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- Southeast Fisheries Science Center

Review of discards and discard mortality in the stock assessment process

- Matt Smith
- Discard Mortality Workshop
- October 7 – 8, 2019
- St. Pete Beach, FL

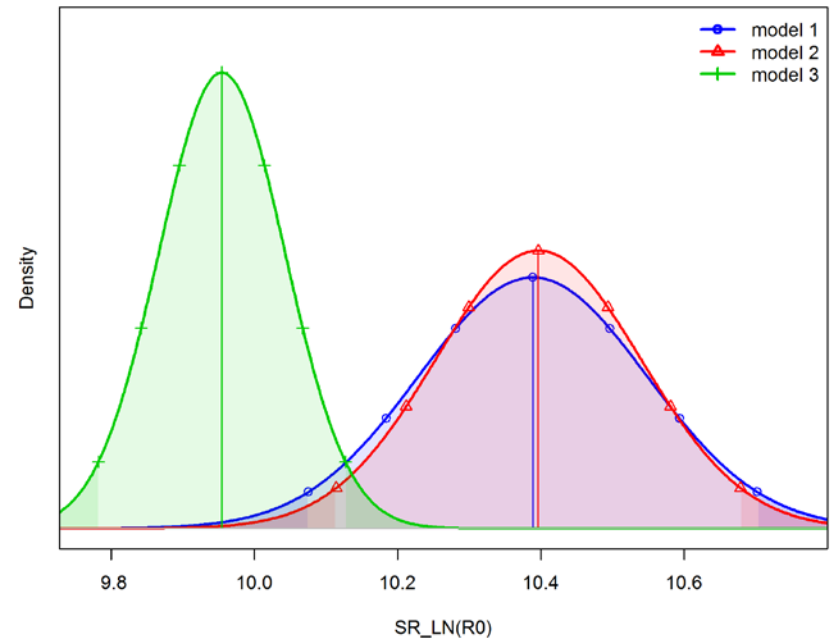
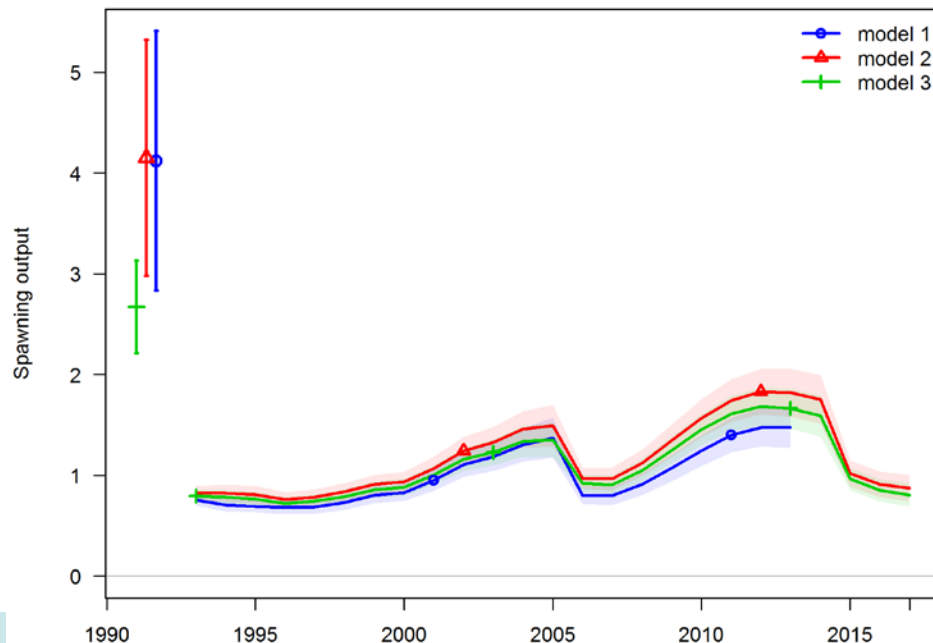


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Stock assessment and discards

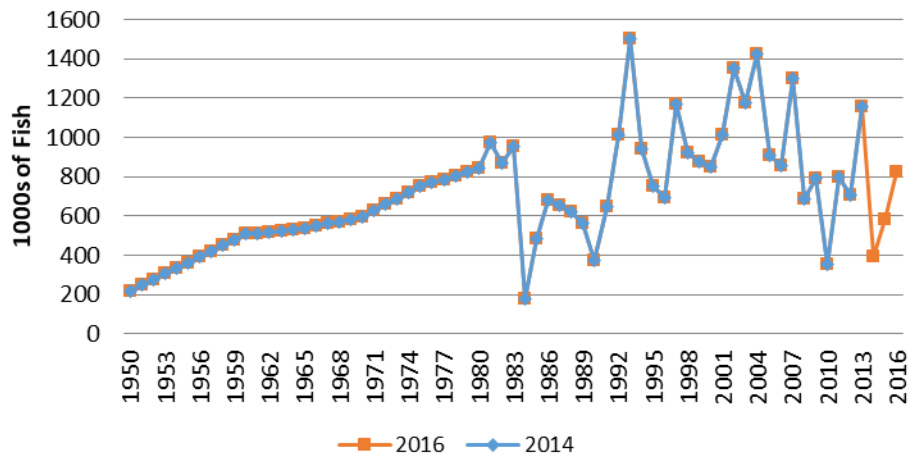
- It's important that we account for all removals in stock assessment
 - Magnitude of removals informs model perception of virgin conditions and productivity



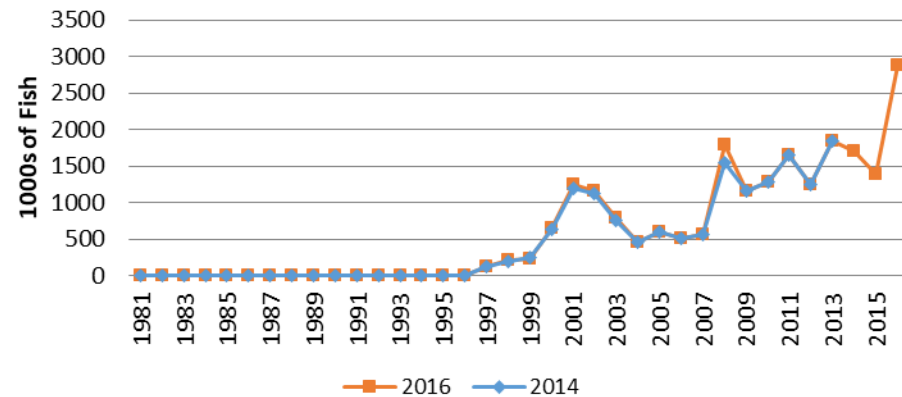
Stock assessment and discards

- Magnitude of discards can be significant

MRIP-E Landings Comparison



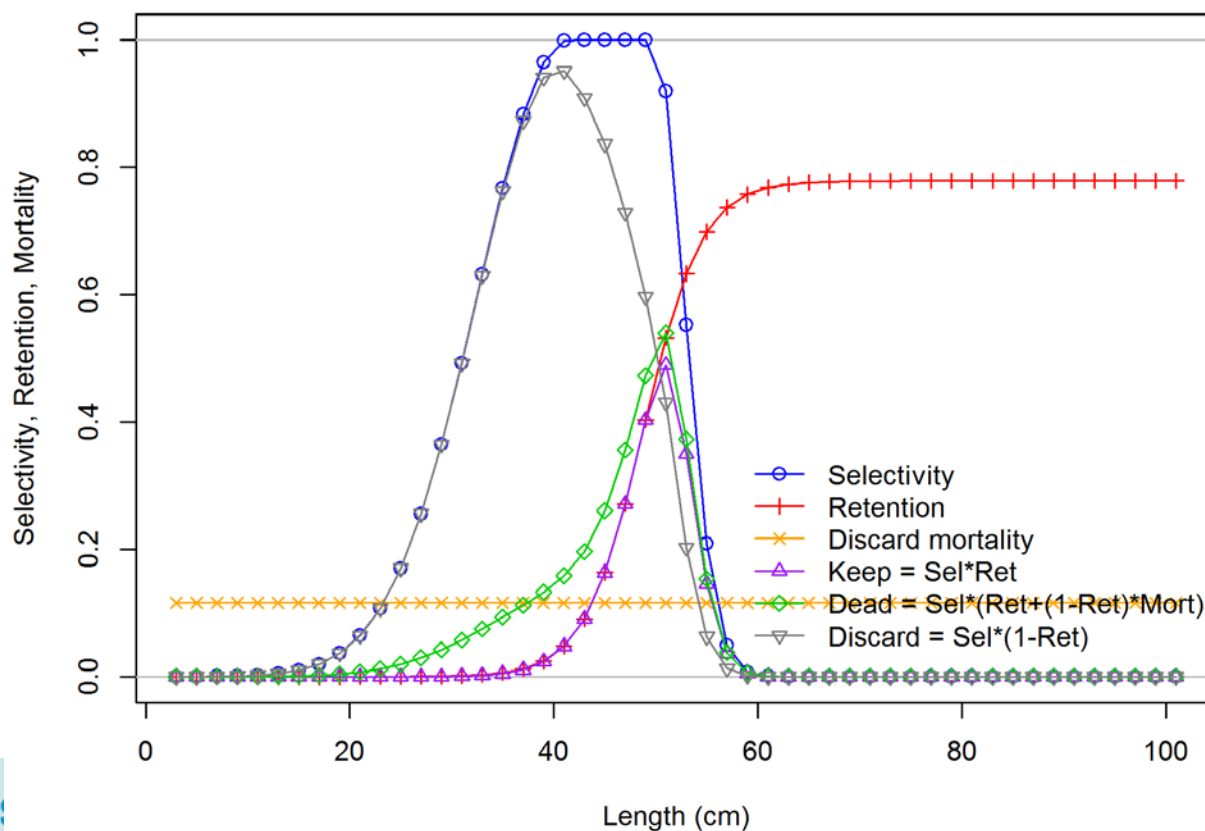
MRIP Closed Season East Discards Comparison



Red Snapper (SEDAR 52)

Stock assessment and discards

- How discards are incorporated depends on the available data and the magnitude of discards.
- Time-series of discards and composition data



Red Grouper
recreational
(SEDAR 61)

Stock assessment and discards

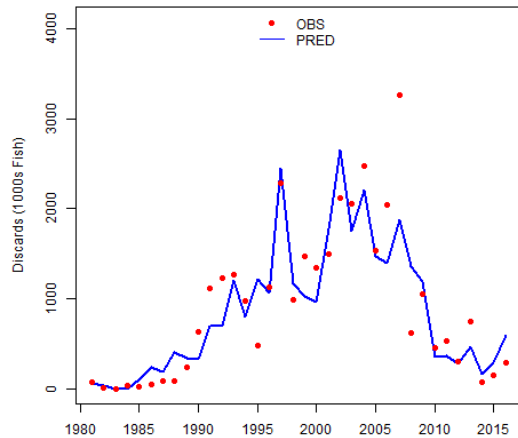
- Discards are separated into dead and live discards using estimated mortality rates

Sector	Venting (Y/N)	Year (Pre/Post 2008)	East		West	
			Closed	Open	Closed	Open
Recreational	N	Pre	0.21	0.21	0.22	0.22
Recreational	Y	Post	0.118	0.118	0.118	0.118
Commercial vertical line	N	Pre	0.74	0.75	0.87	0.78
Commercial vertical line	Y	Post	0.55	0.56	0.74	0.6
Commercial longline	N	Pre	0.74	0.81	0.87	0.91
Commercial longline	Y	Post	0.55	0.64	0.74	0.81

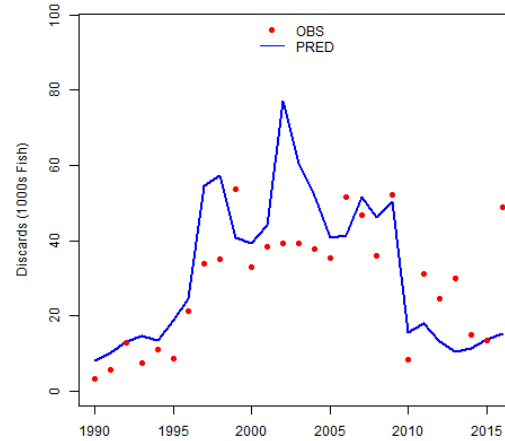
Red Snapper (SEDAR 52)

Stock assessment and discards

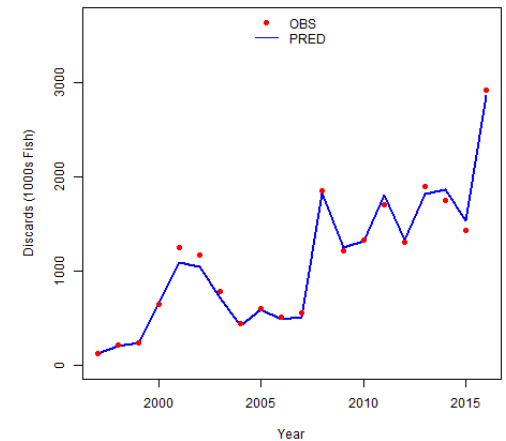
MRIP_E Discards



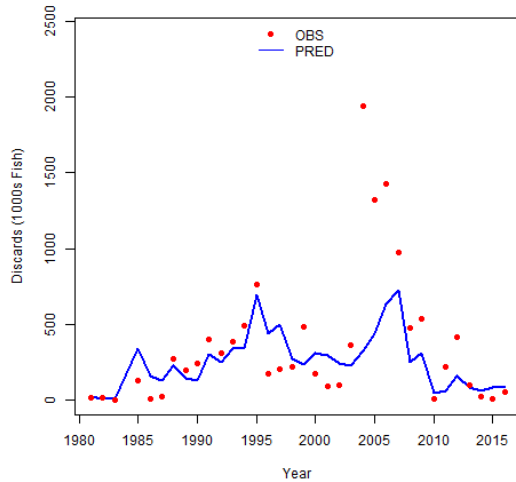
HBT_E Discards



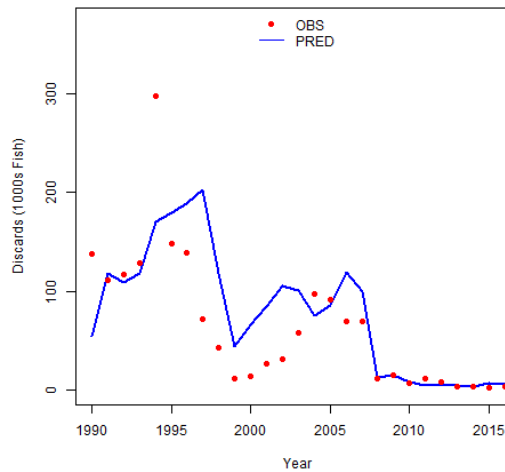
R_Clsd_E Discards



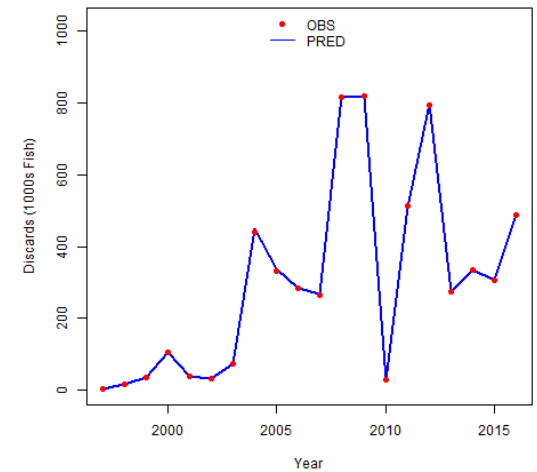
MRIP_W Discards



HBT_W Discards



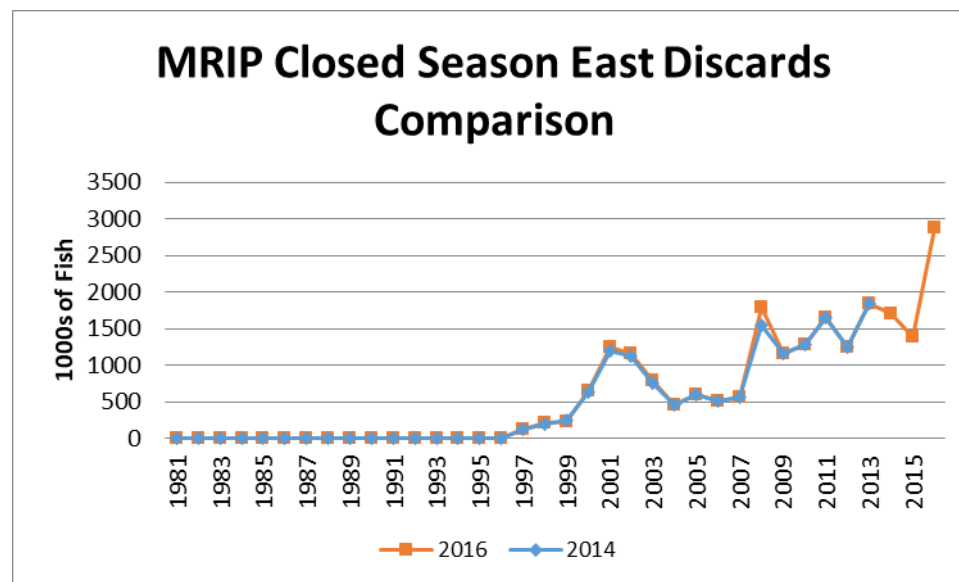
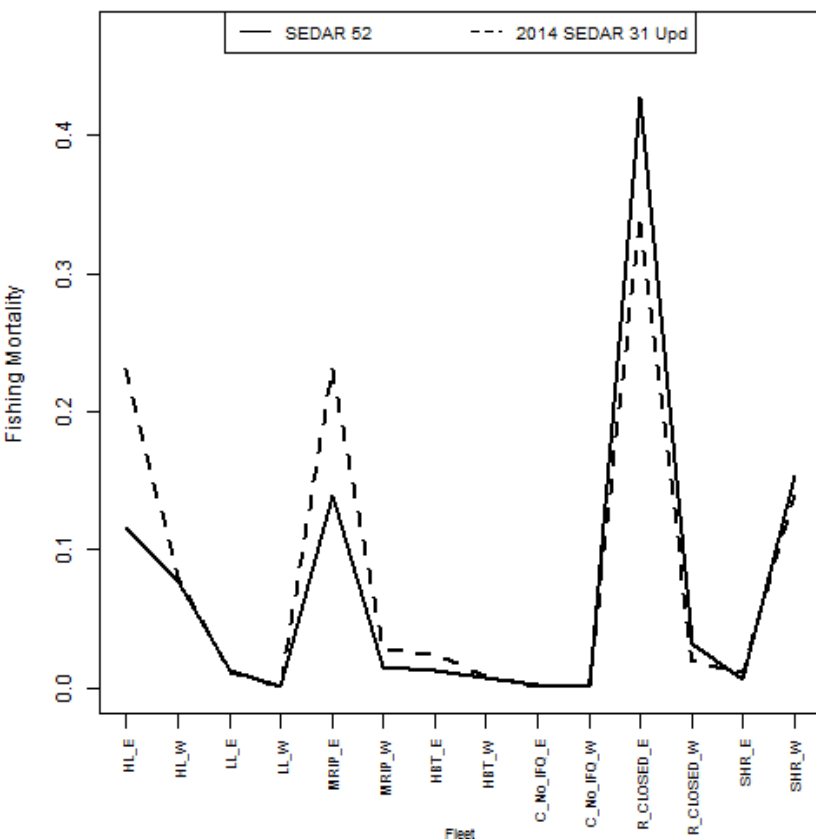
R_Clsd_W Discards



Red Snapper (SEDAR 52)

Stock assessment and discards

- We get estimates of the numbers and biomass of discards and fleet specific mortality rates.



Mortality rate estimates dictate conditions in projections

Where research can help improve the process



Improve estimates of release mortality

	Comm_HL	Comm_LL	Charter/Private	Headboat
gag	25%	25%	12%	12%
gray trigger	5%		5%	
amberjack	20%	20%	20%	20%
king mackerel	25%		20%	22%
red grouper	19%	42%	12%	
spanish mackerel	10%		20%	
cobia	5%		5%	
gray snapper	14%		7%	7%
red snapper pre2008	75% E/ 78% W	81% E/91% W	21% E / 21% W	21% E / 21% W
red snapper post2008	56 % E/ 60% W	64% E / 81% W	11.8% E / 11.8% W	11.8% E / 11.8% W

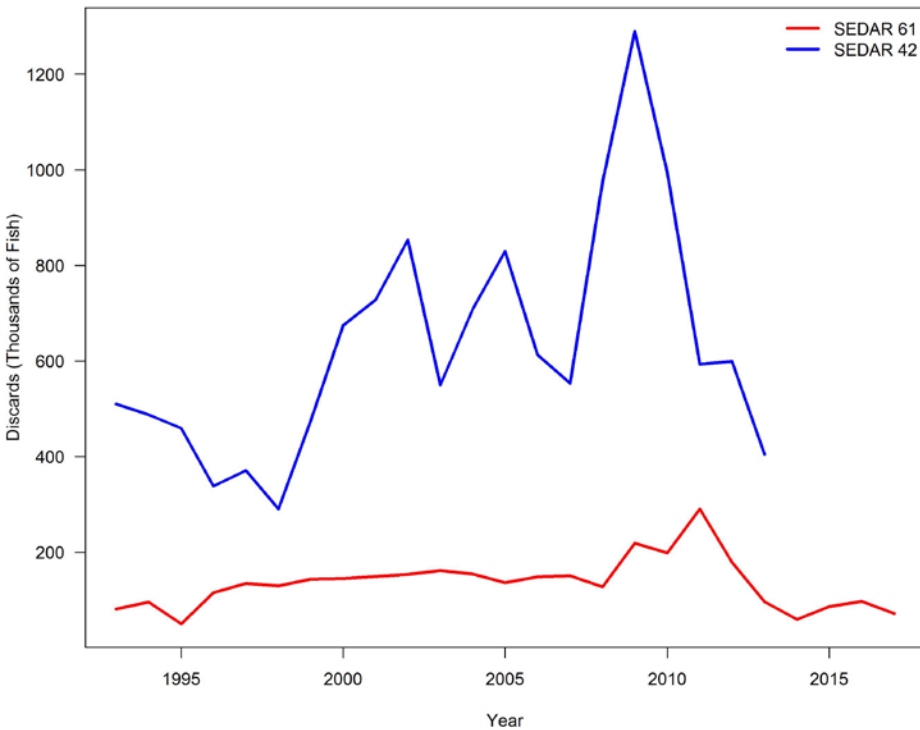
Improve estimates of release mortality

- Release mortality estimates can vary widely
- Meta approaches are good but ...
 - Many recent studies suggest that role of predation has been underappreciated for some species
 - Care must be taken when selecting studies to include in meta-analyses and selecting studies to fund

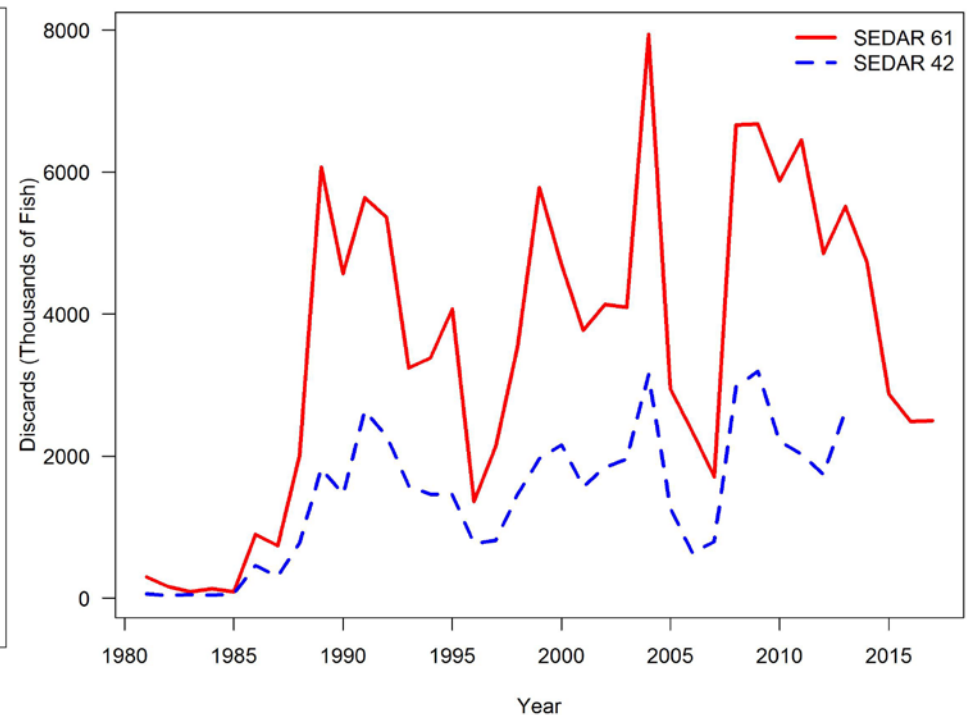
Improved estimates of discard magnitude

- Improve/expand sampling
 - More observers, interviews, ...
- Improve estimation methodology

Red Grouper commercial vertical line



Red Grouper private charter



Improved stock assessment models

- Develop stock assessment models that are seasonal rather than annual
- Add spatial structure (depth)
- Ability to refine model heavily dependent on data resolution



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- Erin Bohaboy



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ICES Journal of Marine Science

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1 Application of three-dimensional acoustic telemetry to assess the effects of rapid recompression
2 on reef fish discard mortality

3

4 Erin Collings Bohaboy^{1*}, Tristan Guttridge², Neil Hammerschlag³, Maurits P.M. Van Zinnicq
5 Bergmann^{2,4}, and William F. Patterson III⁵

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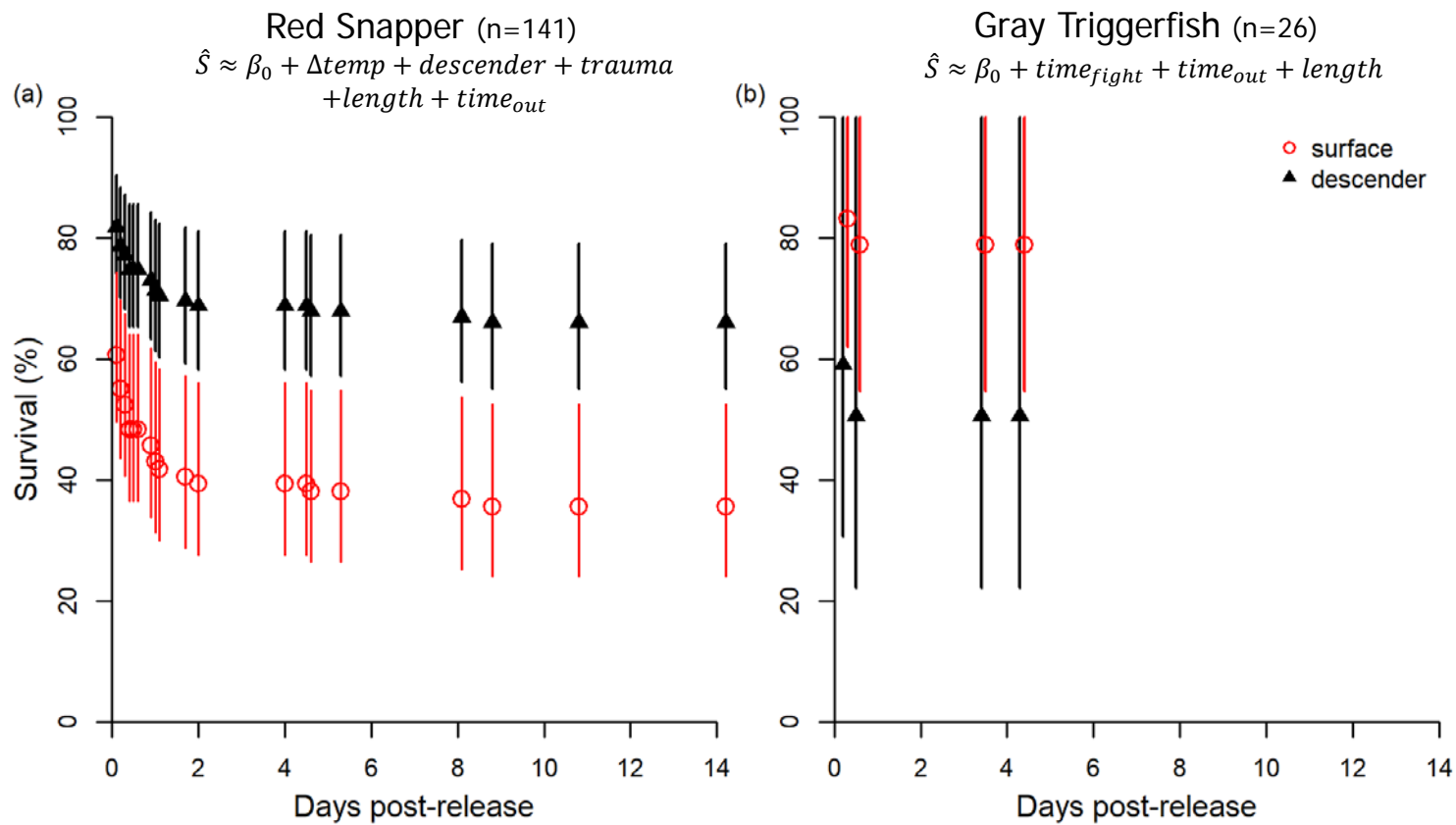
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10 ³Department of Marine Ecosystems and Society, Rosenstiel School of Marine and Atmospheric
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15 School of Forest Resources and Conservation, Fisheries and Aquatic Sciences, University of





Low discard survival of gray triggerfish in the southeastern US hook-and-line fishery

Brendan J. Runde^{a,*}, Paul J. Rudershausen^a, Beverly Sauls^b, Chloe S. Mikles^a, Jeffrey A. Buckel^a

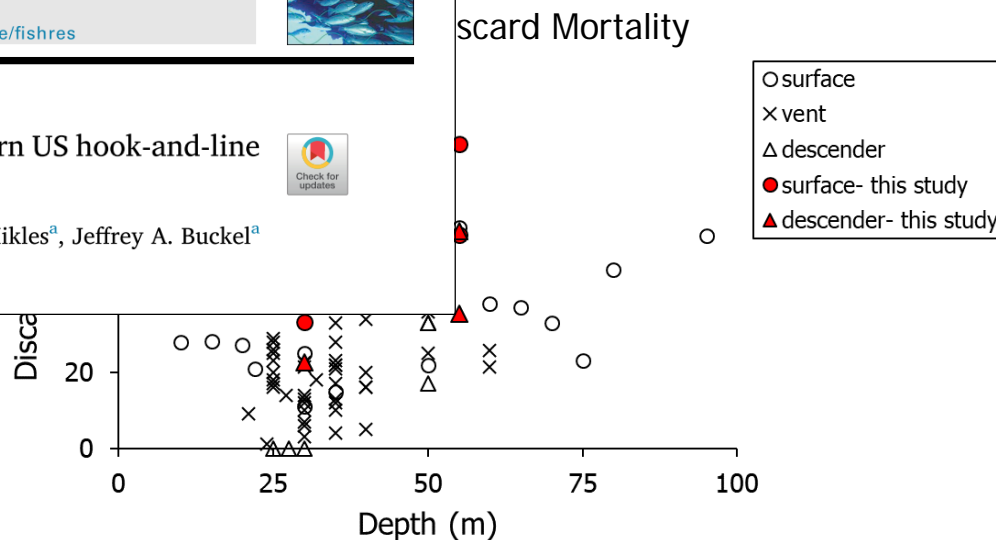
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^b Florida Fish and Wildlife Conservation Commission, St. Petersburg, FL 33701, USA

Gray Triggerfish

- Discard mortality
 - Surface = 27%
 - Descender = 60%
 - Predation = primary cause
- Descender devices had no significantly effect

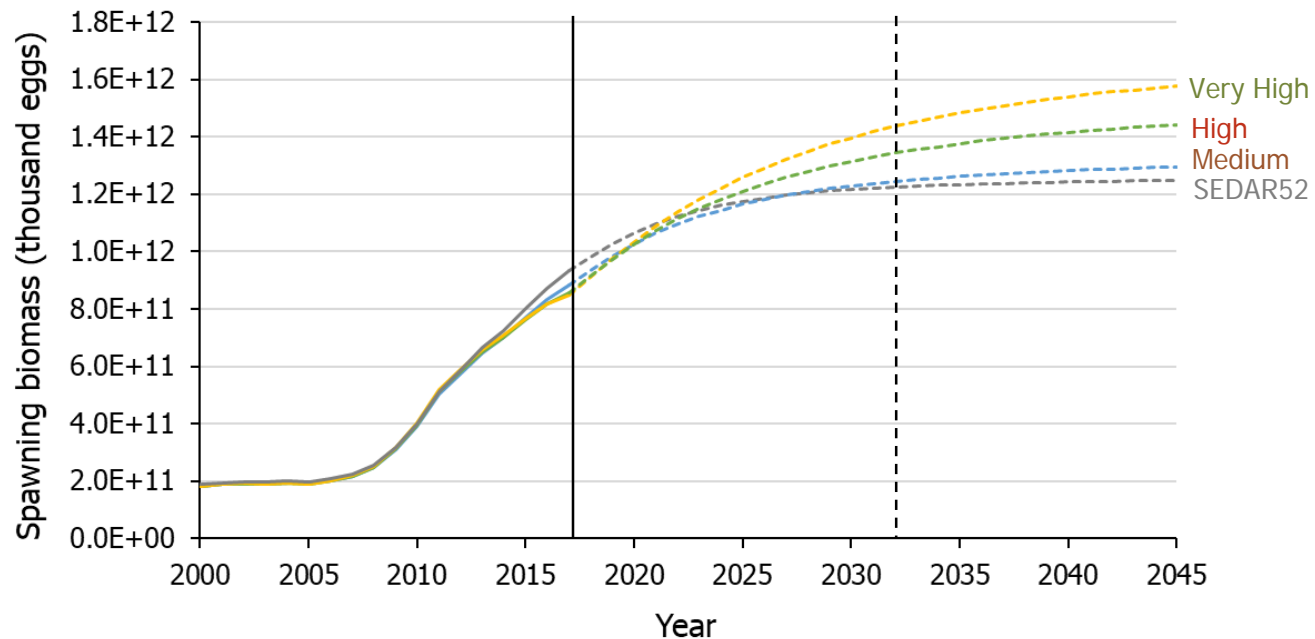
Predation excluded from previous studies?



Modeling Discard Mortality (and size limits) in the GOM Red Snapper Stock Assessment

RED SNAPPER: Pre-2017 Discard Mortality

	SEDAR52 (21 -> 11.8%)	Medium (25%)	High (50%)	Very High (75%)
Neg. LogLikelihood	2552	2568	2599	2633
$\ln(R_0)$	12.00	12.02	12.09	12.16



General Trends: Pre-2017 Discard Mortality

Example: Recreational Season Length (relative % change)

Base Discard Mortality = 75% (very high)

16" Minimum Length					
Discard Mortality Reduction (%)					
100	75	50	25	10	0
31.8	22.1	13.7	6.4	2.5	0

Base Discard Mortality = 25% (medium)

16" Minimum Length					
Discard Mortality Reduction (%)					
100	75	50	25	10	0
9.8	7.1	4.6	2.3	0.9	0

Base Discard Mortality =
21/22% -> 11.8% (SEDAR 52)

16" Minimum Length					
Discard Mortality Reduction (%)					
100	75	50	25	10	0
4.5	3.3	2.2	1.1	0.4	0

Management Objectives (assume 25% base discard mortality)

Recreational Harvest
(Weight)

16" Minimum Length					
Discard Mortality Reduction (%)					
100	75	50	25	10	0
21.2	15	9.5	4.5	1.8	0

Commercial Harvest
(Weight)

16" Minimum Length					
Discard Mortality Reduction (%)					
100	75	50	25	10	0
21.2	15	9.5	4.5	1.8	0

Recreational Harvest
(Number of Fish)

16" Minimum Length					
Discard Mortality Reduction (%)					
100	75	50	25	10	0
20.2	14.3	9.1	4.3	1.7	0

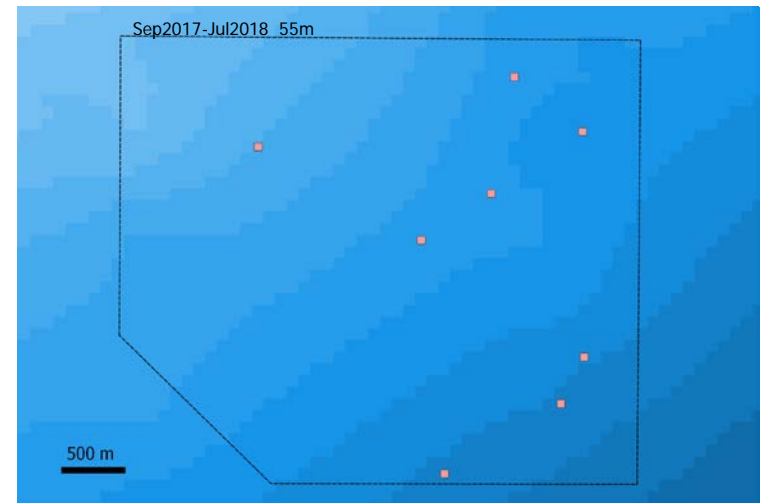
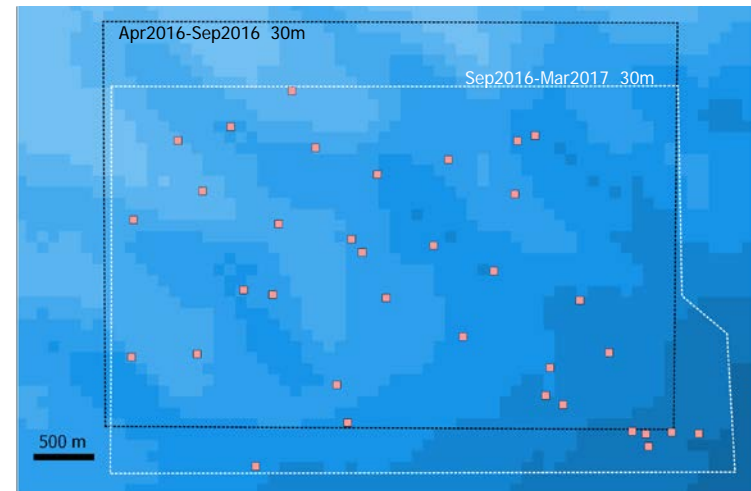
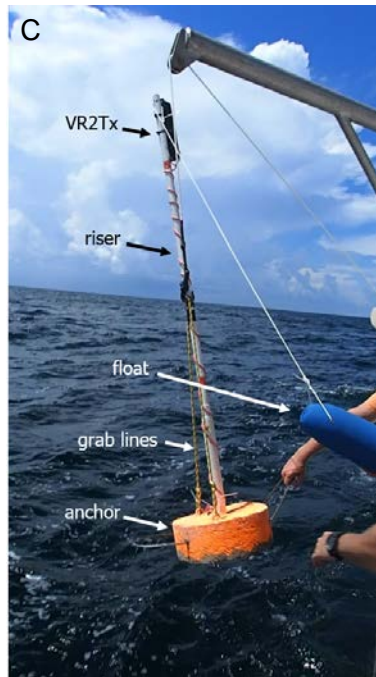
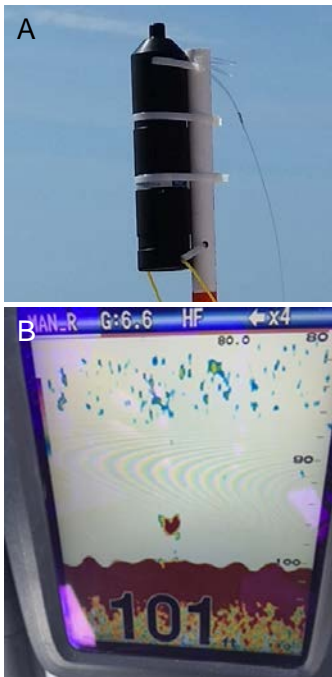
Recreational Dead
Discards (Weight)

16" Minimum Length					
Discard Mortality Reduction (%)					
100	75	50	25	10	0
-100	-70.7	-44.6	-21.1	-8.2	0



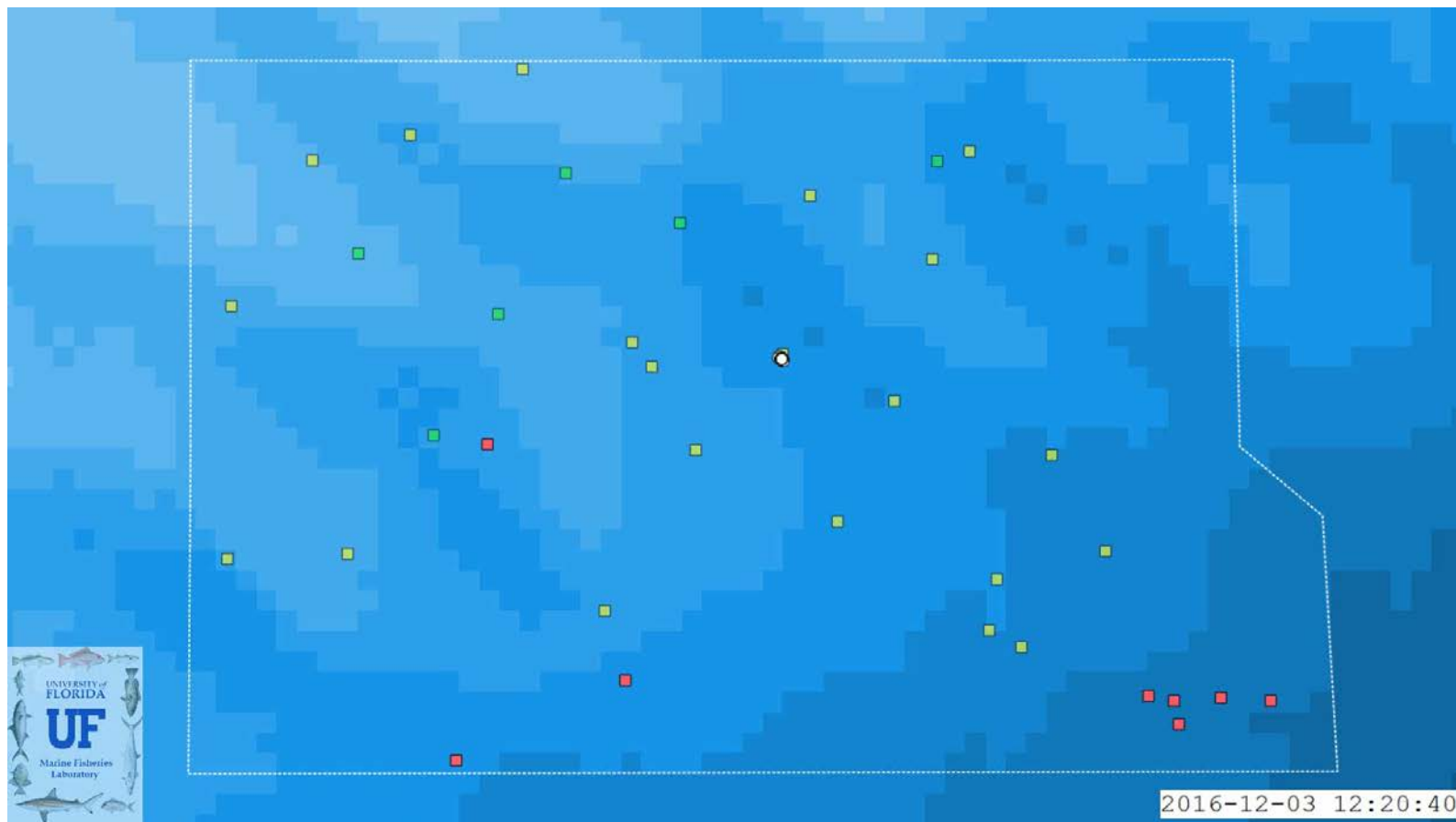
EXTRA SLIDES
Probably don't show

Approach: Three- Dimensional Acoustic Telemetry



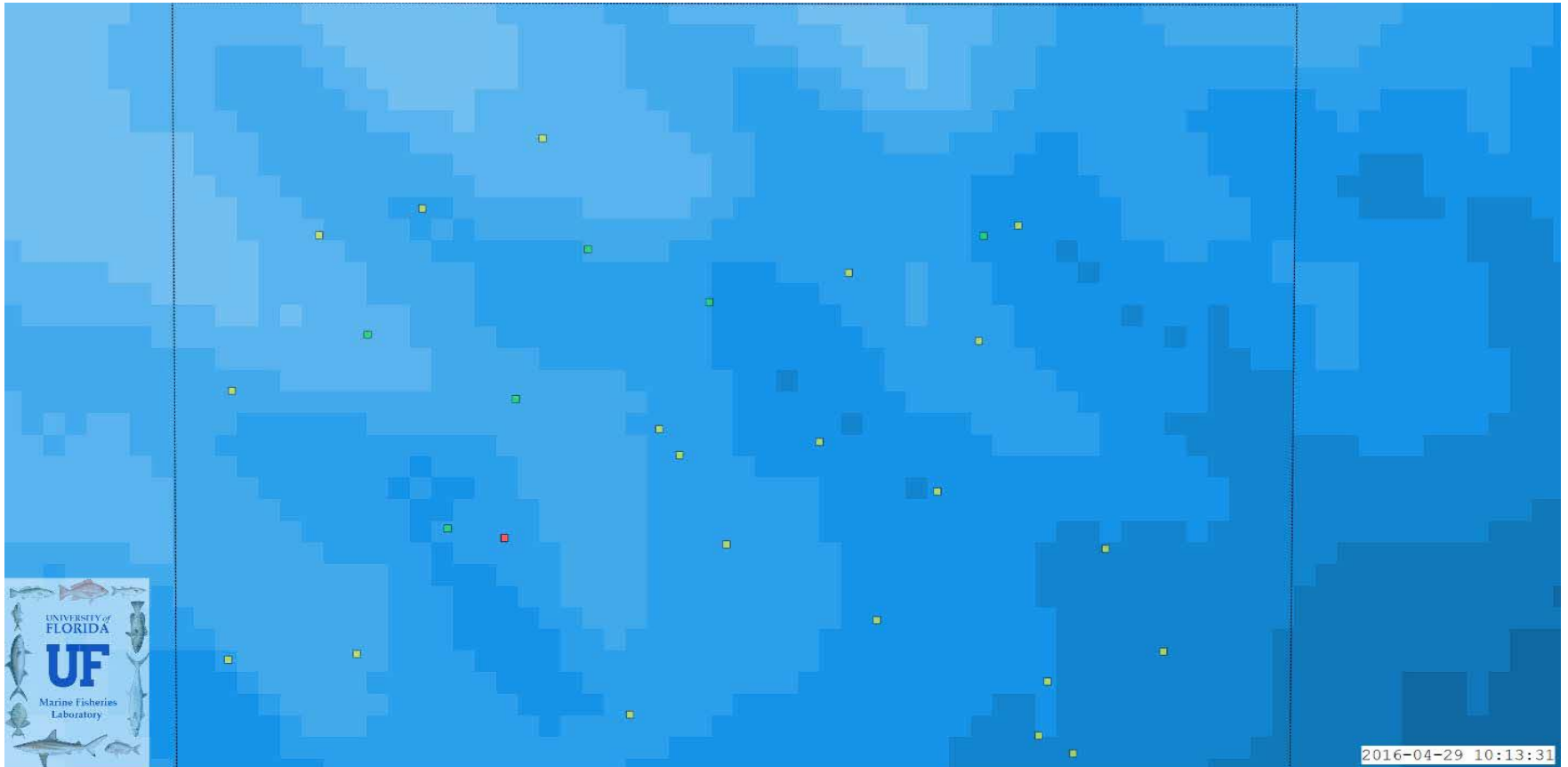
Gray Triggerfish

47 cm FL, tracked 4/28/2016-1/20/2017



Red Snapper

39 cm TL, "tracked" 4 days

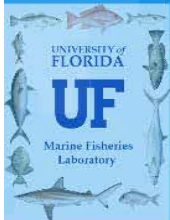
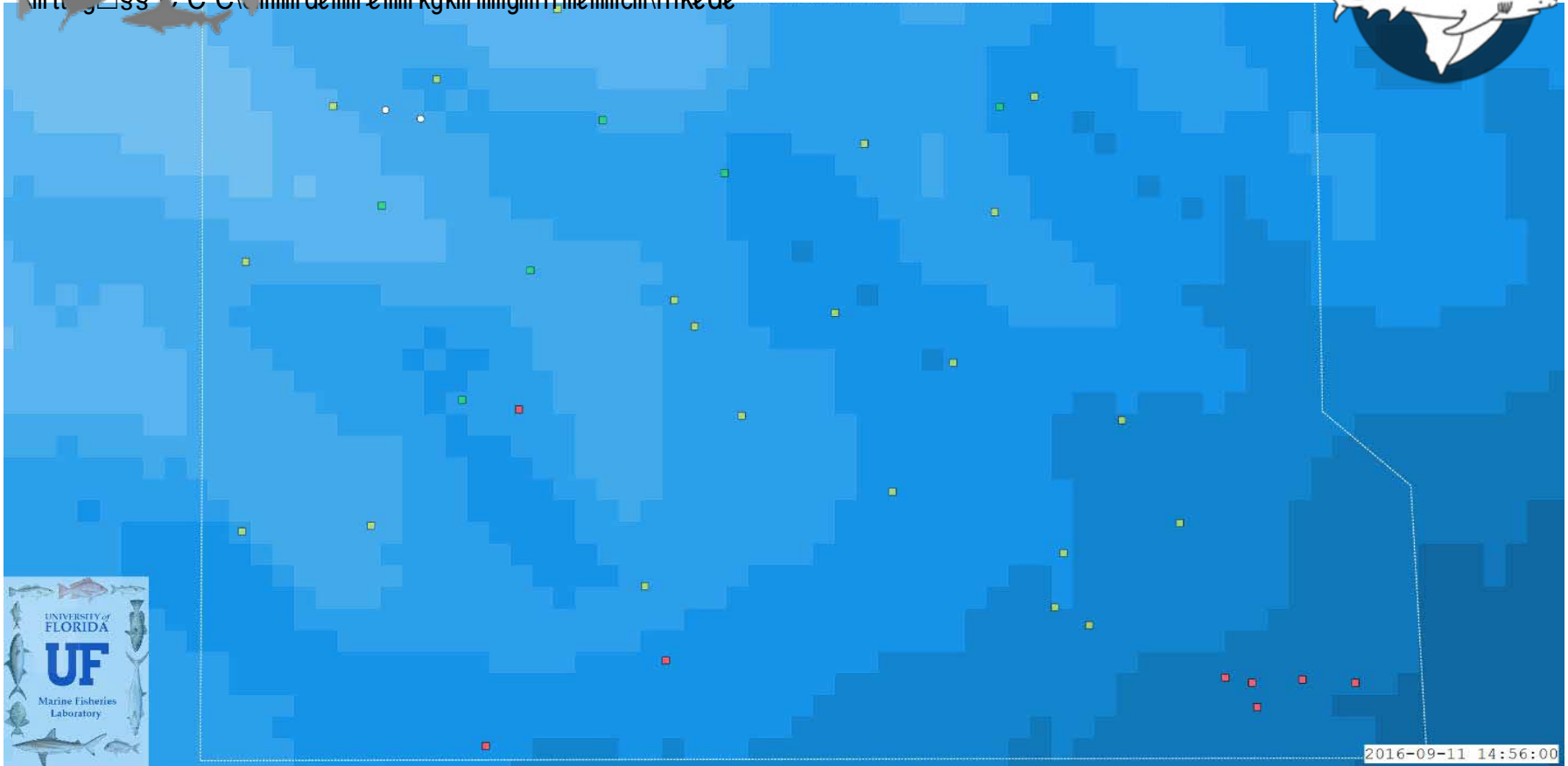


iTAG

Bull Shark (*Carcharhinus leucas*)



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Discussion/Questions

