

## GLOSSARY

### **ADAPTIVE MANAGEMENT**

Adaptive management is an iterative process, designed to experimentally compare selected management actions by evaluating alternative hypotheses about the ecosystem being managed. It consists of three parts: management actions, monitoring, and adaptation. Management actions are treated as experiments subject to modification. Monitoring is conducted to detect the effects of the management actions. Finally, management actions are refined based on the enhanced understanding about how the ecosystem responds.

### **AREA OF POTENTIAL EFFECT**

The legal definition of Area of Potential Effect is the geographic area or areas within which an undertaking may cause changes in the character or use of historic properties, if any such properties exist (36 CFR 800.2(c)). The Programmatic Agreement signatories are currently (as of July 2001) re-evaluating the APE for the Adaptive Management Program and may change it from the current 256,000 cfs.

### **BIODIVERSITY**

Biodiversity is "the variety of organisms considered at all levels, from genetic variants belonging to the same species through arrays of species to arrays of genera, families, and still higher taxonomic levels [including] ... the variety of ecosystems..." (on, E.O. 1992. *The diversity of life*. Belknap Press of Harvard University Press, Cambridge, MA)

### **BIOLOGICAL GOALS**

Biological goals include Goal 1 (foodbase), Goal 2 (native fish), Goal 3 (extirpated species), Goal 5 (Kanab ambersnail), and Goal 6 (riparian and spring communities).

### **CAPACITY (GENERATING)**

Generating capacity is a measure of the ability to generate electric power, usually expressed in MW (megawatts). The capacity of a hydropower plant is a function of head (reservoir elevation) and maximum water flow through the turbines.

### **COLORADO RIVER ECOSYSTEM**

The Colorado River ecosystem is the Colorado River mainstem corridor and interacting resources in associated riparian and terrace zones, located primarily from the forebay of Glen Canyon Dam to the western boundary of Grand Canyon National Park. It includes the area where dam operations impact physical, biological, recreational, cultural, and other resources. The scope of GCDAMP activities may include limited investigations into some tributaries (e.g., the Little Colorado and Paria Rivers).

### **CRITICAL REACHES**

Critical reaches are where there are only very few, very small, or very high use campsites. These reaches are river mile (RM) 6 to 41, RM 75 to 114, RM 130 to 165, and perhaps RM 216 to 246.

### **CULTURAL GOAL**

Cultural goal refers to Goal 11.

### **CULTURAL RESOURCES**

Cultural resources includes, but is not necessarily limited to, any prehistoric or historic district, site, building, structure, landscape, or object included in, or eligible for inclusion in the National Register, including artifacts, records, and material remains related to such a property or resource. Properties of traditional religious and cultural importance to an Indian tribe are included in this definition under Section 101(d)(6)(A) of NHPA.

## **ECOSYSTEM**

An ecosystem is “a community of organisms and their physical environment interacting as an ecological unit.” (Lincoln, R., *et al.* 1998. *A dictionary of ecology, evolution and systematics*. Cambridge University Press, Cambridge.) An ecosystem consists of patterns and processes that are dynamic and occur within a particular range of temporal and spatial variability.

## **ECOSYSTEM MANAGEMENT**

An ecosystem management approach differs from an issue-, species-, or resource-specific approach. Ecosystem management is a method for sustaining or restoring ecosystems and their functions and values. “It is goal driven, and it is based on a collaboratively developed vision of desired future conditions that integrates ecological, economic, and social factors. It is applied within a geographic framework defined primarily by ecological boundaries.” (Interagency Ecosystem Management Task Force. 1995. *The ecosystem approach: healthy ecosystems and sustainable economies*. National Technical Information Service) Ecosystem management is a process that attempts to mimic appropriate ecosystem patterns (abundance and distribution of species and habitats) and ecosystem processes (drivers of ecosystem patterns). It includes managing for viable populations of all native species.

## **ECOSYSTEM PATTERNS**

Ecosystem pattern is the abundance of species, biotic communities, and physical habitats, as well as their spatial and temporal distribution. This is a broader concept than “composition and structure.” Composition usually refers only to species presence or absence, and structure usually refers to the distribution of biotic communities.

## **ECOSYSTEM PROCESSES**

Ecosystem processes are the abiotic (*i.e.*, non-living) and biotic (*i.e.*, living) functions, disturbances, or events that shape ecosystem patterns. There are physical processes (*e.g.*, fire, hydrologic, geomorphic, and climatic regimes; air chemistry, nutrient cycling), biological processes (*e.g.*, competition, predation, herbivory, parasitism, disease, migration, dispersal, gene flow, succession, recruitment, maturation), and anthropogenic processes (*e.g.*, habitat conversion, novel toxins, vandalism).

## **EMERGENCY EXCEPTION CRITERIA**

Emergency exception criteria are operating criteria that allow the Western Area Power Administration to depart from ROD operating criteria in response to various emergency situations in accordance with their obligations to the North American Electric Reliability Council. These criteria also provide for exceptions to the ROD criteria during search and rescue situations, special studies and monitoring, and dam and powerplant maintenance.

## **EXTIRPATED SPECIES**

An extirpated species is one that no longer occurs (*i.e.*, has become extinct) in a particular area. Examples from the CRE include roundtail chub, bonytail chub, and Colorado pikeminnow.

## **FINANCIAL EXCEPTION CRITERIA**

Financial exception criteria would allow a temporary departure from ROD operating constraints on dam releases, as a response to a regional electricity market that is extraordinarily expensive. These criteria do not exist at this time. Similar criteria were in place during the period of Interim Flows (August 1991 to October 1996).

## **FLUVIAL WETLAND (MARSH) COMMUNITY**

The vegetation in this community type is composed mainly of herbaceous plants such as cattail (*Typha* spp.), bulrush (*Scirpus* spp.), and common reed (*Phragmites australis*). This community became established at low elevations within the sand beach community following closure of Glen Canyon Dam. Currently, it usually occurs between about 8000 and 25,000 cfs in periodically inundated environments such as return current channels.

#### **INTERESTED PARTY (PER NHPA)**

Interested parties, for purposes of the National Historic Preservation Act, are additional consulting parties. Certain individuals and organizations with a demonstrated interest in the undertaking may participate as consulting parties due to the nature of their legal or economic relation to the undertaking or affected properties, or their concern with the undertaking's effects on historic properties.

#### **INVASIVE SPECIES**

An invasive species is one that has invaded an area following changes in one or more ecosystem processes and has become dominant. Examples from the CRE include non-native species (e.g., tamarisk) and native species (e.g., willow).

#### **MONITORING**

Monitoring is the "collection and analysis of repeated observations or measurements to evaluate changes in condition and progress toward meeting a management objective." (Elzinga, C.L., *et al.* 1998. *Measuring and monitoring plant populations*. BLM) Monitoring needs to produce data of sufficient statistical power to detect a trend if in fact it is occurring. (Gibbs, J.P., *et al.* 1998. Monitoring populations of plants and animals. *BioScience* 48: 935-940.) Monitoring differs from inventorying, which is the measurement of environmental attributes at a given point in time to determine what is there. It also differs from research, which is the measurement of environmental attributes to test a specific hypothesis.

#### **NATIVE SPECIES**

A native species is one that occurred in an area before anthropogenic alterations to ecosystem patterns and/or processes. Examples from the CRE include humpback chub, razorback sucker, flannelmouth sucker, bluehead sucker, speckled dace, Colorado pikeminnow, bonytail, roundtail chub, river otter, Kanab ambersnail, Southwest willow flycatcher, brown-headed cowbird, netleaf hackberry, honey mesquite & catclaw acacia.

#### **NEW HIGH WATER ZONE COMMUNITY**

The vegetation in this community type is dominated by tamarisk (*Tamarix ramosissima*). Other woody plants include coyote willow (*Salix exigua*), arrowweed (*Tessaria sericea*), and seepwillow (*Baccharis* spp.). In addition to tamarisk, non-native species include camelthorn (*Alhagi camelorum*), and red brome (*Bromus rubens*). This community became established mainly at low to mid elevations within the sand beach community following closure of Glen Canyon Dam. Currently, it usually occurs between about 18,000 and 45,000 cfs.

#### **NON-NATIVE SPECIES**

A non-native species is one that did not occur in an area before anthropogenic alterations to ecosystem patterns and/or processes. Non-natives are also known as introduced, exotic, or alien species. Many, but not all, non-native species can be categorized as an invasive species. Examples of non-native species in the CRE include *Gammarus*, rainbow trout, brown trout, common carp, red shiner, channel catfish, tamarisk, and camelthorn.

#### **OLD HIGH WATER ZONE COMMUNITY**

The vegetation in this community type is dominated by Apache plume (*Fallugia paradoxa*) upstream of river mile (RM) 40, and catclaw acacia (*Acacia greggii*) downstream of RM 40. Mesquite (*Prosopis glandulosa*) is co-dominant with catclaw acacia between RM 40-77 and RM 167-225. Other woody plants include redbud (*Cercis occidentalis*), and netleaf hackberry (*Celtis reticulata*). This community currently occurs on pre-dam flood terraces, sand dunes, and stabilized talus slopes above the pre-dam scour zone (about 100,000 cfs stage elevation) and below desert vegetation.

#### **RANGE OF NATURAL VARIABILITY**

The Range of Natural Variability is the spatial and temporal variation in ecosystem patterns and ecosystem processes under which the ecosystem has evolved. The range of natural variability

for ecological processes is usually defined by their frequency (e.g., number/year), intensity (e.g., cubic feet per second), duration (e.g., number of days), magnitude (e.g., acres), seasonally, and rate of change. See Landres (. Landres, P.B., *et al.* 1999. Overview of the use of natural variability concepts in managing ecological systems. *Ecological Applications* 9: 1179-1188.) for a full discussion.

#### **REASONABLE AND PRUDENT ALTERNATIVE**

“Reasonable and prudent alternatives refer to alternative actions identified during formal consultation that can be implemented in a manner consistent with the intended purpose of the action, that can be implemented consistent with the scope of the Federal agency's legal authority and jurisdiction, that is economically and technologically feasible, and that the Director believes would avoid the likelihood of jeopardizing the continued existence of listed species or resulting in the destruction or adverse modification of critical habitat.” (Fish and Wildlife Service and National Oceanic and Atmospheric Administration. 1986. Interagency cooperation - Endangered Species Act of 1973, as amended; final rule, June 3. *Federal Register* 51: 19926-19963.)

#### **REASONABLE AND PRUDENT MEASURE**

“Reasonable and prudent measures refer to those actions the Director believes necessary or appropriate to minimize the impacts, i.e., amount or extent of incidental take.” (Fish and Wildlife Service and National Oceanic and Atmospheric Administration. 1986. Interagency cooperation - Endangered Species Act of 1973, as amended; final rule, June 3. *Federal Register* 51: 19926-19963.)

#### **RECOVERY**

Recovery is improvement in the status of a listed species to the point at which listing is no longer appropriate, under the criteria set out in section 4(a)(1) of the Endangered Species Act. (Fish and Wildlife Service and National Oceanic and Atmospheric Administration. 1986. Interagency cooperation - Endangered Species Act of 1973, as amended; final rule, June 3. *Federal Register* 51: 19926-19963.)

#### **RECREATIONAL GOALS**

Recreational goals include Goal 4 (trout) and Goal 9 (recreation).

#### **REGULATION**

Western operates two load control areas that are tied to GCD. A load control area is a specific geographic areas assigned to an operator to regulate the moment-by-moment changes in electrical demand on the transmission lines in the area. Regulation is the adjustment in electrical generation within a load control area to meet minor changes in electrical use as reflected by electrical readings on transmission lines. Currently, GCD is committed to providing regulation up to plus or minus 1,000 cfs on an instantaneous basis to Western's load control area.

#### **REGULATION FOR OTHERS**

Regulation for others is that which can be made available for other electrical utilities, provided they have an electrical transmission link to GCD and that they are a control area operator or have contracted an agreement with their control area operator to receive this service.

#### **REMOVAL OF JEOPARDY**

To “jeopardize the continued existence of [a listed species] means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species.” (Fish and Wildlife Service and National Oceanic and Atmospheric Administration. 1986. Interagency cooperation - Endangered Species Act of 1973, as amended; final rule, June 3. *Federal Register* 51: 19926-19963) Removing (or avoiding) jeopardy is intended to be accomplished through the implementation of reasonable and prudent alternatives.

#### **RIPARIAN ZONE**

The riparian zone is the streamside area that is influenced by riverine processes, e.g., flood regime and distance to subsurface water.

#### **SAND BEACH COMMUNITY**

The sparse vegetation in this community type is dominated by Indian ricegrass (*Oryzopsis hymenoides*), beavertail (*Opuntia basilaris*), four-wing saltbush (*Atriplex canescens*), and ephemeral species that are adapted to frequent floods and scour events. This community has been invaded with non-native species such as camelthorn (*Alhagi camelorum*), Russian thistle (*Salsola iberica*), and red brome (*Bromus rubens*). Although this community occurs in the pre-dam scour zone (below about 100,000 cfs), willows and other woody species became established in some reaches of lower Grand Canyon.

#### **SEEP AND SPRING COMMUNITIES**

The vegetation in this community type is composed of a large array of herbaceous and woody species including maidenhair fern (*Adiantum capillus-veneris*), crimson monkey-flower (*Mimulus cardinalis*), golden columbine (*Aquilegia chrysantha*), common reed (*Phragmites australis*), Fremont cottonwood (*Populus fremontii*), poison ivy (*Toxicodendron radicans*), and birchleaf buckthorn (*Rhamnus betulaeifolia*). The water source for these communities can include both groundwater and surface water.

#### **TRIBAL CONSULTATION**

Tribal consultation in the AMP is defined as the formal dialogue with designated governmental representatives and other AMWG members, through AMWG and TWG meetings, about trust assets, resources, and other tribal interests, that results in all the members of the AMWG understanding and appreciating tribal perspectives and the inclusion of tribal values within the AMP. Additionally, this consultation assists federal agencies in realizing their trust responsibility to tribal nations and fulfills the federal government's consultation requirements. Such consultation and the subsequent inclusion of tribal values can add to the knowledge base of the AMP, and tribal perspectives and values can temper the traditional western scientific approach used by the AMP, thus making it stronger.

#### **TRIBAL PARTICIPATION**

Tribal participation ensures that tribal values inform the interpretation of the quantity and quality of resources that results from a Western scientific approach to monitoring and research. Tribal participation is defined as a set of activities that may include one or more of the following: conducting and/or collaborating in resource projects awarded through the competitive process, participating in discussions with PIs regarding where and how they will conduct monitoring and research activities, and tribally relevant data analysis and information sharing.

#### **VIABLE POPULATION**

A population is considered viable when there is a high chance of persistence over a long timeframe without demographic or genetic augmentation. Population viability is not the same as "recovery" or "removal of jeopardy" for a species. However, the concept of population viability is an important consideration in determining recovery and removal of jeopardy.