**STATEMENT OF DAN KIMBALL, SUPERINTENDENT, EVERGLADES NATIONAL PARK, NATIONAL PARK SERVICE, DEPARTMENT OF THE INTERIOR, BEFORE THE SUBCOMMITTEE ON INTERIOR, ENVIRONMENT, AND RELATED AGENCIES OF THE HOUSE APPROPRIATIONS COMMITTEE CONCERNING CLIMATE CHANGE AND LANDS ADMINISTERED BY THE DEPARTMENT OF THE INTERIOR.**

**APRIL 26, 2007**

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Mr. Chairman and members of the subcommittee, I appreciate the opportunity to appear before you today at this hearing on climate change and its impact on lands administered by the Department of the Interior. My remarks will focus on Everglades National Park and the potential effects of climate change on the Everglades ecosystem, the park's infrastructure, and our visitors.

At 1.5 million acres, Everglades National Park is the third largest park in the lower 48 states and protects the largest wilderness area east of the Rocky Mountains. The park includes the largest freshwater sawgrass prairie in North America and the largest protected mangrove ecosystem in the Western Hemisphere. To the members of Congress who debated the park proposal in 1932, Everglades National Park was a new idea: the first national park to be established not as a scenic showplace, but as a biologic marvel.

Everglades National Park is part of the greater Everglades, a 100-mile long, 50-mile wide shallow, freshwater "River of Grass" that historically flowed south from Lake Okeechobee through the freshwater sloughs and prairies to the Gulf of Mexico and Florida Bay. Summer rains flood this river and fuel the reproduction of small fish, algae, and other organisms at the base of the food chain. The winter dry season concentrates this life into ponds and alligator holes that once fed "super-colonies" of wading birds, colonies so large that observers claimed that in flight they blocked out the sun. Where fresh water from the marshes meets salt water at the coast, vast mangrove forests and winding coastal creeks begin. Here, crocodiles and alligators uniquely live side by side. Beyond the mangroves is Florida Bay, a half-million acre estuary made up of shallow basins, grassy mud banks, and mangrove islands. The bay serves as a nesting area, nursery, and feeding ground for lobster, pink shrimp, crocodiles, manatees, turtles, dolphins, and a variety of birds and game fish. As many say, "There are no other Everglades …" The park has also been designated as a World Heritage Site, an International Biosphere Reserve, and a Wetland of International Importance.

The Everglades also serve the people of South Florida. They are a source of drinking water for almost 5 million residents; a giant limestone sponge that helps to absorb the

floodwaters from tropical storms and hurricanes; and one of the major engines of tourism for South Florida.

During the last 130 years, the Everglades have been put in peril by a series of water management projects that were conceived with good intentions, but with little understanding of the ecosystem. As a consequence, wading bird colonies have shrunk by 90%. Sixty-nine species of plants and animals have been listed as threatened or endangered by the State of Florida or the Federal government. The ability of the ecosystem to store water – for both people and nature – has been seriously compromised. The existing "plumbing" of South Florida makes it almost impossible to improve conditions for one user of water without harming another.

As you are aware, the Department of the Interior, in partnership with the U.S. Army Corps of Engineers, the State of Florida, and the Native American tribes, has embarked on a 35-year, $11 billion effort to restore the greater Everglades. As I hope to show later in my testimony, this effort is even more critical in a time of rising seas.

Everglades National Park is very vulnerable to sea level rise. The entire park lies at or close to the level of the sea. Sixty percent of the park is at less than 3 feet above mean sea level. The highest ground in the park is 11 feet above mean sea level. The February 2007 report of the Intergovernmental Panel on Climate Change (IPCC) allowed the park to model the potential impact of sea level rise on its lands and waters. Using six different climate change scenarios, the IPCC report projects that sea level could rise between 7 inches to 23 inches by the end of this century. If this projection proves true, 10% to 50% of the park's freshwater marsh would be transformed by salt water pushed landward by rising seas.

The key to predicting the impacts of sea level rise is knowing the rate at which the water will rise. Sea level has been rising in South Florida since the end of the last ice age, more than 10,000 years ago. Geologic evidence shows that much of the marine area of the park, including Florida Bay and the Gulf Coast, was freshwater marsh 10,000 years ago. Beginning 5,500 years ago, rapidly rising seas (a rate of 9 inches every 100 years) flooded the bay and Gulf Coast and pushed saltwater inland far beyond today's coastline. Approximately 3,200 years ago, the rate of sea level rise dropped to about an inch and a half every hundred years. In this time of slow sea rise, South Florida gained land, including Cape Sable and the Ten Thousand Islands.

The rate at which sea level would rise in the future is an important factor. Past evidence tells us that if sea levels were to rise slowly, mangroves and shallow mud banks might be able to keep pace with the change. If sea levels were to rise rapidly, it is likely that

mangrove areas and coastal wetlands would likely not be able to adapt and would be submerged.

What impacts would sea level rise have on the natural systems within the park? Much is unknown and the subject of scientific speculation. Most scientific reports agree that sea level in South Florida has risen by 10 inches since 1930. During that time, we have seen the erosion and collapse of a few coastal creeks. As water eats away at the land, it carries away nutrients that have been locked up in peat and mud soil and makes them available for algae, microscopic organisms that are a normal part of the ecosystem, but that can increase to levels that harm other life if nutrient levels are too high. To date, the impact of coastal erosion has been local and has not threatened the Everglades' ecosystem. But things could change if the rate of sea level rise increases.

A rise in sea level of between 7 and 23 inches, as projected by the IPCC report, would submerge tidal flats and inland freshwater marshes and impact the species that inhabit these areas, such as wading birds and the Federally endangered Cape Sable Seaside Sparrow. If sea level rises 23 inches, it could submerge the park's pinelands, one of the rarest ecosystems in South Florida. Rising sea levels could also erode beaches, leaving fewer habitats for nesting sea turtles.

On the other hand, this level of sea level rise would increase the area of shallow basins, mangroves, and brackish marshes resulting in the increase of salt water dependent species.

In the Florida Bay area of the park, rising sea levels could submerge shallow seagrass flats under more water and raise salinity concentrations, adversely affecting fish habitat and associated estuarine fisheries. A June 2006 report by the National Wildlife Federation and the Florida Wildlife Federation highlighted these potential impacts and also suggested that sea level rise would harm the world-class recreational fishery in Florida Bay for bonefish, yellowtail snapper, permit, redfish, snook, spotted sea trout, and tarpon.

Florida Bay could be affected not only by sea level rise, but by rising temperatures as well. The IPCC report predicts that sea surface temperatures could rise between 2 and 5 degrees Fahrenheit by 2100. Scientists have linked high sea surface temperatures in 1987 to the seagrass die-off that occurred that same year. Higher sea temperatures could fuel algal blooms or promote marine diseases.

Sea level rise could also impact park buildings, trails, campgrounds, roads, and historic sites. Structures such as fixed docks and backcountry camping platforms (chickees)

might become unusable if waters rise. On the other hand, deeper water might reduce the number of boat groundings in Florida Bay, a major problem facing the park. Sea level rise will exacerbate storm surge impacts and coastal erosion associated with tropical storms, both to natural systems and park infrastructure.

Sea level rise would likely push salt water into the Everglades and threaten the viability of South Florida's drinking water supply. Today, surface water from the Everglades is the principal source of freshwater for the underlying Biscayne Aquifer, which is in turn the source of drinking water for close to 5 million people in South Florida.

Everglades National Park is undertaking a number of actions in response to climate change. First, we are working hard with our partners to complete the Comprehensive Everglades Restoration Plan (CERP). By removing the canals and levees that form barriers to natural water movement, we hope to restore natural flows to the park and restore the Everglades' capacity to store water. More water in the Everglades would create a freshwater head that would act as a barrier to the landward push of saltwater. This freshwater head would make the Everglades ecosystem more resilient to climate change.

Second, we are carefully monitoring climate change indicators and projections, and using this information to shape our management actions. For example, recent information suggests that failed saltwater dams – or plugs – along canals in the Cape Sable area of the park have led to a decline in the number of American crocodiles in the area. From the 1990s until the failure of the plugs, the Cape Sable canals were the most productive crocodile nesting area in the park. The failed plugs let the tides push into the canals, creating strong currents and saltier conditions, both of which make the canals less suitable for nesting. While we would like to replace the plugs to block salt water incursions into the freshwater backcountry of the cape and protect the crocodiles, sea level rise suggests that we should consider structures that are less expensive and permanent than those we would consider in the absence of sea level rise. We are also considering more extreme actions such as storing the seeds of rare, endemic, and threatened and endangered species, and relocating coastal plant and animal species to adjacent protected areas.

Third, we are carefully evaluating how (and if) we construct and rebuild park facilities in flood-prone zones. For example, we have replaced fixed docks with floating or removable platforms so they are more resistant to sea level rise and storm events. We are taking sea level rise into account as we develop our plans to rebuild the lodging, docks, stores, and other visitor services at Flamingo that were seriously damaged by Hurricanes Katrina and Wilma in 2005. We plan to elevate buildings or construct temporary or mobile buildings that can be relocated in advance of major storms.

Fourth, we are one of nine units of the National Park System that has participated in the National Park Service's Climate Friendly Parks Program, a partnership effort between the Park Service and EPA. As part of that program, we have inventoried our sources of greenhouse gases and taken actions to reduce our emissions; utilize alternative fuels, such as biodiesel; operate a more efficient motor vehicle fleet; and implement comprehensive recycling and sustainable design and procurement programs.

Lastly, the park is a member of the newly-formed Miami-Dade Climate Change Advisory Task Force. This 25-member Task Force makes recommendations to the Miami-Dade Board of County Commissioners regarding ways that the South Florida community can work together to reduce locally produced greenhouse gases and to adapt to sea level rise and the impacts of hurricanes with potentially greater intensity and frequency.

In summary, given its geography and topography, Everglades National Park is very vulnerable to sea level rise. Sea level rise would impact the ecosystem, the park's infrastructure, our visitors, and our greater South Florida community. We will continue to monitor indicators of climate change in the park, and adapt accordingly based on what the science tells us. Most importantly, we will continue to do everything we can to restore the River of Grass, resulting in an Everglades ecosystem that will be healthier and more resilient to the effects of climate change.

This concludes my prepared testimony. I would be pleased to respond to any questions you or other subcommittee members might have.