

Greater Everglades Ecosystem Restoration Conference
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Everglades Restoration: The Intersection of Science, Policy and Management

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Good afternoon! I am delighted to join this gathering. I thank all of you for your pursuit of knowledge and your dedication to advancing Everglades Restoration.

I have passed my 7th anniversary at the Department of the Interior. Back in Washington, I am known as Pollyanna—ever the optimist, whatever the topic. Optimistic I remain that Everglades Restoration will bring back a functioning ecosystem. But, all is not well—yet.

As I contemplated this event, I plowed through piles of research papers. I reviewed summaries of Everglades Restoration efforts, an alphabet soup of plans, studies, projects, and research, and, yes, some on-the-ground accomplishments. I then gravitated to the words of Michael Grunwald—a modern chronicler of the Everglades saga.

Grunwald wrote, recently: “Half the Everglades is gone. The rest is polluted, disconnected and infested by invasive species ranging from fast-growing ferns to pythons.” I had my own personal python encounter—a 9-foot critter gliding through deep grasses, a lurking invader. The Everglades is *not* what it used to be.

Grunwald continued: “South Florida is having an ecological and hydrological meltdown, the legacy of a century of plumbing and dredging and growing without much thinking. The Everglades now hosts 69 threatened or endangered species, and its rookeries and fisheries have crashed.” To this picture, Grunwald added: “Massive algal blooms are turning Florida Bay into pea soup. The region’s reefs have lost up to 95% of their elkhorn coral.”

Amid this gathering of scientists, I confess Mr. Grunwald’s colorful depiction may miss the niceties of nuance and the devilish details so important to empiricism. But, as a general portrait, he is not far off. And, whew! This portrait is a hard scenario for an optimist’s cheer. Yet, optimistic I am that the greatest wetland restoration in the world can succeed. I am optimistic that our scientists are generating some of the best—and relevant—science in the world. I am optimistic that the State and the Nation want the River of Grass to return.

As Everglades National Park Superintendent Dan Kimball put it, “Everglades Restoration is not optional.” But it is also not easy.

I want to seize this opportunity, as perhaps my own swan song before I leave Interior, to telescope outward to a 60,000-foot vantage point, ask some “big picture” questions, and paint on the restoration canvas some contextual brushstrokes of complexity, change, and constraints.

In the Everglades Restoration portfolio, we have so many projects and plans, timelines and extended timelines, delays and deliberations, and amendments to plans that some—many—wonder if Everglades Restoration will ever really fulfill our expectations. Meanwhile, time does not stand still.

“Stuff” is happening—specifically, some conditions are worsening.

- Saltwater intrudes into once freshwater systems.
- Nutrient enrichment continues to transform the marine environment.
- Water quality—though improved in some areas—in other areas shows signs of decline, according to some papers presented here.
- Some bird populations remain stressed. In Florida Bay, spoonbills, ospreys, brown pelicans, reddish egrets, and bald eagles have all shown substantial declines in nesting birds.
- Exotic fish—perhaps entering ENP through the canal system—are on the upswing.
- Paradoxically, mangroves are both encroaching and receding.

In this context, it seems to be a good time to step back and ask: are we on the right track? What *is* success? And how do we get there?

Yes, all of us can repeat the three Everglades restoration goals like a familiar catechism: get the water right, get habitat right, and enhance compatibility with the built environment.

But the devil is in the details. How are we translating these goals into actions?

I want to talk about goals and tease out a few questions inspired by the research presentations I poured through. One theme recurs: the holy grail of ecosystem functionality. Yet our metrics of success are calculated—sometimes—in terms of location-specific targets such as those for avian populations. Are these the right metrics? Do location-specific population targets cause us to lose sight of the forest for the trees? Or, let us tailor that phrase: do we lose sight of the Everglades for the blade of sawgrass, or particular sparrow, or individual tree island, or mangrove? Think of the snail kite and the multi-species avian ecology review. The review concludes, for the snail kite, that a mosaic of conditions is more important than particular population numbers in specific locations.

Perhaps the even larger question is: “what future do we seek?” Greek philosopher Heraclitus once wrote: “All is flux; nothing stays still.” So it is with the Everglades. There is no single, pre-intervention past to provide a perfect template—no universally accepted reference point.

One study that I read suggested marl prairies near Shark River Slough, rich and diverse in their biology, are a 20th century phenomenon. They are—through the sleuthing of environmental historians—found to be a product of post-water management interventions. John Ogden at Audubon of Florida tells me the “super colonies” of wading birds present in the southern Everglades prior to the 1970s were also, possibly, a product of altered hydrology. Are the marl prairies, then, the right reference point? What about the conditions that support the “super colonies” of birds?

And, in any event, is the past the right reference point in the context of a changing climate? What is feasible if temperatures and sea levels are rising? Projections indicate 20 – 30% less spring and summer precipitation in south Florida than in the recent past. These increases affect surface water flows, fire frequency, soil moisture, species, and flows of freshwater to coasts. I cannot discern—in mountains of materials and plans—consistent consideration of this climate conundrum. Surely, it is hard to “get the water right” without considering the effects of a changing climate.

Yet incorporating these considerations must not mire us in delays. In all the essentials, what we need to do for Everglades Restoration corresponds with what we need to do to build resilience in the face of a changing climate. But, as USGS scientist Virginia Burkett has noted, we may need flexibility in design and operations—different culvert sizes and more consideration of disturbance events, for example.

Restoration will enhance resilience and reduce risk in context of changing climate. Restoration can also—perhaps—even be part of mitigation strategies. Wetlands are, after all, important carbon sinks or reservoirs. Forty percent of terrestrial carbon is tied up in wetlands. This means their demise over time (like the demise of permafrosted tundra) can release more carbon than all human action. Yikes! I reckon that equation makes Everglades Restoration imperative.

Let me turn back to the question of goals. Questions about goals are, fundamentally, policy questions. Scientists ask: “how does the world work?” and “what do we know?” Policy makers ask: “What do we care about?” “What values are we seeking?” Asking “what do we want” is not the same as asking “what is?” Yet science is imperative to inform the value choices we make and the management decisions rendered. And, while policy makers and scientists ask different questions, they must also be asking some of the same questions:

- What constitutes success?
- How do we get there?

Scientific insights help pinpoint the possible and define the doable. Scientific assessment helps us evaluate results. These insights and assessments are an essential link between actions chosen, evaluation of outcomes, and course corrections.

We have much scientific insight to draw from—whether on climate, ecological history, or ecosystem functions. As I reviewed summaries of the spectacular, diverse and extensive scientific research underway, several qualities of ecosystem functionality recurred:

- Resilience
- Interconnectivity
- Diversity
- Flexibility
- Scale—bigger is better

Yet these qualities elude us. Exotics persist and reduce resilience. Without the benefits of decompartmentalization and more clean water, we still lack essential interconnectivity and ecological vigor. The proposed 187,000 acquisition from US Sugar Corp could enhance scale and flexibility. But big question marks persist on how this will play out on the ground. Will this land enable us to deliver more water simultaneous with improved water quality? Should we deliver more water even at a cost to water quality? Is that a necessary trade off? We have barely begun even to ask what this acquisition may mean for currently planned projects in the South.

But the proposed acquisition is spectacularly bold. It sets the stage for flexibility. We can, perhaps, cut back on below-ground storage and use more passive surface storage with these lands being made available. Florida's Governor must be commended for his leadership.

There are, however, some darker brush strokes in the Everglades Restoration picture. Land fragmentation, water, fire, invasives—these are familiar challenges, though evolving in scope and scale. But new challenges loom. Let us return for a moment to the matter of climate change.

Perhaps no subject is more intriguing than the challenges and complexities of climate change. Make no mistake—evidence of a changing climate is significant. The effects of a changing climate cut a broad swathe across lands and waters—especially in the Arctic and in coastal, low-lying areas like Florida.

The effects are not speculative and are sometimes dramatic. For the Nation as whole, our wildland fire season is 78 days longer than in the 1970s. For Florida, changed vegetation, drier soils, and changing precipitation patterns are coalescing to alter fire intensity. Think of the very hot 40,000-acre fire in Everglades National Park last May, which threatened the park and communities.

According to some research I read, climate change could affect tree island viability. These islands are highly susceptible to changes in response to hydrologic alterations.

Perhaps especially important is to single out the matter of water. I am reminded of the ditty: Water, water, everywhere but nary a drop to drink. The ditty, of course, is an overstatement, but the prospects of saltwater intrusion render the ditty at least metaphorically relevant.

Inevitably, we face complexities that accompany all human action involving time and resource constraints. First and foremost loom possible trade offs. Time and resources—always, always—are constrained in any governance setting and that means we have to make choices.

- How clean is clean enough for water quality?
- Can we achieve ecosystem functionality best with more investment in water flows—while relaxing constraints on water quality?

Don't panic! I am neither advocating nor even proposing that tactic. I am just asking a question—a fundamental policy question. Scientists around me tell me: “Whoa! Anything beyond 20 ppb of phosphorous heads us toward cattails everywhere.” So, probably, there are some hard and fast upper bounds to this trade off question. But are we even asking the question? Should we?

Let me return again to the matter of goals. We all nod approvingly toward the trifecta of goals. But, lurking beneath the surface, some basic debates persist, and these debates complicate decisions and keep us grasping for progress.

Let me delineate a few of these debates:

- “Do no harm” vs. “Do something and adjust later”
- How clean is clean enough? That I have already mentioned.
- Species vs. restoration—fill in the blanks, you know the debate.
- Tree islands vs. ridge and slough landscape.

And, there is the overarching question: in a context of constrained resources, where should efforts focus?

John Ogden, other scientists, and some policy makers suggest we should focus on actions that get the biggest ecosystem restoration “bang for the buck.” That could mean a focus on the core Everglades and downstream southern estuaries where much of the production and abundance in the natural system occurred in the past.

Many trade offs need not be cast as conflicts. But their resolution requires that we think differently. What, then, might be the path forward? We need:

- To take action, both to get results and send a signal
- Flexibility
- Incremental adaptive restoration

I perceive many nods—but what, what, what do these mean? And do our laws, regulations, and decision structures really support incremental adaptive restoration? At Interior, we have generated adaptive management guidance. We are issuing new NEPA regulations that facilitate adaptive management. What about everyone else?

Let me suggest elements of a possible framework. We cannot do everything, nor can we do everything at once. Perhaps the path to success is to center on a few key

transformational projects. Perhaps we need projects that get flows flowing—and, especially, flowing to sensitive areas. This point is affirmed in the multi-species ecology report. We need to get water into the system to stave off what otherwise may be irreversible changes to the ecosystem and then adjust, tinker, and fine tune the timing, direction, and amounts to mitigate unintended consequences.

I am the novice here—I do not know the answers. I barely know the questions.

As I look at the trifecta of goals, one dimension seems notably less evident. Cityscapes: where are they in the vision mix? Yes, the City of Naples is addressing stormwater and using Nature's Capital to filter water. Yes, kudos to the Miami/Dade Climate Change Advisory Task Force for a major visioning of its future. Kudos, too, to Governor Christ and Secretary Tom Pelham for leadership in recognizing this issue.

But across all America, our built environments continue to miss opportunities to “green” urban space in ways that complement conservation efforts. Compatibility with the built environment is multidirectional. Yes, we must mitigate adverse impacts such as flooding. But built environments can also add to the restoration portfolio. I don't mean just having trees and parks. I mean fundamentally rethinking city spaces to incorporate permeable, rather than impermeable, landscapes and parking lots. These efforts are not just “nice to do.” Such efforts can significantly reduce polluting runoff.

I believe we need more intersection between the work of city planners, “green design” professionals, and ecosystem restoration efforts. Can we think differently about that urban/Nature interface?

Let us return to the refrain of Dan Kimball: Everglades Restoration is *not* optional. I am a lifelong birder. I remember the Everglades in 1957. It was already partially transformed but, still, I remember rivers of grass and flocks and flocks of birds.

But one need not be a birder, with a passion for wildlife and the aesthetics of a restored environment and wild places to know Everglades Restoration is not optional.

Water is the essence of life—yet it could be threatened by saltwater intrusion if we don't take significant steps to counter that trend. With changing climate may come increased storm intensities and the risks they pose to human communities, along with devastating habitat and ecological function. One USGS study of the Gulf Coast suggests that each 2.7 mile stretch of sea marsh reduces storm surge by one foot. For Louisiana, with 100 miles of sea marsh 100 years ago, a 30-foot storm surge, when it reached human communities, had decreased to a foot. But those sea marshes are gone in Louisiana.

In Florida, the Everglades is one big sponge that can moderate storm damage and provide drinking water, but only if we keep what's there intact—and achieve restoration goals. We're talking big avoided costs using these “horizontal levees” to prevent storm surge damage. One study puts the value of coastal wetlands for flood protection and buffer potential at \$23.2 billion per year in the United States.

Some of Florida's mangroves affected by the built environment are at risk as storm intensities increase. Consider the work of some researchers presented at this event—some mangroves simply are not regenerating after storms ripped through them in recent years. With a loss of some mangroves, comes a loss of storm buffers. And mangroves appear threatened not merely by storms but by changed hydrology that effects subsurface dynamics associated with elevation rise. Historically, apparently, mangroves kept pace in a sort of dynamic equilibrium with sea level rise. But more intense storms and less water flows into mangroves combine—possibly—to impede elevation rise. Mangroves—once lost—may be lost forever, and that is not good for human communities or the environment. Ironically, elsewhere in the Everglades is the problem of mangrove encroachment.

What is the bottom line? Everglades Restoration is essential to the well being of human communities. Restoration builds resilience into landscapes, especially changing landscapes. But how, how, how do we get that plum we all seek—restoration?

Some fundamentals may need rethinking—and we can do that through the review of the programmatic regulations. We can make “learning” a project design element, for example. Perhaps we need to rethink the way we design, implement, and assess projects—or combinations of projects—to maximize learning on both ecological and engineering questions. I am indebted to John Ogden for posing this question. Yes, we need scientific modeling, but amid uncertainties, learning by doing is an important tool both for scientists and managers.

One presenter talks of the Corps' decision process—the requirement that projects, one by one, undergo “next added increment” analysis. The methodology is ill-fitted to the landscape-scale, interconnected nature of the Everglades Restoration framework. One isolated project may not pass the next added increment cost-benefit test by itself, but, as part of a larger whole, may be an essential component of long-term ecosystem functionality.

And then there's the matter of “do no harm.” Surely Hippocrates had this notion right when it came to health interventions—though even there, one could conjure up counterexamples. But for Everglades Restoration, the variables are so many, the interconnections so great, that “do no harm” can mean an endless quest for more information—and a resulting decision paralysis.

The Everglades itself may be at stake—that is, with a failure to take bold action, we may lose our ability to recover the defining historic conditions of ecosystem functionality. Perhaps—and this is a challenge to those gathered—perhaps we need to settle on the bold, necessary, fundamentally essential actions to get water flowing, with a focus on areas that give us the greatest environmental lift, like restoring Taylor Slough and flows into eastern and Florida Bay. As we proceed, we can then monitor other variables for unintended consequences and impacts and make course corrections, adjustments, and corrective responses.

We know a lot, but we can't know everything. We need a dose of humility, I think, to resist thinking that we can fine-tune our plans to get everything *just right* in one go. Many gathered here are scientists—you know these limitations.

Without upfront, clear goals and a clear game plan on how to get there, we often spin around pursuing a multitude of actions that lead us on a vast set of vectors that radiate out in all decision making directions. With a multitude of vectors shooting off every which way, we end up with a vector sum of zero—and no tangible progress toward the end goal.

I owe this analogy to Tom Armstrong at USGS—and it is an imperfect fit for our situation in the Everglades. But it has some aptness as we point in many directions, spinning with a dizzying array of scientific detail, then striving to “get everything right.” Yes—we need to avoid irreversible, big mistakes. But does anyone really question that getting water flowing is essential?

I know, I know there are questions about flow rates—but perhaps we need flows first, then we can fine tune the rates. We must find that option in which waters can flow, but minimize adverse impacts to tree islands and address seepage problems. These don't have to be mutually exclusive goals if we have the right sequence and right mitigations. So what do we need to do to make that happen?

In Florida, folks like the refrain that the Everglades Restoration effort is the largest wetland restoration endeavor in the world. But fulfilling the vision set forth in that refrain requires action.

In my job, I have great opportunities to see a Nation of citizen stewards—conservation partnerships across large landscapes. Consider the Blackfoot Challenge in Montana. Dozens of ranchers, our federal agencies, the State, tribes, nonprofit organizations, like the proverbial tortoise, slowly but surely are lending a caring hand to hundreds of thousands of acres of land. They are transforming stream banks back to natural configurations and vegetation. They are even protecting grizzlies.

Or consider a Colorado River partnership in which, step by step, over 20 years, 290 miles of river have been opened to fish passage, with stream banks and vegetation restored.

In both cases, partners avoided getting wrapped up in the search for the perfect plan, And the full suite of partners—private landowners, nonprofit organizations, and agencies—are part of the decision process. These partners took a “just do it”—one investment after the other—approach.

Borrowing from these experiences, I believe we must “just do it.” We must get the one-mile bridge done—and then the next steps along the trail thereafter. Secretary Kempthorne has made this an absolute priority. We must also undertake the decompartmentalization and C-111 spreader canal projects. The good news is we have dramatic progress through the stakeholder process of the South Florida Water

Management District. Perhaps we must get water in the Frog Pond, and we must invest in the Picayune Strand project.

I know consensus eludes us on many matters. Should we focus on tree island restoration or achievement of ridge and slough configurations? Should we push, push, push water downstream to forestall estuarine salinity or worry about excessive ponding?

Policymakers get hung up on this stuff. I believe we need to shift gears—make the bold decisions, take action, then adapt and adjust as we strive to get the details right.

Policymakers also drown in near incomprehensible list of enumerated canals and ditches and stormwater treatment areas and water storage areas. To act, policymakers need to understand the choices, their costs, and the hoped for benefits. They need context and a sense of what outcomes might ensure from decisions rendered.

These decisions require the information, insights, and interpretations of science and their intersection with proposed actions so policy makers can better understand trade offs and essentials in order to make choices and advocate action.

I recently spent a few days in Alaska with USGS scientists—scientists doing great, great work on sea bird dynamics. We talked about how to infuse this work into policy decisions. For policy makers, I am reminded of the phrase of economist Thomas Sowell: “information is everywhere but knowledge is rare.” Policymakers need the help of scientists, but policymakers need knowledge as well as information.

They need scientists to synthesize information. They need scientists to help frame the policy questions. They need scientists to help shape options. I know this is a sensitive matter for scientists. I am not suggesting all scientists everywhere in every venue fulfill this role. But I believe the decision process would benefit from serious assistance from scientists with a proclivity for synthesizing research and translating it into policy relevant questions and options.

Some of you are already doing this. I know recently that John Ogden and others began conversing on just this topic. I applaud those efforts.

I want to mention another lesson learned: we need dialogue. I think we can all draw a lesson from author William Isaacs, who has written that: “dialogue is conversation with a center not sides.” Dialogue is about finding that sweet spot that may achieve, not one individual’s ideal, but everyone’s notion of the acceptable.

In the end, the success of Everglades Restoration will depend on getting beyond value chasms and debates about preferences. Formal coordination of human action across complex, multi-dimensional plans, history shows us, is tough. Yet, for the Everglades, that cross-jurisdictional and public-private coordination is imperative as the landscape in question transcends many boundaries. So, too, is coordination between policy makers and scientists.

As I poured through the many dozens of research papers, I was wowed at their sophistication, diversity, and insights. But, as a policymaker, for me the missing link is some sort of synthesis—and some sort of interpretation: we need voices of science at the decision making table.

We need scientists who can help summarize what the science might mean for decision makers. What trade offs are potentially illuminated? For me, what would be useful is a delineation of key policy questions, trade off issues, and decision debates, with the science results arrayed under those issue groupings to help bring focus to the decision discussion. Such synthesis and policy integration could help winnow out which apparent debates really can be resolved with information and analysis and which truly are matters of value judgments, preferences, and priorities.

Everglades Restoration is *not* an option—that is my chorus line for today. But success resides in clear goals, actions influenced by science, and course corrections informed by monitoring.

Those gathered lie at the heart of this decision network. You do really “cool stuff”—looking at apple snails and atmospheric deposition, methylated mercury and mangroves, seagrass and salinity, carbon cycles and crocodiles. You also can make a difference. You can help Florida, this Nation, this world assure that the Everglades will make a come back. What we now need are big ideas and corresponding action.

I'd like to conclude by thanking you. Thank you for helping uncover the mysteries of this place, this planet. Thank you for helping this State and this Nation lend a caring hand to our landscapes. And, now, I would like some special folks to stand so that I might thank them for their help in making my remarks possible:

- Virginia Burkett
- Ronnie Best
- Nick Aumen
- Paul Souza
- Bob Johnson
- Dave Hallak
- Dan Kimball—who, I know, is not yet here
- Rock Salt
- Greg May
- Carol Mitchell

I drew from the work of so many that I cannot name each of you but wanted to thank these individuals for tirelessly answering my questions and sending me as much as my heart desired on Everglades science and policy issues.

Finally, I offer a very special thanks to John Ogden, whom Dan Kimball has called “the conscience of the Everglades.” His tenure over so many years—in so many different roles—has resulted in insights that he has shared with me and which I much appreciate.