

MANAGEMENT ACTIVITIES AT EVERGLADES NATIONAL PARK

TOM ARMENTANO - *National Park Service, Everglades National Park, 40001 SR 9336, Homestead, FL 33030.*

Everglades National Park is engaged in a wide range of management activities both within the park, and in adjacent lands and waters. Perhaps unique for land management agencies is the extensive nature of agency interactions that are required in order to manage the resources that are critical to the park's maintenance and sustainability.

As most of you know, the park is at the southern tip of the Florida peninsula (Figure 1). We have often talked about ourselves as being at the downstream end of the largest water management system in the world. Recently though we have had to be more careful because the Florida Keys Marine Sanctuary people tell us that actually they are at the downstream end. So we now talk about being at the lower end, rather than at the very tail end of the system. But in any case, we share common problems because of that particular geographic situation. The major freshwater inflow structures essentially control the volumes of water we get entering the Park except for local rainfall within the Park, and of course tidal inflows in marine systems. Stated simply, freshwater quantity, quality, distribution and timing are the crux of many of the Park's natural resource problems. In addition, as suggested by Figure 1 our location adjacent to large urban areas causes other major concerns.

Basically, Everglades National Park is as the name indicates, a National

Park, as opposed to some other sort of land management entity. Thus, it was dependent upon congressional authorization for its establishment (Figure 2). One key authorization established most of the Park as official wilderness. In fact, 90% of the acreage of the park is officially classified as wilderness. Although originally the term "wilderness" was commonly used in a general context, passage of the Wilderness Act in 1964 provided a formal definition.

In 1989, the Everglades National Park Protection Expansion Act was passed, recognizing that the park had severe natural resource problems of various kinds, and that something had to be done about it. This act, among other things, directs the Secretary of the Army to assist NPS in trying to restore the natural hydrologic balance that is recognized as essential for maintaining the wilderness status of the park. It also establishes the basis for the acquisition of additional lands in order to achieve that goal.

Basically, the wilderness nature of the Everglades National Park and the main purpose of national parks in general establishes the framework for identifying management activities within the park. Within this framework, the National Park Service engages in only a few natural resource management activities. One is the regulation of fishing and the prohibition of any commercial taking. Commercial fishing in Florida Bay was abandoned in 1985,

except for guide fishing activities. A second is the control of exotics, both the big three plant species exotics, Melaleuca, Schinus (Brazilian pepper) and Casuarina (Australian pine) and some others, but also certain animal exotics. For example, control study of feral hogs is an Everglades National Park management objective. Feral hogs are viewed as a threat to alligators, sea turtles and tree island vegetation within Everglades National Park. We are attempting to develop a program of study and selective control to minimize that problem.

The third main area of management activity in the park is prescribed burning, which as been underway for about 30 years in the Everglades. At a local level, we also control visitor access to sensitive areas for key species, such as in the crocodile sanctuary in northeast Florida Bay and in areas near wading bird nesting colonies.

A close look at the park tells you that it is primarily wetland, both fresh water and saline (Figure 3). The upland areas are very small, consisting mainly of Long Pine Key and the surrounding areas. Of course, the freshwater wetland areas are imbedded with tree islands and bay heads, two distinct but local forest types. Overall, the total upland area is less than three percent of the approximately 1.5 million acres that comprises the total area of the park. Note however that somewhat over 500,000 acres of the total consists of Florida Bay and adjacent marine areas.

Although overdrainage has adversely affected all the Park's wetlands, it is the eastern side of the park, where the greatest degradation of wetland function is believed to have occurred. This area of the park falls

within the area traversed by panthers or at least it did so once.

The concerns in the eastern wetlands relate largely to alteration of water budgets, water supply, and the delivery and timing of the flows of water into the park. The Park is dependent upon the results of water management activities conducted by other agencies in areas outside the park boundaries. This is the focus of a lot of intense negotiation and continuing interaction of various kinds between the National Park Service, the South Florida Water Management District and the Corps of Engineers.

Figure 4 shows key areas on the east side of the park and their proximity to the water management system. First, at the top, is northeast Shark Slough, which is actually only a small part of the historic Shark Slough. The Slough swings southeastward from Lake Okeechobee and the northern Everglades through here. The part of northeast Shark Slough within the park has been isolated by levees and canals, which divert water to other areas, thus reducing natural inflows. The Rocky Glades is a distinctive, relatively high elevation, short hydroperiod wetland landscape pocked with numerous solution holes that play a critical role in the food base for wading birds. The Rocky Glades also is habitat for the endangered Cape Sable sparrow. Historically, the Rocky Glades in some years provided some surface water flows into the lower part of the park during the wet season.

Further south are the headwaters of Taylor Slough (Figure 5), which flows 20 miles downstream into Florida Bay. This area also has been cut off from historic water sources by canals and by agricultural development. Included here

is an area called the Frog Pond, now being farmed intensively and located adjacent to the L-31W levee and canal that interrupts flow from the headwaters of Taylor Slough.

The L-31 canal and levee system was originally constructed in the 1960's. However, it was amplified in the late 1970's and early 1980's. Structures were added, and other adjustments made. It became part of the Congressionally authorized South Dade Conveyance System. The purpose of SDCS was to increase flows westward into Everglades National Park. It became fully operational in the early 1980's. Figure 6 shows one result of this further alteration of the water management system. Monthly surface flow volumes across Context Road are depicted over the last three decades, with a major change occurring in 1982, the first wet season after Hurricane Dennis. Hurricane Dennis dumped large volumes of water into south Dade County and caused extensive flooding outside the Park. In response to that, water managers lowered the canal water levels in the L-31 system in 1982, and never allowed them to rise to pre-1982 levels. Essentially, flows of water across Context Road and Rocky Glade at that time were eliminated except for isolated periods.

As noted, the Rocky Glades are part of the connected series of short hydroperiod wetlands in the eastern side of the park that once provided wet season flows into lower Taylor Slough. As of 1982, of course, that no longer occurs and very little surface water at any time is observed in the Rocky Glades area.

One can reasonably ask whether, in the absence of surface flow, functional wetlands can be expected to persist.

For the Taylor Slough region as a whole, as a result of L-31 and C-111 operations and related policies, the headwaters region of Taylor Slough has changed drastically. If we compare two fifteen year intervals before and after the canal operational criteria were changed (Fig. 6), we can see that standing water and hydroperiods in this region were radically altered but to different degrees at two locations within the slough (Fig. 7) throughout the year. Surface water seldom occurred at the northern site near the canal system. Instead, the water table was depressed several feet below the surface elevation. Further south, the artificial drainage effect is reduced but still significant.

The problem is not only restricted to Taylor Slough. Major changes in water deliveries also have affected Shark Slough.

Figures 8 and 9 refer to alterations in the proportion of water flow through the two eastern flow sections of Shark Slough, which is volumetrically much more important than Taylor Slough. Comparing the western section of Shark Slough from the L-67 extension west to Forty Mile Bend, to northeast Shark Slough, (L-30 to L-67) which I pointed out earlier, shows the relative difference between the historic flows in these areas. Until the 1960's, flows through the eastern section clearly predominated, as expected given its location within the main channel of Shark Slough where it enters Everglades National Park.

But as of the 1960's, when the major canal systems were in operation, flow proportions drastically changed. And of course, the absolute water depths and hydroperiods in northeast Shark Slough were correspondingly reduced. This shift is regarded as significant, and

detrimental to the timing and success of the reproductive cycles of wading birds and alligators and other animals in the park, and for the ecosystem as a whole. Returning to pre-drainage regimes is the main focus of the intergovernmental Everglades restoration program now underway.

To briefly return to prescribed burning, note that the Big Cypress National Preserve and the Everglades Park implement an extensive fire management program (Table 1). Within the park four fire management units have been established. In the mangroves, basically, and the adjacent brackish marshes, wildfires are allowed to burn pretty much without intervention. In Shark River Slough, management of fires and fuels occurs to limit effects on human structures, and whenever there is a possibility of fires entering unit boundaries. Control of plant exotics also is a fire management goal.

The slash pine system is a fire dependent system, and absolutely dependent on fires at periodic intervals of three to six years, depending on location. The goal is to mimic natural patterns and frequencies as it has been for over twenty years. An approach similar to the policy for Unit II will be followed in the east Everglades' acquisition area, a 107,000 acre tract the Federal government is acquiring.

Recently, a new framework has been established for many of the management activities within Everglades National Park, that basically encompasses all of the individual activities and places them into both a regional and an integrated ecosystem context. And I'm referring here to the Federal initiative that originated in the office of the Secretary of Interior and was designed to restore the South

Florida Regional Ecosystem as it is called. The geographic scope extends well beyond Everglades National Park, but Everglades is part of this (Fig. 10).

This very large region, includes urban areas and coral reefs, and extends to the Kissimmee River system. Six Federal departments are involved in the program, including Interior with five of its bureaus (the National Park Service, the Fish and Wildlife Service, Geological Survey, the Bureau of Indian Affairs, and the National Biological Service), the Army Corps of Engineers, Department of Agriculture, Department of Commerce (three bureaus), Department of Justice, and Environmental Protection Agency are all involved in this effort. Nine sub-regions were defined; I will mainly discuss Sub-region 7, Everglades National Park (non-marine areas).

Let me go on and show you just a little bit about what we are trying to do. The Science Subgroup of the South Florida Management Coordination Working Group established a set of criteria for evaluating the success in achieving an agreed-on set of goals for regional ecosystem restoration. The criteria and goals were defined at the regional and sub-regional scale.

For sub-region 7, the Everglades, a series of hydrologic restoration initiatives were recommended which depended partially on the Natural System Model, to define water level and hydroperiod targets in the Everglades. The maintenance and re-establishment of class III water quality standards was stipulated as a corollary of good hydrologic restoration. It is very important that as the flows and volumes of water increases in an ecosystem, that high water quality standards are not threatened.

Hydrologic objectives are expected to lead to ecological improvements. Thus, a set of ecological objectives were established, which includes, to the extent possible within this ecosystem context, the reintroduction and restoration of populations and of threatened and endangered species and other species-level goals (Table 2). Note that reduction of mercury levels in wildlife such as panther and restoration of their populations at a sustainable level also was specified.

Basically, I could go into that in a lot more detail, but I'm going to restrict myself here to a picture that may look like the earlier ones, but is significantly different. It shows basically a big difference here. Refer to Figure 11 for a depiction of a hydrologic restoration target in the Taylor Slough wetlands. A natural water level recession is now more likely to be achievable given that farm areas immediately east of the L-31W system will soon be converted to public ownership and managed as water supply

preserves. Besides providing water supply benefits to Florida Bay, the freshwater wetlands of Taylor Slough will benefit. Ideally this means that populations of wading birds, alligators and other native wetland species will increase while exotic species decline. Of course these achievements would require parallel actions of several kinds and may not succeed given the profound land use changes in the region. Effects upon panther habitat are also uncertain but persistently higher water levels would, based on insights from wildlife biologists, most likely limit movement and carrying capacity for prey species.

So I would like to end with that. One last point, perhaps obvious to most is that accomplishing these goals, will take an enormous amount of research, monitoring, modeling and analysis, a topic I haven't been able to talk about. The next speaker, Jane Comiskey, is going to be able to tell you about one of the approaches in our arsenal to achieve restoration that we think is going to be important for us.

REFERENCES:

- Van Lent, T., R. Johnson, and R. Fennema. 1993. Water Management in Taylor Slough and Effects on Florida Bay. Report #SFRC 93-03. Everglades National Park, Homestead, FL.
- Johnson, R., R. Fennema, T. Bhatt, and F. James. 1995. Evaluation of 1993-95 Experimental Water Deliveries Program. In press.

QUESTIONS:

UNIDENTIFIED PERSON: I don't have a question. But I have a comment. I consider myself moderately ecologically aware. And yet there is much of what you said that I do not understand. And I know that John Q. Public out there probably doesn't understand all of it. And maybe when we go home, if we could write our State Legislative Representatives and the State Department of Education, and ask, or maybe even demand, that a basic course in environmental science be included as a requirement in the secondary schools in Florida. It might help. You know, I don't think we are ever going to reach my generation or your generation. But if we don't reach the generations that are coming up, we are lost.

MR. ARMENTANO: I agree absolutely. I wish I had more time to get into some of the things I talked about, but I didn't. I might point out though that the government's effort so far is restricted to public meetings. There has been a series of public meetings related to the restoration initiative and some of the Corps projects. And that process I think is somewhat flawed actually. But it is one step closer to better communication with the taxpayers. And that is important. And we need to find better ways to do that.

UNIDENTIFIED PERSON: A couple of questions. First of all, to achieve that 1959 level of hydroperiod and so on, will that require more land purchasing in the future?

MR. ARMENTANO: Probably. I did not mention the fact that the acquisition that

would be associated with the 1989 law would not acquire all the land that would really be needed to raise water levels significantly in the eastern side of the park. And there is in fact interest in acquiring additional lands there east of the L-31 system, but are outside the East Everglades acquisition area, that are now presently for the most part being farmed.

UNIDENTIFIED PERSON: So to achieve that '59 level then, without further land purchases, you would probably essentially be flooding residential areas at certain high water times?

MR. ARMENTANO: No area zoned for residential use would be flooded. Either land can be bought to raise water levels, which I think would be best, or the land can be surrounded by it's own local dike and canal system to control water. But no decision has been made at this time.

UNIDENTIFIED PERSON: Perhaps we don't have enough time to get into this, but over the years there has been a lot of discussion about active management practices in the Hole-in-the-Doughnut area to deal with the exotic vegetation and perhaps provide an enhanced prey base, white-tailed deer. And while I understand the overall restoration objectives are not focused on any one species, it seems that it would be not incompatible with the overall restoration objectives to take disturbed sites and utilize them through active progressive management to benefit a natural element of the system, but one which needs some help in the park. Could you comment on that?

MR. ARMENTANO: There is a program being developed to restore the Hole-in-the-Doughnut. The Hole-in-the-Doughnut is an approximately 5,000 acre area in the center of the park that is occupied almost entirely by Brazilian pepper. It was an inholding tomato farm until 1975. The final permits to begin this program to remove the Brazilian pepper are being processed now. And within a year this program will begin to remove the Brazilian pepper and the soil substrate in this rock plowed area. Ideally the original elevation will be approximated and hydroperiods restored. A 15 to 20 year program is planned to treat 200 to 300 acres each year.

UNIDENTIFIED PERSON: I'm not familiar with the exotics. I've been on the site several times. But it has been a while. I have heard that the objective would be to basically create a large shallow wetland area. What concern I would have is that we may be losing an opportunity to enhance conditions for deer and thus the panther. Why not consider a mosaic of wetlands and uplands? It would seem like some sort of an upland or semi upland opportunity shouldn't be lost.

MR. ARMENTANO: The goal is to restore what was there before the tomato farmers, i.e. -- about 10% pine land, and the rest a short hydroperiod wetland that was connected to the western Taylor Slough system. So there's no goals to recreate a new habitat there. That is not considered to be within the mission of the park.

UNIDENTIFIED PERSON: I guess my sense was, or my understanding was that it was dry enough to support

tomatoes without extensive, basically by insitu conditions. And I wasn't aware that they were only able to grow tomatoes there as a result of a lot of additional ditching.

MR. ARMENTANO: The area was basically based on seasonal or speculative agriculture by small farmers who took a chance each year. As you know, the climate regime of the Everglades is quite variable, with a tendency towards swings of three wet years, followed by three dry years. The farmers would take their chances in the drier portion of a ten year cycle, and be able to get a crop in and harvest it, and they would take the loss during the wet years. And that was the nature of the farming on the eastern side of the park and the Frog Pond until very recently. But with rock-plowing, a process of grinding up the limestone substrate which was perfected not long after World War II, it was recognized that if you did that, you could get greater productivity and extend farming throughout the wetter years as well, and that's when the larger landowners and investors became interested, and it drastically changed farming here.

UNIDENTIFIED PERSON: We saw one of the objectives is for the restoration of the panther and wild turkey and other elements of the ecosystem there. It seemed that critical to being able to restore the panther as a persistent element of the ecosystem there would need to be areas where fairly aggressive management is practiced. It seems like the disturbed sites would be logical candidates for that.

MR. ARMENTANO: I'm not sure how one would do that in the Hole-in-the-

Doughnut. The policy established for the Park which is principally officially designated wilderness would prohibit this. It's part of the 10% that's not. Admission of the park as established by authorizing legislation is to reestablish the "primitive conditions," that characterized the park before man began influencing it.

UNIDENTIFIED PERSON: Right. And I'm not an attorney. I don't want to argue Park Service policy. But I think that the Endangered Specie Act also places an affirmative obligation on the Park Service and other Federal agencies to aggressively manage to benefit endangered species. I've had similar issues with the Forest Service about burning practices to benefit red-cockaded woodpeckers in wilderness areas. And I think that there is, at least among a lot of the conservation community, a consensus that when you have the Wilderness Act or enabling legislation for the Park Service, and the Endangered Species Act, that the obligation to manage the habitat to benefit endangered species, I think, is a very strong argument.

MR. ARMENTANO: Basically, ecosystem restoration is a context in which we would do species' level and community level restoration or improvement.

UNIDENTIFIED PERSON: All I am saying is it seems with disturbed sites, there is an opportunity to do some things to benefit native endangered species, that a pure restoration concept of all those disturbed sites might miss those opportunities. This is a long-standing issue and debate. But it seems like the overall objective of trying

to maintain and restore the native communities, I think, is very positive and the way we ought to be going. But when we have existing disturbed sites and we have an opportunity to perhaps

benefit endangered species, I think we ought to utilize those opportunities.

