1. INTRODUCTION - ENVIRONMENTAL CONDITION ASSESSMENT

Environmental Condition Assessment (ECA) is a process for establishing long-term monitoring that uses "environmental indicators" as a primary tool to assess current resource conditions and to detect change in these conditions over time. This process is equivalent to the National Park Service's 'vital signs' process (Davis, in press) and the 15 steps of the process are described below. Environmental indicators will be the parameters that, when measured over time, will provide information about trends in ecosystem condition. Monitoring integrated sets of indicators will provide valuable information, in an efficient manner, on the response of environmental complexes to visitor use, park management, and external influences.

Properly selected environmental indicators can be used in parklands to:

- help managers understand how natural systems are responding to internal and external influences and threats;
- evaluate the ability of ecological systems to sustain biological diversity while providing visitor recreation and educational opportunities;
- anticipate or forecast emerging natural resource problems before they reach crisis proportions; and
- monitor progress in maintaining and restoring ecosystems and ecosystem processes, both in natural areas of the park as well as heavily used and modified sites, such as day use areas and campgrounds.

An assessment of the condition or health[1] of environmental complexes is complicated by two major factors: 1) the lack of adequate knowledge of the basic ecological elements (structure, components, and processes) occurring in the park units; and 2) the difficulty in deciding what the desired environmental condition actually should be. Any process used to assess conditions, whether it is for the health of a person or for ecological complexes, relies on certain knowledge and assumptions. To evaluate health, it is necessary to know the qualities of good health and poor health. Much is known about the factors or elements of human health. The range in human characteristics, such as body size, heart rate and blood pressure, is well documented. In contrast, little is known about the range of variation in a healthy ecosystem. Ecosystem health cannot be assessed without the knowledge of normal ranges of variation.

Since little is known about most environmental complexes, the use of indicators as a method to assess environmental condition has important limitations at this time. In many cases, a change in condition of an indicator, such as an increase in the number of a particular native wildlife species, will not necessarily provide a clear indication of whether or not environmental conditions are improving or declining. To again use the human condition as an example, a high heart rate in and of itself doesn't necessarily mean a person is in poor health - she may have just run three blocks to get to her medical appointment. As in the medical profession, environmental assessments must not rely heavily on short-term data or narrowly focused information. Assessment of environmental condition must be based on trends of various indicators that provide information on different elements of the ecosystem, including components, structures and processes.

An Environmental Condition Assessment program designed for a specific park should:

- identify the status or condition of sensitive species;
- identify the status of selected indicator species;
- identify the status or condition of key processes (fire, nutrient flow, hydrologic cycles) in environmental complexes;
- identify threats;
- document and display data in a manner which allows managers to assess local conditions and events (such as a wildfire) within the context of surrounding regional conditions and events; and
- represent present knowledge, yet be capable of being modified as new knowledge and techniques are developed.

[1] We realize that in some ways 'health' is an inappropriate metaphor for ecological condition and there has been much debate over use of the term. However, we agree with Karr and Chu (1999) that, "*Health* as a word and concept in ecology is useful precisely because it is something people are familiar with."

2. PROGRAM IMPLEMENTATION

2.1 DESIGN AND IMPLEMENTATION OF UNIT NATURAL RESOURCE INVENTORY, MONITORING AND ASSESSMENT (IMAP) PLANS

Unit monitoring programs must be well thought out to help ensure that the efforts capture the most important information in an effective and efficient manner for both short and long-term management needs. This section describes the 15 steps followed in the ECA process to develop and prepare the unit IMAP plan (Figure 1). Through this planning process many essential issues are addressed, including identification of general unit management goals and objectives, identification of a conceptual model of the park unit and ecosystems, identification of monitoring priorities, development of monitoring protocols, and provisions for database management and reporting of all essential aspects of the program.

The ECA process can be carried out in several ways, and we highly recommend an interdisciplinary approach that includes park ecological, maintenance, interpretation, and ranger personnel. Several successful IMAP plans have been developed during workshops, generally lasting 1-3 days, whereat key park personnel go through the steps in the following process. An alternative approach is for one person to be given responsibility for the ECA process, and through meetings with key individuals and iteratively circulating intermediate products for review among park staff a plan is derived.

2.2 INFORMATION PHASE – THE FIRST 5 STEPS

2.2.1 STEP 1 – IDENTIFY BROAD GOALS AND OBJECTIVES FOR THE UNIT

Based on the unit's General Plan, Declaration of Purpose, or reason for acquisition, and intrinsic values, in concert with District and Department-wide goals, articulate the primary goals and objectives of the unit. A review of the general legal mandates and directives, such as those contained in the classification statutes and Department Resource Management Directives, and policies and management objectives contained in the General Plan for the unit is helpful at this time.

This step can be accomplished through a workshop of the Interdisciplinary Team.

The product expected for this step is a statement of unit goals and objectives.

2.3 2.2.2 STEP 2 - IDENTIFY ECOLOGICAL UNITS AND MANAGEMENT ZONES AND CREATE MODELS

Parks are a mosaic of different environmental complexes and land uses. Assessing the condition of natural resources in a park requires delineation of its different ecological units, or environmental complexes. Ecological units are equivalent to ecosystems for this purpose and are based on the analysis of vegetation, landforms, and hydrologic processes.

It is then necessary to identify management zones. This is necessary to provide a foundation from which desired environmental conditions and appropriate environmental indicators can be identified. Management zoning involves dividing the park into specific management areas, each with specific management objectives. Each zone also specifies a particular combination of physical, biological, social and management conditions. To achieve and maintain these conditions, different types and levels of use and facilities are permitted and different management actions are taken. Larger and/or less homogenous, parks may require more zones than smaller and/or more uniform, parks, where fewer (or even a single) zones may suffice. Zones should be established through synthesis of existing information on natural and cultural resources, recreational values, and long-term management objectives. The boundaries of zones can be established using a combination of natural boundaries, such as watersheds, and boundaries of areas with different land use, such as campgrounds and day use areas. A large area containing lands

with similar broad management objectives can be identified as one zone and further subdivided into subzones, as necessary, to identify more specific objectives.

Preparation for the workshops also includes the development of conceptual models that provide an outline of management zones in the unit. The models are designed as a graphic tool to help organize the information and the discussions. They are based on the various management zones within the units and habitat types or natural communities known to occur within them. Major watersheds may provide a scheme for partitioning or subdividing the units because they represent easily recognized subunits within the parks. In small units, watersheds may not be an effective tool for division. Instead, ecological units may be delineated as natural communities and management zones may be defined based on land use. Diagrams identifying the broad categories of biotic (living), abiotic (non-living, i.e. air and water quality and geologic features) and socio-cultural resources (human-influenced). The models can further break down the categories to the level of components (such as fishes, birds, soils, and land pollution). Reference forms were created to allow convenient recordation of the specific biotic, abiotic, and socio-cultural components addressed in each referenced report, see attached example (Table 1) from Plumas-Eureka State Park. The conceptual models and diagrams are important tools for assessment of existing information and gap analysis.

The expected product from step 2 is the delineation of all zones and subzones on a park map with a U.S.G.S. standard base.

2.3.1 STEP 3 IDENTIFY EXISTING RESOURCE INFORMATION AND KNOWLEDGE GAPS

Review and assess what is known about the biotic and abiotic resources of the unit and identify important information gaps. This task is accomplished through literature review and through a workshop where the interdisciplinary team discusses what information was available and what information is needed.

Approximately two weeks prior to the first team workshop the District Ecologist needs to begin a review and compilation of reference sources that address the natural resources in the unit. The information gathered can be entered into a database now or at a later time.

The products expected from Step 3 are lists of references and management issues for the various management zones identified in Step 2.

2.3.2 STEP 4 – ESTABLISH UNIT INVENTORY AND MONITORING PROGRAM GOALS AND OBJECTIVES INCLUDING FRAMEWORK FOR DATABASES

As discussed by Elzinga et al.(1998) monitoring objectives, to be effective, should be realistic, specific, unambiguous, and measurable. The goals and objectives of the unit IMAP should support the resource goals outlined in Step 1 and the management zones identified in Step 2. The team identifies which of the resource goals and management zone objectives require an ongoing evaluation of resource conditions or of resource and/or visitor management effectiveness. These form the basis for the unit IMAP plan objectives.

The product expected from Step 4 is a preliminary statement of goals and objectives for the unit IMAP plan. These may need to be modified if further steps point to refinements or omissions.

2.3.3 STEP 5 - DESCRIBE EXISTING CONDITIONS

This is the last step in the Information Phase and the first task of entering information into the Environmental Indicator Matrix under the ECA process. An example of the ranking method (discussed in Step 11) and the Matrix format is attached as Table 1. The matrix is a tool for showing the relationships between the existing resources of the unit, desired resource conditions, stressors to the resources, environmental indicators of resource condition, and target measures.

Providing information in the first two columns of the matrix involves describing the resources of the unit using a hierarchical approach. The approach draws information from some of the diagrams and models prepared in Step 2.

Management zones are identified in the first column. Important environmental complexes (such as coastal foredune) within each selected zone and/or subzone are shown in the second column. Statements on the existing condition of selected resource components (such as water quality or specific animal species) are also provided in the second column under appropriate major categories (such as hydrology and terrestrial animal).

The following is a guide for selecting categories and components under management zones and subzones. When deciding which categories and components to use, selection should be based on which ones afford the broadest and truest "picture" of the condition of the unit, while maintaining a realistic approach to what information-gathering can be accomplished with sufficient regularity and accuracy to be reliable and useful. This step involves selecting components for which environmental indicators can be identified that provide relevant and measurable data over time.

When filling in the Matrix Existing Condition column include basic statements pertaining to the integrity/quality of the environmental complex and the component parts. In many cases, adequate information will not exist initially. In these situations, the lack of data can be stated and additional information can be collected over time.

The type and extent of information to be gathered will vary among park units. The following identifies some important parameters or topics under each of the six major resource categories and serves as a guide until a comprehensive guideline or standard is prepared.

Atmospheric

- Temperature and precipitation (such as daily high/low temperatures and rainfall).
- Pollutant concentrations (such as particulates and nitrogen oxides).

Geologic

- Major landslide areas.
- Erosion and sedimentation (such as the rate of coastal bluff retreat).

Hydrologic

- Water quantity and quality;
- Fluvial processes.

Plant Life

- Native plant species (such as lists and mapped locations).
- Special interest plants, including endangered, threatened, sensitive and alien species.
- Plant communities (communities/type map).

Animal Life (for invertebrates, reptiles and amphibians, fishes, mammals, birds)

- Native species (such as lists and mapped locations).
- Special interest animals, including endangered, threatened, sensitive and alien species.

Esthetics

- Noise and visual conditions or intrusions.

2.4 ASSESSMENT PHASE – STEPS 7 TO 12

Following the information phase the assessment phase utilizes the judgement and experience of park staff to continue completing the environmental indicator matrix (Table 1).

2.4.1 STEP 6 - DESCRIBE DESIRED CONDITIONS

Desired conditions are statements describing the conditions of the environmental complexes, components, and processes that are expected to exist if management goals and objectives are achieved. These statements can address visitor uses, degrees and/or types of development desired, as well as natural resource conditions to be maintained or restored. It is important to make calls, even if based solely on professional judgement, about the desired condition of park resources.

2.4.2 STEP 7 - IDENTIFY STRESSORS

An environmental stressor is a specific cause of ecosystem change. It may be an active threat or a result of past land uses. Stressors may be threats that the Department has direct control over and thus has the ability to change (e.g. slides occurring along roads or trails), or may be the result of off-site influences (e.g. air quality effects on vegetation/visual resources). Both types of stressors are important to consider and include under this column in the matrix. A stressor's exposure is the frequency, duration and/or the intensity and rate of accumulation of the stressor on the environmental complex or its component parts.

2.4.3 STEP 8 - IDENTIFY ENVIRONMENTAL INDICATORS

An environmental indicator is a specific component of the environmental complex affected by exposure to a stressor. Indicators are used to measure the response of biological features of ecosystems to their exposure to stresses, whether natural or anthropogenic. Indicators are selected that will measure the integrity of the whole system, including species, features and processes integral to healthy continuance of the environmental complex. This step must not attempt to underestimate or oversimplify the complexity of ecosystems. It is critical to attempt to look at the 'big picture' and to identify components (known and unknown) and potential factors of change (stressors/exposure). There is a point later in the process where prioritization of needed data collection and/or active management efforts will occur.

2.4.4 STEP 9 - IDENTIFY TARGET RANGES

Target ranges set the goal for maintenance of a particular desired resource condition. Targets must be identified in some measurable quantity. For example, a target for a coastal grassland might be "Not less than 80 percent native species" and/or "Less than 5 percent cover by any alien species rated as highly invasive". For animals, an appropriate target for an environmental indicator at the individual hierarchical level might be between 20 and 60 successfully fledged snowy plovers (a ground nesting endangered bird).

2.4.5 STEP 10 - ASSESS EFFECTS OF NOT ATTAINING DESIRED CONDITIONS

In this step, an assessment is made of the effects associated with not attaining the desired resource condition. It indicates the environmental result that is likely to occur if the indicator is not in the desired state. The potential impact of this effect upon natural conditions within and beyond the environmental complex should be addressed. The effect of the stressor on the environment should also be defined in terms of potentially direct effects on park visitors as well as the other citizens of the state.

2.4.6 STEP 11 - RANK ENVIRONMENTAL INDICATORS

Due to limited funding and staff, only the most useful, relevant and economically feasible of the many possible environmental indicators should be used in the evaluation of environmental conditions. The most useful and

relevant indicators are those that will provide information about specific resources within the complex that are most indicative of ecosystem condition (health).

The relative importance of all of the unit's many resources that might be monitored will be judged and numerically ranked using the three broad criteria (knowledge of resource and threat, importance of resource, and intensity of threat). A description of each criterion and explanation for how to apply them is provided in Tables 1 and 2.

Note that evaluations and comparisons will be made at the park level. Interpark comparisons are not expected. This is because resource "X" may be critical in one park but not in another. Note also that all evaluations and comparisons are to be made without regard to probable cost of data gathering or of subsequent remedial actions. If Resource "X" is the most important, it is the most important without regard to the cost of protecting it.

2.4.7 STEP 12 - IDENTIFY MONITORING PROJECTS

Natural resource monitoring includes the spectrum of activities running from repeated casual observations to the more formal collection of quantitative measurements at specific intervals of time. The appropriate intensity for monitoring is dependent on both the characteristics of the element being monitored and the level of information needed for management.

The word "monitoring" can mean different things depending on the discipline involved. Some of the common terms associated with monitoring are discussed below. In the State Park System, all of these monitoring types may be used; however, "trend" monitoring and "project" monitoring are the primary monitoring activities used in natural resource management.

Long Term Monitoring: Baseline or Inventory vs. Trends : Baseline data and inventory data are terms that are sometimes interchangeable in usage, although baseline implies a commitment to a continued assessment over time. Both terms signify the initial assessment made of an area. Trend monitoring involves monitoring the changes in the elements of interest over the long-term and may simply be the continuation, over time, of the sampling conducted during the initial inventory. Ecological health assessments are a type of trend monitoring.

Project or Management Activity Monitoring: This type of monitoring assesses the impacts of specific management actions such as habitat restoration, species reintroduction, and prescribed fire. Monitoring of specific project effects may be of shorter duration and require more intensive sampling than trend monitoring. Some management actions, such as prescribed fire, may be recurring and have long-term effects. Therefore, there may be considerable overlap between project monitoring and trend monitoring.

Visitor Use Impacts: Impacts from recreation and other public use often require a different approach than project monitoring. Either using a "carrying capacity" approach or defining minimum acceptable conditions, monitoring data on recreation use and its effects can provide a rational basis for mitigating impacts by such means as restricting use, changing the period of use, or closing areas.

Compliance Monitoring: Laws governing water quality, air quality, and other environmental elements may specify required levels for particular parameters. For instance, state of local agencies may require monitoring to determine if the water quality downstream from a park sewage treatment plant meets predetermined standards.

Monitoring mitigation actions for Department facility development projects required by other agencies can be included in this type. The California Environmental Quality Act requires monitoring for project mitigation activities. In addition, federal, state, county and regional regulations may require monitoring for certain management activities the Department undertakes.

In a few instances, data to measure and assess high priority indicators may already have been gathered through monitoring efforts of park staff, researchers, or other government agencies. However, new monitoring projects will need to be planned to acquire needed data/information for most of the highest priority indicators.

2.5 IMPLEMENTATION AND EVALUATION PHASE – STEPS 13-15

Once the planning steps have ended it is time to set-up and carryout actually inventory and monitoring projects. The next three steps describe the process of implementing the IMAP plan.

2.5.1 STEP 13 - INITIATE INVENTORYING & MONITORING PROJECTS

High priority projects are implemented to gather data on the environmental indicators to determine if measurements are within the target range. Experts should be identified who will design and conduct the field studies and who will prepare specific inventory and monitoring study plans including details about appropriate sample methods and timing of sampling. To ensure quality control the IMAP project manager at HQ should review the study plan before any fieldwork is initiated. DPR, contract, or volunteer staff may perform project fieldwork. An important element of this step is ensuring data is processed according to IMAP data management standards that will be issued to all Districts and made available on the IMAP website.

2.5.2 STEP 14- EVALUATE RESULTS

Evaluating the data and answering the question "Is the desired condition existing or met?" presents many challenges depending on the environmental indicators selected. In many cases, the target range will not be initially known and will need to be determined at a later time through the evaluation of many cycles or years of monitoring. This step involves statistical analysis of data and comparisons with previous years inventory and monitoring findings. This evaluation also includes an assessment of the monitoring protocol to determine if selected indicators appear useful or if new indicators should be selected.

In some instances, standards or target ranges have been developed such as for some water quality parameters. For many others, they have not. Methods to evaluate data and express individual trends in a particular resource and to evaluate trends for an entire park will be developed over time. Guidance on how to address these questions will be developed during the initial pilot study.

The unit IMAP plan should contain a schedule for planning purposes showing the seasons of data collection, period of data analysis, and when final reports of inventory and monitoring studies will be produced.

2.5.3 STEP 15 - ASSESSMENT

Once information on the condition of important resource values is evaluated, projects can be designed and initiated to correct or ameliorate an environmental complex or specific environmental indicator that is out-of-balance or otherwise not in the "desired condition". Adaptive management efforts may focus on those indicators that have the highest numerical ranking - those judged to be most significant in the Environmental Indicator Matrix.

The ranking and importance of individual monitoring projects will be reevaluated based on the findings and available target ranges to make sure the field effort is meaningful. Work on projects that have consistently met target criterion may be scaled-back so that other issues may be emphasized.

2.6 CONCLUSION

The ECA process is an important place to start before implementing a monitoring program. The 15-steps in the process have proven to develop an effective inventory, monitoring, and assessment plan for each park. It is probably also possible to develop plans for several parks simultaneously on a bioregional basis using this process. IMAP HQ and Service Center staff will assist Districts in the planning process.

GLOSSARY

Desired Condition - The condition of natural resources expected to result if resource management goals and objectives are achieved. This can (and should) include evaluations of the social component of park management by identifying the desired natural resource condition that can be maintained while allowing for an accepted level of visitor use (or non-use).

Ecosystem - A system formed by the interaction of living organisms (including people) with their environment. Spatially, ecosystems are described for areas in which it is meaningful to talk about these relationships.

Ecosystem Function - The flow of species, materials, and energy within an ecosystem, across landscapes and through time. Includes a variety of processes, such as succession, biotic food chains, fire, hydrologic systems, and nutrient cycling.

Elements (of an ecosystem) - The basic building blocks of ecosystems. Three fundamental types of elements: **components** are the kinds and numbers of organisms and physical attributes that make up the ecosystem -- the "pieces"; **structures** refer to spatial distribution or pattern of these "pieces"; and **processes** refer to the flow or cycling of energy, materials, and nutrients through space and time.

Environmental Complex - As assemblage (entirety of/aggregate) of natural features (biological, physical, chemical) occurring within a specific geographic area, features deemed to reflect collectively a unique grouping of ecosystems.

Environmental Condition - The general status of an environmental complex.

Environmental Indicators - Measurable features of ecosystems that provide useful evidence of the state or condition of the environment. Indicators can be biological, physical, or chemical.

Environmental Stressor - A specific cause of ecosystem change.

Environmental (Stressor) Exposure - The frequency and/or duration of exposure and/or the intensity and rate of accumulation of the stressor on the environmental complex or component parts.

Existing Condition - Basic statements pertaining to integrity/quality of the environmental complex and the component parts. In some parks, existing conditions may not be known. Data collection will be needed to determine "condition". In other cases, enough data may be available to describe the current condition.

Function - The specific role or activity of an ecosystem component. For example, fire functions as a rapid decomposer of woody material.

Healthy Ecosystems - Normally, an ecosystem is considered "healthy" if its structure and functions allow the maintenance of biological diversity, biotic integrity, and ecological processes over time. The term "healthy", however, is laden with values that have not been consistently defined.

Indicator - An organism or an ecological community that is so closely associated with particular environmental conditions, that its presence (or absence) is a fairly certain sign or symptom of the existence of these conditions (see "Environmental Indicator").

Limiting Factor - Any environmental factor whose presence, absence, or abundance is the main factor restricting the distribution, numbers, or condition of an organism.

Monitoring - The collection of information to determine the effects of resource management and to identify changing resource conditions or needs.

Natural Resource Inventorying is the process of acquiring information on park resources, including the presence, distribution, and condition of plants, animals, soils, water, air, geologic features, biotic communities, natural processes, and human-induced changes in park resources.

Natural Resource Inventories are accounts of park resources, including the presence, class, distribution, and normal variation of plants, animals, and abiotic components such as water, soils, landform and climate. They include an assessment of the biological or ecological diversity. Inventories are designed to contribute to a statement of the condition of park resources, which is best described in relation to a standard condition such as the natural or unimpaired state. Inventories may involve both the compilation of existing information and the acquisition of new information.

Natural resource monitoring is long-term systematic repetition of a specific resource survey and the analysis of those data to predict or detect natural and human-induced changes in resource condition, and to determine if natural resource condition objectives are being achieved.

Reference Variability - The spectrum of conditions possible in ecosystem composition, structure, and function, considering both temporal and spatial factors. Specifically, it is the distribution of data values for an Environmental Indicator over a selected period of time (for biological indicators, an evolutionary time period). Also referred to as Natural Range of variability or Historic Range of Variability.

Response Indicator - A specific component of the environmental complex affected by exposure to a stressor.

Species Richness - The number of species, either in total or by some grouping scheme.

Succession - The predictable, orderly, long-term developmental changes of an ecosystem, involving changes in species composition, structure, and community processes

Figure 1. Environmental Condition Assessment (ECA) Process Flowchart and relationship to District, Service Center, and NRD Inventory, Monitoring and Assessment Program (IMAP).

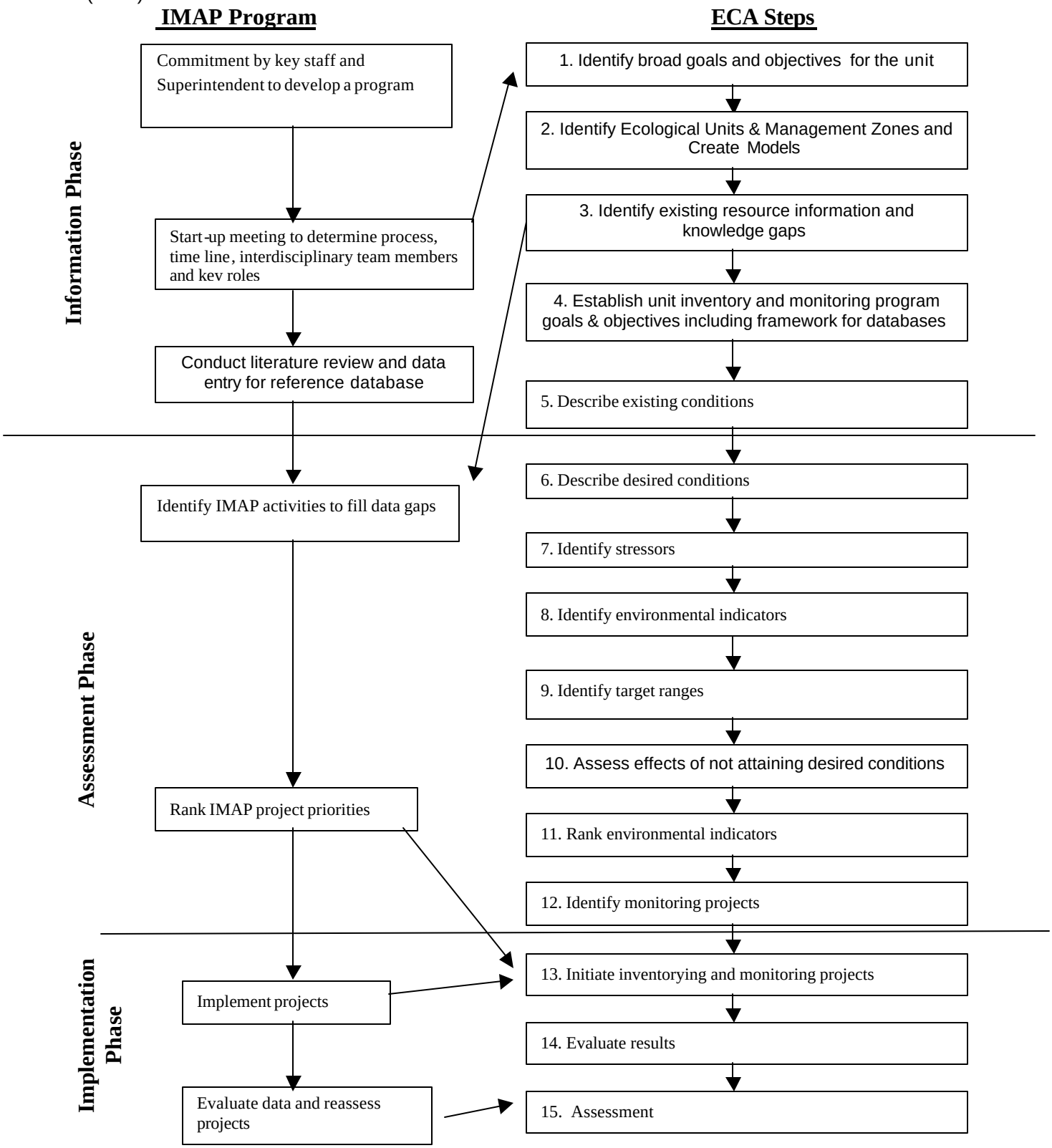

Table 1. Ranking environmental indicators and Environmental Indicator Matrix (used in ECA process Steps 5-12, example from Plumas-Eureka State Park).

Importance of the Resource (40 points): The intrinsic or inherent importance of a resource in and of itself, without respect to other factors, may be measured in terms of its quality or quantity. This importance has been identified by such means as state and federal legal requirements or listings, local recognition, the unit's general plan, the unit's resource inventory or management plan(s), departmental policies and/or the judgment of well-informed professional resource managers.	**Quality:** Either a superb (the best) example or an excellent characteristic sample -- the resource size (a critical mass or scale, its current or prospective condition), and its location (good distribution, minimum fragmentation and its relationship to other ecologically relevant resources) are important considerations.	**Quantity:** The total acreage, the number of existing examples within and outside the park; is it rare, endangered, or listed at state or federal level.	**Legal Aspect:** The resource in question is protected by law or policy at some level; protectors include everything from CEQA/NEPA to endangered species laws to the regulatory requirements of the Coastal Commission and local governments. The level of required legal protection is an important factor in measuring "intrinsic importance."	
Intensity of the Threat to the Resource (40 points): The probable reduction in the quality and/or quantity and/or viability of the resource that will occur if remedial action is not taken. The estimated potential negative changes may be measured in terms of their magnitude, speed, and irreversibility.	**Magnitude:** How much of the resource will be lost, particularly in terms of the size needed for a viable population.	**Speed:** The rate at which the loss is taking place, considering whether the rate of change is constant or increasing/decreasing over time.	**Irreversibility:** The potential loss of resource viability, or the genetic diversity needed for a healthy population.	
Knowledge of the Resource and the Threat(s) to It (20 points): The quantity and quality of the information already at hand, the time needed to gather more, the possibility that the new information that is to be gathered will be useful in other areas or for other purposes, and the capability of the department's own actions to have a positive impact on the situation.	**Quantity:** How much Is known about the threat, its nature, how it works, its changes over time and the impact of possible remedial actions.	**Quality:** Is the known information the result of scientific studies, observations, informed opinions or anecdotal information.	**Spillover:** Will information gathered here be useful on other matters of importance to the department.	**DPR Capability:** The degree to which the department, as a land manager or in its influence of others, can have a significant effect reducing the threat.

Management Zone Subzone	Environmental Complex Existing Condition	Desired Condition	Stressor/ Exposure	Environmental Indicator	Target Range (Measure) of Indicator	Is Desired Condition Existing?	Effect on Resource	Effect on Public	Environmental Indicator Ranking	Management Activities, as necessary	Is Desire Condition Met?
Parkwide	**Parkwide.** The integrity and long-term perpetuation of important natural resources in the park depends on the perpetuation of habitat on, or adjacent to, nearby lands (especially for the scrub communities northeast of the park). Linkages or corridors to these lands is equally important.	Perpetuation of adequate ecological linkages to important off-site habitat areas.	Existing zoning and land use northeast of the unit has impacted and continues to impact off-site habitat values. Linkages to park habitats have also been impacted.	Connectivity to important off-site habitat areas.	Unknown	Unknown					
	Coastal Foredune										
I. Coastal Zone .... A. Spit Area	**Soils and Flora.** Sites are recovering from extensive past disturbance. Prescribe fire treatments, visitor control, exotic plant control and native plant revegetation efforts begun in the 1980's have made some significant improvements.	Biotic communities to be in similar condition as occurred prior to significant European influence (prior to 1800).	Visitor use (hikers and equestrians) creates conditions favorable to the introduction and spread of invasive plants pests.	Percentage of bare ground.	20-40% bare ground.	Yes. 30% is bare ground.					
				Native plant cover.	60-80% native plant cover.	No. Only 50% cover is native.					
				Exotic plant cover.	Less than 10% cover by most invasive exotic taxa.	No. 20% cover is exotics					
	Coastal Dune Scrub										
	Soils, Flora, and Fauna. Sites are recovering from extensive past disturbance. Visitor control, exotic plant control and native plant revegetation efforts begun in the 1980's have made some significant improvements.	Biotic communities to be in similar condition as occurred prior to significant European influence (prior to 1800). Native plant communities with a variety of seral stages.	Visitor use (hikers and equestrians) creates conditions favorable to the introduction and spread of invasive plants pests; fire suppression affects processes that helped maintain mosaic pattern of different seral vegetation stages.	Presence of invasive exotic plants, such as ice plant.	Total coverage by the most invasive exotics (identified for region) to be less than 5%.	No. 20% of cover is in the class of highly invasive species.					
				Potential habitat for Morro Bay Kangaroo rat.	Not less than 100 acres of prime habitat.	Yes. 120 acres of prime habitat.					
					Not less than three different seral stages of dune scrub.	Yes. 40% young, 30% middle aged, 30% old.					
	Dune Chaparral										

Management Zone Subzone	Environmental Complex Existing Condition	Desired Condition	Stressor/ Exposure	Environmental Indicator	Target Range (Measure) of Indicator	Is Desired Condition Existing?	Effect on Resource	Effect on Public	Environmental Indicator Ranking	Management Activities, as necessary	Is Desire Condition Met?
	Flora. Areas are recovering from historic disturbance. Some diversity of different seral community stages exists.	Biotic communities to be in similar condition as prior to European influence (prior to 1800). Native plant communities to include different seral stages; subareas with different levels of senescence in shrubs.	Soil disturbance by visitors favors the introduction and spread of invasive plants pests; continued fire suppression and other factors are tending to maintain an even age (single seral stage) community, compromising long-term stability.	Status of Morro Manzanita (T&E species).	Not less than 60 acres of good habitat.	No. Only 40 acres of good habitat.					
					30-40% of area in each of three age classes.	No. Only two classes (40% middle age & 60% old (senescent).					
					Not less than 40 total plants.	Yes. 45 plants					
	Intertidal										
I. Coastal Zone ....B. Intertidal .....and terraces	**Flora and Fauna**. Existing conditions are largely unknown. Native intertidal species abundance and diversity is thought to be within the desired range in areas with limited visitor access and potentially degraded in other areas.	Biotic communities to be in similar condition as occurred prior to significant European influence (prior to 1800).	Various exploitation during period 1800 to 1950's; sport and commercial harvest since.	Presence and distributions of sea palm.	To be determined through initial monitoring of pristine vs. impacted areas.	Unknown					
				Species diversity and abundance of selected taxon	To be determined through initial monitoring of pristine vs. impacted areas.	Unknown					
	Grassland										
	Flora. Most grasslands are moderately to highly modified due to past land use (including agriculture), fire suppression and invasion of exotic plants.	Biotic communities to be in similar condition as occurred prior to significant European influence (prior to 1800).	Suppression of natural processes (including fire) and soil disturbance due to facilities and visitor use continues to create conditions suitable for the introduction and spread of exotic pest plants.	Percent native plant cover.	50 -75 % native species.	No. Cover only 40% native species.					
				Status of high priority invasive exotic plants, such as Kikuyu grass.	Total coverage by top priority exotics (as listed) to be less than 20 %.	No. 40% of cover is in the class of highly invasive species.					
	Wetlands - Creek estuaries										
	Riparian Forest										

Management Zone Subzone	Environmental Complex Existing Condition	Desired Condition	Stressor/ Exposure	Environmental Indicator	Target Range (Measure) of Indicator	Is Desired Condition Existing?	Effect on Resource	Effect on Public	Environmental Indicator Ranking	Management Activities, as necessary	Is Desire Condition Met?
II. Upland Zone .... A. Natural ..... Areas	**Flora**. Control efforts underway since the mid 1980's have had some success in reducing the number of eucalyptus in riparian areas. Other exotic plants also threaten the native communities.	Biotic communities to be in similar condition as occurred prior to significant European influence (prior to 1800).	Eucalyptus continue to restock the area through resprouts and seeds.	Presence of eucalyptus.	Mid-term (5-20 years) - less than 5 plants/ac.; long-term (20-50 years - less that 1 plant/ac.	No. 10 plants per acre.					
			Visitor use and off-site upper watershed land uses increases the potential for introduction and spread of invasive plants pests.	Status of most invasive exotic plants, such as German ivy.	Total coverage by most invasive exotics (other than eucalyptus) to be less than 5 %.	No. Cover is 10% highly invasive species.					
	Fauna. The riparian forests provide overwintering sites for monarch butterflies.	The unit should continue to provide suitable habitat (shelter and foraging) for monarch populations.	Reduction in certain eucalyptus groves used by monarchs may decrease overwintering populations if alternate sites in native stands are not suitable and accepted. Disturbance by major storm events and visitors may also be factors.	Number of overwintering locations within unit and population numbers.	Not less than 3 locations in park and not less than a total of 10,000 butterflies.	Yes. 3 groups with a total of 12,000 butterflies.					
	Pine Forest										
	Flora. The pine forest appears to be stable and in good health, however, no studies have been conducted to confirm.	Biotic communities to be in similar condition as occurred prior to significant European influence (prior to 1800).		Presence and status of pitch canker	Unknown.	Unknown.					
	Creek corridor										
	Hydrology. Streambank erosion is moderate/high, especially in Islay Creek, due to maintenance of road to adjacent landowner and related minor/moderate landslides. Significant impacts extend downstream, possibly to estuary.	Erosion and sedimentation to be minimal with no significant adverse impacts to downstream bank stabilization and aquatic communities.		Sedimentation and turbidity.	Unknown.	Unknown.					
	Oak Riparian Forest - Islay Creek										
II. Upland Zone .... B. Recreation .....Facilities (Campground and Day-use Areas)	**Hydrology and Flora.** Streambank erosion is moderate/high in this reach due upstream erosion problems and bank modifications associated with campground development and maintenance. Campground road and sites require frequent maintenance as a result.	Bank erosion and sedimentation to be within norm for non-impacted streams with no significant adverse impacts to downstream aquatic life.	Accelerated bank erosion due to upstream disturbances and visitor facilities and use along this reach.	Bank stability (rates of erosion).	Unknown.	Unknown.					
				Vegetative cover.	80% plant cover.	No. 70% cover.					

Management Zone Subzone	Environmental Complex Existing Condition	Desired Condition	Stressor/ Exposure	Environmental Indicator	Target Range (Measure) of Indicator	Is Desired Condition Existing?	Effect on Resource	Effect on Public	Environmental Indicator Ranking	Management Activities, as necessary	Is Desire Condition Met?
	Hydrology. Water quality is unknown.	Islay Creek should be managed for optimum water quality to support native aquatic life and allow for safe human contact. Campground facilities and use should not degrade water quality. Coon Creek may serve as benchmark.	Turbidity from upstream erosion and possible contamination from campground and sanitation use and maintenance.	Sedimentation and turbidity.	Unknown.	Unknown.					
				Dissolved oxygen levels	Unknown.	Unknown.					
				Coliform levels.	Unknown.	Unknown.					
				Diversity and abundance of selected aquatic invertebrates and fishes.	Unknown.	Unknown.					

TABLE 2. CRITERIA USED TO PRIORITIZE INVENTORYING AND MONITORING PROJECTS

IMPORTANCE OF THE RESOURCE AND/OR DEALING WITH THE ISSUE
5 - Very important
3 - Important
1 - Slightly/not important

PRESENT KNOWLEDGE OF THE RESOURCE
1 - Substantial information exists
3 - Very little information (moderate)
5 - No information

RATE OF CHANGE IN THE RESOURCE AND/OR ISSUE
5 - Probably very rapid
3 - Probably fairly rapid to moderate change or widely variable
1 - Probably slow

CONSEQUENCE OF THAT CHANGE
5 - Probably very serious
3 - Probably moderate
1 - Probably slight

CHANGE IS A RESULT OF LAND MANAGEMENT ACTIONS: INCLUDING RESOURCE MANAGEMENT PROJECTS, OUTSIDE AGENCY ACTIVITIES, ADJACENT LAND DEVELOPMENT, ETC.
5 - Probably a direct result
3 - Probably an indirect result
1 - No

RESOURCE IS RELATED TO A SIGNIFICANT PUBLIC HEALTH OR SAFETY ISSUE
5 - Probably a key element
3 - Possibly a key element
1 - Probably not a key element

PROJECT WILL CONTRIBUTE SIGNIFICANTLY IN FILLING GAPS IN KNOWLEDGE OF THE RESOURCE AND/OR ISSUE
5 - Probably very well
3 - Probably moderately well
1 - Probably only slightly

USEFULNESS OF INFORMATION AND/OR TECHNIQUES TO OTHER AREAS OR DPR PARK UNITS
5 - Probably of wide use
3 - Probably of some use
1 - Probably of little use

LEGAL REQUIREMENTS: INCLUDING DPR MANDATES TO UNDERSTAND THE EFFECTS OF OUR MANAGEMENT UPON LISTED OR CANDIDATE TAXA; OTHER PRC MANDATES; INTERAGENCY AGREEMENTS; PERMIT requirements (for ongoing projects)
5 - Yes
3 - Some
1 - No