

Barotrauma in Atlantic Coast Fisheries

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Atlantic Ecosystems

- Coastline 2,100 miles
- Two Large Marine Ecosystems
 - Northern
 - Southern
- Three Councils
 - New England
 - Mid Atlantic
 - South Atlantic



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Recreationally Harvested Species

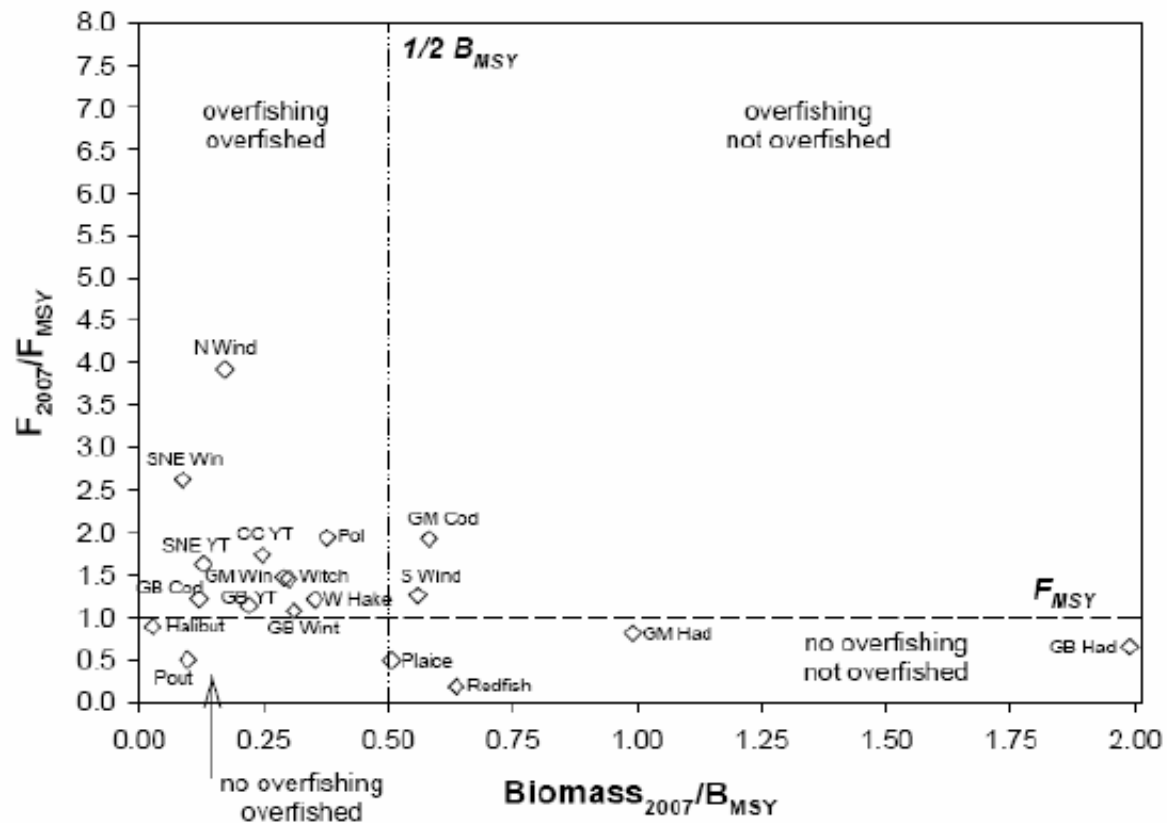
Species	Average Number*	% Released Alive**	Rank
Summer flounder	24,370,210	88%	1
Atlantic croaker	21,541,534	57%	2
Bluefish	19,157,723	23%	3
Striped bass	16,877,121	85%	4
Spot	15,622,482	36%	5
Black sea bass	12,467,530	83%	6
Atlantic cod	11,527,398	72%	24
Red snapper	1,760,879	82%	56
Groupers	2,658,762	75%	60 and 61

*Average Number 2005-2010 **Released alive = B2

Source: Personal communication from the NMFS, Fisheries Statistics Division 3/5/2011

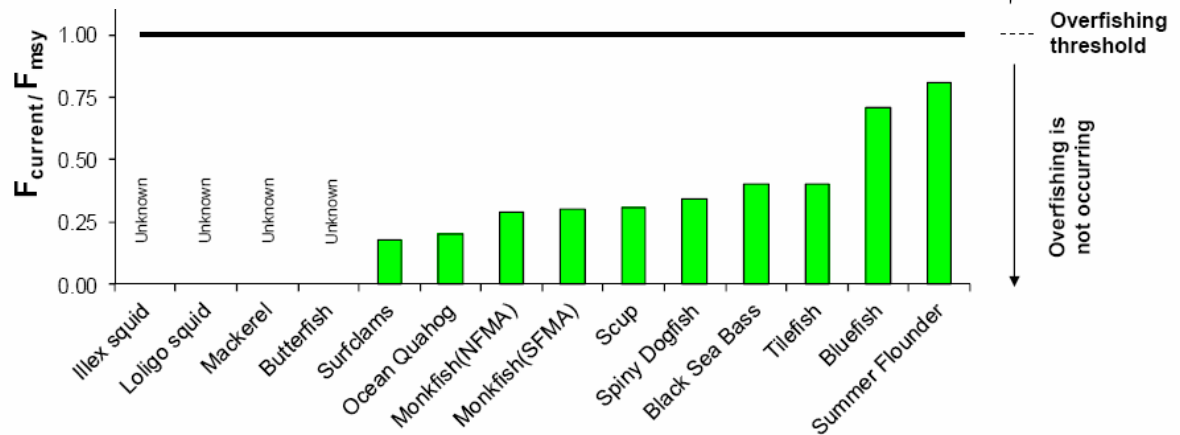
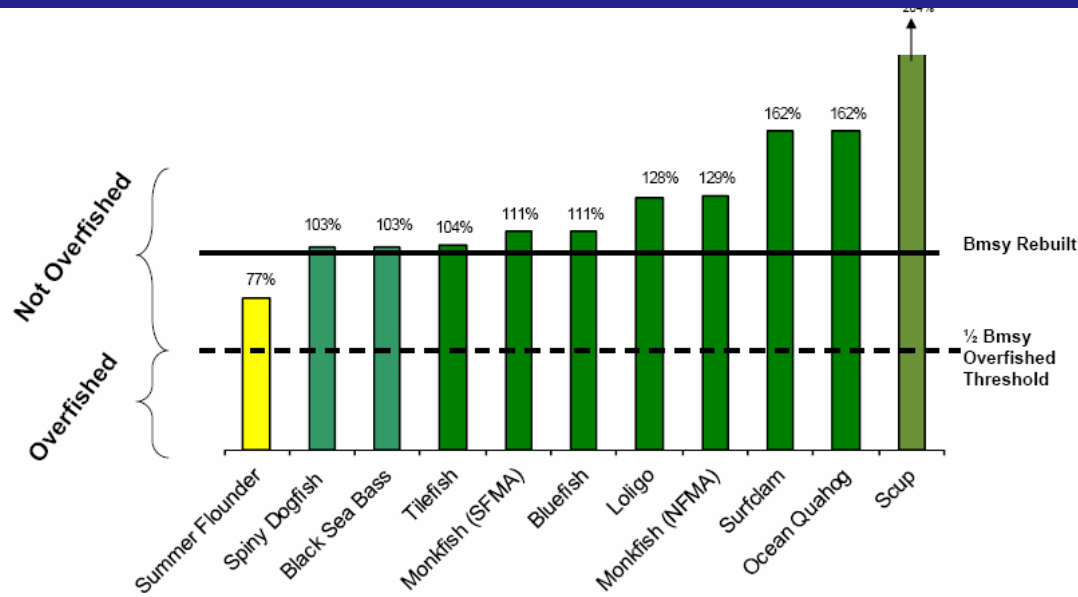
Stock Abundance in the NE

2007 Groundfish Stock Status



Source: NEFMC <http://www.nefmc.org/nemulti/index.html>

Stock Abundance in the MA



Source: MAMFC
<http://www.mafmc.org/Stock%20Stat%20us/StockStatusWebFeb2011.pdf>

Stock Abundance in the SA*

Species	Year	Benchmark		Year	Update	
		Overfishing	Overfished		Overfishing	Overfished
Red porgy	2002		Yes	2006		Yes
Black sea bass	2003	Yes	Yes	2005	Yes	Yes
Vermilion snapper	2003	Yes	N/A	2007	Yes	N/A
Yellowtail snapper	2003					
Goliath grouper	2004	N/A	N/A			
Hogfish	2004	N/A	N/A			
Snowy grouper	2004	Yes	Yes			
Tilefish	2004	Yes				
Gag grouper	2006	Yes				
Red snapper	2008	Yes	Yes			
Greater amberjack	2008					
Mutton snapper	2008					
King mackerel	2009					
Spanish mackerel	2008		N/A			
Vermilion snapper	2008	Yes				
Black grouper	2010					
Red grouper	2010	Yes	Yes			
Red snapper	2010	Yes	Yes			
		50%	42%			

Bold = New Benchmark

*Note: 73 species in Snapper/Grouper Complex

Source: SAFMC SEDARs

Species Overfished and Overfishing

<u>Species</u>	<u>% Discarded Alive</u>
• Windowpane flounder	
• Winter flounder	45%
• Cod	72%
• Red snapper	82% now 100%
• Speckled hind	} Grouper combined >70%
• Warsaw grouper	

Source: Personal communication from the NMFS, Fisheries Statistics
Division 3/5/2011

Discard Mortality Research

Collins 1991

- Hooking and Depth
- Observer/Cage
- Survival was high
 - A. Fish swimming down
 - B. Survival from cage
- Groupers
 - Only 43% swam down
 - Only 2 mortalities

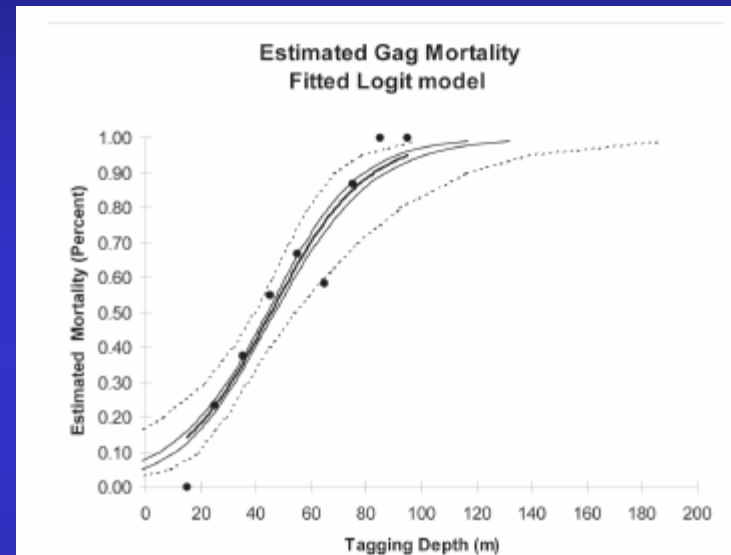
SPECIES	DEPTH ZONE					
	21 m		36 m		46-54 m	
	n	% swam	n	% swam	n	% swam
<i>Centropristis striata</i>	42	100	121	69	2	50
<i>C. ocyurus</i>	12	100	79	97	33	76
<i>Mycteroperca microlepis</i>	3	100	1	100	0	--
<i>M. phenax</i>	0	--	1	100	4	50
<i>Epinephelus adscensionis</i>	0	--	0	--	2	0
<i>E. cruentatus</i>	0	--	0	--	1	0
<i>Lutjanus campechanus</i>	0	--	1	0	0	--
<i>Rhomboplites aurorubens</i>	0	--	26	96	121	87
<i>Pagrus pagrus</i>	0	--	25	96	33	94
<i>Calamus nodosus</i>	0	--	0	--	12	92
<i>C. leucosteus</i>	1	100	1	100	0	--
<i>Diplodus holbrooki</i>	20	80	0	--	0	--
<i>Haemulon aurolineatum</i>	14	100	5	100	67	90
<i>H. plumeri</i>	0	--	1	100	1	100
<i>Balistes capriscus</i>	2	100	0	--	2	50
<i>B. vetula</i>	0	--	0	--	2	50
<i>Holocentrus ascensionis</i>	0	--	0	--	2	100
TOTAL	94	96%	261	84%	282	85%

SPECIES	DEPTH ZONE					
	21 m		36 m		46-54 m	
	n	% surv	n	% surv	n	% surv
<i>Centropristis striata</i>	85	93	134	87	0	--
<i>C. ocyurus</i>	9	100	79	92	13	77
<i>Mycteroperca microlepis</i>	4	50	4	100	0	--
<i>M. phenax</i>	0	--	2	100	7	100
<i>Epinephelus drummondhayi</i>	0	--	0	--	2	100
<i>E. morio</i>	0	--	1	100	0	--
<i>Lutjanus campechanus</i>	3	100	1	0	0	--
<i>Rhomboplites aurorubens</i>	0	--	6	100	71	65
<i>Pagrus pagrus</i>	0	--	12	92	17	65
<i>Calamus nodosus</i>	0	--	1	100	0	--
<i>C. leucosteus</i>	1	100	1	100	6	83
<i>Diplodus holbrooki</i>	25	92	1	0	0	--
<i>Haemulon aurolineatum</i>	11	100	2	100	76	80
<i>H. plumeri</i>	1	100	4	100	0	--
<i>Balistes capriscus</i>	1	100	0	--	4	100
<i>Holocentrus ascensionis</i>	0	--	0	--	1	100
TOTAL	161	90%	248	89%	197	75%

Discard Mortality Research

McGovern et al. 2005

- Hooking and Depth
- Mark Recapture Study
- Depth had significant impact



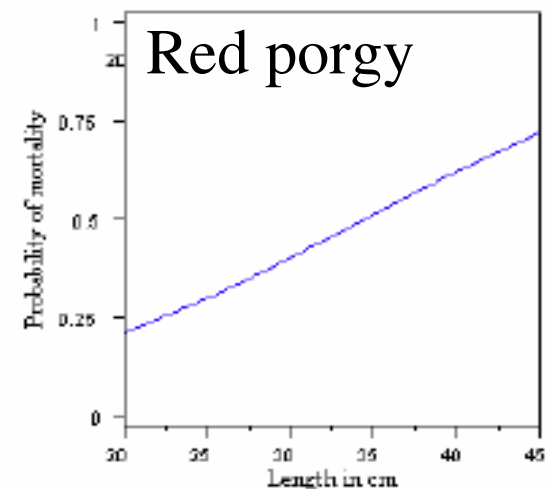
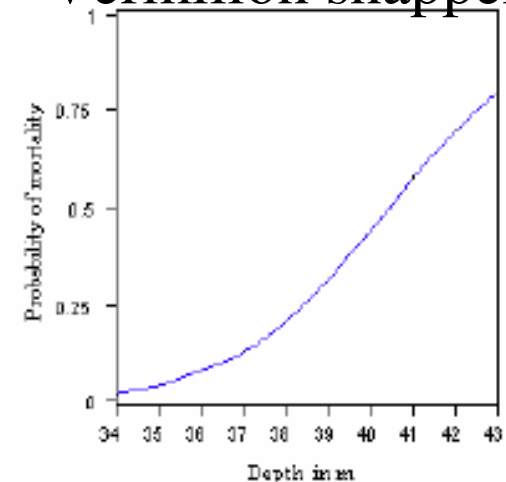
Median tagging depth (m)	Number tagged	Number recaptured	Percent recaptured	Fitted logit mortality (number)	Fitted logit mortality (percentage)
15	253	49	19.4	36.04	14.2463
25	1,221	181	14.8	281.16	23.0274
35	730	88	12.1	255.58	35.0113
45	871	76	8.7	428.90	49.2420
55	357	23	6.4	227.04	63.5966
65	321	16	5.0	243.58	75.8801
75	39	1	2.6	33.15	84.9966
85	57	0	0	51.91	91.0728
95	11	0	0	10.43	94.8377

Discard Mortality Research

Guiccone 2005

- Hooking and Depth
- Cage Study
 - Fish lowered to depth
 - Control fish caught in traps
- Depth significant for vermilion snapper mortality

Vermilion snapper



Discard Mortality Research

Rudershausen et al. 2007

- Hooking and Depth
- Observer/Modeling
- Impacts
 - Depth (d)
 - Hooking location (h)
- $DM = 1 - (1-d) * (1-h)$

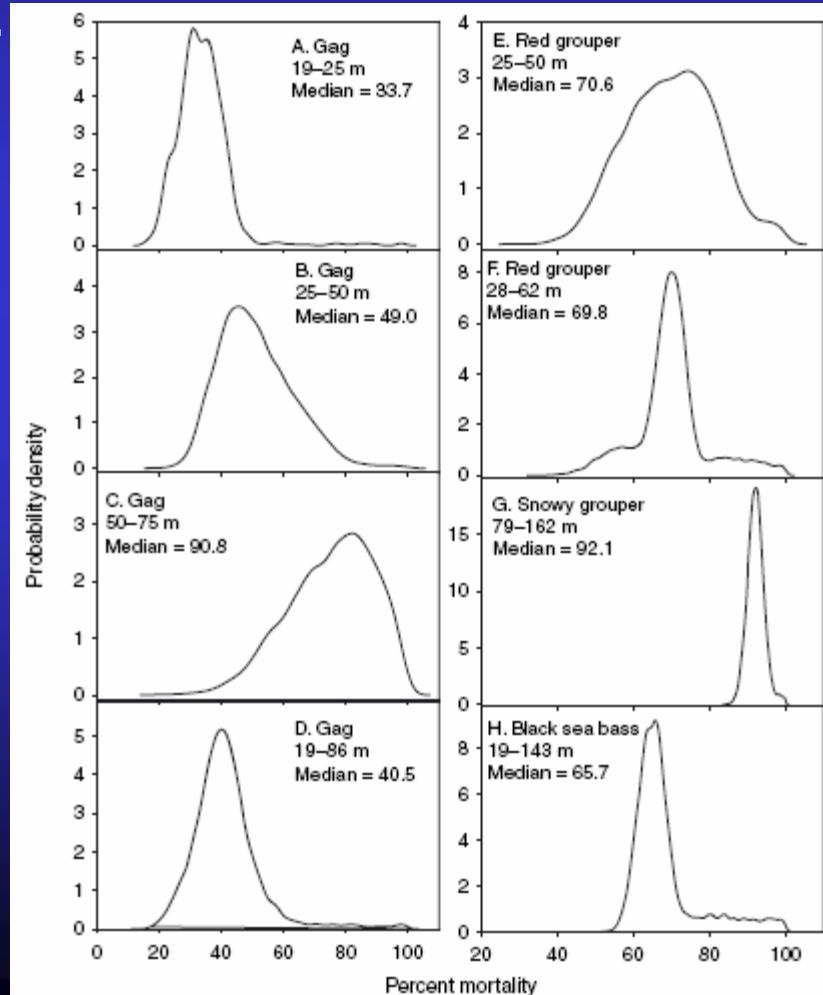
Species	Hooking location	<i>n</i>	Mortality
Vermilion snapper	Jaw	208	7.7
	Gut	12	33.3
Red porgy	Jaw	175	12.6
	Gut	14	35.7
Black sea bass	Jaw	72	2.7
	Gut	6	16.7

Species	Depth strata (m)	Immediate mortality	Delayed mortality
Vermilion snapper	25–50	9.6	44.5
	50–75	14.3	31.3
Red porgy	25–50	13.6	26.0
Gag	19–25	0	33.7
	25–50	0	49.0
Red grouper	25–50	8.6	70.6
White grunt	25–50	8.4	31.5
Snowy grouper	All depths	n/a	92.1
Black sea bass	All depths	3.6	65.7

Discard Mortality Research

Rudershausen et al. 2007

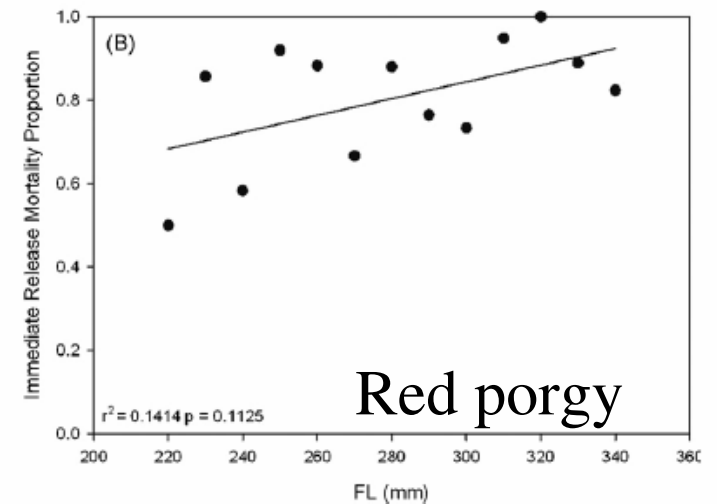
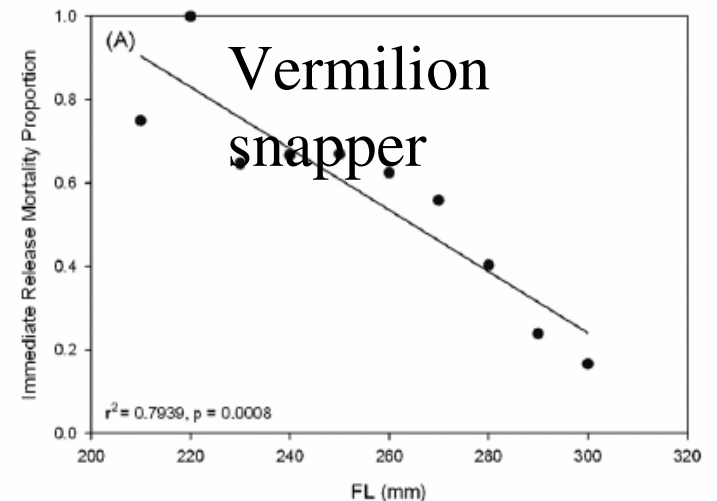
- Hooking and Depth
- Observer/Modeling
- Impacts
 - Depth (d)
 - Hooking location (h)
- $DM = 1 - (1-d)^*(1-h)$



Discard Mortality Research

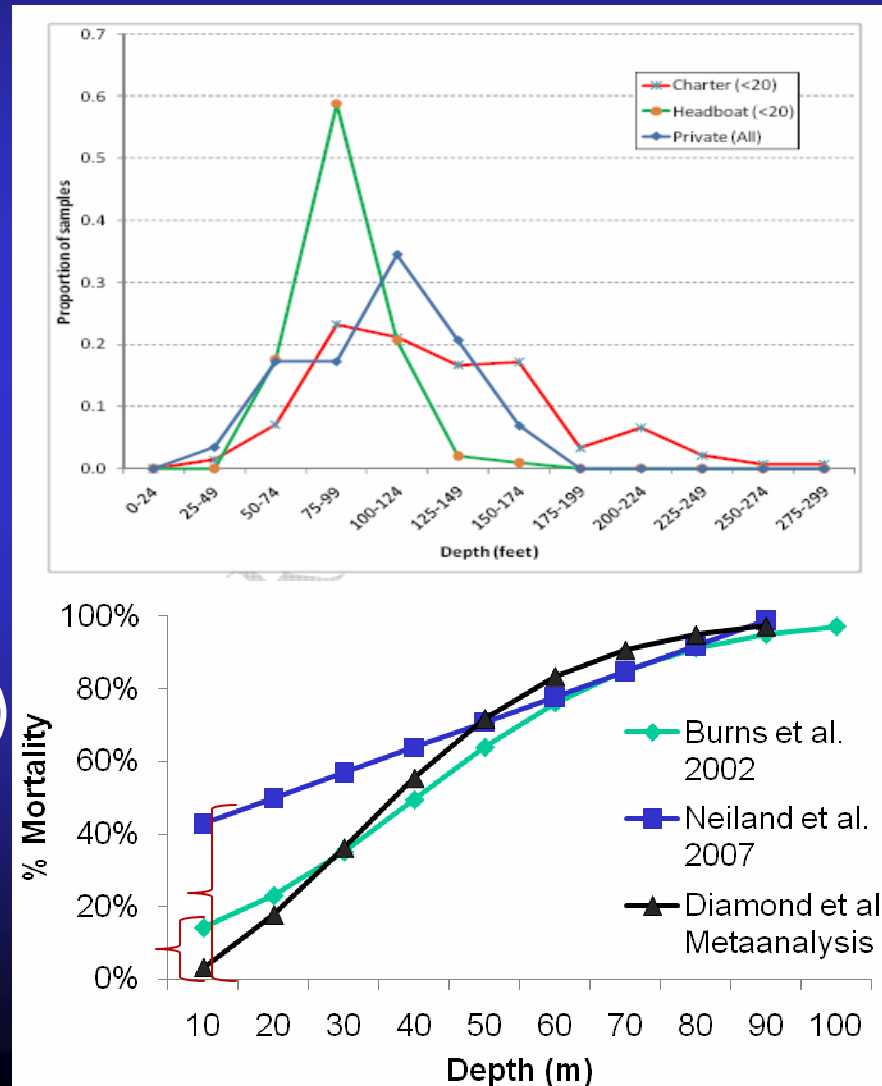
Stephen and Harris 2010

- Hooking and Depth
- Observer
- Immediate release mortality <50% for most species
- Larger vermilion snapper survived better



Discard Mortality in Management

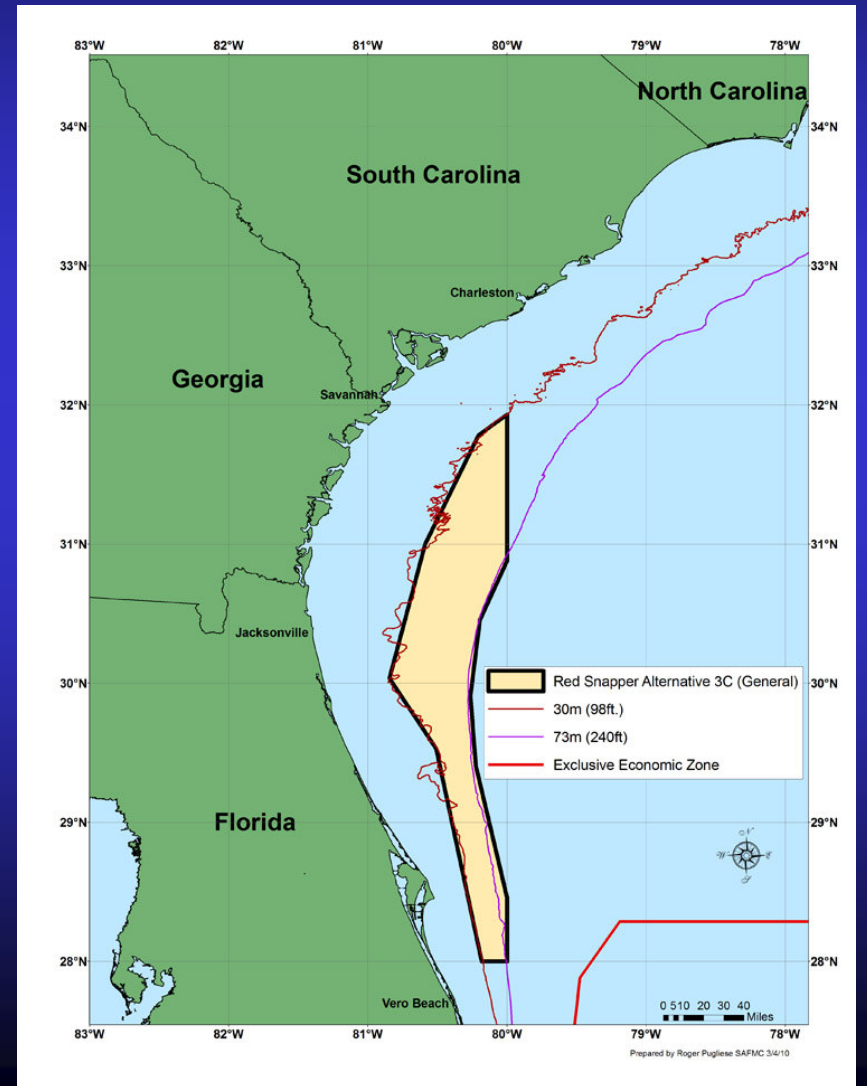
- Hooking mortality
- Barotrauma
- Ex. Red snapper
 - Reviewed 20+ articles
 - DM range 1-93%
 - $DM = 1(1 + \exp(-(-2.39 + 0.06 * d)))$
 - Recreational
 - 39% for-hire
 - 41% private



Source: SEDAR 24

Management Methods

- Closed areas
 - Red snapper
 - MPA
- Closed seasons
 - Spawning season
- Gear restrictions
- Minimum size limit
- Bag limits



Outreach

- Sea Grant Documents/ Websites
- Research presentations
- Snapper/Grouper FMP Amendment 16
 - Circle Hooks
 - Dehooking devices
 - Venting tools (not passed)



FLORIDA SEA GRANT
Science Serving Florida's Coast



Some Venting Tools Available Today

To maintain healthy populations of popular game species, every fisherman is responsible for carefully handling fish that are released so they can survive, spawn and perhaps be caught again. Reef fish such as red grouper, gag, and snapper may require venting to be able to swim back to safe habitat depth and avoid surface predators.

If a fish is bloated and floats, or if the fish's stomach is distended out of the mouth, the fish should be vented.

A sampling of venting tools is shown to illustrate features and components. The tools are not displayed to scale. Approximate retail price is given when available. No manufacturer endorsement is intended or implied.



Florida Sea Grant/Novak Venting Tool Kit
Retail: \$25.00
<http://www.arcdehooker.com>
(877) 411-4272 (toll free)
info@arcdehooker.com

Tool that Florida Sea Grant and Mote Marine Laboratory developed about 10 years ago; ARC developed kit for storage/disposal and marketing



SnapperSaver
Retail: \$57.00 + S&H
<https://www.shop.snappersaver.com>
sales@snappersaver.com

Prototype shown; new models anodized in red, blue and gold; protective stop button added on production line models; also features a dehooker.

See more on other side

New Research

- Requested in most stock assessments
- Tagging methods to determine release mortality
- Headboat Observer
 - Size
 - Rate
 - Condition



Access to Healthy Stocks

Healthy Stocks

- Black sea bass (Mid Atlantic)
- Bluefish
- Black grouper
- Yellowtail snapper
- Greater amberjack

Management

- Accountability measures
- Species groupings
- Large area closures
 - Red snapper
 - Deepwater

Literature Cited

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