

# Biological Surveys, Ecosystem Impact Analysis and Mitigation Measures

From the 2004  
Guidebook for the  
Hawaii State  
Environmental  
Review Process

## Introduction:

Hawai'i State law calls for efforts to prevent or eliminate damage to the environment and biosphere and the protection of endangered species and indigenous plants and animals. To meet this goal, special care must be taken to assess a proposed project's impact on biological resources.

The purpose of the state's environmental review law is to encourage full, accurate and complete analysis of proposed actions, promote public participation and support enlightened decision making by public officials. To assist agencies and applicants in meeting this legal purpose, the office of Environmental Quality Control offers the following guidelines for preparers of environmental reviews under the authority of HRS 343.

These guidelines do not constitute rules or law. They have been refined by staff, student interns and peer review to provide a helpful checklist of items that will assist planners in preparing an adequate biological survey.

An Environmental Assessment or Impact Statement for a project that may affect biological resources should contain a biological survey that considers the items and issues described below.

## **Part I. Biological Surveys: Methods and Content**

### Survey Method

#### Timing

Surveyors should take into account the activities of nocturnal, migratory and seasonal species and conduct surveys accordingly. (e.g. a survey of wetland flora should take place during the rainy season to observe otherwise dormant species.)

#### Route and Coverage

A thorough flora/fauna survey, should provide the following:

- a map containing the survey routes
- a minimum of 50% coverage of the study area (although smaller areas may merit a larger percentage of study coverage)
- the areas covered must include a composite of all terrain present (i.e., ridge tops, wetland, slope, riparian habitat etc.)
- accounting for native invertebrate populations may be accomplished by estimating the coverage of host flora.

#### Adjacent Streams

Stream conditions both up and down-stream from a survey site should be assessed. The Hawaiian Stream Bio-assessment Protocol (HSBP) developed by the Environmental Planning Office of the Department of Health may be utilized in studying habitat and biotic quality of streams.

The Hawai'i Stream Assessment produced by the Commission on Water Resource Management (CWRM) should also be consulted to identify waterways that qualify as a "heritage" streams. Investigators should also consider CWRM's Stream Protection and Management (SPAM) system administrative rules and consult with DLNR's Division of Aquatic Resources.

#### Literature Search

Literature and database sources should be searched for historical sightings of significant biological resources. Consult sources such as the **Manual of the Flowering Plants of Hawaii**, the Bishop Museum, The Nature Conservancy's Hawaii Heritage Program Database listings, the U.S. Fish and Wildlife Service, the National Biological Service, the State Department of Land and Natural Resources Division of Forestry and Wildlife and Natural Area Reserve Commission, the University of Hawaii botany, zoology and geography departments and the Audubon Society.

On-island experts should be contacted for information on historical sightings of significant species which may not be present during the survey (e.g., migratory water birds, ephemeral plants)

## Ecosystem Characterization

### Description

A description of the ecosystem should include the following:

an analysis of principal community types including both native and non-native organisms and the biological values of these community types

note the presence and condition of plant and animal communities based on elevation, moisture, substrate, topography and physiography (examples include: coastal dry shrublands; montane wet forests; seasonal or perennial wetlands and streams; anchialine pools; aeolian lava flow systems; and subterranean cave ecosystems)

a description of any obligate species (those requiring specific niches)

a list any applicable global ranks (established by the Nature Conservancy), describe species density (frequency of sightings or rate of occurrences), historical and current ranges and the location of notable species

### Native Intactness

Analyze habitat intactness based on species composition. Assess the native bio-diversity of the project site based on alien-to-native species proportions and distributions and the presence of indicator species for a given ecosystem. Indicator species should be considered to identify potentially high quality ecosystems. For example, the presence of 'o'opu, or native goby species, (Lentipes concolor, Awaous stamineus, Sicyopterus stimpsoni), as well as hihiwai (Neritina granosa) in streams indicate unaltered stream conditions necessary for their survival.

### Listed Species

Any rare, threatened and endangered species and their habitats should be listed and described. Indicate the presence and distribution of the following taxonomic groups:

species listed as either endangered or threatened by the state or federal government or both

species that are proposed or candidates to be listed as either endangered or threatened by the state or federal government or both

species of concern as determined by the U.S. Fish and Wildlife Service (those which appear or are suspected to be declining and may eventually fall under one of the categories listed above)

those species noted as rare or vulnerable by authorities on the specific taxa and not necessarily recognized by the State or Federal Endangered Species Act (such as insects)

In addition, note whether the habitat type is part of critical or essential habitat for the taxa listed above and restricted to the project area.

### Resource Values

Note any historical and/or cultural importance related to the species or habitat. Also describe any economic, scientific, medicinal or recreational value related to the species or habitat. Non-

governmental organizations, local community associations, oral histories, Hawaiian language texts, kupuna and recreational users can be consulted to obtain this information. The book, **Valued Economic Ecosystem Components** by Gordon Orian, identifies various resource economic indices that may be of assistance in this analysis.

### 3. Shelf life of biological surveys

If the biological survey for a given site is older than 5 years it should be updated. A new "walk through" of the site should be performed at a minimum. Project proponents should also consult with area experts to determine if any changes have occurred since the area was last surveyed.

## **Part II. Ecosystem Impact Analysis**

Consistency with existing land use policy

The EA should include a full discussion of how the proposed action corresponds to existing county and state land use requirements, goals and objectives related to conservation. The analysis should relate to the following:

- State and county zoning
- County General Plans
- State Plan
- State Environmental Policy (HRS 344)
- Habitat fragmentation and encroachment assessment

Determine whether the proposed action reduces the principal community types which are located on the given site and are part of the larger ecological community outside the project area.

For example, if the project alters native forest that occupies 10% of the project area, but represents 50% of that forest type remaining in the district, then the impact analysis should cover both the reduction of vegetation in the immediate project area and in the district as a whole.

Identify and assess areas that are generally intolerant to change such as wetland habitat, dryland forests and coral reefs. Analyze potential impacts resulting from catastrophic events (e.g. hurricanes, fires and landslides) in addition to the project impacts. Consider this cumulative impact on the survival of any species.

Noise impacts on the area should also be considered.

#### Alien species importation

Indicate whether and how the proposed action increases the potential for alien species dispersal that may affect native species. For example, if temporary access roads/corridors are to be built through pristine forest for construction in a disturbed area, discuss how the construction of access roads could increase alien plant dispersal. Encroachment of exotic grasses that increase the area's fire hazard can also be a concern.

#### 4. Cultural impact analysis

Discuss potential impacts to the cultural use of biological resources. The analysis should relate to native gathering and other traditional subsistence practices (e.g., fishing, aquaculture) as well as current cultural activities (e.g., commercial, scientific, recreational, educational).

#### 5. Impacts on Streams and Coastal Waters

A project's impact on streams, rivers and coastal waters should be assessed. A project that alters streams could impact upon the following:

- wetlands, estuaries and fisheries
- native species, food sources, water quality, temperature and nutrient load
- reduction in flow leading to increased predation or competition from alien species
- siltation or contamination of habitat from run-off
- ground water resources or agricultural uses

### **Part III. Proposed mitigation measures**

#### 1. Vegetation alteration

If the proposed action reduces and/or alters existing vegetation, mitigation measures may include the following:

- incremental clearing of project site to reduce erosion and siltation
- concurrent application of geotextiles or other proven techniques in erosion-prone areas
- revegetation with native species

#### Alien species introduction and establishment

If the project is shown to increase the potential for alien species importation, then mitigation should include the cleaning of gear, equipment and clothing before, during and after the project is completed.

### 3. Ecosystem-wide and species-specific management of significant biological resources

If the project potentially impacts significant biological resources, mitigation of impacts should go beyond mere avoidance of the resources. The EA should consider direct management and/or protection of sensitive species and their supporting ecosystems, to include the following:

- ecosystem protection planning: designation of heavy impact activities to areas within the project that can sustain them (e.g., previously degraded areas)
- habitat enhancement: selective weeding, native species outplanting
- subsequent monitoring: engage foresters and/or biologists to monitor effects of actions over time and direct additional management actions as needed

#### Project design

To reduce or mitigate a project's impacts, it may be appropriate to integrate the following components into its design:

- buffer zones to protect fragile areas
- walkways or boardwalks to protect sensitive areas
- native landscaping appropriate to the area
- detention and retention basins to control run-off
- vegetated rather than channelized stream banks

#### Alternative analysis

To direct harmful development away from sensitive native ecosystems, the project proponent should consider employing conservation techniques such as land exchanges, conservation easements, and management agreements with non-profit organizations. The Trust for Public Land and the Nature Conservancy, among other organizations, may provide technical assistance with developing these options.