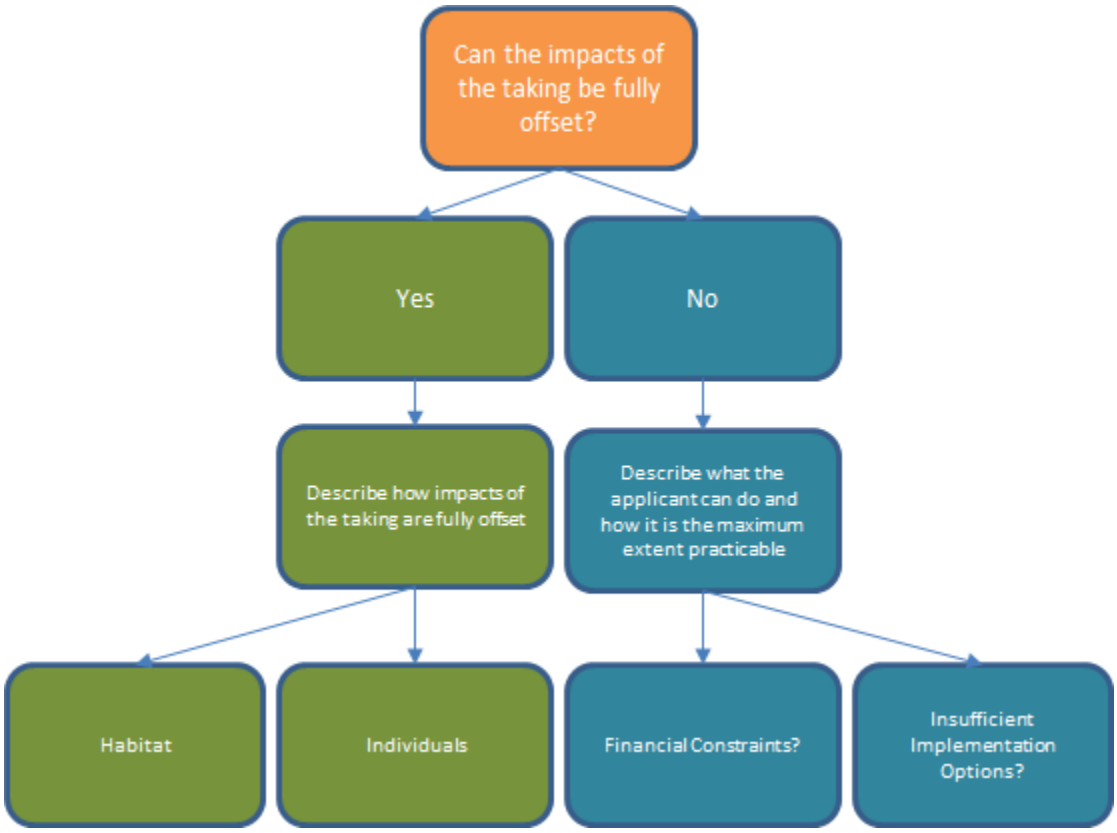
The Services staff must fully document their independent evaluation and conclusion, which may include a third party analysis. A summary of the applicant's justification and the Services' conclusion must be described in the Services' Findings. All the supporting documents associated with the applicant's justification, the Services' evaluation and conclusions and that of a third party, if used, must become part of the administrative record for the HCP.

9.5.5 Services Demonstration of Maximum Extent Practicable

Using the results of our independent evaluation, that may or may not include a third party analysis (above), the Services needs to explain and document clearly and logically in the HCP Findings our conclusions that what the applicant is offering for minimization and mitigation is the maximum practicable and that additional mitigation would not be feasible. If we issue the ITP, the Services should also make clear that the other issuance criteria can still be met, despite the applicant's inability to fully offset their impacts.

If we determine impacts will not be fully offset (but is the most that the applicant can practicably provide), be prepared with thorough documentation and logical analysis so a judge can understand our rationale. The following case law provides more discussion on making the maximum extent practicable finding: National Wildlife Federation v. Babbitt, 128 F.Supp.2d 1274 (E.D. Cal. 2000); National Wildlife Federation v. Norton, 2005 WL2175874 (E.D. Cal., Sept. 7, 2005); National Wildlife Federation v. Norton, 306 F.Supp.2d 920 (E.D. Cal. 2004); SWCBD v. Bartel, 470 F. Supp. 2d 1118 (S.D. Cal. 2006); Sierra Club v. Babbitt, 15 F.Supp.2d 1274 (S.D. Ala. 1998); Sierra Club v. Norton, 207 F.Supp.2d 1310 (S.D. Ala. 2002**)**; Union Neighbors United, Inc. v. Jewell, 831 F.3d 564 (D.C. Cir. 2016); Friends of the Wild Swan v. Jewell, 2014 U.S. Dist. LEXIS 116788 (D. Montana, Aug. 21, 2014) (see the HCP Handbook Toolbox).

Figure 9.1d: Decision Tree to Evaluate Maximum Extent Practicable Options



Key concepts:

- The goal for every HCP, should be to fully offset the impacts of take resulting from the covered activities, and every HCP must minimize and mitigate the impacts of take to the maximum extent practicable; ideally, the HCP should also contribute to the recovery of the species and provide a net conservation benefit.
- The applicant must show in the HCP that it considered other alternatives to the taking, than the one it chose (e.g., no action/abandon the project alternative alternative, low mitigation alternative, fully offsets impacts alternative alternative, more than fully offsets impacts alternative alternative).
- If there are other HCPs that cover the same species and address similar actions and circumstances, explain any substantial differences in required mitigation or minimization measures between this HCP and those other HCPs in the Findings (See Chapter 16.1).
- If impacts will not be fully offset by the HCP, require the applicant to provide documentation to support a conclusion that additional mitigation would not be practicable (preferably analyzed by an independent, third party and in a clear, objective, documented format, which the Services will evaluate).
- For each covered species, make sure the Findings and record reflect our independent evaluation of the impacts of the taking, the adequacy of the mitigation provided under the plan, and the impracticability of providing additional mitigation.

- If the biological impact from covered activities cannot be offset, then the field lead should contact the regional HCP coordinator and regional solicitor (for FWS) or regional lead and general counsel (for NMFS), and an economist (if making the financial case) for assistance in making a "maximum extent practicable" finding.
- In making the maximum extent practicable finding for each covered species, it is possible that the impacts of the taking to some covered species will be fully offset, while impacts to other covered species are not.
- We must understand the effects of impacts and conservation on covered species.

9.6 Changed and Unforeseen Circumstances

Federal No Surprises Assurances (codified at 50 CFR 17.3, 17.22(b)(5), 17.32(b)(5); 50 CFR 222.307(g)) (see the HCP Handbook Toolbox) provides assurances to Section 10 permit holders that, as long as the permittee is properly implementing the HCP and the ITP, no additional commitment of land, water, or financial compensation will be required with respect to covered species, and no restrictions on the use of land, water, or other natural resources will be imposed beyond those specified in the HCP without the consent of the permittee. The No Surprises rule has two major components: changed circumstances and unforeseen circumstances. Changed and unforeseen circumstances must be considered and are typically required to be included in HCPs. However, in rare instances it may be determined that it is not necessary to include changed and unforeseen circumstances in the HCP, such as low-effect HCPs with a short duration.

9.6.1 Changed Circumstances

Changed circumstances are defined in the No Surprises rule as "changes in circumstances affecting a species or geographic area covered by [an HCP] that can reasonably be anticipated by [plan] developers and the Services and that can be planned for (e.g., the listing of new species, or a fire or other natural catastrophic event in areas prone to such events)." (50 CFR 17.3). If additional conservation and mitigation measures are deemed necessary to respond to changed circumstances, and such measures were provided for in the HCP, the permittee will be required to implement such measures (50 CFR 17.22(b)(5)(i), 17.32(b)(5)(i); 50 CFR 222.307(g)(1)). If additional conservation and mitigation measures are deemed necessary to respond to changed circumstances, and such measures were not provided for in the HCP, the Services will not require any additional measures beyond those provided for in the HCP, without the consent of the permittee, provided the HCP is being properly implemented (50 CFR 17.22(b)(5)(ii), 17.32(b)(5)(ii); 50 CFR 222.307(g)(2)).

Difference between Changed Circumstances and Adaptive Management

Changed circumstances are circumstances that can be reasonably anticipated and specifically addressed in an HCP prior to permit issuance. When properly implemented, no additional commitment of land, water, or financial compensation will be imposed by the Services onto the permittee beyond those specified in the HCP, without the consent of the permittee. Adaptive management is a strategy for addressing uncertainty associated with an HCP's conservation program, particularly uncertainty that poses a significant risk to the covered species. This includes, but is not limited to, uncertainty related to the covered species status or trend; uncertainty related to the effects of a proposed covered activity on a proposed covered species;

and uncertainty related to the effectiveness of an applicant's proposed minimization and mitigation measures. Through assumption-based learning and robust monitoring, adjustments can be be made to the HCP's conservation program in response to what is learned. Whether an adaptive management strategy is necessary will be determined on a project-by-project basis. However, adaptive management is essential for HCPs that were developed despite significant information and data gaps that pose a significant risk to a species at the time the permit is issued.

HCP assurances (No Surprises) can also apply to an adaptive management strategy when all appropriate HCP provisions have been mutually crafted and agreed upon and approved by the Services and the applicant. To receive assurances, the adaptive management strategy should identify up-front the range of possible operating conservation program adjustments that could be implemented as new information or data is obtained. This range defines the limits of what resource commitments may be required of the permittee. This process will enable the applicant to assess the potential economic impacts of adjustments before agreeing to the HCP.

Helpful Hint: The HCP must identify a suite of potential changed circumstances, the specific response to each, the costs of implementing the response, and the funding assurances for those responses, where appropriate. In doing so, potential problems can be identified in advance and specific strategies or protocols for dealing with them can be incorporated into the HCP, thus facilitating adjustments to the HCP's conservation program without having to amend the HCP.

Changed circumstances and planned responses are treated as part of the HCP's operating conservation program. Like other aspects of the conservation program, effectiveness of management actions in reducing the effects of changed circumstances can be improved through implementation of the monitoring and adaptive management programs.

If additional or alternate conservation measures are necessary to respond to changed circumstances, and such measures are not part of the responses to changed circumstances provided in the plan, the Services and the permittee should work together to shift priorities to best meet goals and objectives within the original resource commitments in the HCP. We cannot require additional actions or funds be expended without the permittee's consent; so it is important to identify upfront in the plan all reasonably foreseeable changed circumstances that may occur during the permit term and feasible responses to them. The No Surprises regulation prohibits us from requiring mitigation involving any additional commitment of land, water, or financial resources or additional restrictions on the use of land, water, or other natural resources beyond the level otherwise agreed on in the HCP without the consent of the permittee. If a condition arises that should have been-but was not identified as a changed circumstance in the HCP, we cannot require the permittee to address it. This makes the process to identify changed circumstances during plan development extremely important.

9.6.2 Unforeseen Circumstances

Unforeseen circumstances are defined as changes in circumstances affecting a species or geographic area covered by a conservation plan that could not reasonably have been anticipated by plan developers and the Services at the time of the negotiation and development of the plan and that result in a substantial and adverse change in the status of the covered species (50 CFR17.3). The Services bear the burden of demonstrating that unforeseen circumstances exist

using the best available scientific and commercial data available while considering certain factors (50 CFR 17.22(b)(5)(iii)(C) and 17.32(b)(5)(iii)(C); 50 CFR 222.307(g)(3)(iii)) (see the HCP Handbook Toolbox).

In deciding whether unforeseen circumstances exist, the Services shall consider, but not be limited to, the following factors (50 CFR 17.22(b)(5)(iii)(C) and 17.32(b)(5)(iii)(C); 50 CFR 222.307(g)(3)(iii)):

1. The size of the current range of the affected species;
2. The percentage of the range adversely affected by the covered activities;
3. The percentage of the range that has been conserved by the HCP;
4. The ecological significance of that portion of the range affected by the HCP;
5. The level of knowledge about the affected species and the degree of specificity of the conservation program for that species under the HCP; and
6. Whether failure to adopt additional conservation measures would appreciably reduce the likelihood of survival and recovery of the species in the wild.

In negotiating unforeseen circumstances, the Services 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 HCP without the consent of the permittee (50 CFR 17.22(b)(5)(iii)(A); 50 CFR 222.307(g)(3)(i)). If additional conservation and mitigation measures are deemed necessary to respond to unforeseen circumstances, the Services may require additional measures of the permittee where the HCP is being properly implemented only if such measures are limited to modifications within conserved habitat areas, if any, or to the HCP's operating conservation program for the affected species, and maintain the original terms of the plan to the maximum extent possible (50 CFR 17.22(b)(5)(iii)(B) and 17.32(b)(5)(iii)(B); 50 CFR 222.307(g)(3)(ii)). If unforeseen circumstances are found, the permittee is not *required* to come up with additional resources or funds to remedy unforeseen circumstances, but the Services and the permittee should work together to determine an appropriate response within the original resource commitments in the HCP.

Notwithstanding these assurances, nothing in the No Surprises rule "will be construed to limit or constrain the [Services], any Federal agency, or a private entity, from taking additional actions, at its own expense, to protect or conserve a species included in a conservation plan" (50 CFR 17.22(b)(6) and 17.32(b)(6); 50 CFR 222.307(h)).

The "unforeseen circumstances" section of the HCP should discuss the *process* for figuring out how to address those future changes in circumstances surrounding the HCP we may not reasonably anticipate. There may be other approaches we can use to respond to the needs of the affected species, including increasing the effectiveness of the HCP's operating conservation program (without raising costs), Government actions we can take to meet species needs, or voluntary conservation measures the permittee can take.

Helpful Hint:

- **stick to the regulatory language for changed and unforeseen circumstances,**
- **identify a comprehensive list of circumstances,**
- **identify thresholds to make it clear when something is changed vs. unforeseen (e.g., 100-year flood in a long duration HCP vs. 500-year flood),**
- **develop a plan for how we or the permittee will respond to each circumstance, and**
- **secure funding for responding to changed circumstances.**

See 9.6.10 for more on how jeopardy and No Surprises interact with changed circumstances.

9.6.3 Steps to Identify and Plan for Changed and Unforeseen Circumstances During HCP Development

1. Identify all changed circumstances using the changed circumstances checklist (Table 9.6.4a) or similar.
2. Develop thresholds for clearly identifying when circumstances are changed vs. unforeseen.
3. Where appropriate, develop response for each- what will be the response to ensure goals and objectives are met if circumstance X happens to Y degree?
4. Estimate the cost of the changed circumstances responses and provide an assured funding source to fund the responses.

9.6.4 Differentiating Between a Changed and an Unforeseen Circumstance

One way to differentiate between a changed and unforeseen circumstance is to use a risk assessment or probability of that condition occurring.

- For example, you might consider that the probability of a 100-year interval flood event is likely to occur within the life of a long-term permit, but a 500-year flood is not. Keep in mind, however, that in some locations the risk of what previously was considered a 500-year or 100-year flood event may now be expected to occur much more frequently due to climate change effects.
- Similarly, you may find that fires up to a XXXX acres or with specific return frequencies of 1 per XX years are likely to occur during the permit term, but fires above that size or at more frequent intervals would be unforeseen circumstances.
- Weather events such as tornadoes, tropical cyclones, and blizzards, can be expected to recur in certain regions, and models may help understand the expected changes of frequency and intensity from climate change effects.

It is possible that no response will be needed for a particular changed circumstance, such as flooding in a healthy river system or fire in a fire-adapted community, if vegetation is likely to regenerate naturally and covered species will recover and possibly benefit from the event. However, it is key that the applicant carefully consider potential changed circumstances and that the HCP includes a robust set of plan responses to those changes if they could affect the success of the conservation measures. Changed and unforeseen circumstances apply to the mitigation lands and also to the administration and operation of an HCP.

The changed and unforeseen circumstances checklist may be useful to ensure the HCP includes the appropriate information and planners ask the right questions (see Table 9.6.4a). Like other aspects of the conservation program, effectiveness of management actions in reducing the effects of impacts from elements identified as changed circumstances can be improved through implementation of the monitoring and adaptive management programs.

Table 9.6.4a: Changed circumstances checklist. Conditions that exceed the identified range of changed circumstances will be considered unforeseen.

Element	Condition within which will be considered a 'changed' circumstance				If changed circumstance occurs, remedial actions will include:	How will remedial action be funded?	Cost estimate for remedial action	If threshold for changed circumstance is surpassed, response will be:
	Size	Frequency	Duration	Intensity				
Contaminant spill								
Disease								
Drought								
Dramatic economic change								
Earthquake/tsunami								
Economic downturn								
Expansion/succession of vegetation community								
Fire								
Flooding								
High winds								
Invasive species introduction								
New species listing/ designation of critical habitat								
Sea level rise								
Temperature • Excessive heat • Excessive cold								
Tornado/Hurricane								
Volcanic eruption								

Not all of these will apply to your HCP, and some may be missing.

9.6.5 Determining Changed vs. Unforeseen Circumstances

Changed circumstances are those that can be reasonably anticipated and planned for. Any source of information that is useful for anticipating potential conditions can be used as the basis for determining changed vs. unforeseen circumstances. Specific sources include:

- weather records over the past xx years,
- disease trends,
- population trends,
- proximity of invasive species to the plan area,
- historical fire data,
- sea level rise models,
- projections of drought and megadrought, etc.

For consideration of climate change effects, past events may not always be useful, but they may help predict future events. The Services have specialists who can help provide the best available scientific information regarding relevant trends and projections and how to interpret and use them in the context of changed *vs.* unforeseen circumstances.

9.6.6 National Environmental Policy Act (NEPA) and Changed Circumstances

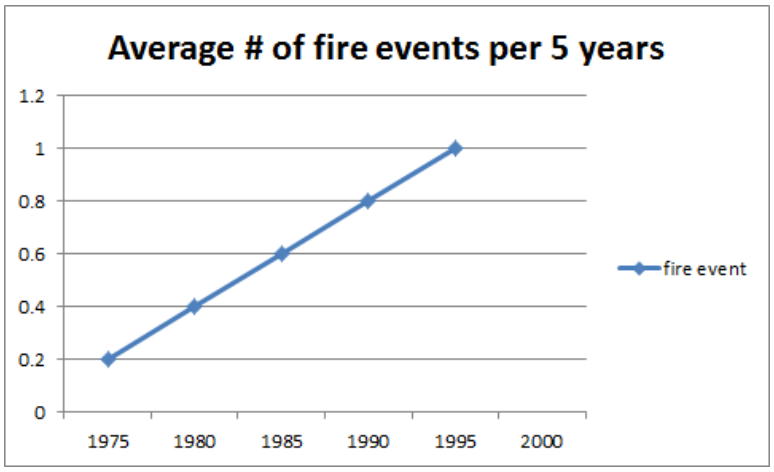
The NEPA analysis conducted on the issuance of the section 10(a)(1)(B) permit should include the realm of changed circumstances and all resulting activities to avoid the need for a future amendment to the permit and to the NEPA document associated with the Services' issuance of the permit.

9.6.7 Considering Climate Change Effects in Changed Circumstances

When developing the list of changed circumstances and the remedial actions to reduce their effects, the effects of changing climatic conditions need to be considered. Of the elements considered for changed circumstances, what is their current trajectory or trend? If the current trend continues, or if projections indicate an acceleration in the trend, how might that affect the management response at year xx? For those elements that you're not considering as changed circumstances, does thinking about their trend or trajectory bring them into the realm of changed circumstances?

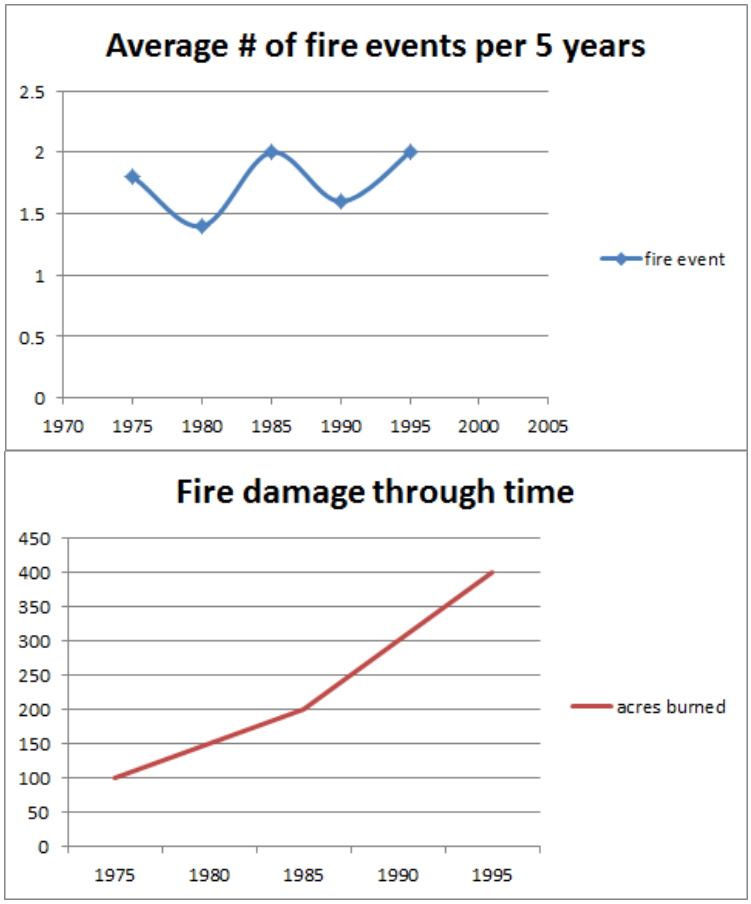
For example, looking at the frequency of fire events over the last 25 years may be all you need to understand fire trends in the area. See Figure 9.7a.

Figure 9.7a: Example 1- Fire events



This figure suggests an increased frequency of burns. Sometimes the situation takes more examination to really understand meaningful trends:

Figure 9.7b: Example 2- Fire events



In the second example, the average number of fire events does not tell the whole story. Only after looking at the number of acres damaged from those same fire events do we see a significant trend in fire activity. This is an indication of increased intensity of burns rather than increased frequency. In this case and others, the average is probably not the best threshold for demonstrating changed circumstances have been exceeded, as it is possible that the average would be exceeded at least half of the time.

It is not necessary to incorporate climate change in of itself as an identified changed circumstance. Rather, we should consider how the potential local effects of climate change, such as sea-level rise, drought, wildfire, or invasive species, may cause changes to the effectiveness of the HCP's conservation strategy that would require adjusted implementation. For example, scientific modeling of fire and climate change has projected a substantial risk of increase in conditions for very large fires (the top 5 - 10 percent of the largest fires) across many parts of the United States in the coming decades, as well as an extending the "fire season." When assessing climate change effects in changed circumstances, it is important to consider the best available scientific information, including the historical record, the recent trajectory or trend, and the projected future trajectory for specific variables that are relevant for the region and timeframe of interest (see 9.6.7).

9.6.8 Timing of Changed Circumstances

Changed circumstances can occur during the permit term. Changed circumstances do not apply after the permit term ends. After the permit term ends, management changes should be memorialized in the conservation easement or similar governing document. Funding must be provided to address post permit management needs (usually from an endowment).

9.6.9 Information Needs for Changed and Unforeseen Circumstances

The HCP needs to include enough information to:

- identify potential elements that may be encountered during the permit term
- identify when changed or unforeseen circumstances are triggered
- make clear when an element is changed vs. unforeseen (e.g., intensity, size, duration, frequency)
- identify what the management response(s) will be to reduce the effects
- provide a cost estimate of the remedial action
- Provide an assured funding mechanism to remediate changed circumstances

9.6.10 No Surprises and Changed Circumstances

The No Surprises regulations provide the permittee with assurances that, assuming the plan is being properly implemented, the Services will not require additional measures or funding beyond what was agreed to in the HCP without the permittee's consent. Changed circumstances must be written into the plan, including remedial measures and funding for those measures. If we determine that continued implementation of the plan will jeopardize the existence of a covered species or adversely modify its critical habitat, there are two options:

1. the Services can revoke the permit coverage for that species, or
2. the permittee can voluntarily implement additional measures beyond what they committed to in the HCP if they are sufficient to remedy the pending jeopardy of the species/adverse modification (permittee retains permit).

If we determine that continued implementation of the plan would jeopardize the existence of a non-covered species or adversely modify its critical habitat, there are three options:

1. the Services can revoke the permit coverage for those activities that are taking the species,
2. the permittee can voluntarily implement additional measures beyond what was committed to in the HCP if they are sufficient to remedy the pending jeopardy of the species/adverse modification (permittee retains permit), or
3. the permittee can amend the HCP (and NEPA document) to include the species at risk as a covered species and reduce the impacts to a level less than jeopardy/adverse modification (permittee retains permit).

HCPs should identify the listing of non-covered species and designation/revision of critical habitat within the plan area during the permit term as changed circumstances. This upfront thinking helps make clear what the steps are to react and accommodate a newly listed species or critical habitat designation while keeping the permit in good standing. While we do our best to include all the species that may be ESA-listed as a covered species and to protect essential species habitat in HCPs, it is not always predicted when such a situation will arise, especially over a long permit term. The process to address future ESA listings can also be addressed in other sections of the HCP or in the Implementing Agreement.

In order to receive an ITP with No Surprises assurances, the permittee must do their part to keep their permit in good standing. The permittee must ensure they are properly implementing the permit, including the HCP and Implementing Agreement (if applicable).

9.7 Considering Climate Change

In light of the improved understanding of the ongoing and projected effects of climate change, it it may be useful to apply the SHC approach. The SHC approach is a structured approach to conservation planning that incorporates new information, which is particularly important with changing conditions, like climate change. Further, integrating the approach from *Climate-Smart Conservation* incorporates consideration of climate change effects into an adaptive management framework. Using the *Climate-Smart Conservation* approach helps ensure the HCP and our issuance of a permit is consistent with Executive Orders and related agency policies for including climate change considerations and adaptation to climate change effects in our planning and management.

The HCP conservation strategy, as well as our section 7 and NEPA work related to HCP permit issuance, should consider climate change and its effects. The Department of the Interior issued its Climate Change Adaptation policy in 2012 to “integrate climate change adaptation strategies into its policies, planning, programs, and operations.” Based on the Department’s policy, the Fish

and Wildlife Service issued policy on climate change adaptation in 2013. From the FWS policy, section 1.6:

"It is our policy to effectively and efficiently incorporate and implement climate change adaptation measures into the Service's mission, programs, and operations. ….from facilities maintenance to public use of lands, and from habitat restoration and refuge management to endangered species recovery plans."

The DOI and USFWS climate change adaptation policies also emphasize the use of the best scientific information available. More than just to meet agency policy, integrating consideration of climate change effects into planning and implementation of HCPs makes sense to maximize their efficiency and effectiveness in contributing to the conservation of species.

The National Marine Fisheries Service, Office of Protected Resources also issued its Endangered Species Act Climate Guidance in 2016 (see the HCP Handbook Toolbox). NMFS' experiences with recent ESA listing decisions (*e.g.*, ice seals and corals) reinforced the importance of agency climate change policy guidance to better support NMFS ESA resource managers in agency analyses and decision-making. Seven key climate change considerations are identified in the guidance and relevant considerations for each are provided in the 2016 document. These considerations are: climate change emission scenarios; time periods for projecting anticipated climate change effects; addressing the adequacy of international and national policies and regulations; considerations for critical habitat designations; weighing the beneficial and adverse effects of actions; designing appropriate management action recommendations; and requirements in permitting and project designs.

The types and magnitude of ongoing and projected effects of climate change varies in different geographic areas and over time. Climate-related effects on species and habitat also vary, and may include interactions with non-climate conditions, e.g., habitat fragmentation, invasive species. Consequently the work involved in integrating consideration of climate change effects in an HCP conservation strategy will depend on many factors. Although there is no "one-size-fits-all" approach, there are some best practices that can guide this work. When appropriate, we should encourage applicants to develop an HCP conservation strategy that integrates consideration of climate change effects throughout the process, and thus is "climate-aligned" by design; this approach is likely to be more efficient and effective than developing a conservation strategy and then trying to retrofit it to include these considerations.

Climate change, its effects, and climate adaptation approaches are the subject of continuously evolving scientific work and management experience. Familiarity with the key concepts and approaches described in documents such as *Climate Smart Conservation,* will be extremely helpful in designing the HCP conservation strategy, as well as in the section 7 and NEPA processes related to an HCP. In addition, assistance from Services or other climate change specialists may be helpful. Throughout this chapter and elsewhere in the handbook, information is included to facilitate the integration of climate change considerations. Details are provided in the HCP Handbook Toolbox, and are based on a set of best practices applicable to other analyses and planning under the ESA. The best practices material will be updated as appropriate when substantial new information emerges.

When we consider climate change in the HCP context, we intend to focus our considerations and analyses on the specific proposed covered activities under review and the expected climate change effects relevant to the activities (e.g., the effects of increased fire on covered species).