

South Florida Ecosystem Restoration Task Force

System-wide Indicators Update

December 6, 2007



www.sfrestore.org

System-wide Indicators

- 1. Fish & Macroinvertebrates**
- 2. Wading Birds (Woodstork, White Ibis & Roseate Spoonbill)**
- 3. Florida Bay SAV**
- 4. Florida Bay Algal Blooms**
- 5. Crocodylians (Alligator & Crocodiles)**
- 6. Oysters**
- 7. Periphyton-Epiphyton**
- 8. Juvenile Pink Shrimp**
- 9. Lake Okeechobee Littoral Zone**
- 10. Invasive Exotic Plants**
- 11. Water Volume**
- 12. Salinity Intrusion in the Biscayne Aquifer**
- 13. Flood Protection – C111 Basin**



Three Tier Communication

Providing a Transparent Linkage from Simple to Complex

Biennial Report:

1. Stoplight Restoration Report Card

Detailed Assessment Report:

2. Simplified Graphics & Maps representing data in Report Card “stoplight-coded” formats
3. Full data analysis, results, scientific theory and publications

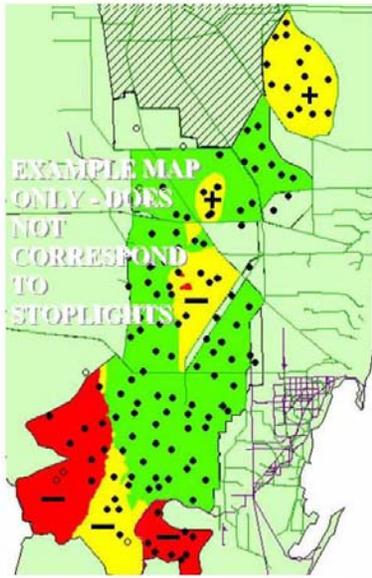


Tier 1 – Biennial Report

Stoplight Restoration Report Card

KEY FINDINGS – FISH

SUMMARY FINDING: Fish density was lower than expected—based on rainfall—throughout Shark and Taylor Sloughs since 2000, coinciding with the onset of the ISOP/IOP water management programs. Several dry-downs have occurred that were not predicted from rainfall patterns and appear to have resulted from operation schedules. Starting with each drying event, fish populations decline and remain lower than expected for two or more years. Fish density in WCA-3A and 3B was less affected by ISOP/IOP than in Everglades National Park. There was a slight increase in fish density consistent with a movement of fish into the area of WCA-3A which held water while the surrounding marshes did not.



- Legend. Standardized difference between Observed Density and Predicted Density. Plus sign = too many fish; minus sign = too few fish. Green is the target range.
- RED + (greater than 0.4)
- YELLOW + (0.2 to 0.4)
- GREEN (-0.2 to 0.2)
- YELLOW - (-0.2 to -0.4)
- RED - (less than -0.4)

KEY FINDINGS:

1. Taylor Slough had the largest decrease in fish density overall.
2. Shark Slough also had statistically significant decreases in fish density at most monitoring sites.
3. The Pre-ISOP/IOP versus Post-ISOP/IOP conditions show that fish densities have decreased significantly in much of the southern Everglades because of dry-downs that would not have occurred prior to ISOP/IOP, as predicted by rainfall.
4. Fish density in Water Conservation Areas 3A and 3B were less affected by ISOP/IOP, though they are inconsistent with expectations from NSM conditions because of ponding in 3A and drainage of 3B. Fish are more sensitive to drying frequency than water depth, which explains why ISOP/IOP had little impact in 3A because of the high-water conditions of 3A during the ISOP/IOP period.
5. Overall fish densities (and crustaceans) were lower than expected for the much of the 6 year post-ISOP/IOP period as compared to the Pre-ISOP/IOP period.
6. Water management operations in regions that showed significant decreases in fish densities from the expected should be evaluated by managers and hydrologists to determine hydrological operations that would improve fish densities toward target (predicted) levels.
7. Additional water is needed for Taylor Slough.
8. Implementation of DECOMP should lead to greater densities of small fish in WCA-3A and 3B, and will probably also shift large-fish populations from WCA-3A to 3B.

STOPLIGHTS - FISH

PERFORMANCE MEASURE	LAST STATUS ¹	CURRENT STATUS ²	PROGNOSIS ³	CURRENT STATUS	PROGNOSIS
TOTAL FISH DENSITY TAYLOR SLOUGH				All five monitoring sites in Taylor Slough showed a lower fish density than would be expected based on rainfall. Two sites had deviations indicative of a significant trend of lower fish densities overall. Pre-ISOP/IOP fish densities were within the green range and Post-ISOP/IOP fish densities decreased into the red range.	Pre-ISOP/IOP water conditions were more favorable for fish populations than Post-ISOP/IOP hydrologic conditions. Without significant changes in water management we expect the lowered fish density to continue. This may be a long term decreasing trend without improvements in water management.
BLUEFIN KILIFISH DENSITY TAYLOR SLOUGH				Bluefin Killifish also displayed a lower than predicted density in all sites in Taylor Slough during the Post-ISOP/IOP period. This corresponds to several dry-downs that, based on rainfall, should not have occurred under the Pre-ISOP/IOP water management operations. Killifish are particularly well correlated with water levels and Days Since Rewetting (from a drydown), and are well suited for predicting fish density.	Bluefin Killifish are expected to continue lower than predicted populations as noted above without significant changes in water management (ISOP/IOP) that has been creating dry-downs that based on rainfall should not have occurred.
TOTAL FISH DENSITY SHARK RIVER SHOUGH				Five of six monitoring sites in Shark Slough showed lower fish density than would be expected based on rainfall. Only site 6 showed no change from Last Status condition or from predictions (green) and it is located such that water management actions have no impact on that site. We consider site six to be an index, or reference, of overall aquatic faunal productivity.	We expect to see the same patterns in fish density for Shark Slough that we found in Taylor Slough (see above) without changes in water management.
BLUEFIN KILIFISH SHARK RIVER SLOUGH				Bluefin Killifish densities were much less than predicted for Shark Slough beginning in July 2001. This corresponds to several dry-downs that, based on rainfall, should not have occurred under the Pre-ISOP/IOP water management operations.	See Bluefin Killifish noted for Taylor Slough above.
TOTAL FISH DENSITY WATER CONSERVATION AREA 3				Fish density was indistinguishable from rainfall-based expectations at all 11 monitoring sites during the Post-ISOP/IOP period. However, Pre-ISOP/IOP and Post-ISOP/IOP conditions are not consistent with expectations from the historical ecosystem because of ponding in WCA-3A and over-drying in WCA-3B. Both conditions lead to fewer small fish than expected. Ponding supports more predatory fishes and over-drying kills fish.	We expect this area to remain in the yellow light for the foreseeable future, pending action on management programs such as DECOMP.
BLUEFIN KILIFISH DENSITY WATER CONSERVATION AREA 3				Bluefin Killifish density was lower than expected based on rainfall at one monitoring site in western WCA-3A and one in southern WCA-3B. Their density was consistent with expectations at 9 other monitoring sites during the Post-ISOP/IOP period. Pre-ISOP/IOP and Post-ISOP/IOP conditions earned a yellow status because of ponding in southern WCA-3A and over-drying in WCA-3A compared to historical conditions.	We expect this area to remain in the yellow light for the foreseeable future, pending action on management programs such as DECOMP.
TOTAL FISH DENSITY WATER CONSERVATION AREA 1				No information on Loxahatchee at this time.	
BLUEFIN KILIFISH DENSITY WATER CONSERVATION AREA 1				No information on Loxahatchee at this time.	

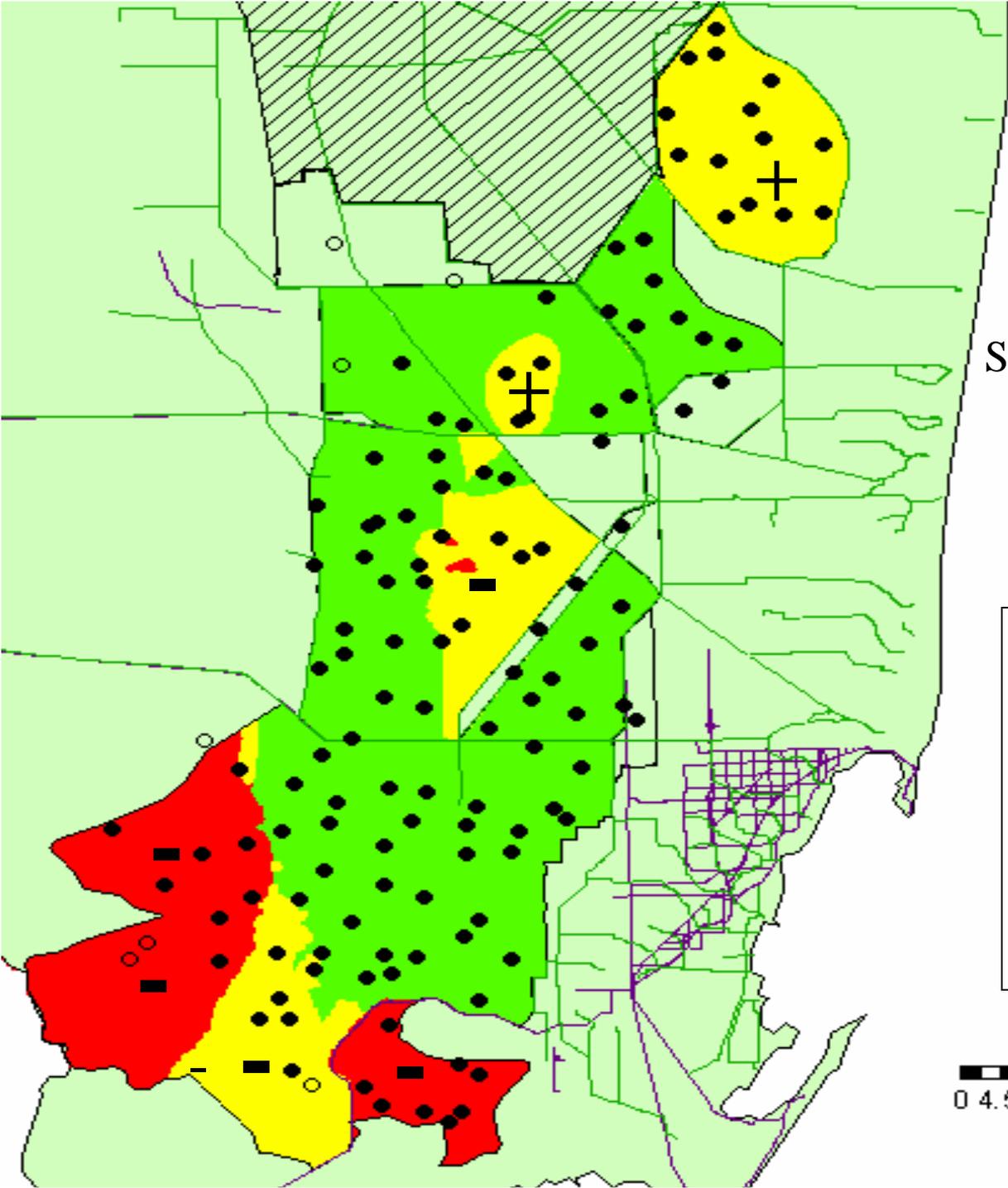
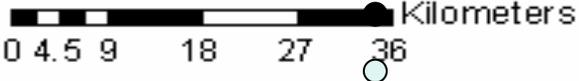
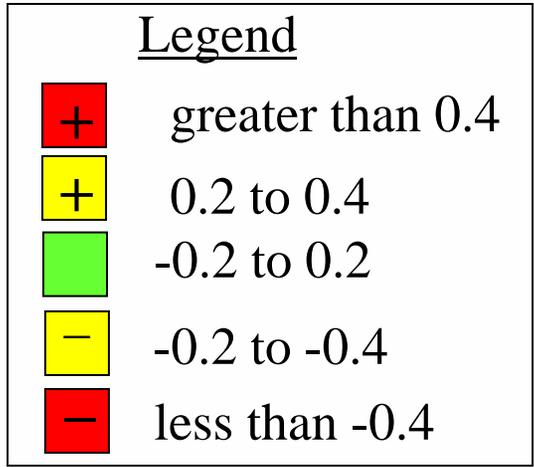
Tier 2 - Detailed Assessment Report

Simplified Graphics & Maps

Total Fish Density

Standardized difference between observed density of fish and predicted density (O-P/P)

● Represents sampling locations



Tier 2 - Detailed Assessment Report

Simplified Graphics & Maps

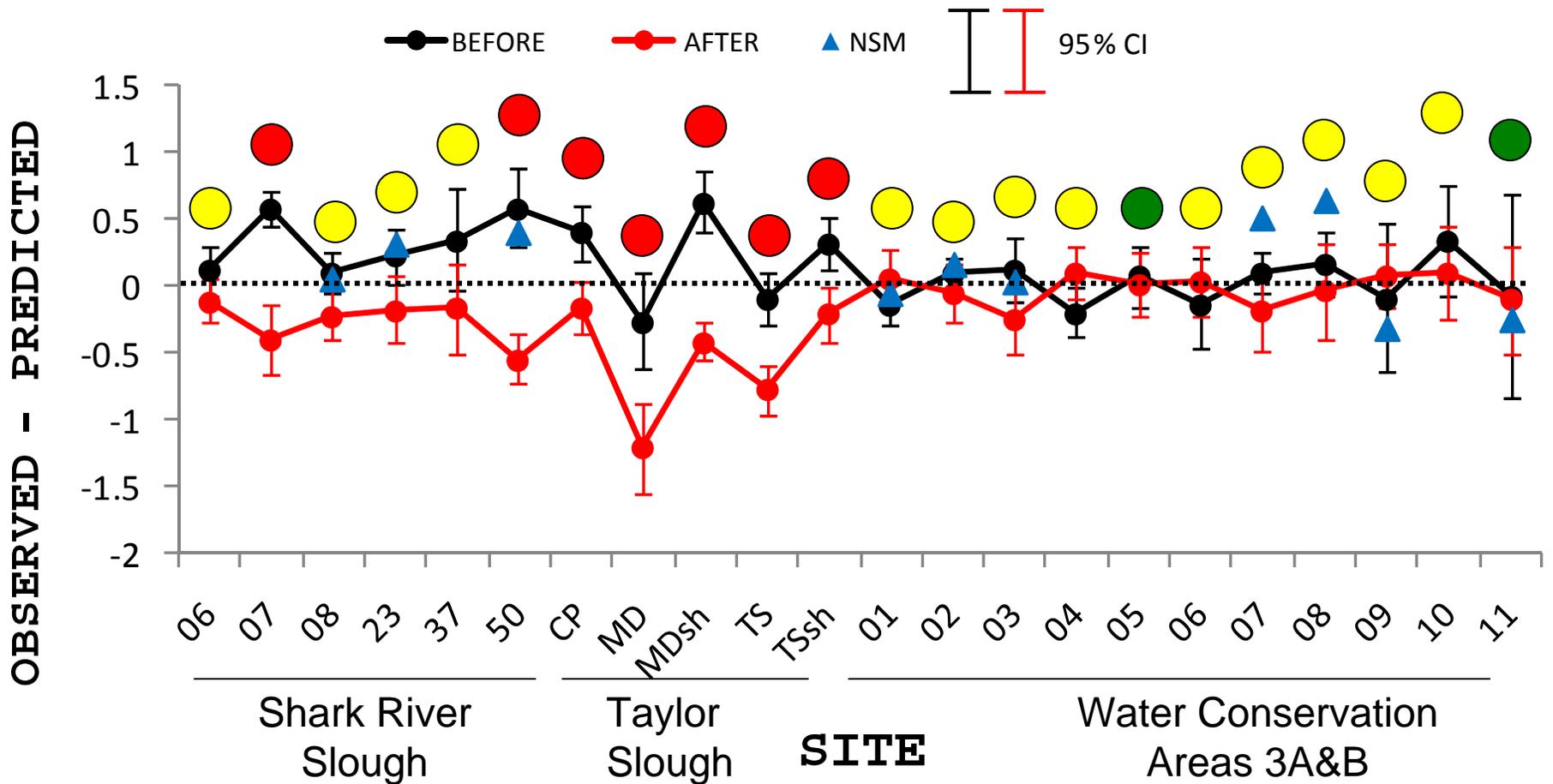
Differences Between Predicted and Observed Before, Natural System Model, and After

Where 95% confidence intervals completely overlap = green

Where 95% confidence intervals partially overlap = yellow

Where 95% confidence intervals do not overlap = red

Total Fish



Tier 3 - Detailed Assessment Report

Full Data

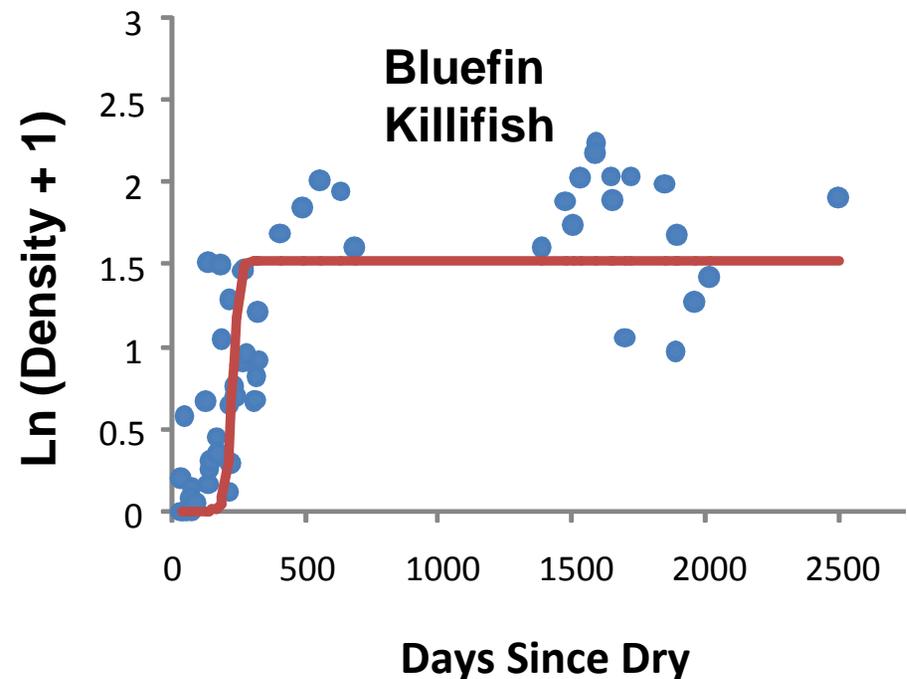
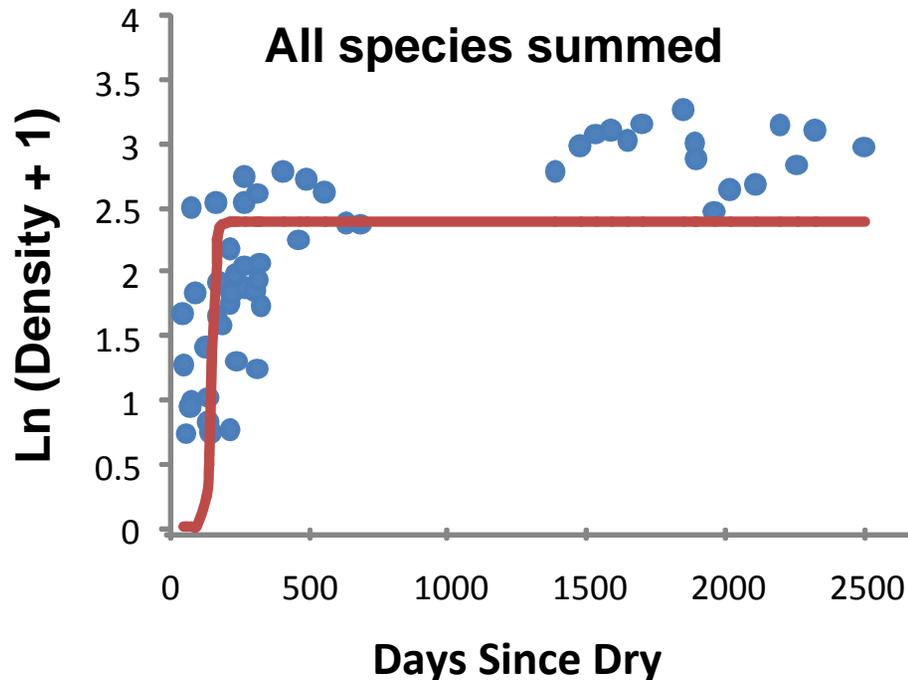
Logistic Model Density with DSD

Example of relationship between a performance measure (All Species & Bluefin Killifish density) and days since rewetting after last dry down

Using a 12 year time series for fishes and macroinvertebrates at 20 sites



Taylor Slough Example Site TS



South Florida Ecosystem Restoration Task Force

Additional Information:

Contact: Carrie Beeler

Phone: (305) 348-6745

Email: cbeeler@sfrestore.org

www.sfrestore.org

Office of the Executive Director

(305) 348-1665



www.sfrestore.org