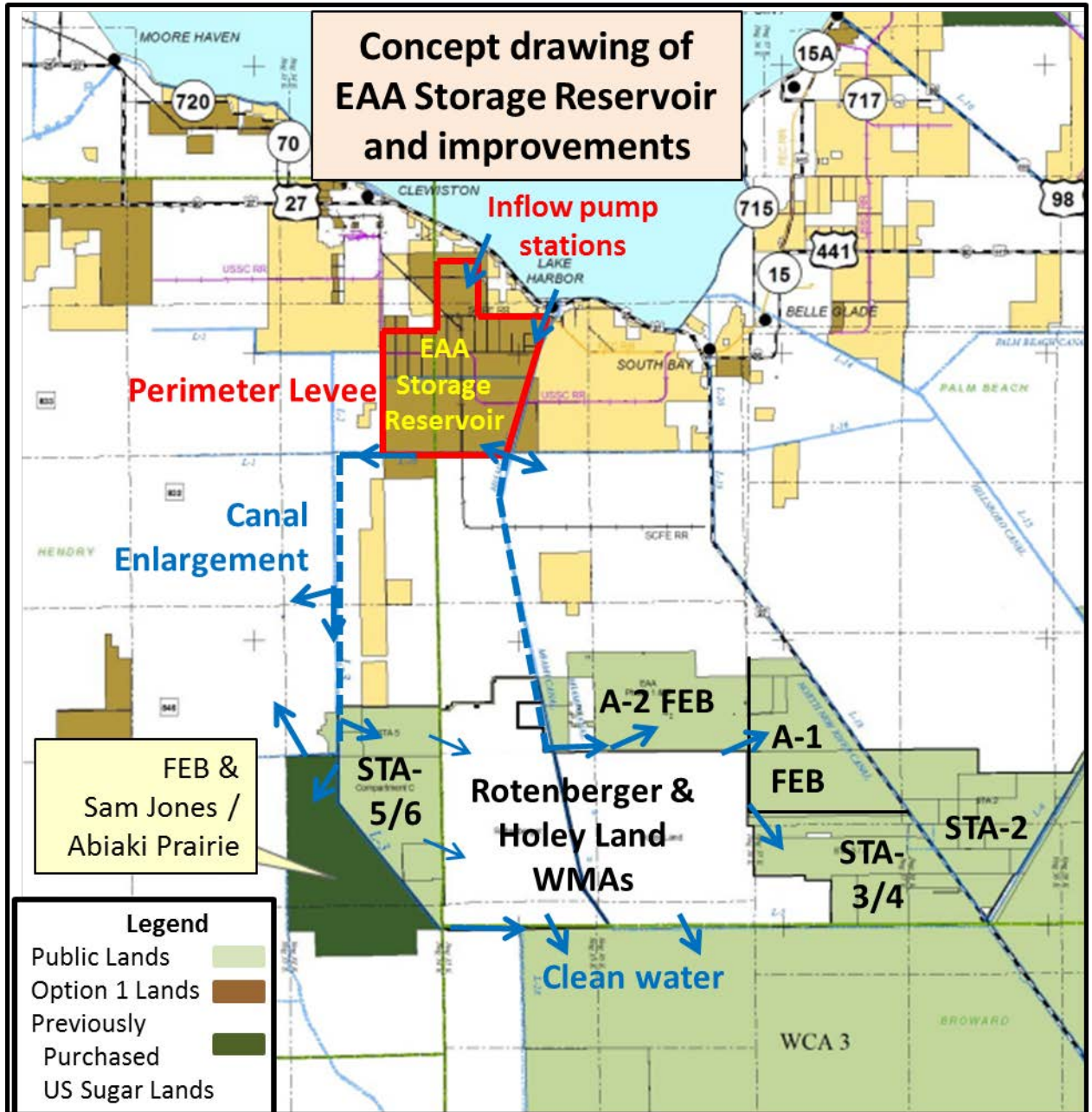


Resolving System Constraints: *An Action Plan*



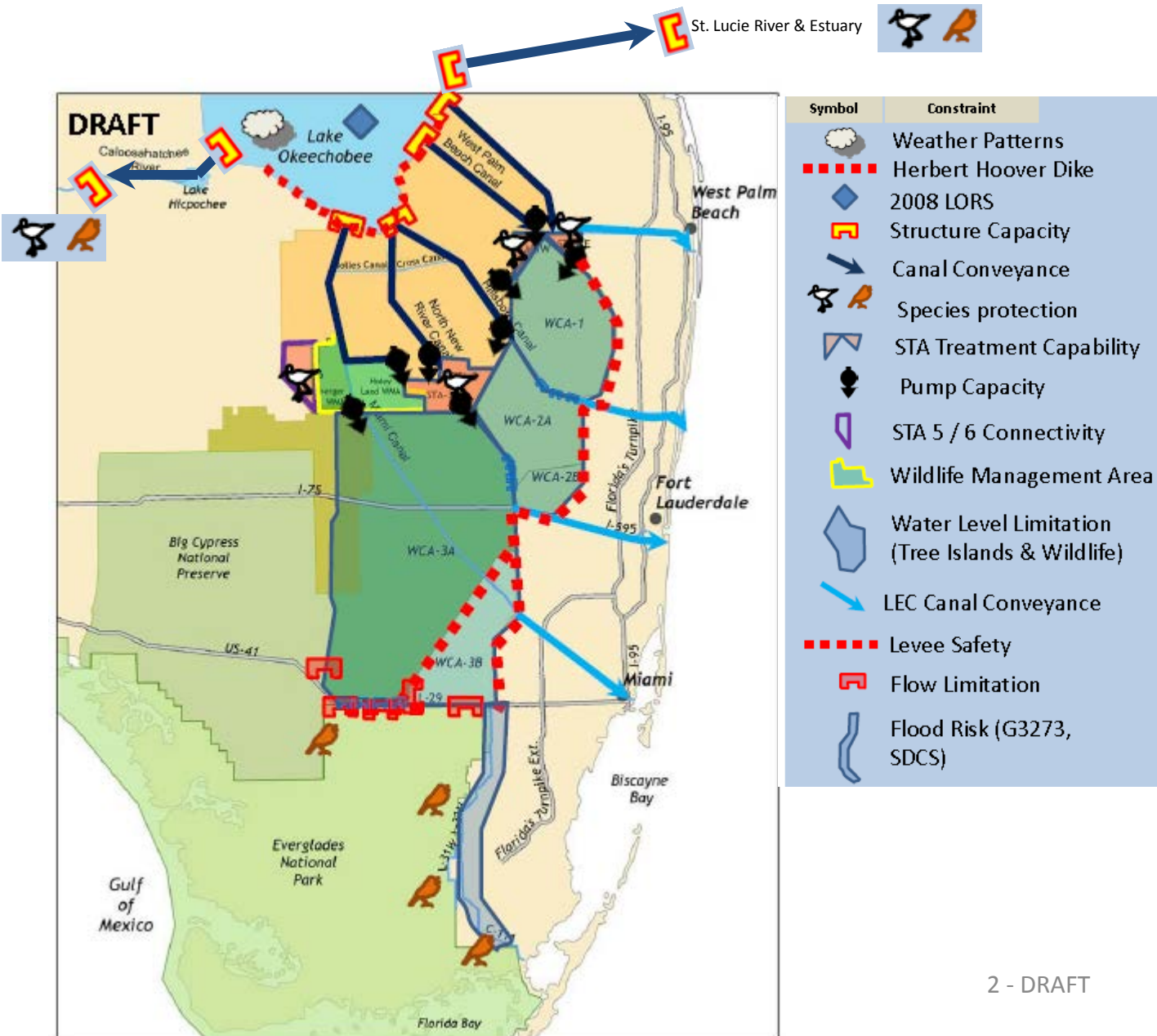
March 12, 2015

Gary Goforth

DRAFT

Identifying Ways to Resolve System Constraints = Action Plan

- Identifying system constraints is a fundamental step in identifying long-term solutions to minimize destructive Lake releases to the estuaries.
- A properly constructed “System Constraints” document provides fundamental engineering justification for the State to purchase available lands within the EAA in order to increase the storage and treatment necessary to achieve this long-term goal.
- District staff are creative problem solvers – ask them to develop a conceptual plan for best utilizing the US Sugar Option 1 lands and present their recommendations in 30 days.*



Executive Summary

1. Many constraints exist to achieving the goal of eliminating destructive Lake releases to the estuaries. Although it may not be possible to stop all Lake releases in very wet years, Lake releases can be significantly reduced by resolving the majority of the constraints through proper planning, operations and constructing additional storage and treatment areas.
2. The existing system of structures, canals and treatment areas has sufficient capacity to send significantly more treated Lake water to the Everglades than in the past decades, upwards of 250,000 – 500,000 AF/yr.
 - a. During 2014-2015, the District demonstrated that year-round Lake releases to the STAs (i.e., slow and steady) can result in over 500,000 AF/yr of treated water to the Everglades in some years without noticeable harm to the STAs.
 - b. With the completion of the A-1 Flow Equalization Basin in the near future, the storage and treatment capacity will increase even more.
 - c. Additional Lake water can be sent south with modifications of current federal and District operational policies.
 - d. Current estimates of additional Lake water than can be sent south with the completion of Restoration Strategies and CEPP should be revised in light of the 2014-2015 operations.
3. However, the storage and treatment capacity of the existing system is not sufficient to completely end all of the destructive Lake releases to the estuaries, and additional storage and treatment features north, east, west and south of the Lake are needed to resolve these capacity constraints.

Key Recommendations from University of Florida Water Institute Study:

Provide Additional Water Storage, Treatment and Conveyance South of Lake Okeechobee

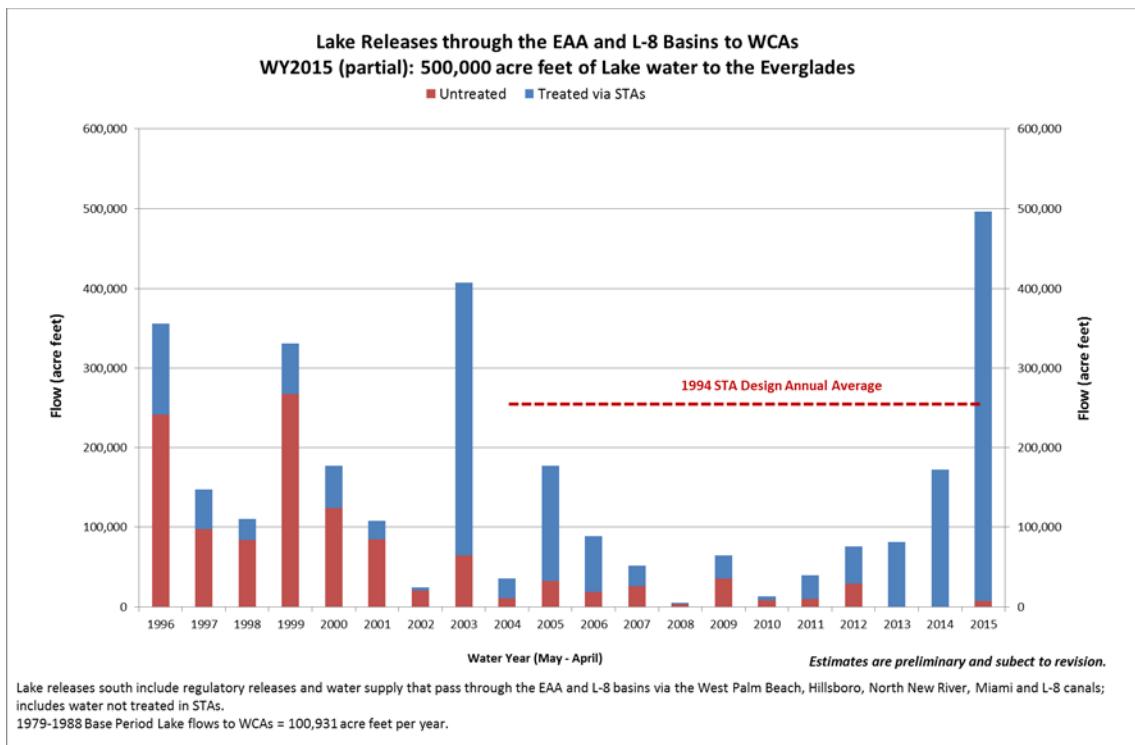
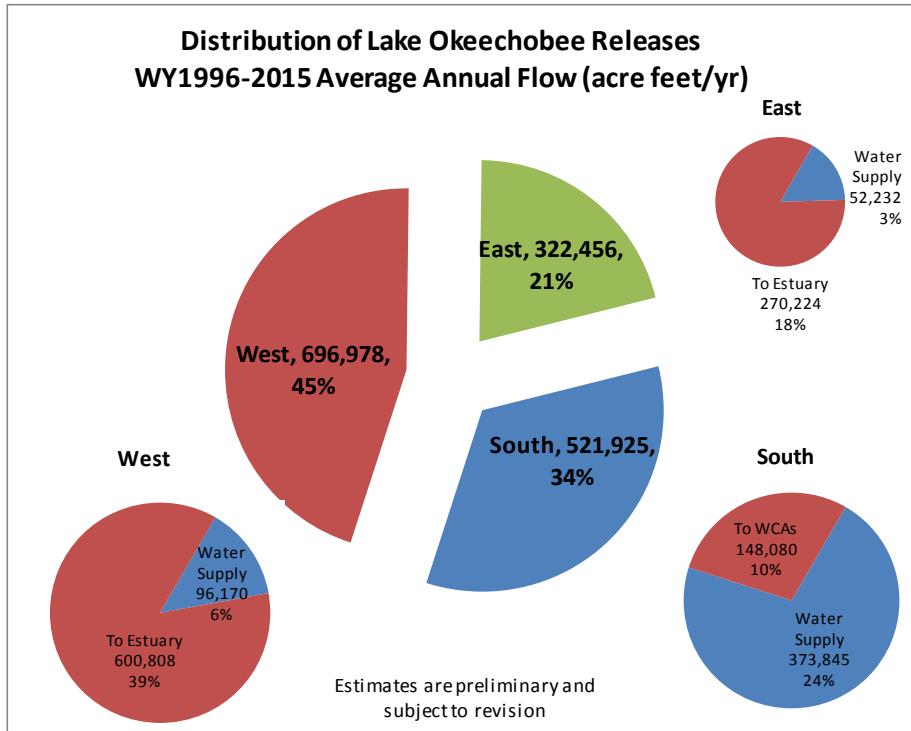
- will require additional land between the lake and the WCAs, e.g., the current U.S. Sugar land purchase option,
- lands from other willing sellers, and/or
- use of existing state-owned land (e.g., Holey Land and Rotenberger WMAs)

Creating new storage and conveyance along the western boundary of the EAA, where Lake Okeechobee water is cleaner and excess treatment capacity exists in STA 5/6, may be a promising option.

From the *Integrated Delivery Schedule*: The EAA Reservoir: Improves the timing of environmental deliveries to the WCAs; reduces Lake Okeechobee regulatory releases to the estuaries; meets supplemental agricultural irrigation demands; and increases flood protection within the Everglades Agricultural Area.

Sending Lake Water South

The existing water management system has been designed and operated to send Lake Okeechobee water south (34%), west (45%) and east (21%) – and constraints exist for each direction. Only ten percent (10%) of Lake releases made it to the Everglades since 1996, compared to nearly 100 percent in historical times.



Lake Okeechobee and the Dike

Herbert Hoover Dike around Lake Okeechobee. Parts of the dike were constructed in the 1930s, and concerns over its structural integrity led to lowering the overall regulation schedule to the current *interim* operating schedule (LORS2008). It will be possible to hold more water in the lake, thus reduce the destructive discharges to the estuaries, as the U.S. Army Corps of Engineers rehabilitates the dike.

Action Item: *The Corps has already spent \$650 million in rehabilitation and this work should be expedited.*

Lake Okeechobee Regulation Schedule (LORS) provides guidance on how much Lake water goes south and how much goes to the estuaries. LORS takes into consideration many factors, including the integrity of the Herbert Hoover Dike, the ecology of the lake ecosystem, and water supply needs of adjacent landowners. LORS2008 was developed 7 years ago as an *interim* schedule in response to concerns about dike safety. The Corps has been developing a revised dam safety report.

Action Item: *In light of the \$650 million in rehabilitation work on the dike, and pending the outcome of the revised dam safety report, the State could request that the Corps revise LORS to provide greater storage in the Lake and reduce the destructive discharges to the estuaries.*

Structure Capacity: "Structure capacity" refers to the amount of water that can be sent south during a relatively short timeframe (e.g., a day or a week) through the spillways and culverts located around Lake Okeechobee. The total structure capacity varies depending on Lake level and EAA canal level, allowing for different amounts of water to be sent south during different times of the year. During WY2015, the District sent over 1,000,000 AF through these structures into the EAA and L-8 basins.

Short-term Action Item: *Lake releases can be maximized by sending water south all year round, especially in the dry season when the STAs and Everglades need water at the same time the Lake water levels need to drop for the health of the Lake ecology and in anticipation of the upcoming wet season.*

Long-term Action Item: *Structure capacity could be increased as part of a reservoir system constructed on the US Sugar Option 1 lands.*

Stormwater Treatment Areas (STAs)

Canal conveyance capacity. During storm events, the EAA and L-8 canals are used primarily to provide flood protection, however, these canals are not needed for flood protection every day of the year, and their capacity can then be used to deliver Lake water to the STAs and WCAs. During WY2015, the District sent over 500,000 AF through the EAA canals into the STAs.

Action Item: Canal conveyance capacity could be increased as part of a reservoir system constructed in the EAA on the US Sugar Option 1 lands.

Pump Capacity: With the construction of the STAs, there is now more capacity than ever before to remove basin stormwater. During WY2015, the District sent over 500,000 AF of Lake releases through these pumps into the STAs.

Short-term Action Item: According to District staff, Lake deliveries may be increased by operating the pumps round the clock, necessitating smaller pumps in some cases.

Long-term Action Item: Pump capacity could be increased as part of a reservoir system constructed on the US Sugar Option 1 lands.

STA Treatment Capability. Overloading the STAs with EAA runoff and Lake Okeechobee deliveries may adversely affect the ability of the STAs to reduce phosphorus levels. However, by delivering historic volumes of Lake water at a relatively low rate throughout the year – and not just the wet season, STA performance actually improved by 4 ppb. In addition, District scientists indicate there have been no adverse impacts on the treatment vegetation due to Lake water. The only STA that has not exhibited a performance improvement was STA-5/6 which did not receive any Lake water.

Action Item: Continue the year round delivery of Lake water to the STAs at a year-round target loading rate of 1 ft per month.

Long-term Action Item: Treatment capacity could be optimized as part of a reservoir system constructed on the US Sugar Option 1 lands.

STA 5/6 Connectivity: STA-5/6, located in Hendry County, is the only STA that has not received Lake water in several years and has the poorest performance of the STAs. While a physical connection exists between the Lake and the STA, the associated operations are complicated. Portions of STA-5/6 discharge can be sent directly to the northwest portion of WCA-3A, an area that needs Lake water to keep from drying out, without passing through the EAA canals.

Action Item: The connection to the Lake can be improved as part of a reservoir system constructed on the US Sugar Option 1 lands.

Regional Constraints

Species Protection. Without the delivery of Lake water during the dry season, migratory birds and protected species (e.g., snail kites) find it conducive to build their nests in the STAs. Once they nest in an STA, restrictions to protect the birds are put into place which severely limit the amount of water that can be sent through the STA. To discourage this nesting, the STAs' Avian Protection Plan encourages a minimum depth of 6 inches. The only STA with nesting snail kites at this time is STA-5/6 – coincidentally the only STA that has not received Lake water.

Action Item: Continue the delivery of Lake water to the STAs during the dry season to discourage nesting. Send Lake water to STA-5/6 in future dry seasons to discourage nesting.

Wildlife Management Areas: Over 60,000 acres of public lands lie between the EAA and the Everglades, and shallow water depths are maintained to improve remnant Everglades habitat. These public areas are not being used to store and treat additional Lake water.

Short-term Action Item: During the temporary periods of emergency releases from the Lake, these public lands should be used to store and treat additional Lake water, with a target of 0.5 ft per month, i.e., much less than the STAs. Outflow pumps may be necessary to ensure a flow-through condition and to lift the water into the WCAs.

Long-term Action Item: The utilization of these areas could be optimized as part of a reservoir system constructed on the US Sugar Option 1 lands.

Water Level Limitation (Tree Islands & Wildlife): The number and diversity of tree islands have diminished over time due primarily to changes in the hydrologic regime. These areas are sensitive ecologic habitats and have special significance to Florida's Indian Tribes.

Action Item: Continuing to deliver treated Lake water to the WCAs throughout the year (not just during the wet season) and increasing outflows from the WCAs along the Tamiami Trail will help protect the remaining tree islands.

Regional Constraints

Lower East Coast Canal Conveyance: These canals move local floodwaters and Lake water east to replenish drinking water wellfields and send excess water into the Atlantic. They could be enlarged to increase their conveyance, although it would be better not to waste this water to the ocean, and instead, keep it within the south Florida system.

Action Item: Increase Lake flows to the LEC canals to help stave off saltwater intrusion in the coastal wellfields as the sea level rises.

Levee Safety: The earthen levee built along the eastern boundary of the WCAs keeps water from flooding developed areas along the east coast. The safety of these levees places a constraint on the water depths within the WCAs.

Action Item: Delivering treated Lake water to the WCAs throughout the year (not just during the wet season) and increasing flow along the Tamiami Trail will help maintain safe water levels.

Flow and Water Quality Limitation: The Tamiami Trail blocks the sheetflow of water south into the Everglades National Park, and more openings are being installed to restore a more desired flow regime. Stringent limits of phosphorus are in place along the Tamiami Trail: for the most recent year, the geometric mean of phosphorus was 5.6 ppb – well below the 10 ppb criterion.

Action Item: Continue coordination with federal agencies to remove remaining flow limitations into the Park. In addition, continue coordination with federal agencies to review/revise, as appropriate, water quality limitations.

Flood Risk (South Dade Conveyance System): The area around the city of Homestead, adjacent to the Everglades National Park, is experiencing groundwater problems stemming from holding higher water levels in the Park. These groundwater issues may be exacerbated with sea level rise.

Action Item: Continue working with the agricultural community to evaluate potential solutions for minimizing seepage from the Park.