

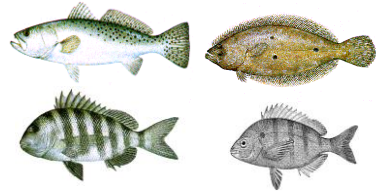
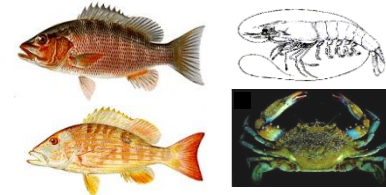
# EFFECTS OF ALTERED FRESHWATER INFLOW ON FISH, SHRIMP AND CRABS OF THE 10,000 ISLANDS ESTUARY OF SOUTHWEST FLORIDA

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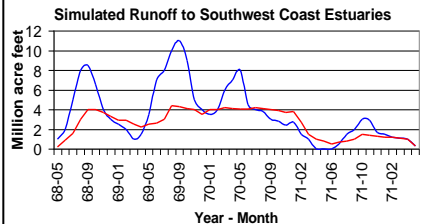
## Abstract / Introduction

## What We Know About Freshwater Flow

## Protocols

## Differences Between Bays

Pumpkin Bay, Faka Union Bay and Fakahatchee Bay lie downstream of the Southern Golden Gate Estates, a failed development which built 813 miles of roads and 138 miles of canals during the 1960's to drain the swamps of Collier County in SW Florida. Over-drainage through the Faka Union Canal has resulted in a significant decrease in Faka Union Bay compared to adjacent Pumpkin and Fakahatchee Bays. Roads and canals in the Southern Golden Gate Estates, are being removed and filled which will provide a more even distribution of water to the three bays. In July 1998, we began a random sample, fisheries-independent trawling program to establish current baseline distributions and relative abundances of fish and invertebrates prior to the restoration. The planned hydrologic restoration will reduce the flow out of the Faka-Union Canal dramatically and provide a more even distribution of water to the coastal wetlands and bays of the 10,000 Islands.



- Runoff from natural watersheds (without canals ----) is less variable and more sustained than flow from channelized wetlands (with canals ----) like the Southern Golden Gate Estates.
- Channelized flow creates extreme and abrupt salinity changes

### Materials and Methods

- Sites selected randomly in grids positioned downstream of the freshwater sources
- Five minute bottom trawls using a 20ft. trawl with 1/8" mesh at each site covering approximately 0.1 nm
- All fish are identified and measured (SL) as are pink shrimp (CL), blue crabs and stone crabs (CW)
- Protocols are based upon the Florida Marine Research Institutes Fisheries Independent Monitoring Program
- VOLUNTEERS are trained in fish identification and trawling protocols and are essential to this projects success

### Multi-Dimensional Scaling Technique

This figure represents the result of a multi-dimensional scaling (MDS) analyses of the data (numbers of fish caught for each species) collected during trawls. This statistical procedure first constructs similarity values that describe the relationship of the species composition of the catch data between each sampling site and season. The resulting matrix of similarity values for these data are then displayed on a graph with the relative position of the symbols representing the amount of similarity (closer together) or difference (further apart) in the species composition of the catch.

### Possible Indicator Species:



- **Gobiosoma robustum** (code goby) prefers higher salinities, seagrass beds and algal mats (Robins, 1986)



- **Microgobius gulosus** (clown goby) prefer muddy bottom types (Robins, 1986)

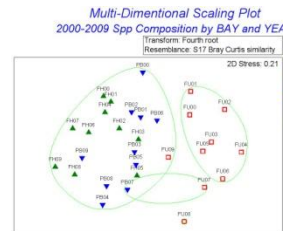
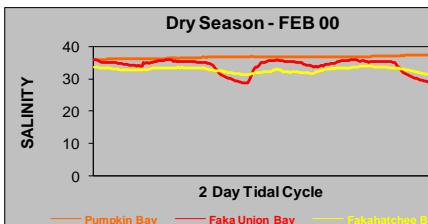
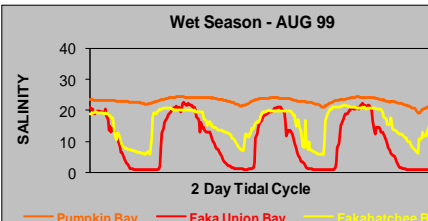
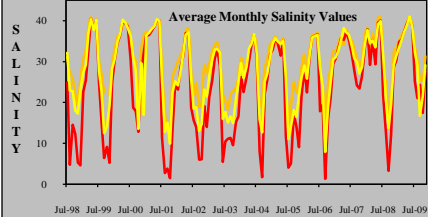
Faka Union Bay exhibits lower salinities with little submerged vegetation and fine, silty mud

### The Southern Golden Gate Estates

Naples | Interstate 75 | Miami

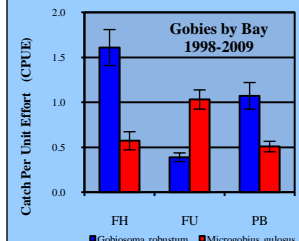
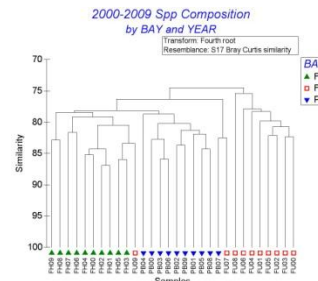
Major Drainage Canals

Faka-Union Canal and Bay looking downstream from the Southern Golden Gate



### Clustering Technique

This figure represents the results of a cluster analyses of the data (numbers of fish caught for each species) collected during trawls. This statistical procedure first constructs similarity values that describe the relationship of the species composition of the catch data between each sampling site and year. The resulting matrix of similarity values for these data are then arranged in clusters that are more similar to each other. The graphical display is called a dendrogram.



## Conclusions

- All three bays exhibit significantly different daily, seasonal and annual salinity regimes
- Similarities in species composition using a multi-dimensional scaling technique indicate patterns related to season and location
- Relative abundance of two gobies appear to reflect environmental conditions in each bay
- Data presented here will generate performance measures to gauge impact of hydrologic restoration of the SGGE system

## Acknowledgements

- Many thanks go to the multitudes of volunteers who have graciously donated their time and efforts over the years
- Rookery Bay NERR staff in Administration, Education, Research, Resource Management and Maintenance departments