

Bioeconomics

Past present and future of
fisheries of Pulley Ridge

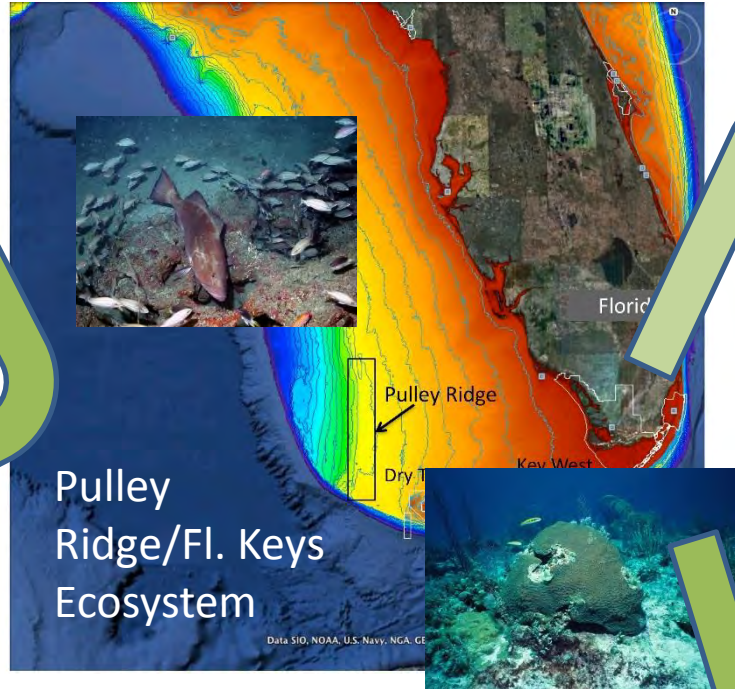
David J. Die



ECOSYSTEM SERVICES PROVIDED BY REEF SYSTEM



SEAFOOD



RECREATION



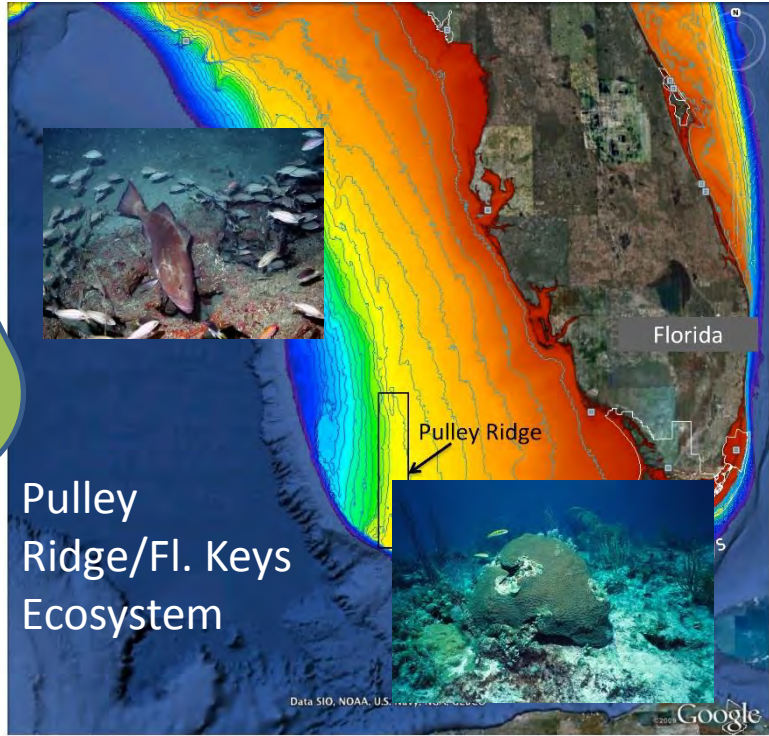
HABITAT/
PROTECTION



ECOSYSTEM SERVICES PROVIDED BY REEF SYSTEM



SEAFOOD



Bioeconomics sub-project focused on federally managed commercial fishery for reef fish as the main SEAFOOD producing activity linked to the Pulley Ridge



Analysis of responses
of Commercial
fishing fleets to past
management

Economic value of
commercial reef fish
fisheries in the Pulley
Ridge

Other
Pulley Ridge
Subprojects

Analysis of impacts of future
management alternatives on
ecosystem structure and
function in the Pulley Ridge

Fishery dynamics in response to management changes

Analysis of responses of Commercial fishing fleets to past management

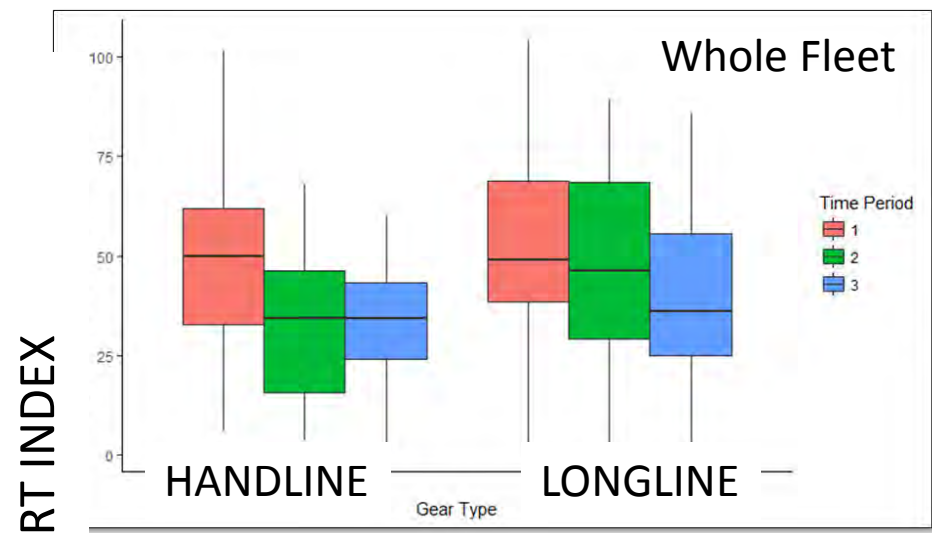


NMFS Logbook data: Longline Handline

- implementation of the Pulley Ridge Habitat Area of Particular Concern in 2005
- reef fish Individual Fishing Quota program in the Gulf of Mexico in 2010

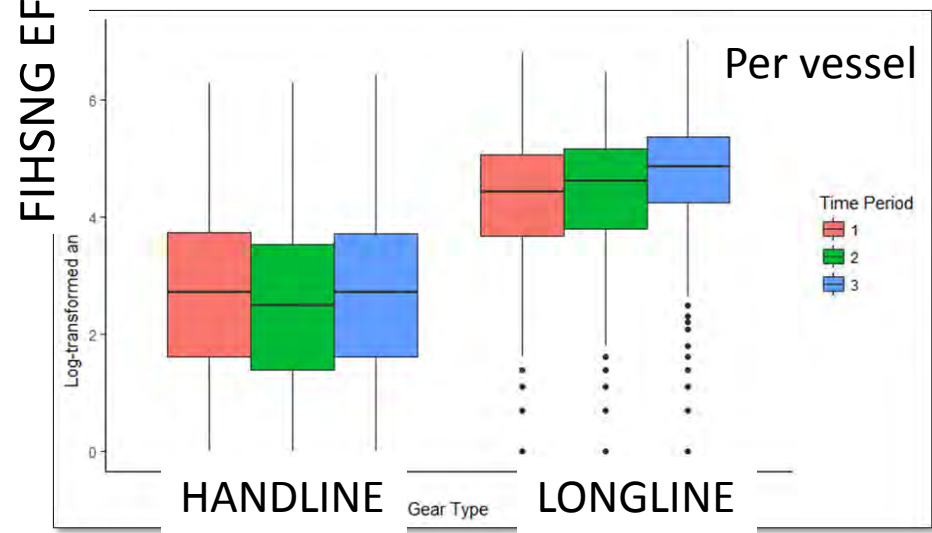
Two analyses:

- Areas 1- 6 Florida West Coast
- Areas 1-3 Pulley Ridge and vicinity



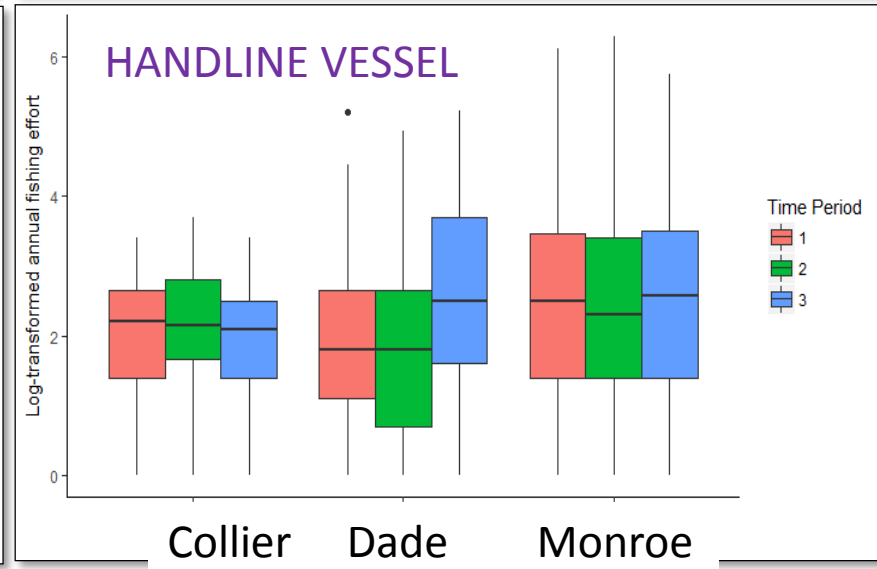
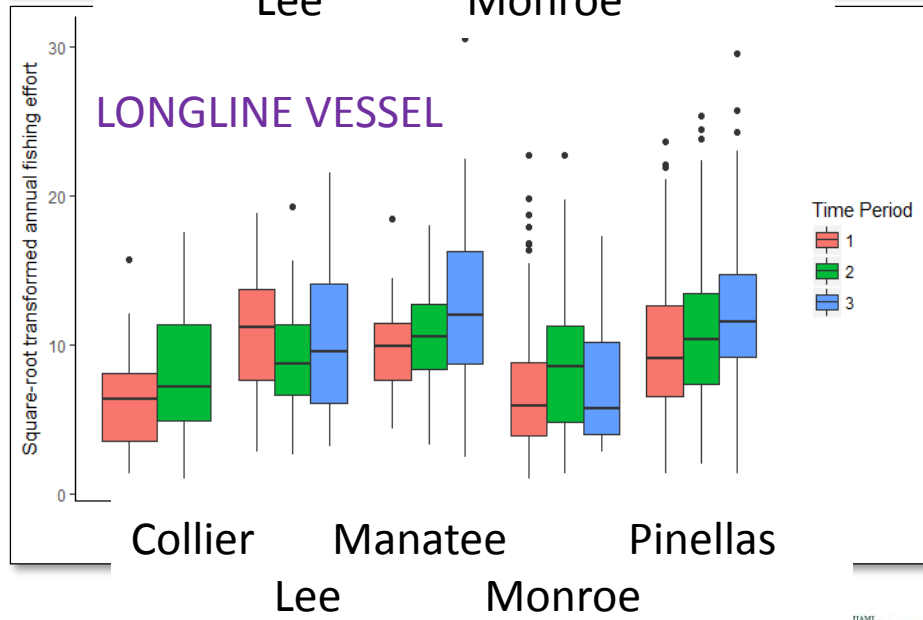
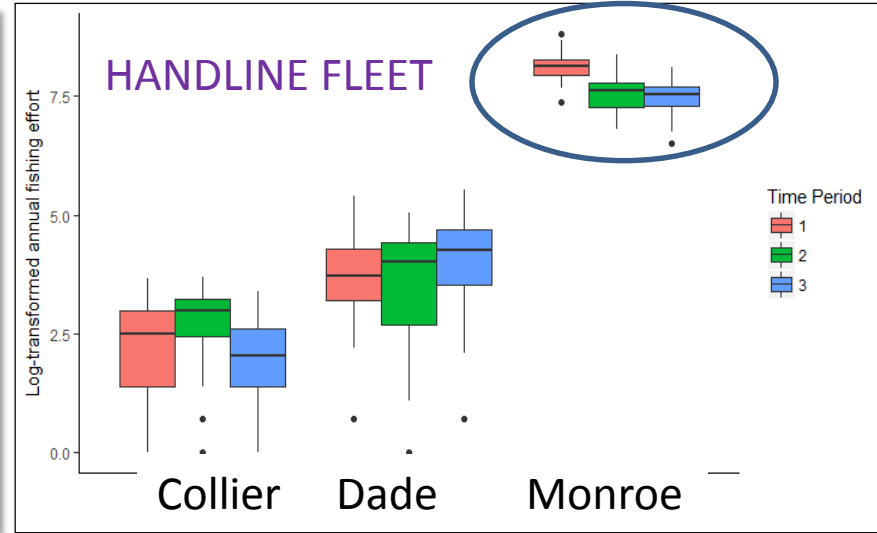
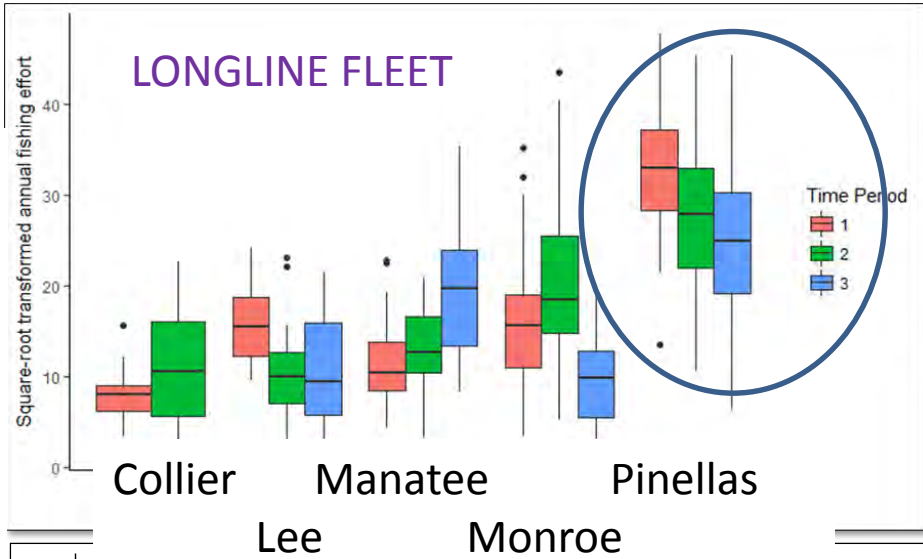
Responses of fishing fleets to regulation (Florida West Coast): Fishing effort around Pulley Ridge

- Time period
- 1 – 2000-2004 Baseline
 - 2 – 2005-2009 Post HAPC
 - 3 – 2010-2015 Post Catch shares



- Some Changes in fleet-level effort: decline in longline after catch shares,
- Fewer changes at vessel level

FIHNSG EFFORT INDEX



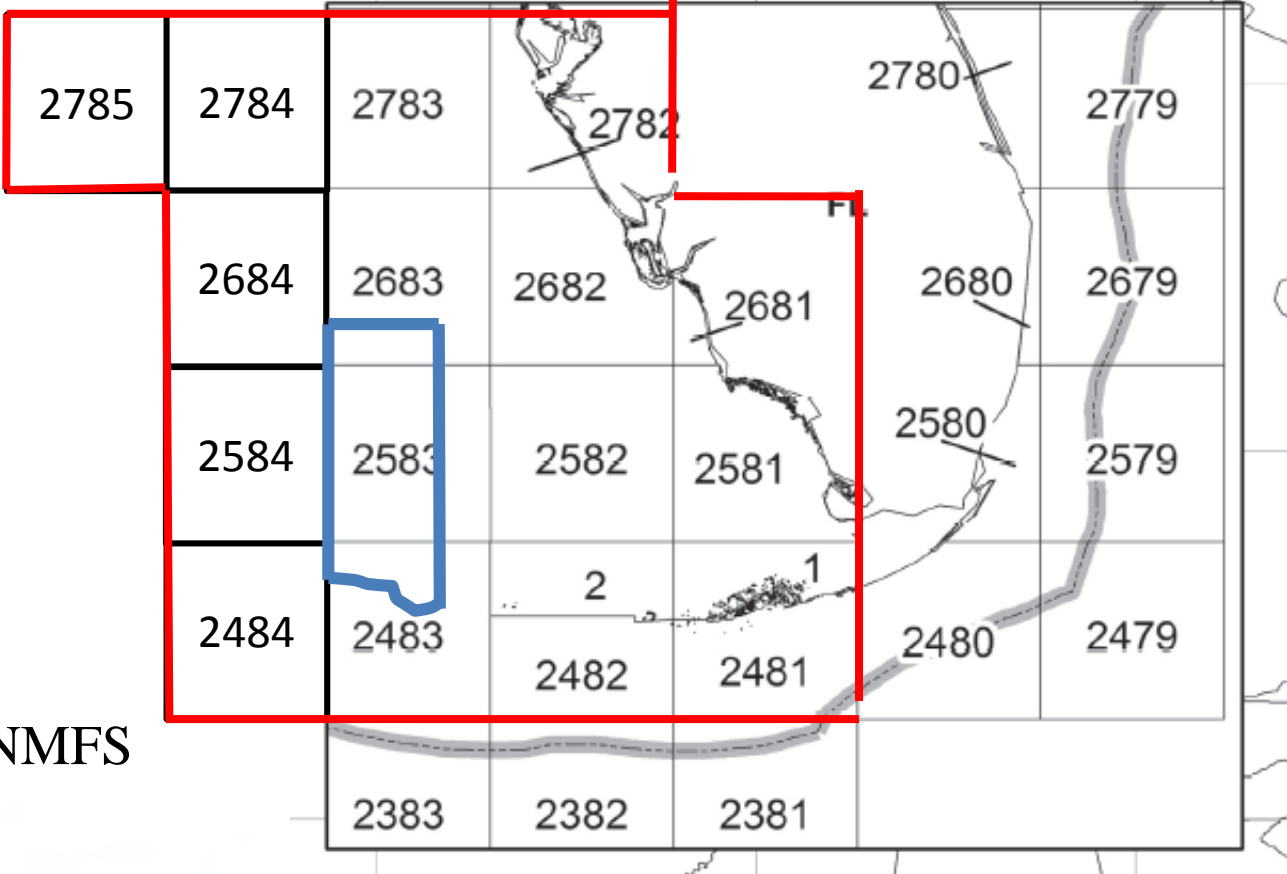
Predictions of changes in fisheries in response to management changes will be driven by the time schedule and spatial scope of the change and will be associated with large uncertainty

- Fishery-wide management actions (Catch shares) lead to large changes in fishery operations and result and possibly major impacts to resources
 - re-distribution in time and space of fishing effort
 - increase sustainability of fishery operations
 - change fishing community (Ports) links to resources
- Impacts of relative small changes in spatial management (HAPC) are difficult to detect and predict
 - Limitations of available knowledge on resources
 - Confidentiality provisions of fishery data
 - Affect individual business decision making

National Marine Fisheries Service Data Monitoring Areas

Pulley Ridge ~ =
25% of the 2483 +
70% of 2583 +
22% of 2683

Data credit:
Dr. David Gloeckner, NMFS



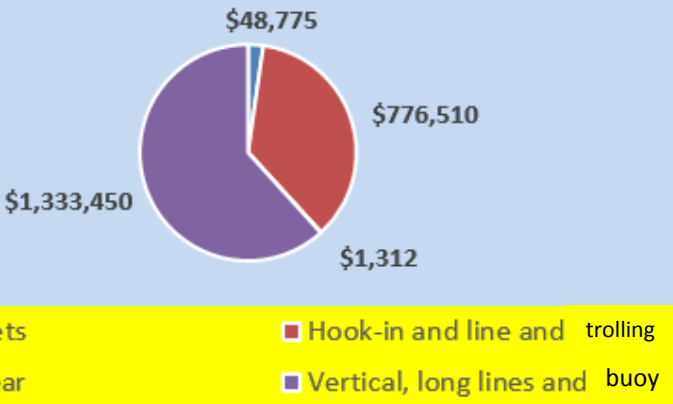
Average Annual Commercial Catch in the Florida Gulf Coast and Pulley Ridge, 2012-14 (\$)

Gulf Coast Landing Region	Total Annual Landing	Total Catch from NMFS Reporting Areas	Catch from Pulley Ridge	Percent Catch of Pulley Ridge
Santa Rosa, Escambia, Walton, Okaloosa and Bay	11,853,464	22,996	5,059	0.04
Lee, Charlottee, & Sarasota	1,473,884	1,282,484	185,380	12.58
Miami Dade, Broward, Palm Beach and Martin	3,902,834	570,295	-	0.00
Monroe and Collier	8,739,684	8,171,640	587,587	6.72
Dixie, Taylor, Citrus, Levy, Pasco, Hernando, Franklin, Gulf, Jefferson and Wakula	5,680,545	313,299	23,955	0.42
Pinellas, Hillsborough, and Manatee	18,558,015	13,407,925	1,358,066	7.32
Breward, Volusia, St Lucie, and Indian River	4,856,026	4,882	-	0.00
Total	55,064,453	23,773,520	2,160,047	3.92

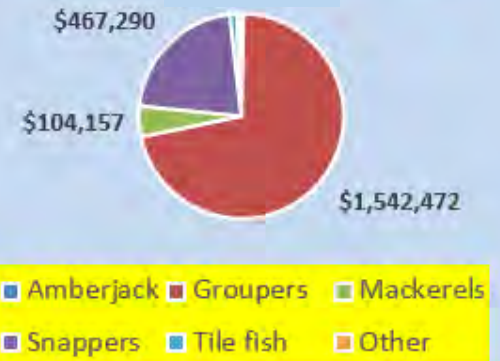
Note: Total Annual Landing is the total landing at each country group docks including the state-controlled area

Major Gear Types and Species Caught in Pulley Ridge

Gear-wise Average Annual Catch in Pulley Ridge, 2012-2014



Species-wise Average Annual Catch in Pulley Ridge, 2012-2014

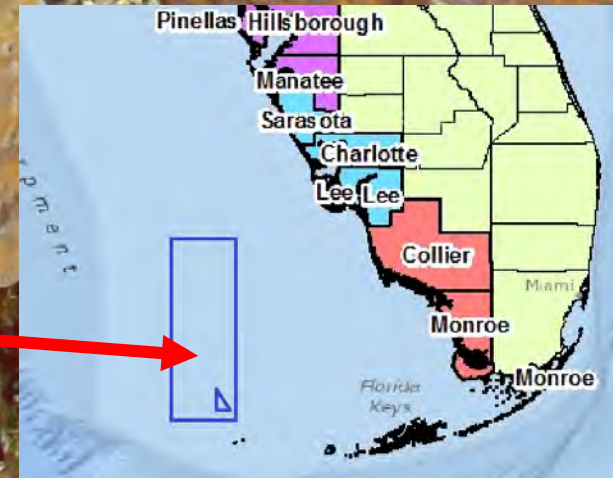


**Vertical, long lines and buoy
Number 1 gear type
In Pulley Ridge**

**Groupers followed by
snappers are the top species
caught**

How much income is made in the Pulley Ridge Region?

Costs and Profit	Amount (\$)
Total revenue	2,160,047
All non-wage inputs	674,337
Crew payment	412,674
Captain pay	490,009
Owners' profit	583,027
(Gross profit before netting fixed cost)	



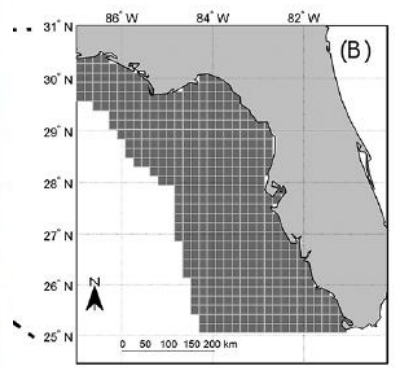
Conclusions from the Economic Analysis...

- Relative impact of partial or full restriction in PR not likely to be significant
- A slightly increased fishing in the neighboring areas
- Neighboring areas already heavily fished
- A primary survey indicates that the fishermen not likely to support the regulation
- Resistance probably rooted in the past regulation experience

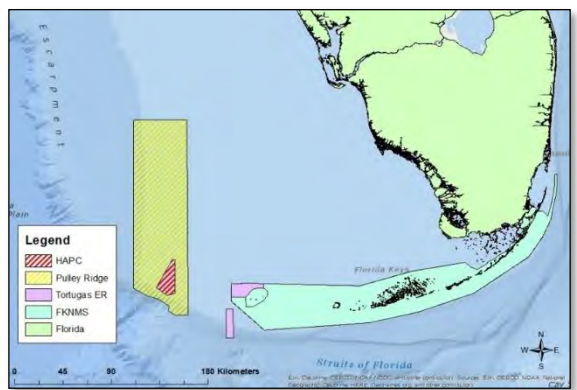
Ecosystem models

Analysis of impacts of future management alternatives on ecosystem structure and function in the Pulley Ridge

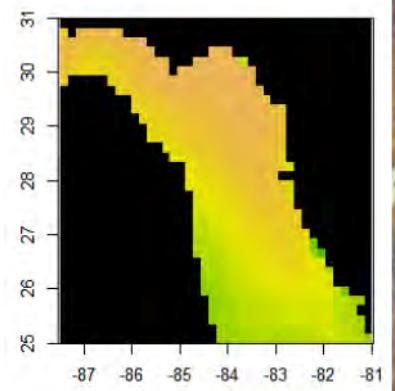
OSMOSE
(Gruss et al)



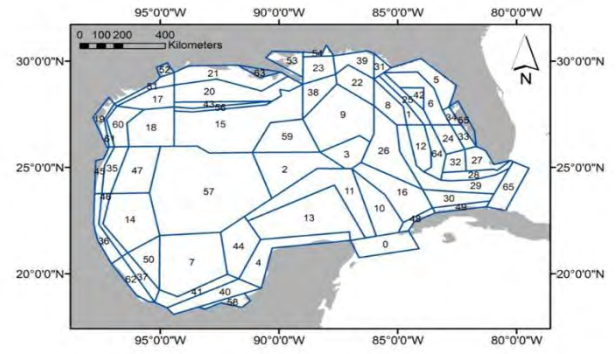
Spatial scope
Pulley Ridge Project



ECOSPACE
(Chagaris et al)



ATLANTIS (Ainsworth et al)

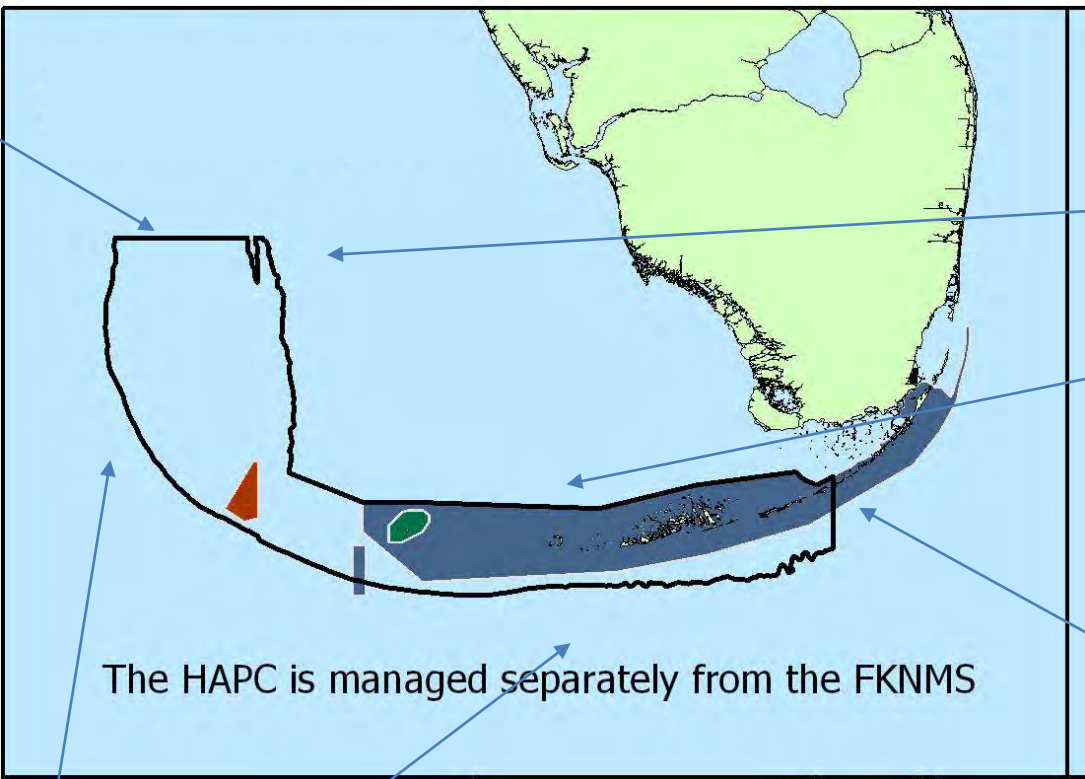


Available models do not match project scope. New model needed

EWE study area

Partially based on connectivity conclusions from Pulley Ridge project

Northern limit
Northern most part of the extended Pulley Ridge area in alternative 3 of the GOMFMC



Eastern limit 70m isobaths in the northern section of the "L", then FKNMS boundary all the way to Long Key

The HAPC is managed separately from the FKNMS

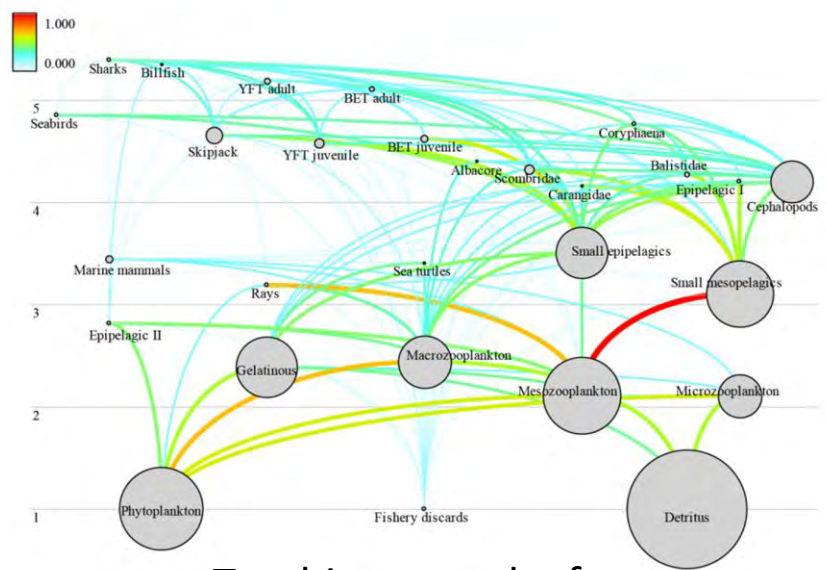
Western and southern limit: Shelf break ~ 200m isobath.



- Landings
- Bycatch/discards
- Discard fate

- Describes and quantifies trophic linkages
- Assumes mass-balance of system over given time
- Run from series of linear equations for each functional group

- Biomass
- Production/Biomass
- Consumption/Biomass
- Diet Composition
- Yield (fishery)
- Emigration



ECOPATH

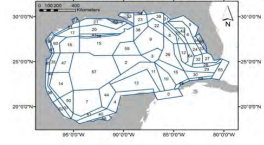
Trophic network of "functional groups"



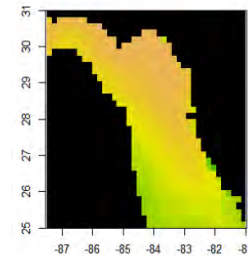
ATLANTIS (Ainsworth et al)



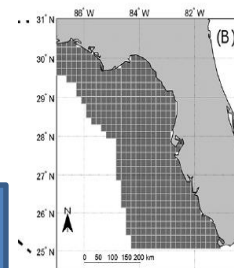
ATLANTIS (Ainsworth et al)



ECOSPACe (Chagaris et al)



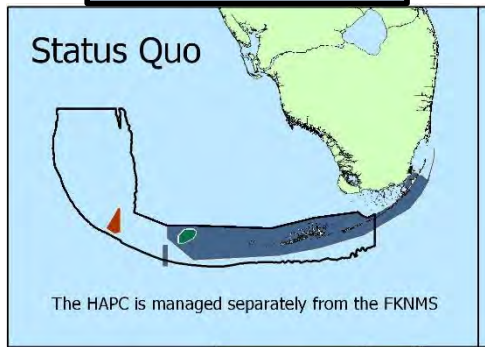
OSMOSE (Gruss et al)



Boundary conditions
Diet matrix



EWE Model



Biomass estimates



Pulley Ridge Cruises

NOAA NMFS
FKNMS
surveys



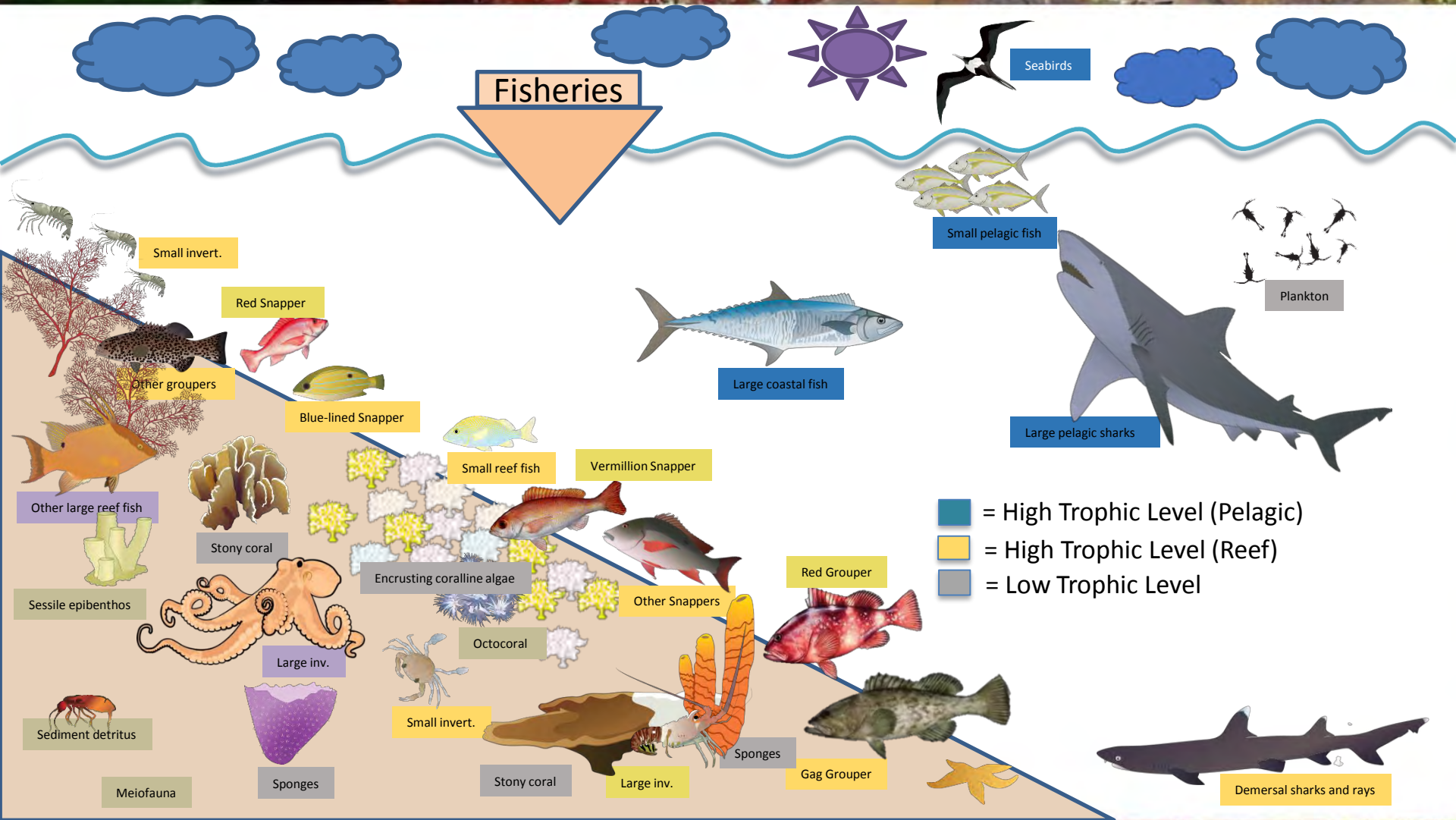
Logbook program
MRFS

Fishery data



EWE Model for Pulley Ridge-Florida Keys

Analysis of impacts of future management alternatives on ecosystem structure and function in the Pulley Ridge



28 Functional Groups
4 fishing fleets

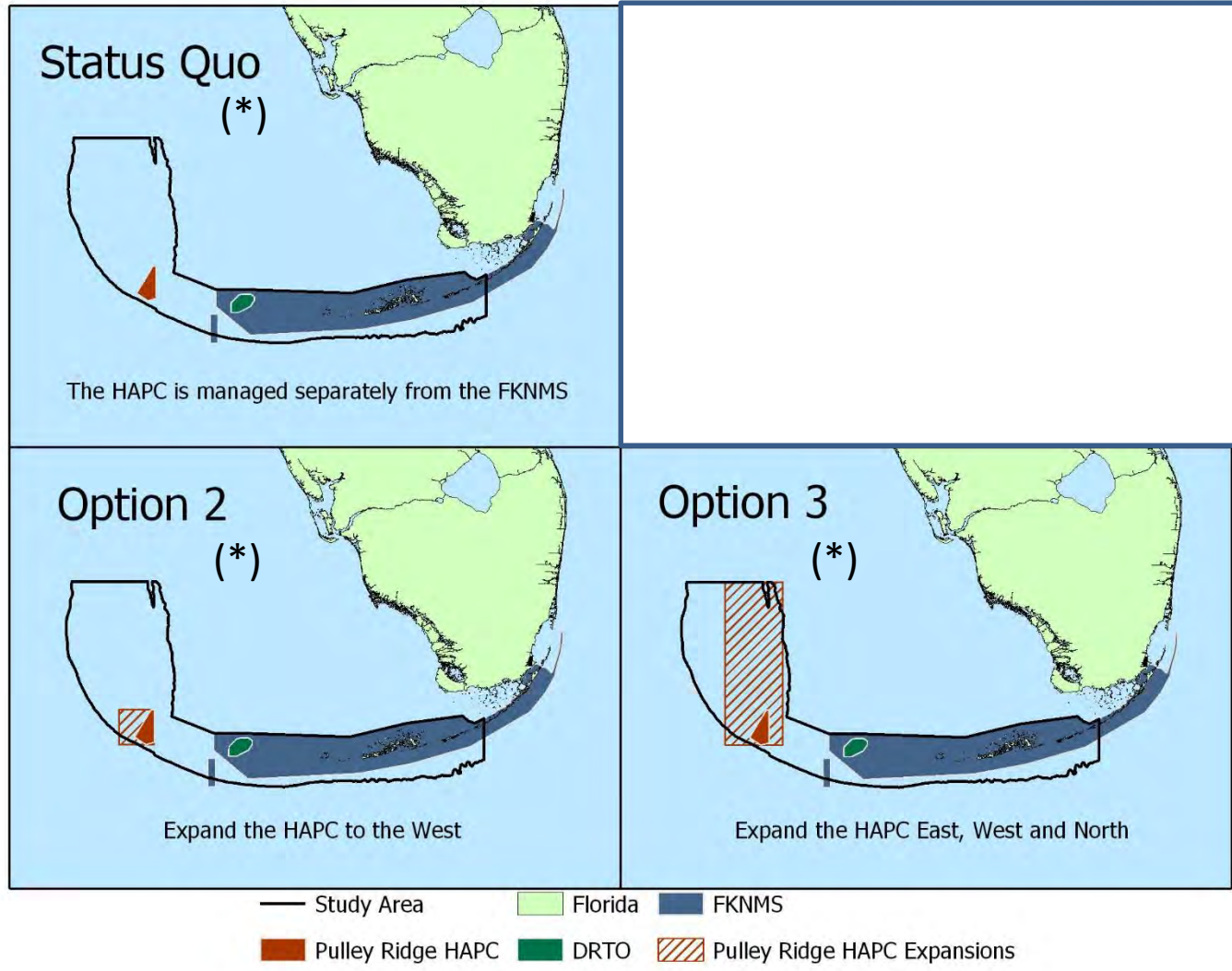


Balanced for average 2010-2015

Three alternatives management scenarios to be evaluated with EWE

Ready to be run and reported upon

(*) derived from proposals from GOMFMC



DECISION SUPPORT SYSTEM

Will provide easy WEB-based access to highlights of project results

The screenshot shows a web browser window with the URL mesophotic.ccs.miami.edu/explore/select. The page title is "Pulley Ridge". The main content area is titled "EXPLORE PULLY RIDGE" and contains four interactive cards:

- GENETIC CONNECTIVITY**: Represented by a DNA double helix icon. Credit: Created by Stock Image Folio from Noun Project.
- BIOECONOMICS**: Represented by a bar chart with an upward arrow and a dollar sign. Credit: Created by Davo Sime from Noun Project.
- PHYSICAL DYNAMICS**: Represented by three wavy lines. Credit: Created by Sweet Farm from Noun Project.
- BIODIVERSITY**: Represented by a coral branch and two fish. Credit: Created by Julie Reyes Villalta from Noun Project.

The background is a map of the Florida coast, showing the Gulf of Mexico, the Straits of Florida, and various cities and locations like Ocala National Forest, Orlando, and Miami. A user profile for "DAVID DIE" is visible in the top right corner. The browser's address bar and tabs are also visible at the top.

BIOECONOMICS - OVERALL CONCLUSIONS

- Value of fishery catch associated to Pulley Ridge is significant and will change in response to spatial changes in management
- Fishery dynamics are strongly influenced by management
- Impacts of relatively small changes in spatial management are difficult to detect at the population/ecosystem level
- Ecosystem models can provide a sense of the degree of disruption of ecosystem linkages in response to management changes
- EWE model of Pulley Ridge/FKNMS is ready to produce evaluation of alternative options
- Decision support system will allow for easy access to results of evaluation of management options



Acknowledgements

 ROSENSTIEL
SCHOOL of MARINE &
ATMOSPHERIC SCIENCE



 FLORIDA
INTERNATIONAL
UNIVERSITY



Emily Starnes
UM (MSc 2017)



Mahadev
Bhat



Nadia
Seeteram



Chiara Pacini
UM (candidate MSc)



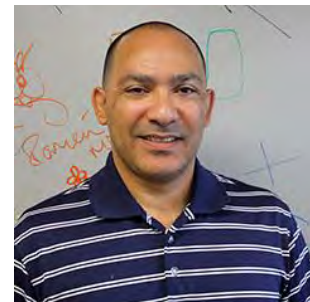
Alexandra Norelli
UM (candidate MPS)



Tim Norris



Chris Mader



Julio Perez