Introduction

"A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise."

Aldo Leopold
The Upshot, The Land Ethic

Why a Multi-Species Recovery Plan?

The Multi-Species Recovery Plan was conceived as part of the South Florida Ecosystem Restoration Initiative to fulfill two major objectives: to recover species that are threatened or endangered, and to restore and maintain the biodiversity of native plants and animals in the upland, wetland, estuarine, and marine communities of the South Florida Ecosystem (refer to Volume I for a further discussion on the background of this Recovery Plan). The Multi-Species Recovery Plan also facilitates implementation of an Ecosystem Approach to Fish and Wildlife Conservation. An ecosystem approach will more efficiently and effectively enable the FWS to fulfill the mission "to conserve, protect, and enhance the Nation's fish and wildlife and their habitats for the continued benefit of the American people" (FWS 1994). This approach does not downplay the need for individual species' recovery plans, however, it does broaden the scope of recovery planning and implementation to the landscape level. An ecosystem approach to fish and wildlife conservation means protecting or restoring the function, structure, and species composition of an ecosystem, while providing for its sustainable socioeconomic use.

Geographic Scope of the Multi-Species Recovery Plan

The South Florida Ecosystem encompasses 67,346 square kilometers (26,002 square miles) covering the 19 southernmost counties in Florida (Figure 1). This region includes 51,934 square kilometers (12,833,121 acres) of land and 15,412 square kilometers (3,808,413 acres) of water in the Kissimmee River-Lake Okeechobee-Everglades drainage and the Peace River drainage. The multi-species recovery plan addresses the needs of species that occur within these geographic boundaries.

Organization of Volume II of the Multi-Species Recovery Plan

This volume begins with an overview of the South Florida Ecosystem, and includes some of the major ongoing multi-agency partnerships and conservation efforts to illustrate the complexity of ecological issues within this region of the United States. The remainder of the volume consists of individual community accounts, similar in format to the species accounts from Volume I, that discuss the

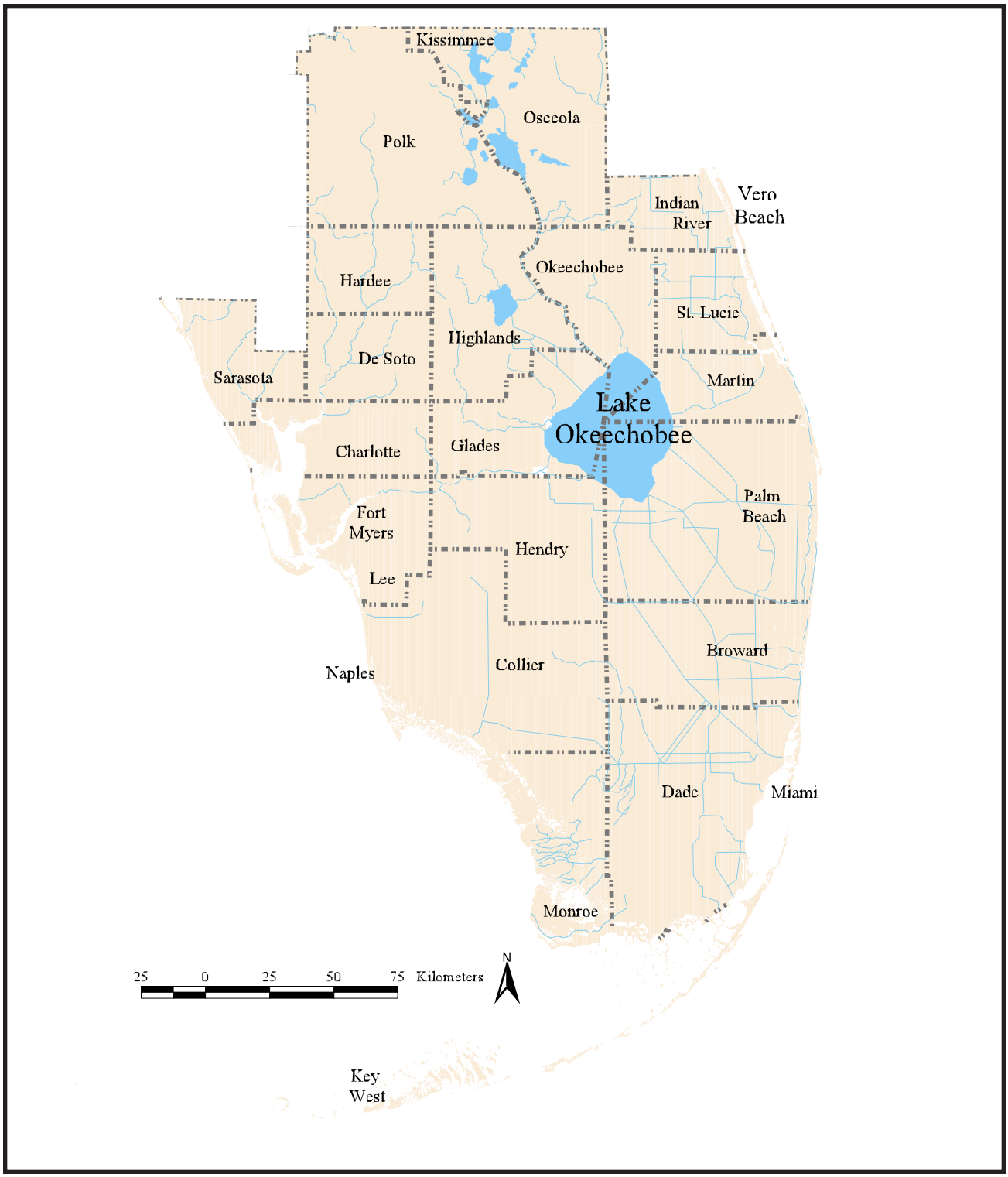


Figure 1. The Counties of South Florida.

biological composition, status, trends, management and restoration needs of 23 major ecological communities within South Florida. Like the species of concern, each of these communities has been assigned a status rank by the Florida Natural Areas Inventory (FNAI) as part of The Nature Conservancy's Natural Heritage Program (Table 1). Some of the ecological communities are combined within one account (*i.e.*, scrub, scrubby high pine, and scrubby flatwoods), resulting in a total of 18 accounts for this volume. Unlike the species accounts in Volume I, however, which were prepared by an internal team of FWS biologists, the community accounts were written by an external team of scientists and land managers, thus they reflect a bit more variation in style and content.

Table 1. Global and State Rank Summary of 23 Ecological Communities in South Florida (adapted from FNAI 1997).

COMMUNITY NAME	GLOBAL RANK	STATE RANK
High Pine	G2/G3	S2
Scrub	G2	S2
Scrubby High Pine	G2/G3	S2
Beach Dune	G4?	S2
Coastal Strand	G3?	S2
Maritime Hammock	G4	S2
Mesic Temperate Hammock	G?	S3/S4
Tropical Hardwood Hammock	G?	S2
Pine Rockland	G1	S1
Scrubby Flatwoods	G3	S3
Mesic Pine Flatwoods	G?	S4
Hydric Pine Flatwoods	G?	S4?
Dry Prairie	G2	S2
Cutthroat Grass	G2	S2
Wet Prairie	G?	S4?
Freshwater Marsh	G3/G4	S4
Seepage Swamp	G3/G4	S2/S4
Flowing Water Swamp	G3/G4	S2/S4
Pond Swamp	G3/G4	S2/S4
Mangrove	G3	S3
Saltmarsh	G4	S4
Seagrass	G2	S2
Nearshore and Midshelf Reefs	G1/G2	S1/S2

Multi-Species Approach to Recovery

As discussed previously, the multi-species recovery plan is contained in two volumes, entitled "The Species" and "The Ecosystem." Volume I, "The Species," provides an overview of the biology, ecology, distribution, status, trends, management, and recovery actions needed for the 68 federally-listed species that occur in South Florida. Those species accounts provide the most current biological information available and represent updates and revisions to existing recovery plans for individual species. An explanation of the approach to species recovery is provided in that volume. That volume, containing all 68 recovery plans packaged together, could have served as a multi-species recovery plan. However, it does not take a true multi-species approach to recovery; that approach requires an understanding of the ecology of the system as a whole.

This volume, "The Ecosystem," discusses South Florida at that next ecological scale; it provides a community/ecosystem-level perspective for maintaining biodiversity, and is what truly makes this effort a multi-species recovery plan. This volume integrates the needs for species of concern in addition to the federally listed species discussed in Volume I. The species of concern include federally listed species, candidates for Federal listing, FWS species of management concern (former Federal Category 2 candidates for listing), state-listed species, migratory birds, interjuristictional fishes, species ranked by FNAI as G1-3/T1-3/S1-3, and species considered as rare by the Florida Committee on Rare and Endangered Plants and Animals (FCREPA) (Appendix C).

In Volume I, *recovery* objectives and criteria were identified for all 68 federally listed species included in this Recovery Plan. In Volume II, *restoration* is the analogous term at the community level.

Ecological restoration in the broad sense is defined as any activity which improves the overall ecological condition of a natural community or disturbed site. It includes both ecological restoration *sensu strictu*, the return of a community or ecosystem to a pre-disturbance condition, as well as the creation of an ecosystem *de novo* when it uses an historic natural community as a model. Restoration activities may involve biological or hydrological manipulation, repatriation of extirpated or nonviable native species, control and elimination of invasive or damaging non-native (exotic) species, and cleanup of environmental contaminants.

In-kind restoration refers to the restoration of a natural community which did not occupy the precise location of the restoration, but which is normally found within the immediate vicinity of it. Not-in-kind restoration may be a legitimate activity when it is no longer possible to restore the community which historically occupied the site due to significant site alterations.

Management which attempts to restore natural community functions, structures and/or composition is termed restorative management, and includes both in-kind restoration and not-in-kind restoration. In South Florida, for certain communities that exist as isolated fragments of the landscape, human intervention in the form of restorative management will always be needed to facilitate the functioning of ecological processes.

The restoration of a natural community on land which has been massively disturbed through mining, hydrological alteration other agricultural activities, road-building, etc., so that the site no longer has any resemblance to the original natural community which once occupied the landscape, is termed re-creation. Re-creation also may include both in-kind restoration and not-in-kind restoration. This type of restoration can be used to expand, add buffers to, or connect existing preserves.

Finally, the term creation refers to the design of natural community analogs on massively disturbed land where it is impossible or unfeasible to restore an historic natural community. Historic natural communities are used as general models, and only species which are within their historic ranges are used to construct these natural community analogs (*e.g.* the restoration of tropical hardwood hammocks on fill pads surrounding buildings along the Tamiami Trail).

Volume II provides an excellent overview of the ecology of each of the communities in South Florida; information that is needed in the development and implementation of effective restoration plans. Community-level restoration actions, following each account, equate to recovery actions for the listed species in Volume I. A general template used to develop the community-specific restoration actions for each account is given below. These actions are the tasks needed at the community/ecosystem level to restore the structure, function, and biological composition of a particular ecological community, to the extent possible. These tasks are expanded upon in each account, where information was available.

A Template for Community-level Restoration Actions in South Florida:

1. **Prevent further destruction or degradation of existing communities {=protect}**
   Acquire natural communities threatened with development
   Promote conservation easements and landowner agreements
   Enforce regulatory protection of natural communities
   Prevent degradation of existing preserves
   Protect natural communities from point source and non-point source pollution
2. **Manage existing natural communities within the context of restoration objectives**
   {= restore existing degraded natural communities}
   Restore ecosystem functions
      Restore natural fire regimes
      Control exotic plants and animals
      Restore hydrology
      Restore natural biological interactions (food webs, nutrient cycling, etc.)
   Restore ecosystem structure and composition
      Restore soils
      Manipulate existing populations of native species
      Augment populations of native species
      Reintroduce extirpated plants and animals

Protect natural communities from point source and non-point source pollution

3. **Maintain natural communities in a natural condition**
Provide analogs for ecosystem functions such as fire regimes
Continue to control exotic plants and animals in perpetuity
Monitor for extirpations and extinctions, and negative population trends of keystone and rare species, including pollinators, dispersers and soil organisms
Monitor and correct for both point source and non-point source pollution

4. **Re-create natural communities where they have been destroyed by human activities** (e.g. following mining or the cessation of farming activities) {=increase spatial extent; reconstruct}
Restore ecosystem structures
    Soils and soil organisms
    Hydrology
    Plants
    Animals
Restore ecosystem functions
    Control exotics and aggressive native weeds
    Restore natural fire regimes
    Restore natural biological interactions (food webs, nutrient cycling, etc.)
Restore ecosystem composition
    Late-successful species
    Rare species
Protect natural communities from point source and non-point source pollution

5. **Create natural community analogs where natural communities have been destroyed by human activities to the extent that a legitimate natural community can no longer be restored** {=rehabilitate; construct}
Restore ecosystem structures
    Physical landforms, drainage patterns, etc.
    Soils and soil organisms
    Plants
    Animals
Restore ecosystem functions
    Control exotics and aggressive native weeds
    Restore hydrologic processes
    Restore fire regimes
    Create natural biological interactions (food webs, nutrient cycling, etc.)
Restore ecosystem composition
    Late-successful species
    Rare species
Protect from point source and non-point source pollution

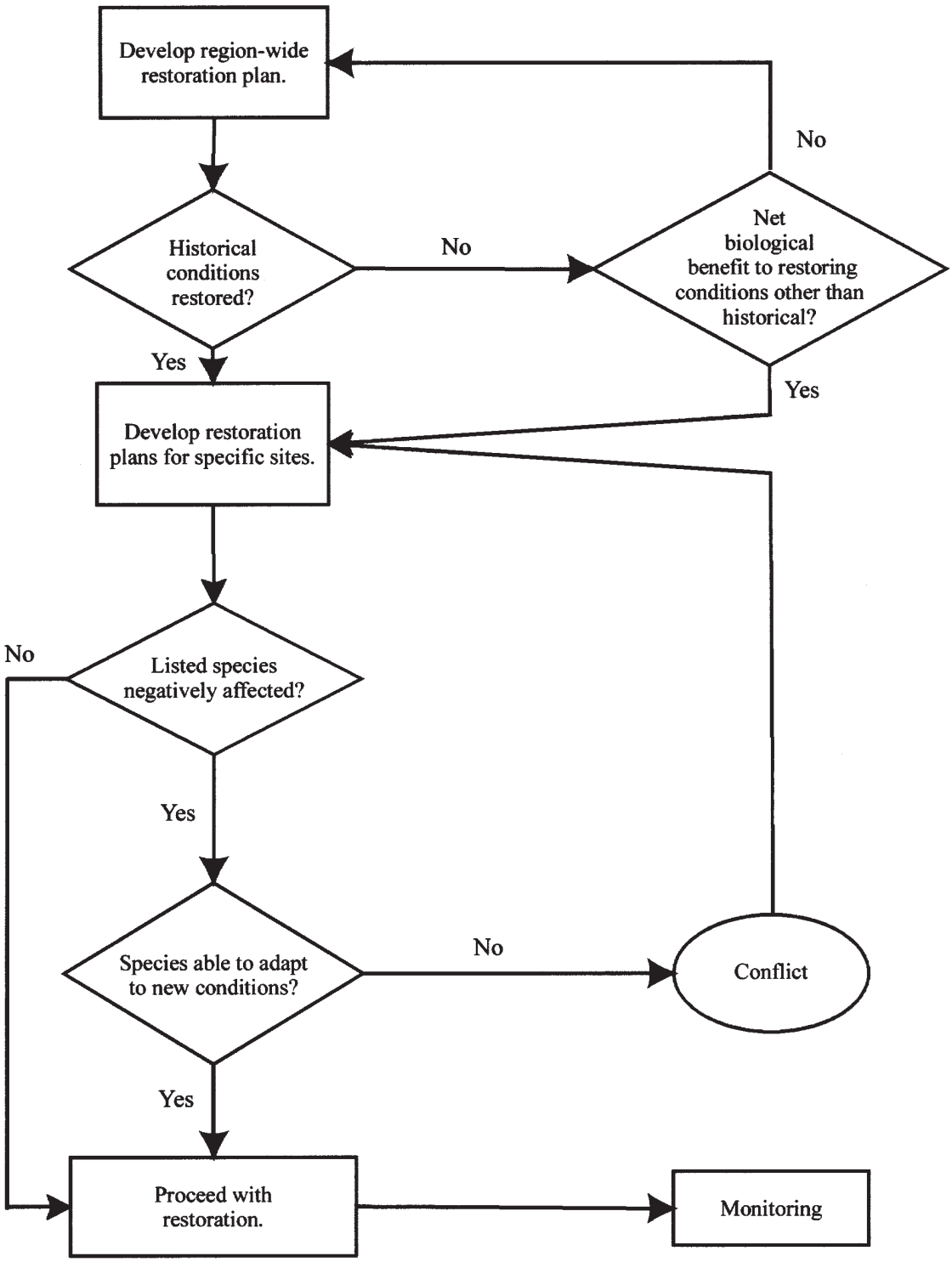
6. **Connect appropriate habitat**
7. **Conduct community-level research**
8. **Monitoring**
   Monitor community-level processes
   Monitor community structure
   Monitor community composition including rare and keystone species
9. **Increase public awareness** (information/education at region/ecosystem/community/ species/taxon/genetic levels)
   Reintroduce extirpated plants and animals
   Protect natural communities from point source and non-point source pollution

Implementation of the Multi-Species Recovery Plan

The Multi-Species Recovery Plan provides the biological and ecological framework for a proactive approach toward the conservation and sustainability of biodiversity within South Florida. It is intended to be used as a tool by the FWS and our partners for assistance with project planning, research needs, protocols for management and restoration actions, information and data coordination and sharing, environmental compliance, interagency consultations, and habitat conservation plans. From the FWS's perspective, responses to every permit, every NEPA compliance document, and every request for technical assistance are treated as opportunities to recover threatened and endangered species or to conserve the ecosystems upon which they and other species depend.

Adaptive management is an integral component to any plan, allowing for incorporation of new information as it becomes available. The Multi-Species Recovery Plan is subject to the adaptive management process, and will continuously be improved as implementation of tasks results in new information, techniques, and approaches to recovery and restoration. It became apparent during the preparation of this volume that information is just now becoming available on proven techniques and applied methodologies for conducting "on the ground" restoration activities for many of the ecological communities discussed. Because restoration is an evolving science, Volume II intentionally does not incorporate specific restoration methodologies for many of the communties. The accounts do, however, provide sources for finding such information, as well as identification of specific individuals and groups using the current techniques. Working toward the goal of restoration of these ecological communities will also facilitate the species recovery process as outlined in Volume I. An example of how the adaptive management process could work using a multi-species approach to recovery and restoration planning and implementation is depicted in a flow chart in Figure 2, adapted from information in Cox *et al.* (1994). Implementation of the Multi-Species Recovery Plan, using an adaptive management process, will ensure the long-term conservation of biodiversity in South Florida.

Figure 2. A Multi-Species Approach for Evaluating Restoration Planning and Implementation.



Use of the flow chart in Figure 2 requires evaluation of several specific questions:

1. **What are the natural historical conditions** (*i.e.*, structure, function, and composition) of the area to be restored, and does the plan help to restore, enhance, and sustain the natural ecological community?
2. **Are there any listed species that may be affected by the restoration plan in the immediate future?**
3. **Does the listed species of concern have a high degree of vagility?** (can the species rapidly move its center of distribution to accommodate a shift in hydropattern - *i.e.*, the snail kite)?

   If *YES*, then there is every reason to believe that modifications that are planned to restore the historical system will accommodate the listed species, and monitoring should be implemented to verify that result.

   If *NO*, the species has a low vagility, (*i.e.*, the Cape Sable seaside sparrow), then a conflict exists, and actions must be delayed and an immediate interim solution sought.

4. **Is the listed species' population so critically small that an immediate change in local conditions required for community restoration will immediately benefit the species survival?**

   If *YES*, then the plan may continue.

   If *NO*, then a conflict exists, and a delay in action is needed along with an immediate interim solution.

   Interim solutions, the adaptations to a restoration plan, must be able to be implemented without bringing the overall plan to a halt. Interim solutions can modify the early stages of a planned restoration initiative, and allow affected species a sufficient amount of time to recover to an acceptable population level before the plan is fully implemented.

   The restoration plan must incorporate a broad range of environmental conditions and management options to meet the biological needs for all species of concern. More importantly, the plan must insure stable population structures and community composition at some spatial and temporal scale. This approach allows for population variability due to natural stochastic events inherent in any system.

   Monitoring species and populations survival and reproduction for status and trends analysis, and monitoring to detect changes in structure, function, and composition of the ecological community in response to management efforts, will provide information for measuring the overall success of restoration plans. Sutter (1996) discusses four criteria that monitoring techniques and processes must meet to reliably detect changes in populations and communities: (1) monitoring data must have a known and acceptable level of precision, (2) data collection techniques need to be repeatable over years and across personnel, (3) data must be collected over a long enough period of time to capture important natural processes and responses to management, and (4) efficiency must be considered an integral component of monitoring. In addition, monitoring objectives should be specific and quantifiable, provide the framework for defining tasks, specify the variables to be measured and the frequency of measurement, and specify how success or failure will be assessed, and communicate and justify the project and provide a historic record of the project.

Literature Cited

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