

Science, Service, Stewardship



Atlantic bluefin tuna

Recent fishery trends – catches, bycatch, relevant research

May 6, 2010

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Atlantic Bluefin Tuna (BFT) Considerations for 2010/2011

Purpose of BFT management under the 1999 Highly Migratory Species Fishery Management Plan has not changed:

- Implement rebuilding plan for 2019 and provide fishing opportunities in accordance with Magnuson-Stevens Act and Atlantic Tunas Convention Act

Overriding management question over past several years has changed:

- ...from “How do we constrain landings to quota?” to “How do we fully utilize quota?” to “How do we constrain landings to quota?”

Why the recent change?

- Smaller overall ICCAT quota allocation (2010 U.S. base quota ~ 950 mt)
- Reduction of allowed quota underharvest carryover from current 50% to 10% next year
- Changing size distribution of available BFT over recent years
- Highly successful Angling category performance (2x adjusted recreational subquota)
- Pelagic longline landings 30% over adjusted subquota
- Recent pelagic longline discards greater than landings

Current Situation

- NMFS' priority management objective with regard to the BFT quota is to ensure that total U.S. landings are within the ICCAT allocated quota.
- In the last few years, NMFS has not deducted overharvest from the Angling and Longline category quotas given: (1) large underharvests in other categories and the total U.S. quota; (2) the large amount of unused Reserve; and (3) the change in amount of underharvest that could be carried forward in 2006 (limited to 50% of U.S. quota) (i.e., could not give directed commercial categories full 2008 underharvests in 2009 as the total of those underharvests would exceed the 50% limit).
- U.S. landings exceeded the base quota in 2009, although were within adjusted quota
- 2010 fishery will require more oversight of individual categories to prevent overharvest of U.S. quota, particularly given anticipated increased availability of commercial sized BFT and therefore fuller use of commercial quotas

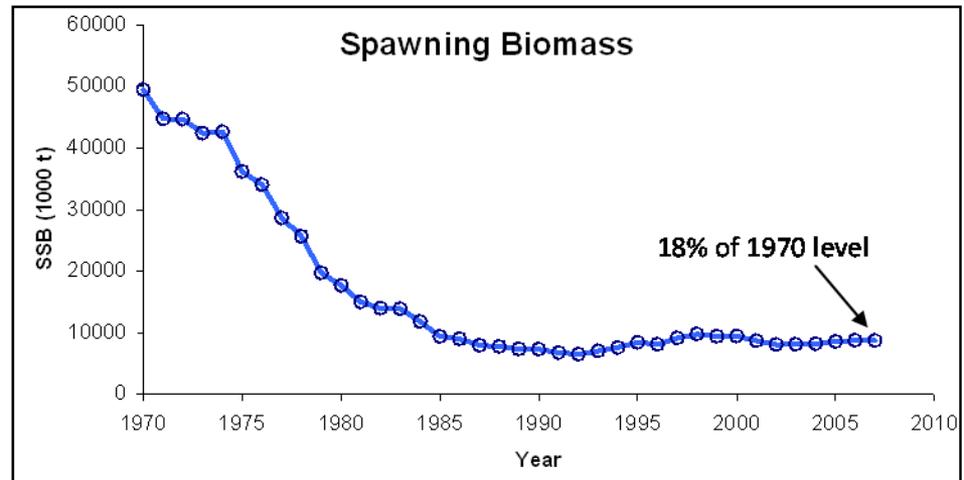
Challenges

- Current operational system adequate to manage commercial landings fishery in real time
- Current system not designed to monitor recreational landings in real time for *inseason* management
- Current system not designed to monitor longline discards in real time
- Recreational constituent interest in increasing recreational opportunities
- NGO and industry constituent interest in addressing BFT and the future of the pelagic longline swordfish fishery
- Regional differences among both commercial and recreational interests for access to BFT (i.e., New England, Mid-Atlantic, NC, etc.)

Western BFT Fishery Overview

Western Atlantic BFT Spawning Stock Biomass and Rebuilding Progress

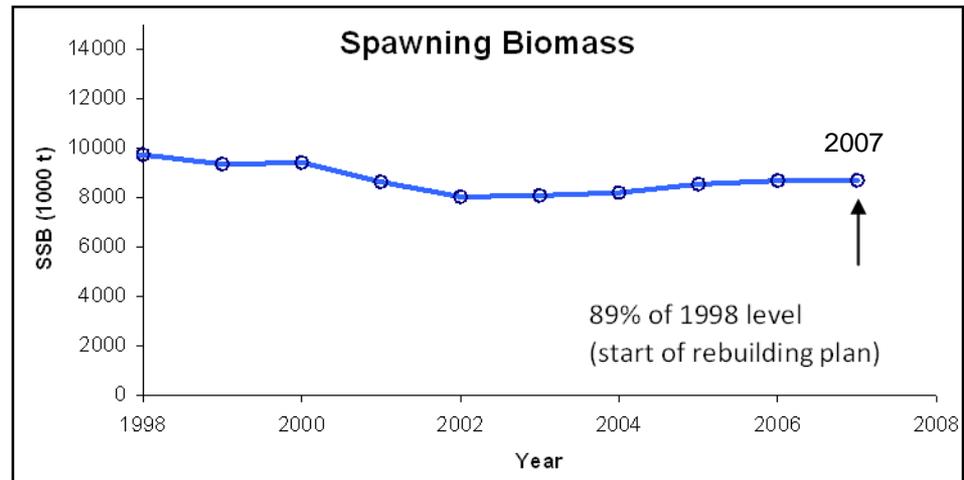
1970-2007



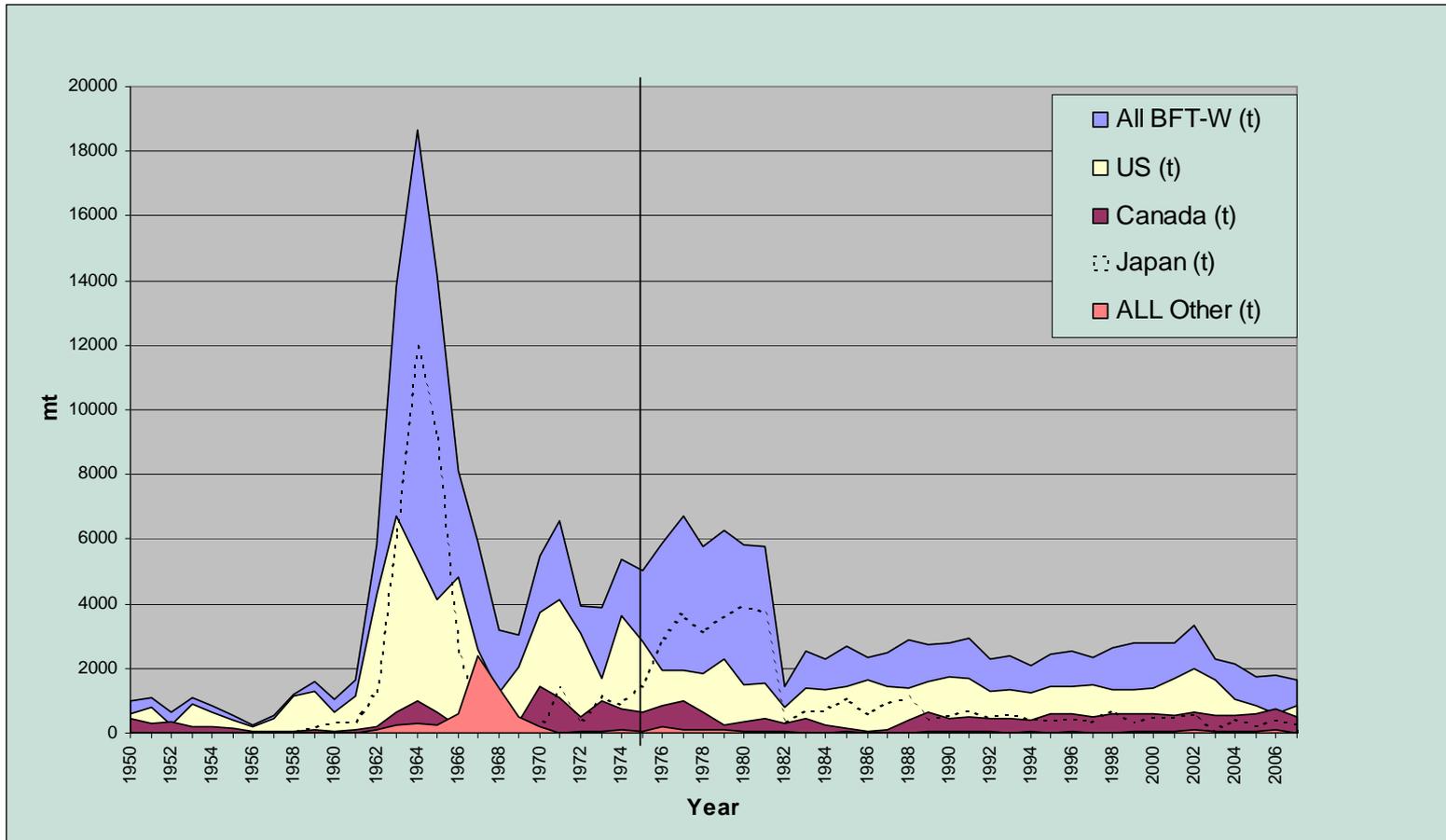
Halfway through rebuilding period (1999-2018), SSB was below 1998 level

1998-2007

(since start of rebuilding period)

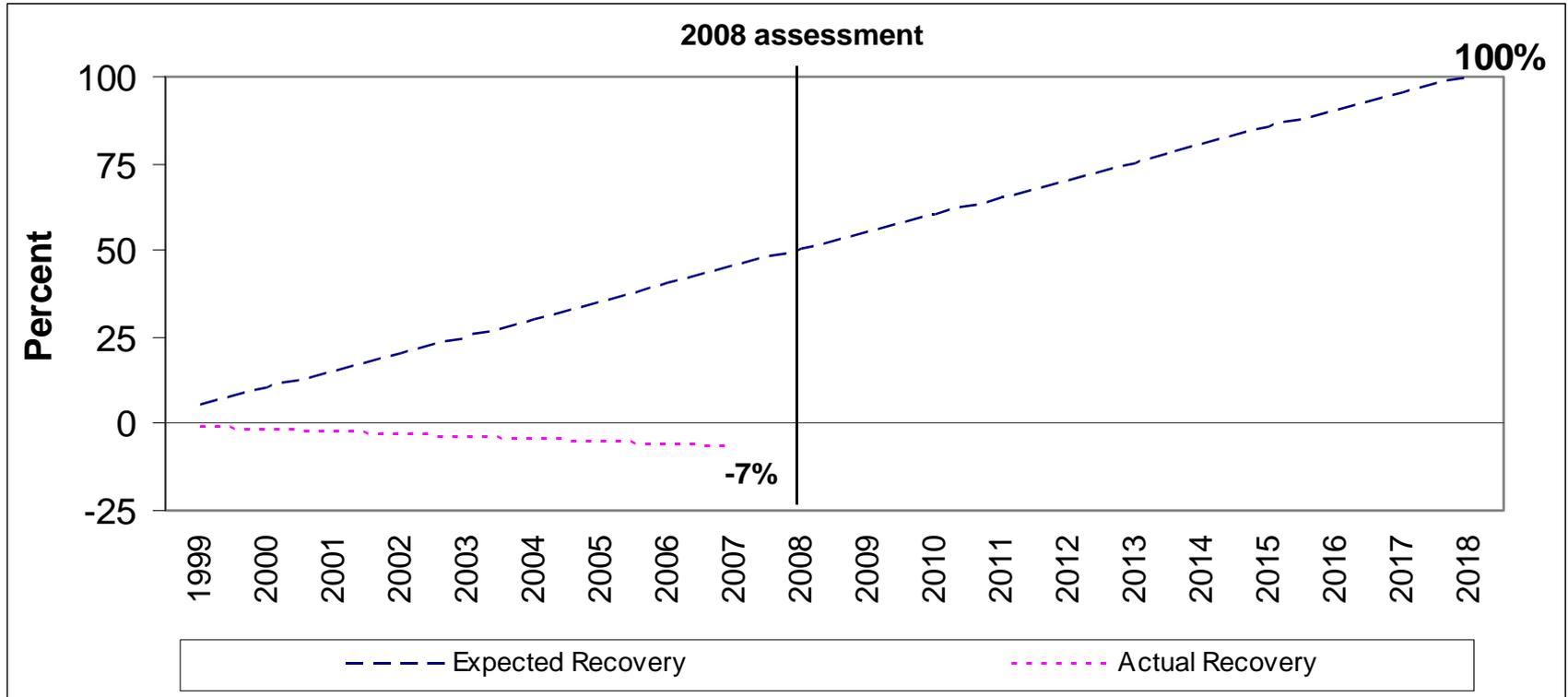


Western Atlantic BFT Landings (mt) (1950-2007)



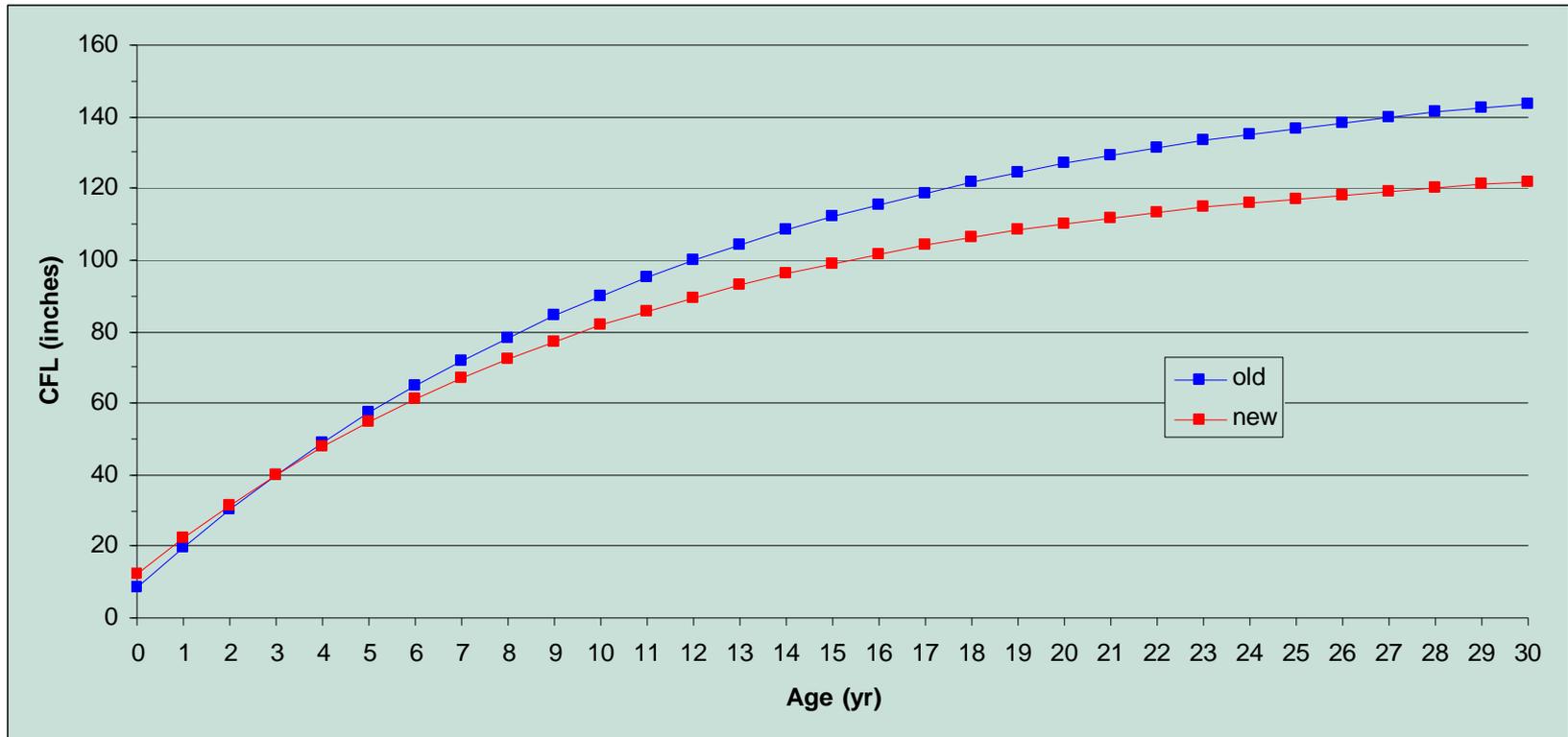
We typically talk about the status of the stock (e.g., the spawning stock biomass) relative to 1975. SCRS estimates that SSB was depleted after that point. But when you examine landings back to 1950, you get a more complete picture of landings trends over the past half-century.

Western Atlantic BFT Rebuilding Progress



Simplified schematic, based on SCRS-08-175, to highlight start and end points, not actual interannual changes. The paper indicates that past projections, which were used as the basis for setting Total Allowable Catches, may have been overly optimistic. ICCAT took this into consideration in preparing the 2009-2010 WBFT Recommendation. Next assessment: 2010

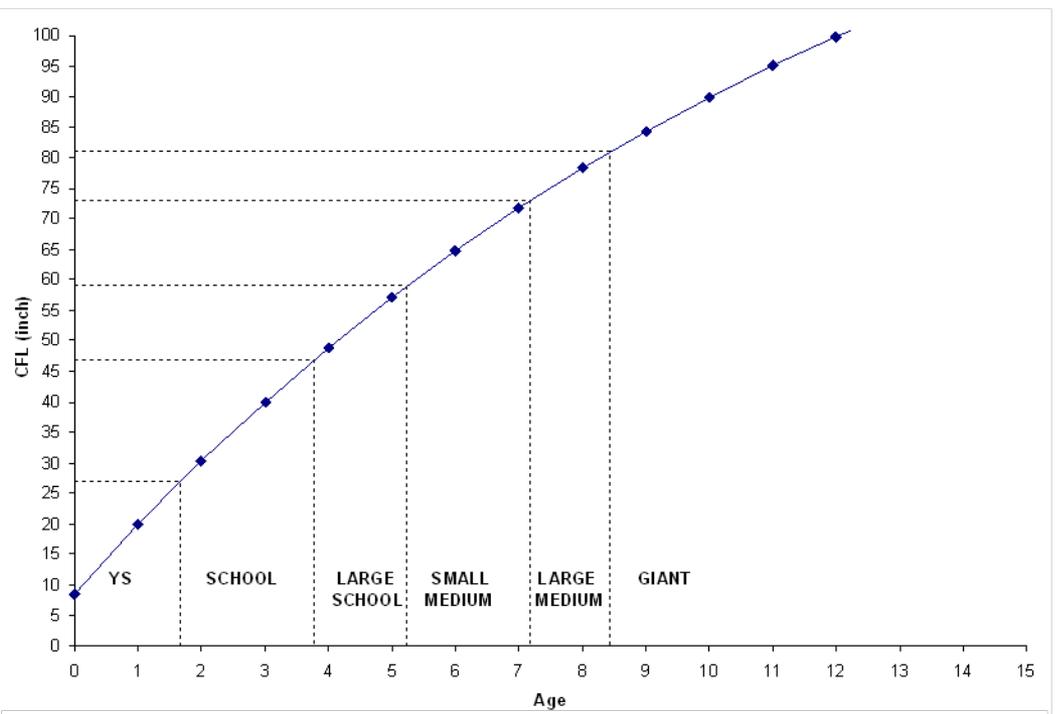
Comparison of BFT growth curves



Old growth curve (from Turner and Restrepo, 1994) used by SCRS for past assessments

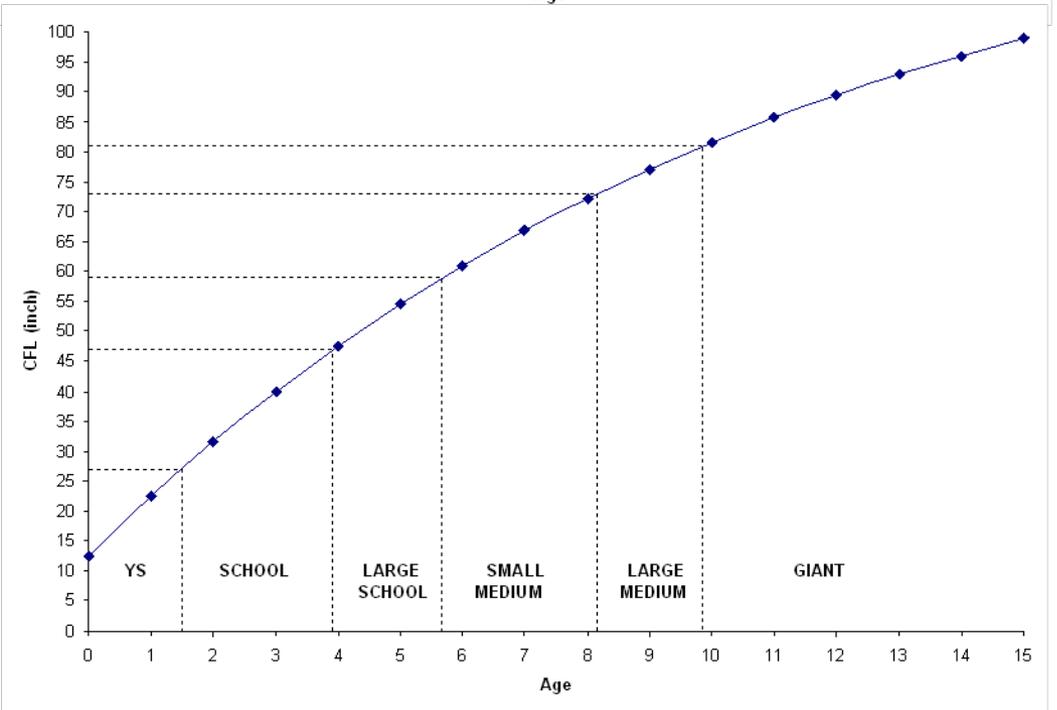
New growth curve (Restrepo et al., in press) recently adopted by SCRS for 2010 assessment

Old growth curve
(Turner and Restrepo, 1994)



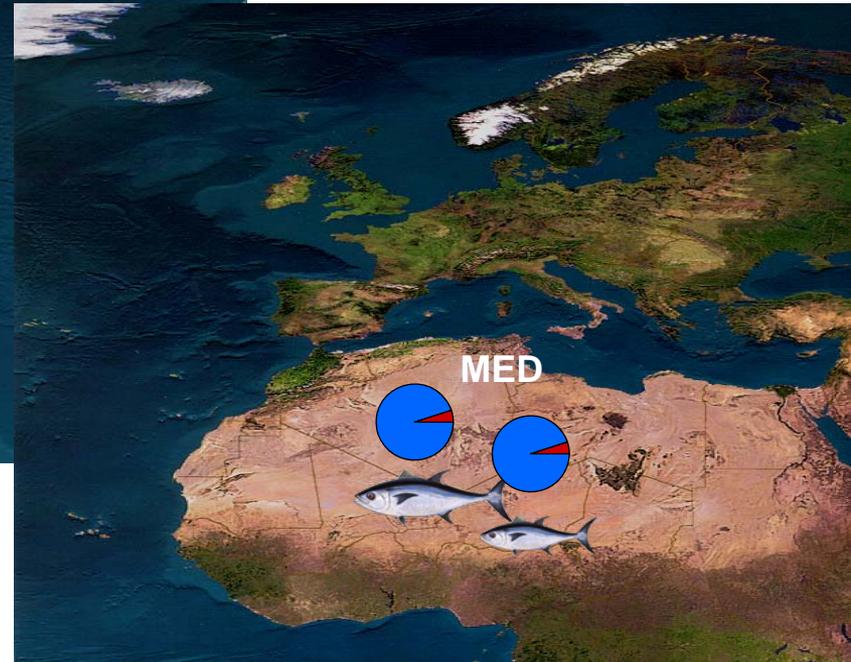
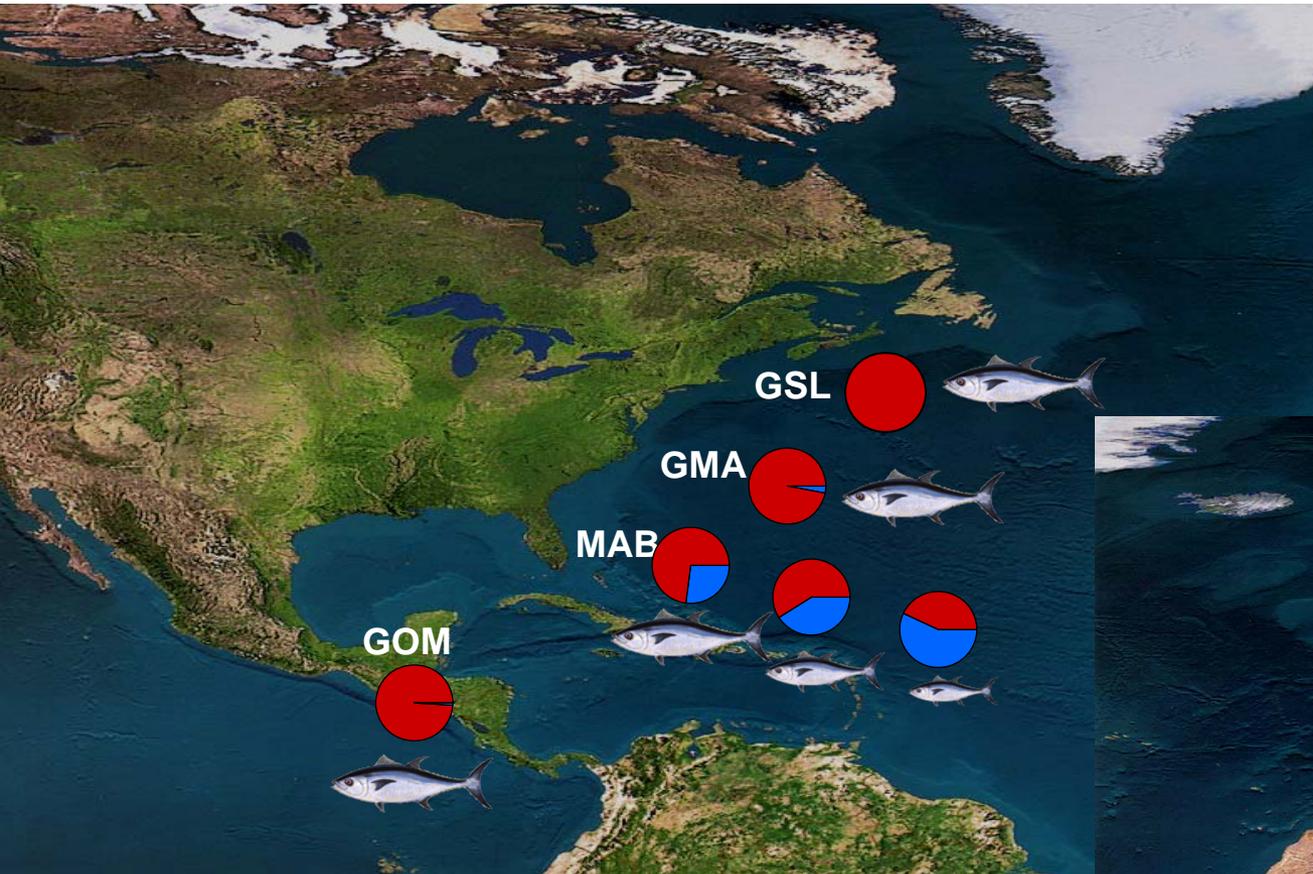
Age	Old curve	New curve
0	YS	YS
1	YS	YS
2	S	S
3	S	S
4	LS	LS
5	LS	LS
6	SM	SM
7	SM	SM
8	LM	SM
9	G	LM
10+	G	G

New growth curve
(Restrepo et al., in press)



From Rooker's study of BFT stock contribution rates

Red=western origin
Blue=eastern origin



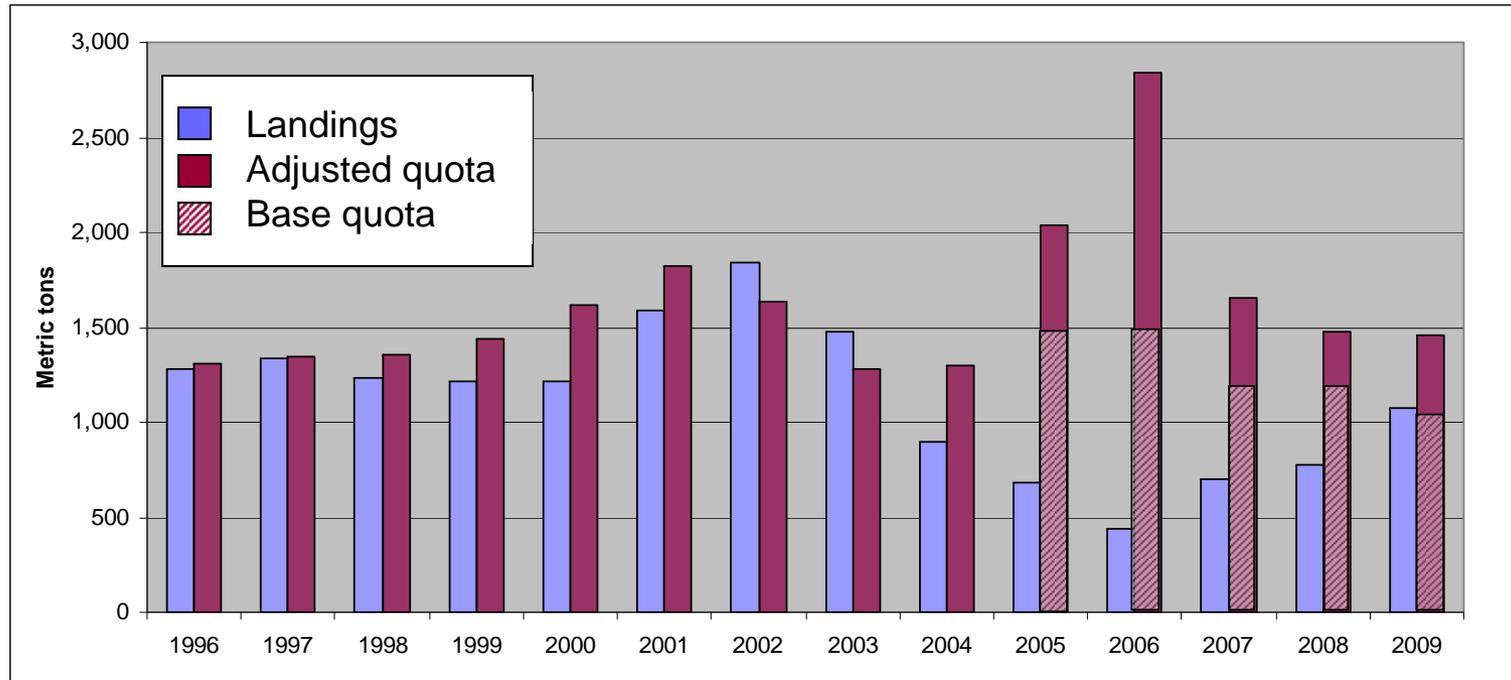
The rate of mixing between the 2 stocks is size-dependent and is significant for smaller size classes.

Largest proportion of eastern origin BFT in Mid-Atlantic Bight area and for school size BFT (2-3 years old). Proportion ↓ for older fish.

Rooker et al, 2008: Science 322:742-744. Oct. 31. 2008

U.S. BFT Fishery Overview (1996-2009)

U.S. BFT Landings vs. Adjusted Quotas (mt)

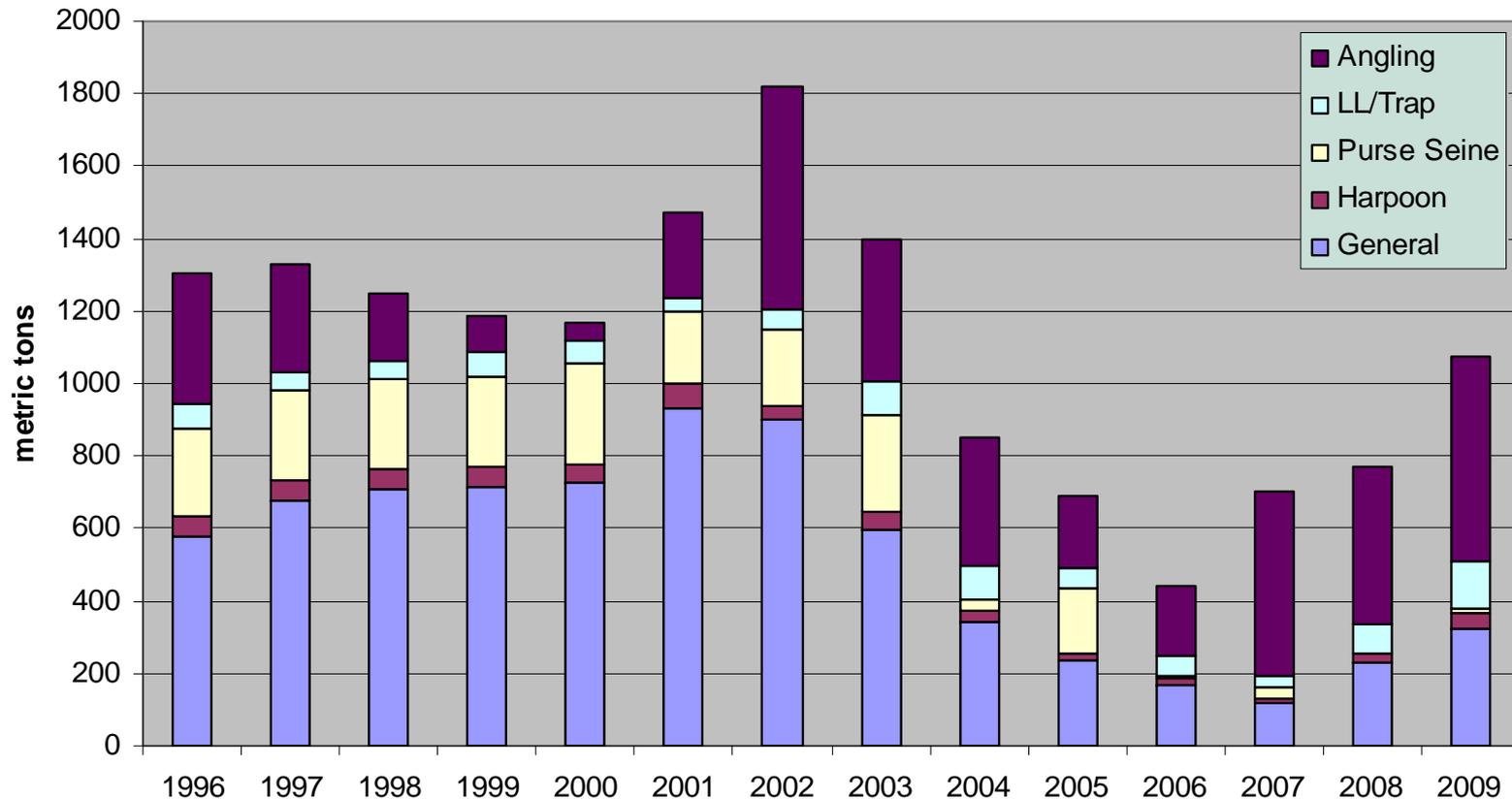


Reductions in landings and large amounts of underharvest beginning in the mid-2000s has precipitated requests for regulatory changes to more fully utilize U.S quota.

In 2009, total landings=1,073.7 mt which corresponded to 73% of adjusted quota (1,462.3 mt) and 104% of base quota (1,034.9 mt)

U.S. base quotas shown for 2005 through 2009 (hatched bars) to illustrate relation of recent landings to base quota.

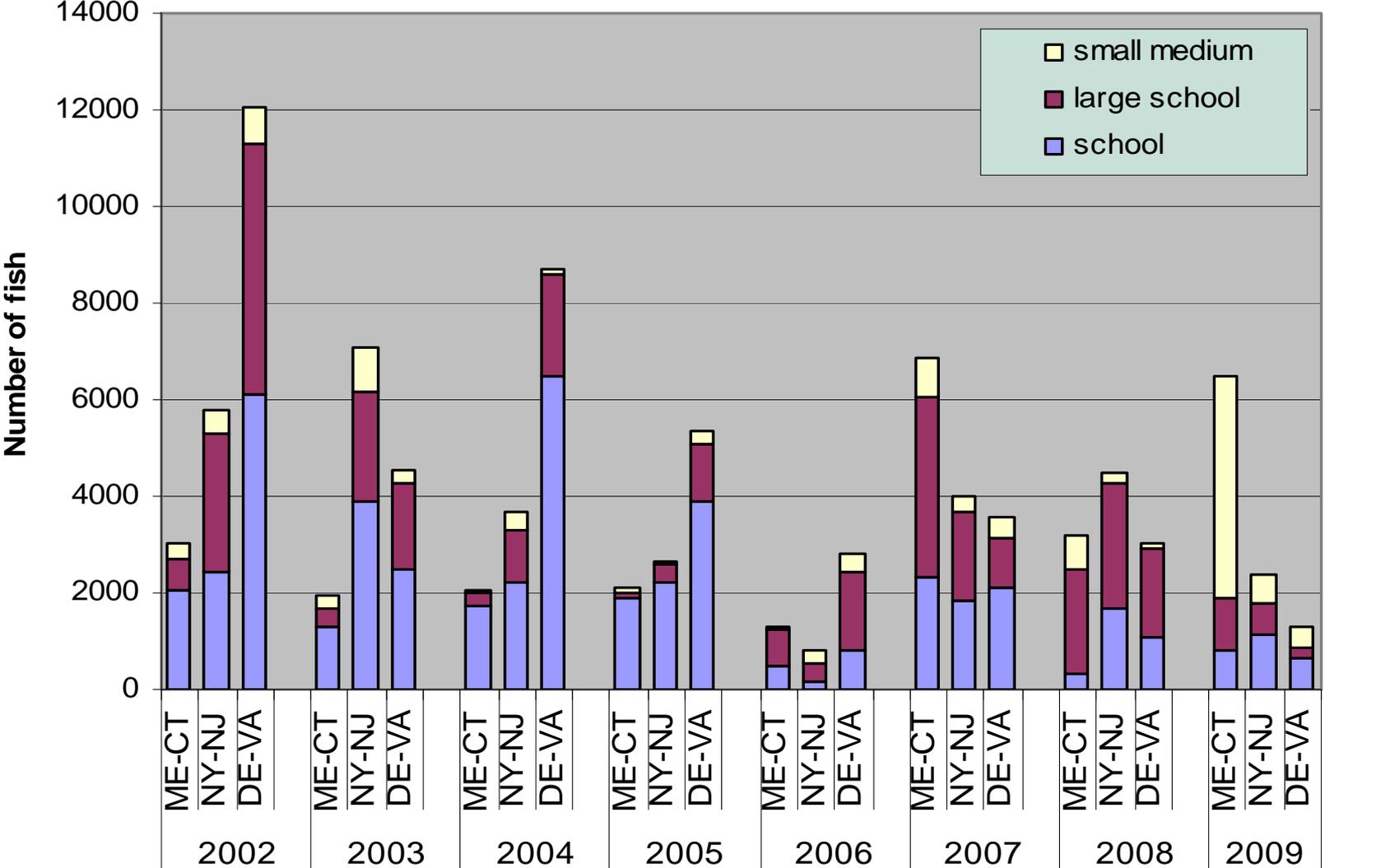
Landings by Category (mt)



Note the decline in General category landings from 2001 through 2007 and the large proportion of Angling category landings 2007 through 2009 (associated with a spike in large school/small medium BFT landings). General category landings grew from the 2007 low in 2008 and again in 2009.

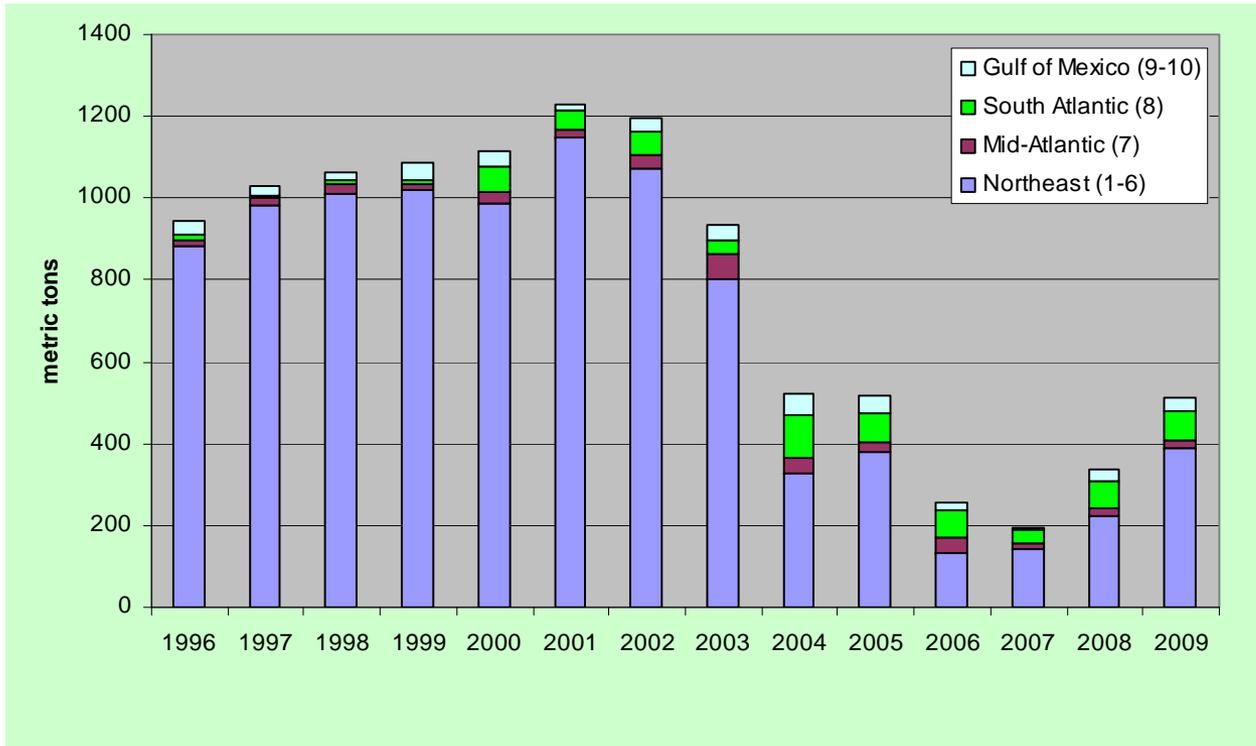
Longline and Trap combined because both incidental fisheries and data at beginning of time series combined.

Recreational Landings by Area

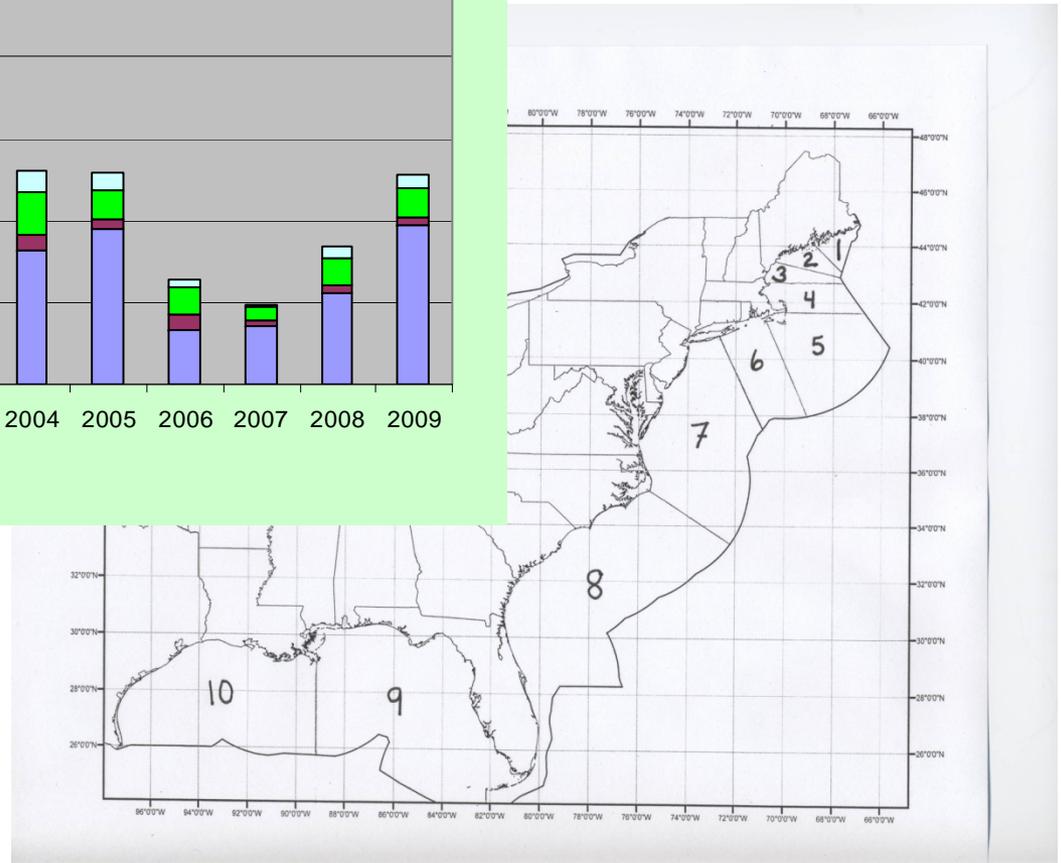


Data source: LPS (for ME-VA only)

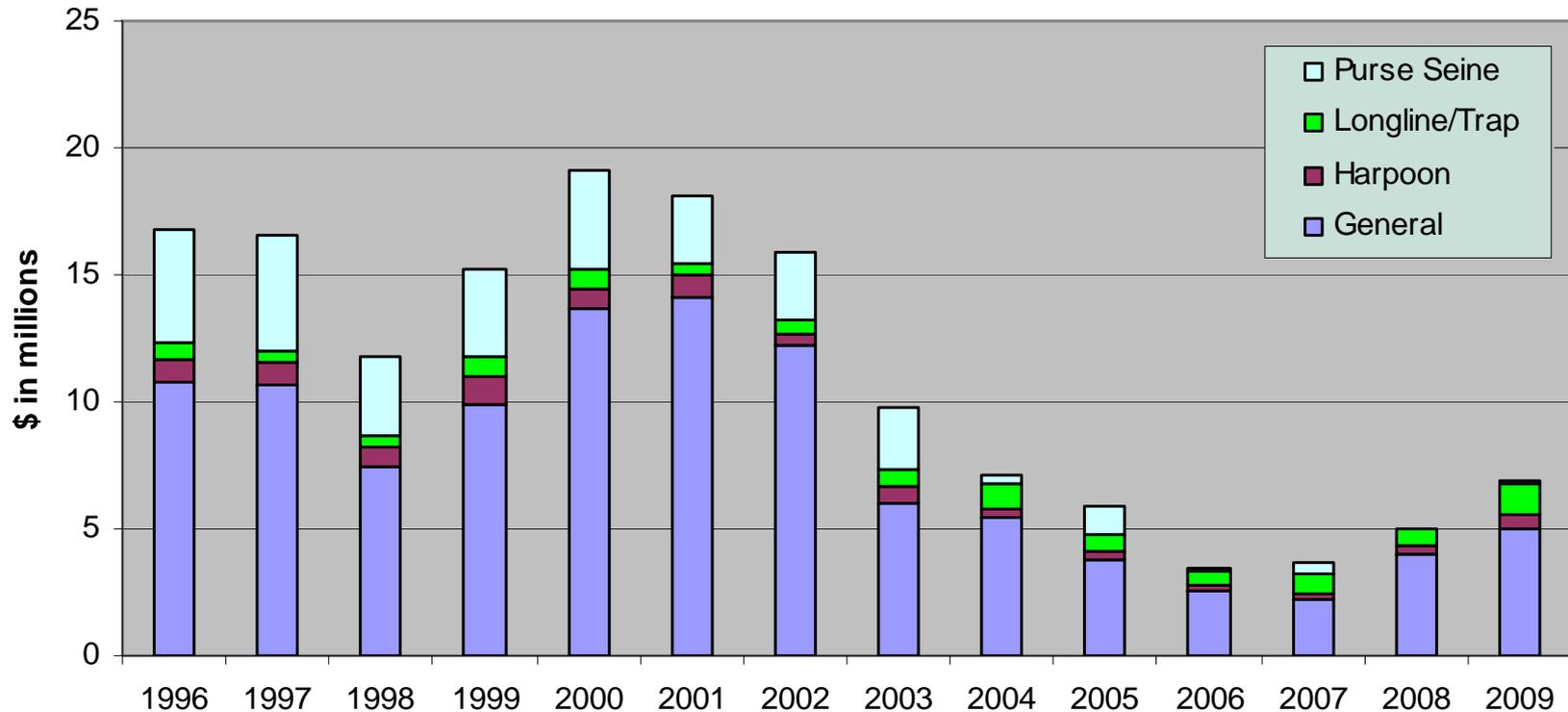
Commercial Landings by Area



Commercial landings declined from peak in 2001 until 2007, and increased in 2008 and 2009.



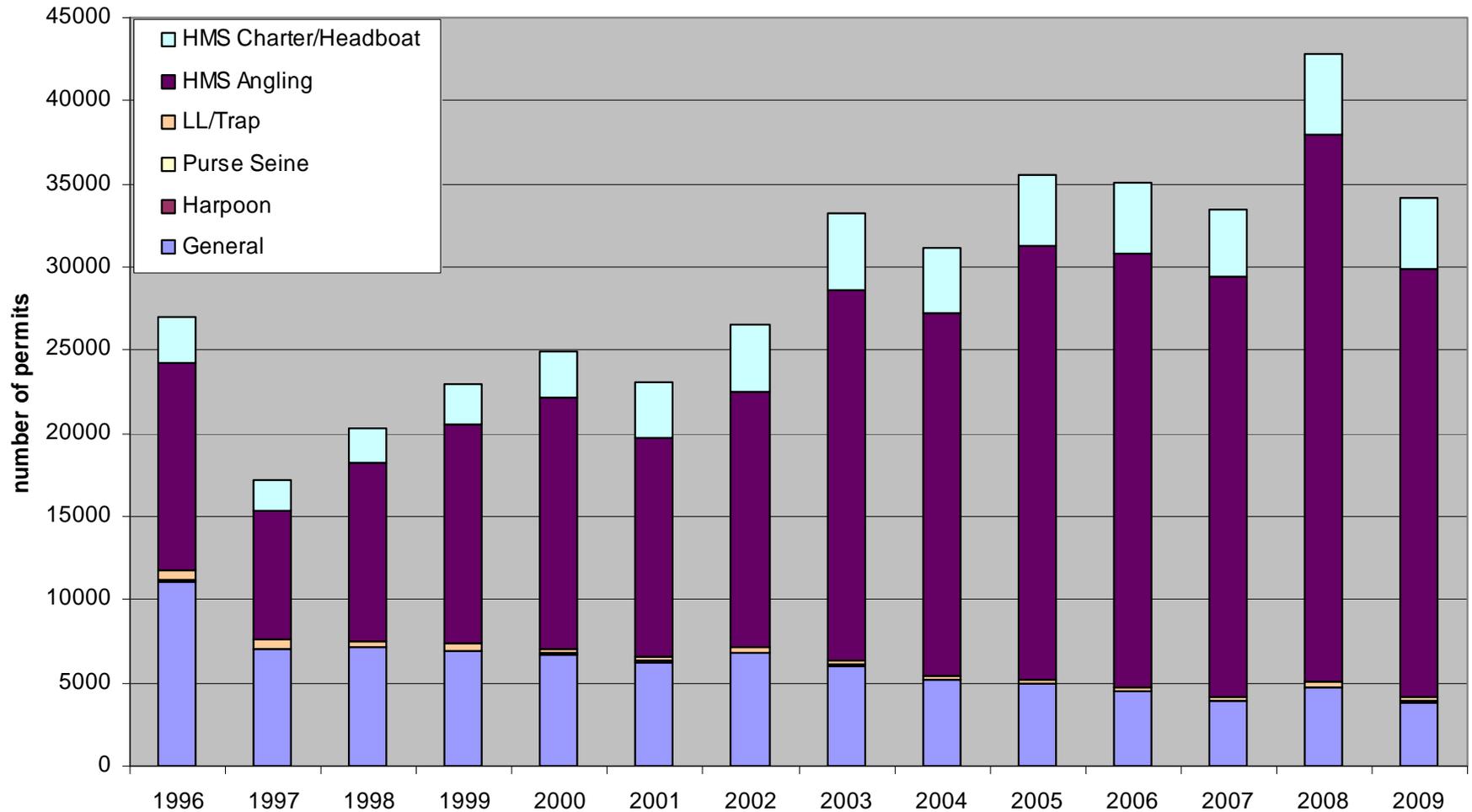
Ex-vessel Revenues by Category



Commercial ex-vessel revenues declined overall from peak in 2000 until 2006, and have increased each year since then.

Fishery Permits and Effort

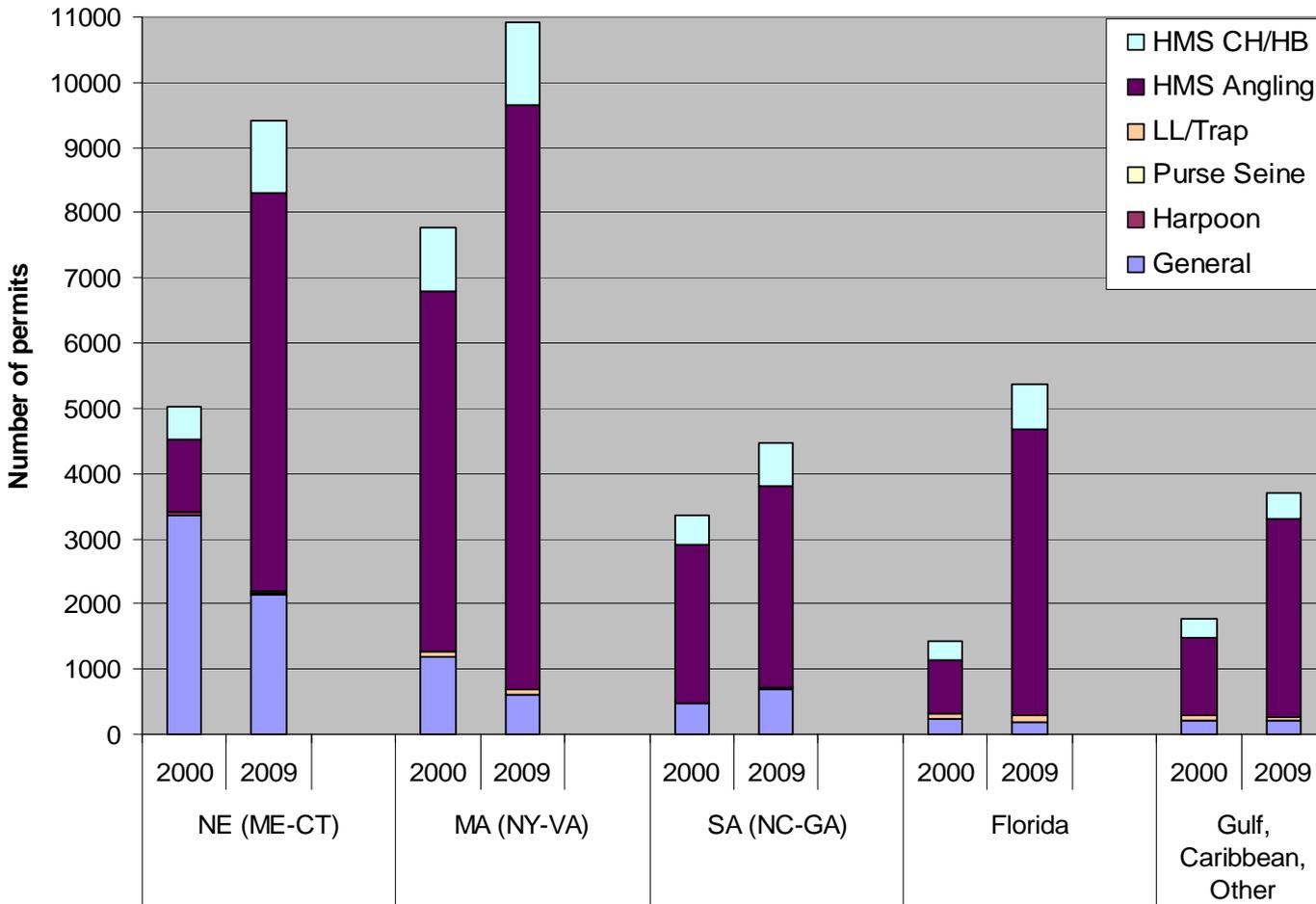
Fishery Permits by Category



The number of HMS permits issued peaked in 2008 at ~43,000.

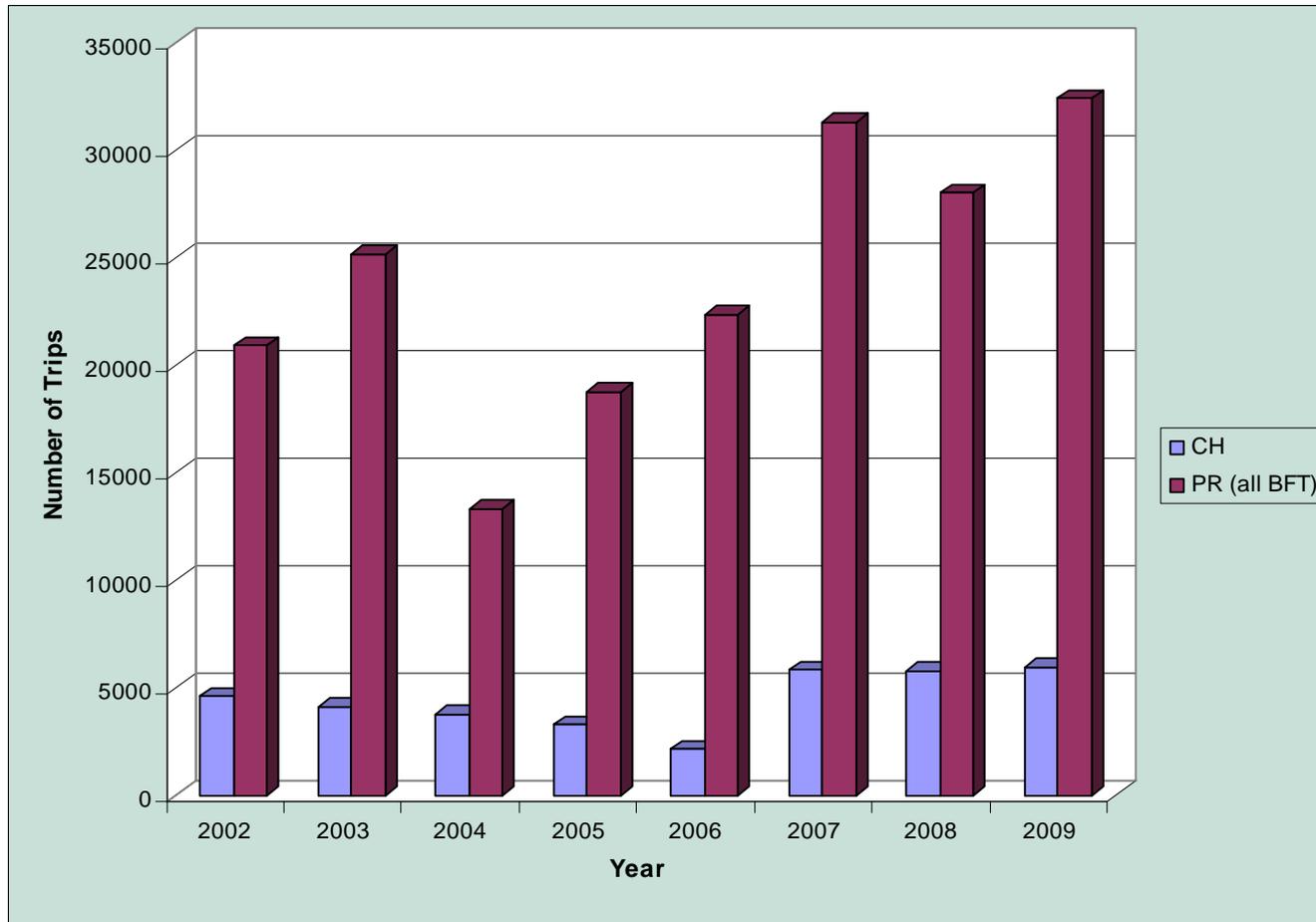
There were ~ 34,000 HMS permits issued for 2009.

Fishery Permits by Area 2000 vs. 2009



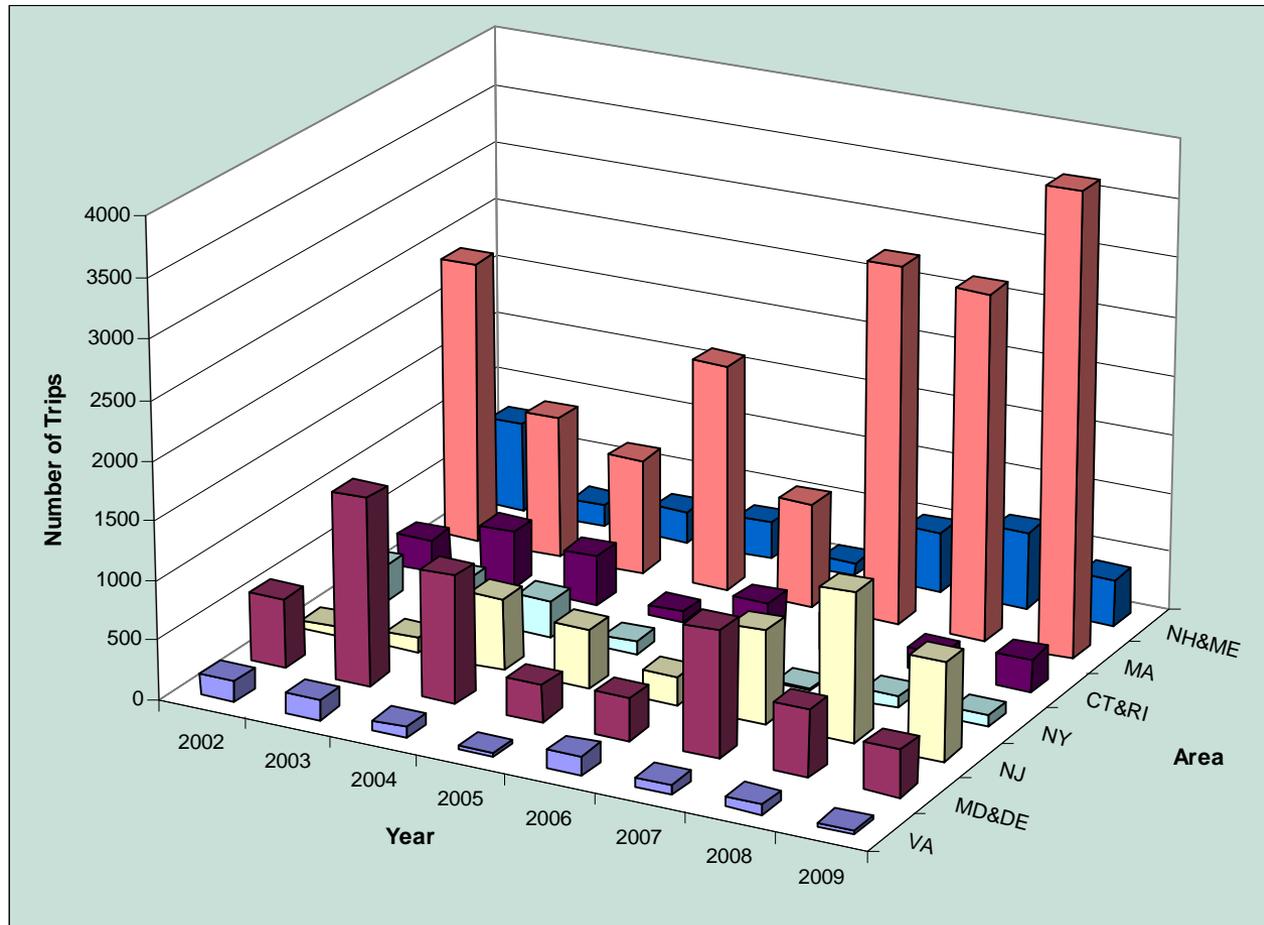
Permit numbers have increased in all areas over timeframe. In New England, there has been a substantial increase in recreational permits and decrease in commercial General category permits. In the Mid-Atlantic and Florida, there have been large increases in recreational permits.

Annual Recreational BFT Directed Trips Charter vs. Private Vessels



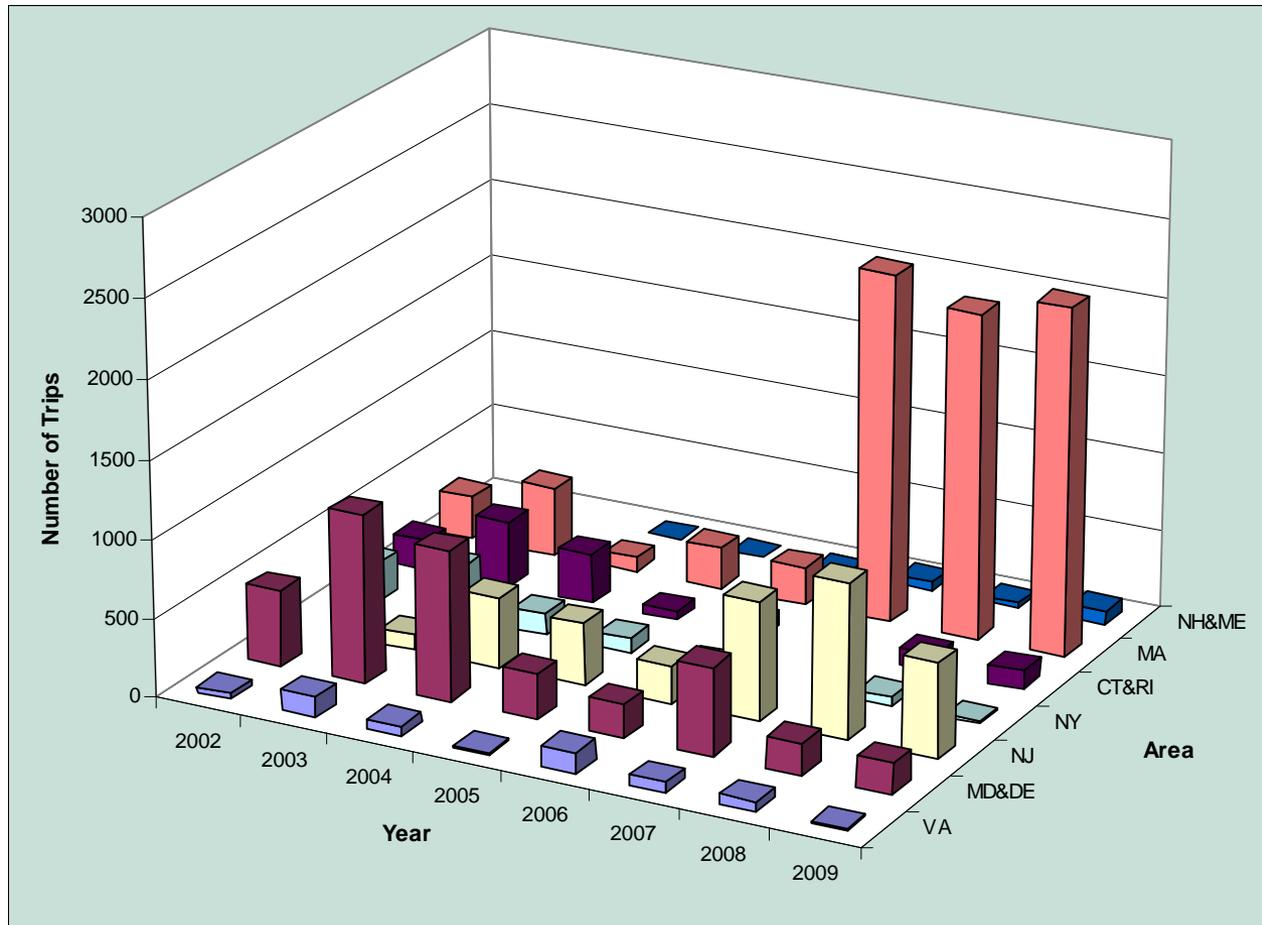
Includes any charter or private trip primarily targeting BFT (source: LPS)

Annual Recreational BFT Directed Charter Trips by Area, 2002-2009



Includes any charter trip primarily targeting BFT (source: LPS)

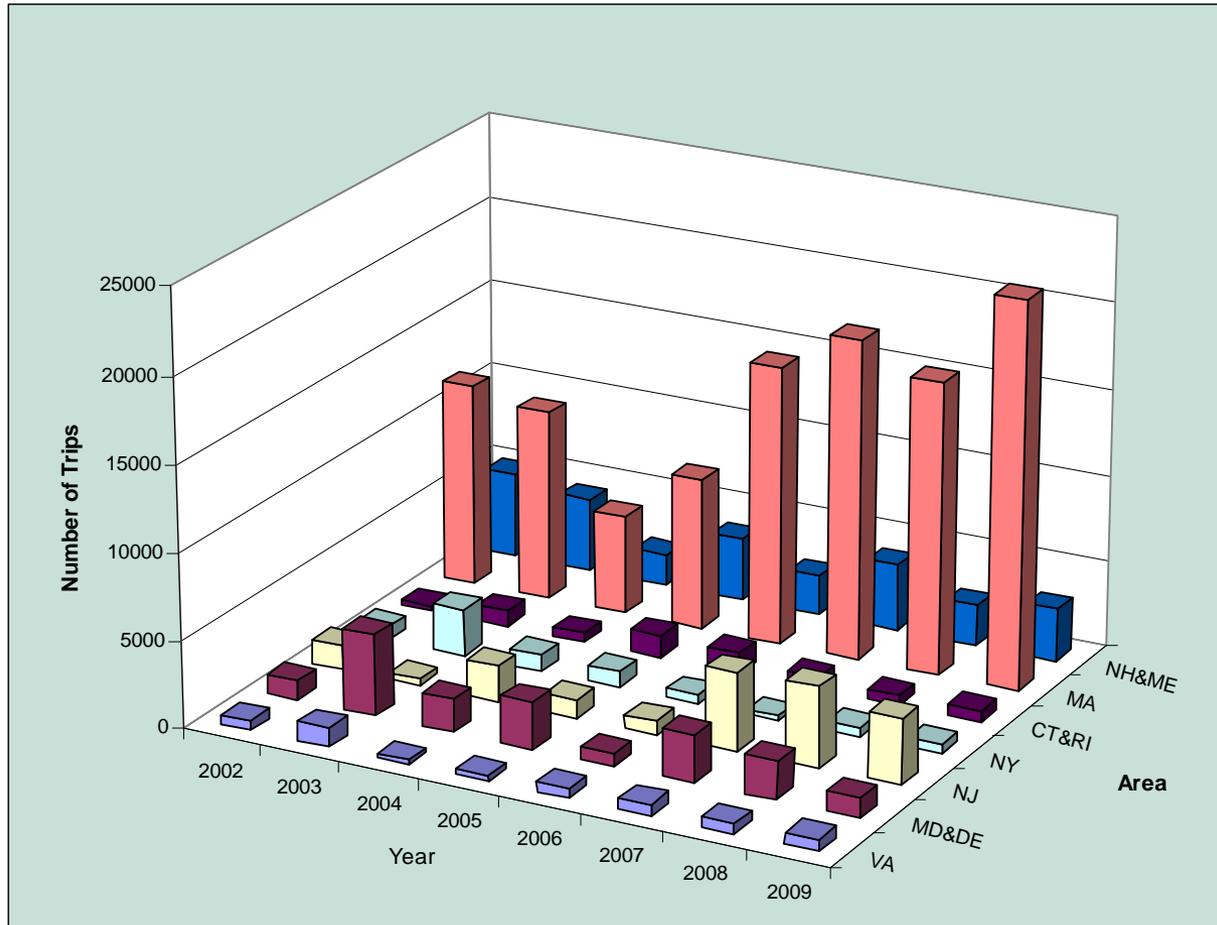
Annual Recreational BFT Directed Charter Trips for BFT <73" by Area, 2002-2009



Note
substantial
increase in
recreational
trips in MA
for BFT<73"
in last 3 yrs

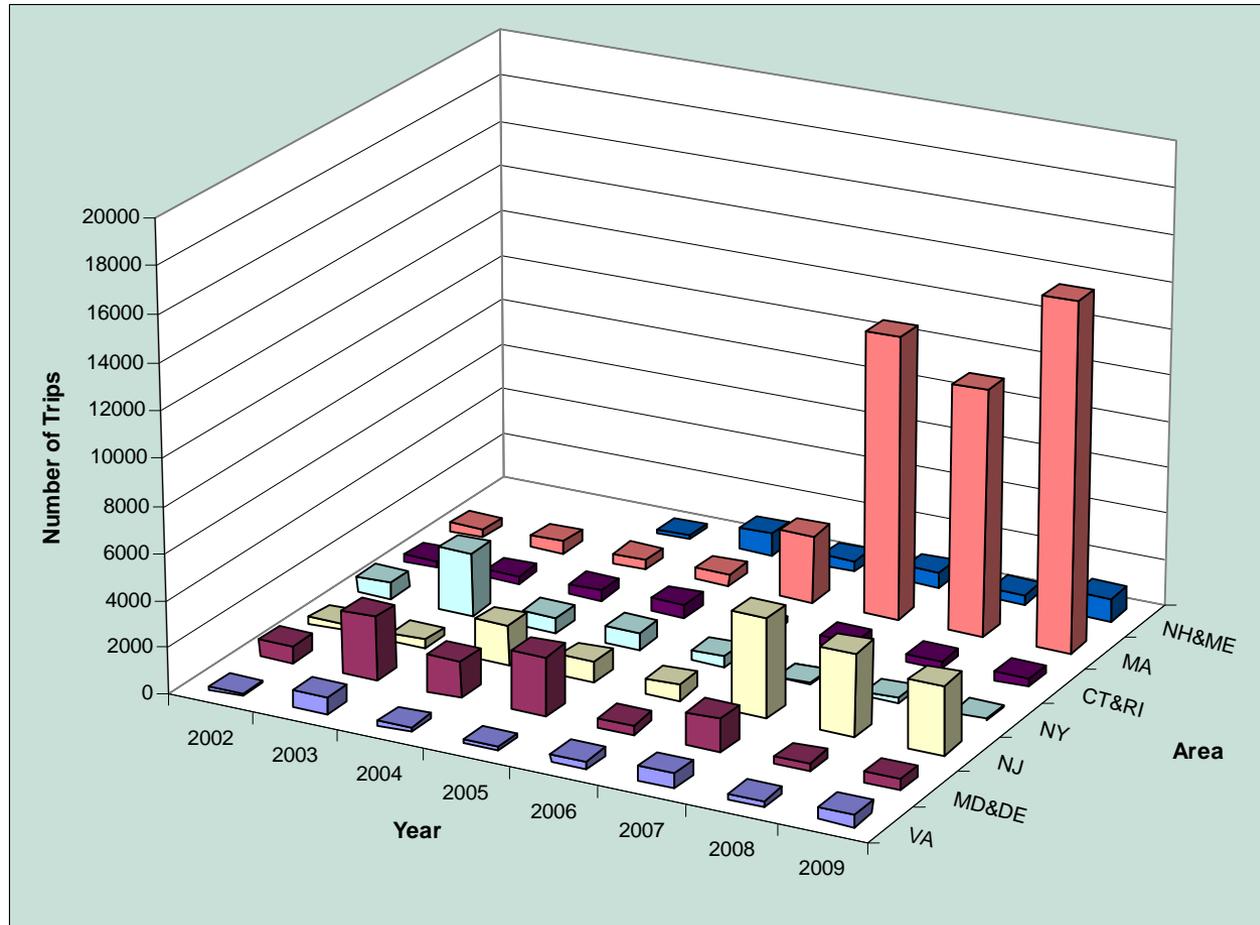
Includes any charter trip primarily targeting school, large school, or small medium BFT (source: LPS)

Annual Recreational BFT Directed Private Trips by Area, 2002-2009



Includes any private trip primarily targeting BFT (source: LPS)

Annual Recreational BFT Directed Private Trips for BFT <73" by Area, 2002-2009

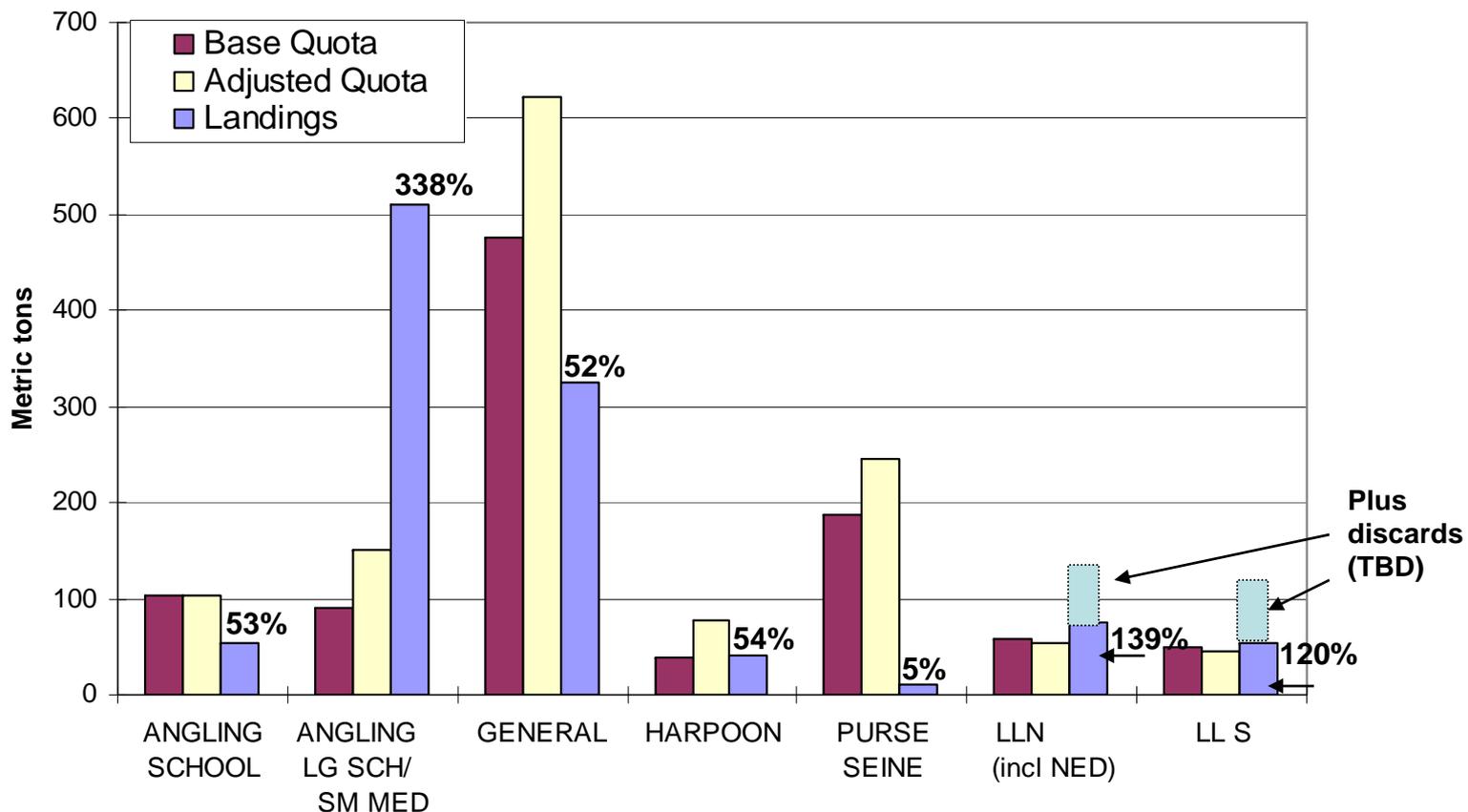


Note
substantial
increase in
recreational
trips in MA
for BFT<73"
in last 3 yrs

Includes any private trip primarily targeting school, large school, or small medium BFT (source: LPS)

Recent (2009) BFT Fishery Activity

2009 BFT Base and Adjusted Subquotas and Landings (mt)

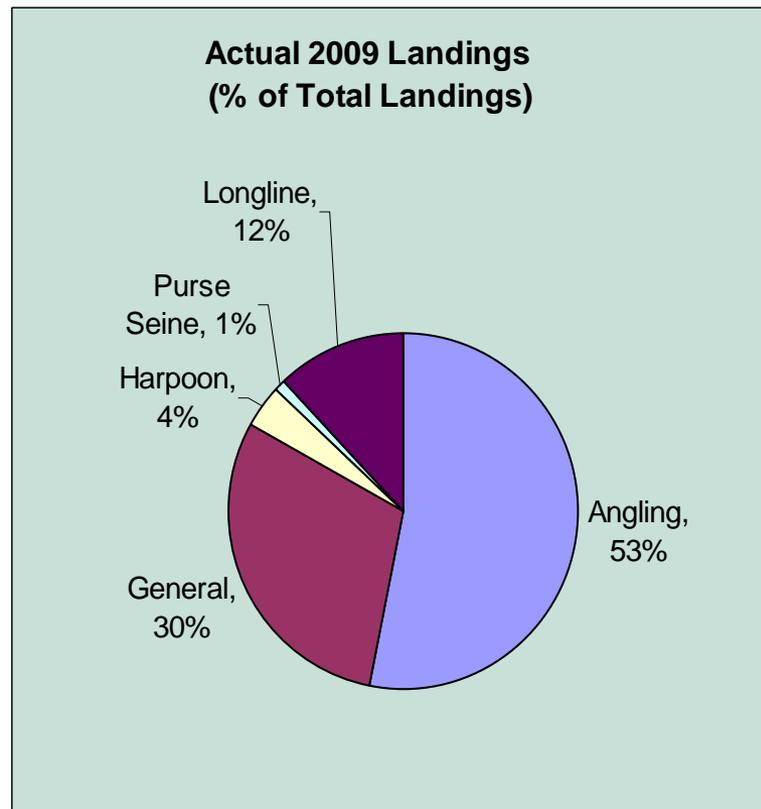
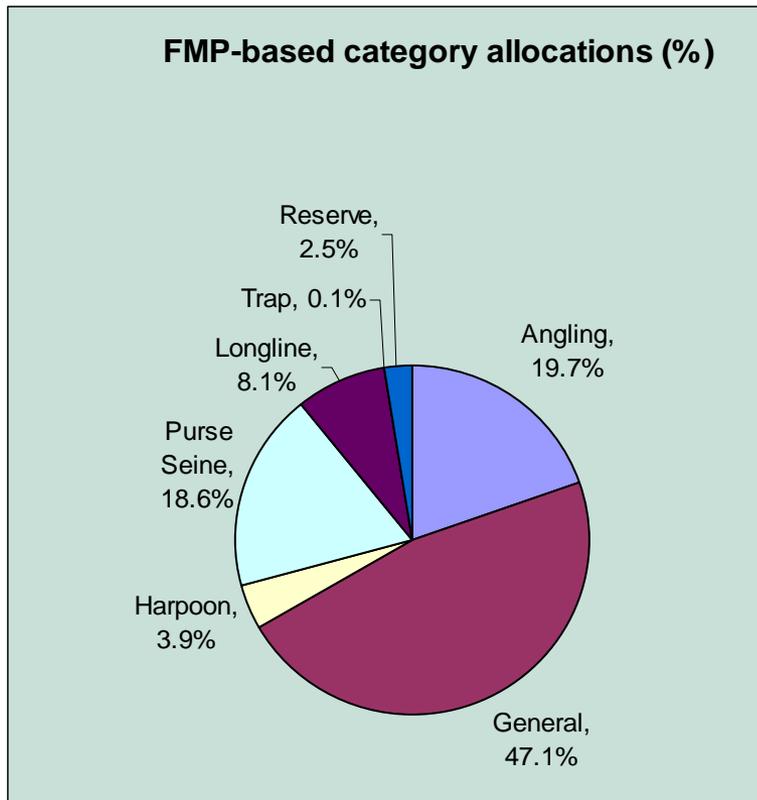


The Angling and Longline categories are exceeding their subquotas while the General, Harpoon, and Purse Seine categories continue to underharvest their subquotas.

Landings as % of adjusted quota shown above blue bars. Angling total=217% of adjusted quota. Longline total=131% of adjusted quota.

2009 Longline dead discard estimates not available yet but must be accounted for. 2008 amount used as proxy.

Comparison of FMP allocations to % of 2009 Landings



Recent landings by category as a percent of total landings (at right) compared to allocations established in the 1999 HMS FMP (at left).

Base and adjusted BFT quotas, landings, and retention limits, 2007-2009

Category	2007 (June 2007-December 2007)					2008 (January-December)					2009 (January-December)				
	Base Quota	Adj. Quota ¹	Lndgs & LL dd ²	% of Adj. Quota	Ret. Limit	Base Quota	Adj. Quota	Lndgs & LL dd	% of Adj. Quota	Ret. Limit	Base Quota	Adj. Quota	Lndgs & LL dd	% of Adj. Quota	Ret. Limit
General	548.8	643.6	122	19	LM/G: 3	548.8	740	235.3	31	LM/G: 3	475.7	623.1	325.4	52	LM/G: 2: Jan 3: June-Dec
Harpoon	45.4	53.3	12	23	LM: 2 G: unlim. 6/1-11/15	45.4	61.2	22.0	36	LM: 2 G: unlim. 6/1-11/15	39.4	76.6	41.4	54	LM: 2 G: unlim. 6/1-11/15
Longline –	119.4	225	35	16	Incidental Only	119.4	81.7	75.0	92	Incidental Only	106.8	99.3	129.6	131	Incidental Only
North & NED	62.8	105	26	25		62.8	47.7	33.0	69		57.7	54.7	75.9	139	
South	56.6	120	9	8		56.6	34	42.0	124		49.1	44.6	53.7	120	
dead discards			90					173					n/a		
Trap	1.2	1.4	0	0	LM/G: 1/y	1.2	1.6	0.3	19	LM/G: 1/y	1.0	1.3	0	0	LM/G: 1/y
Purse Seine	216.7	254.1	28	11		216.7	292.2	0	0		187.8	246	11.4	5	
Angling	229.5	269.2	507	188		229.5	309.5	437.6	141		199	260.6	565.9	217	1:S,LS,or SM (1/1-5/31)
School	119.0	119.0	155	130	1	119.0	119.0	54.6	46	1	103.5	103.5	54.4	53	1: 6/1-12/31
LS/SM	105.2	144	351	244	2	105.2	183.4	381.5	208	2: 1/1-2/9; 1:2/10-12/31	90.9	151.1	510.9	338	1: 6/1-12/31
LM/G	5.3	6.2	1	19	1/year	5.3	7.1	1.5	14	1/year	4.6	6.0	0.6	10	1/year
Reserve	29.1	207.6	0			29.1	207.6	0			25.2	155.4	0		
TOTAL³	1190.1	1654.2	704	43		1190.1	1693.9	770.2	45		1034.9	1462.3	1073.7	73	
<i>TOTAL (incl. DD)</i>	<i>1190.1</i>	<i>1654.2</i>	<i>794</i>	<i>48</i>		<i>1190.1</i>	<i>1693.9</i>	<i>955.2</i>	<i>56</i>		<i>1034.9</i>	<i>1462.3</i>	<i>1246.7</i>	<i>85 if use</i>	<i>173</i>

1 Adjusted quota reflects quota published in final rule, as modified via inseason transfers during the fishing year

2 commercial landings data for 2007 and earlier are from 2009 specs EA Table 6; 2008 commercial landings and trophy fish data are from 2/12/09 2008 annual report posted on HMS website; all landings data for 2009 from 4/20/10 annual report posted on HMS website;

3 Totals are subject to rounding error.

KEY: G = Giant > 81", LM = Large Medium 73 – 81", SM = Small Medium 59-73", LS = Large School 47"-59", S=School 27"- 47"

Longline – Incidental Only = 1 BFT / 2,000 lb target catch, 2 BFT / 6,000 lb, and 3 BFT / 30,000 lb.

DD = Dead Discards

NED = Northeast Distant gear restricted area

Base and adjusted BFT quotas, landings, and retention limits, 2004-2006

Category	2004 (June 2004-May 2005) ⁴					2005 (June 2005-May 2006)					2006 (June 2006-May 2007)				
	Base Quota	Adj. Quota	Lndgs & LL dd	% Adj. Quota	Ret. Limit	Base Quota ⁵	Adj. Quota ⁶	Lndgs & LL dd	% of Adj. Quota	Ret. Limit	Base Quota ⁷	Adj. Quota ⁸	Lndgs & LL dd	% of Adj. Quota	Ret. Limit
General	689.8	359	344	96	LM/G: 1 to 2	689.8	707.3	234	33	LM/G: 1 to 2	689.8	1163.3	160	14	LM/G: 3: June-Jan
Harpoon	57.1	41.4	30	72	LM: 2 G: unlim. 6/1-11/15	57.1	90.0	23	26	LM: 2 G: unlim. 6/1-11/15	57.1	124	22	18	LM: 2 G: unlim. 6/1-11/15
Longline	143.6	126.2	92	73	Incidental Only	143.6	174.8	57	33	Incidental Only	143.6	258.2	66	26	Incidental Only
North & NED	72.4	80.0	34	43		72.4	114.9	29	25		72.4	155.9	28	18	
South	71.2	46.2	38	126		71.2	39.9	28	47		71.2	102.3	38	37	
Discards ⁹			72					131					91		
Trap	1.5	2.3	0	0	LM/G: 1/y	1.5	3.8	0	0	LM/G: 1/y	1.5	5.3	0	0	LM/G: 1/y
Purse Seine	272.4	289.4	32	11		272.4	530.0	178	34		272.4	624.1	4	<1	
Angling ⁴	288.6	299.6	355	118	varied ¹⁰	288.6	289.4	199	69	varied ¹¹	288.6	382	190	50	varied ¹²
School			181				117.2	108	92		38.5	49.2	24	49	
LS/SM			168				165.6	90	54		243.5	318.4	164	52	
LM/G			<1		1/year		6.6	1	15	1/year	6.6	12.5	2	16	1/year
Reserve	36.6	298.5	<1	<1		36.6	245.9	<1	<1		36.6	282.3	0	0	
TOTAL¹³	1489.6	1416.4	853	60		1489.6	2041.2	691	34		1489.6	2839.2	442	16	
<i>TOTAL incl. DD</i>	<i>1489.6</i>	<i>1416.4</i>	<i>925</i>	<i>65</i>		<i>1489.6</i>	<i>2041.2</i>	<i>822</i>	<i>40</i>		<i>1489.6</i>	<i>2839.2</i>	<i>533</i>	<i>19</i>	

4 2004 was a complex year. Final quotas were published in December, concurrent with a complex and substantial inseason quota transfer. Notices did not provide subquota detail.

Landings information by Angling subcategory represents information from LPS and trophy fish; total includes NC fish.

5 2005 quota specifications did not break base quota into subquotas

6 2005 Adjusted quotas from 2006 EA (Table 1a), which made adjustments from 2005 final rule.

7 The 2006 Angling category school subquota base quota was modified to be in compliance with the ICCAT 8% tolerance limit for school landings over four years.

8 2006 Adjusted quotas from 2007 EA (Table 1), which made adjustments from 2006 final rule

9 Annual U.S. dead discard allowance for 2004-2006 was 68 mt; ICCAT discontinued dead discard allowance in the 2006 BFT Recommendation, effective in 2007 onward

10 2004 Angling category daily retention limits: 2004: 1 S, LS, or SM 6/1-6/20; 7/22-8/19; 9/21-11/18; 12/21-5/31 (except CHB inc. to 3 fish 6/21-7/21; 8/20-9/20); 2 S, LS, or SM 6/21-7/21; 8/20-9/20

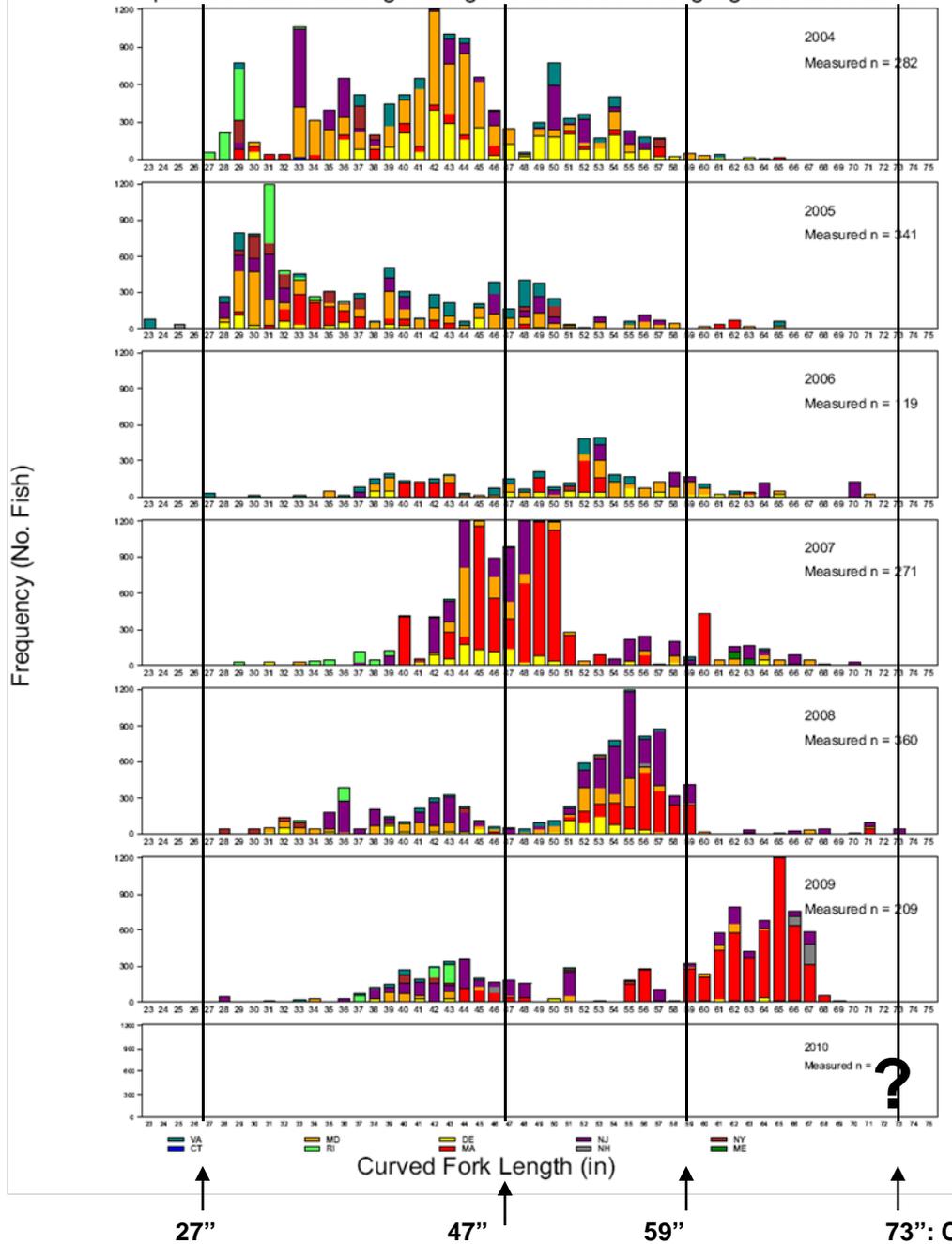
11 2005 Angling category daily retention limits: 1 S, LS, or SM 6/1-9/30 (except CHB inc. to 3 fish, only 2 of which could be schools 6/17-7/31; 9/1-9/30); 1 LS/SM 10/1-5/31

12 2006 Angling category daily retention limits: 1 school in the south 7/1-7/21; 1 school in the north 8/25-9/14; 1 school in NC 3/24-4/15; 2 LS or SM 6/1-5/31 all areas

13 Totals are subject to rounding error.

2009 BFT Fishery by Category

LPIS: Expanded Catch-at-Length Length Distribution of Angling BFT 2004-2010



The average weight of recreationally landed BFT has increased substantially over the last several years

- School: 27 to <47"
- Lg. School: 47 to <59"
- Sm. Medium: 59 to <73"
- (Lg. School and Sm. Medium BFT traditionally have been managed as one size class)

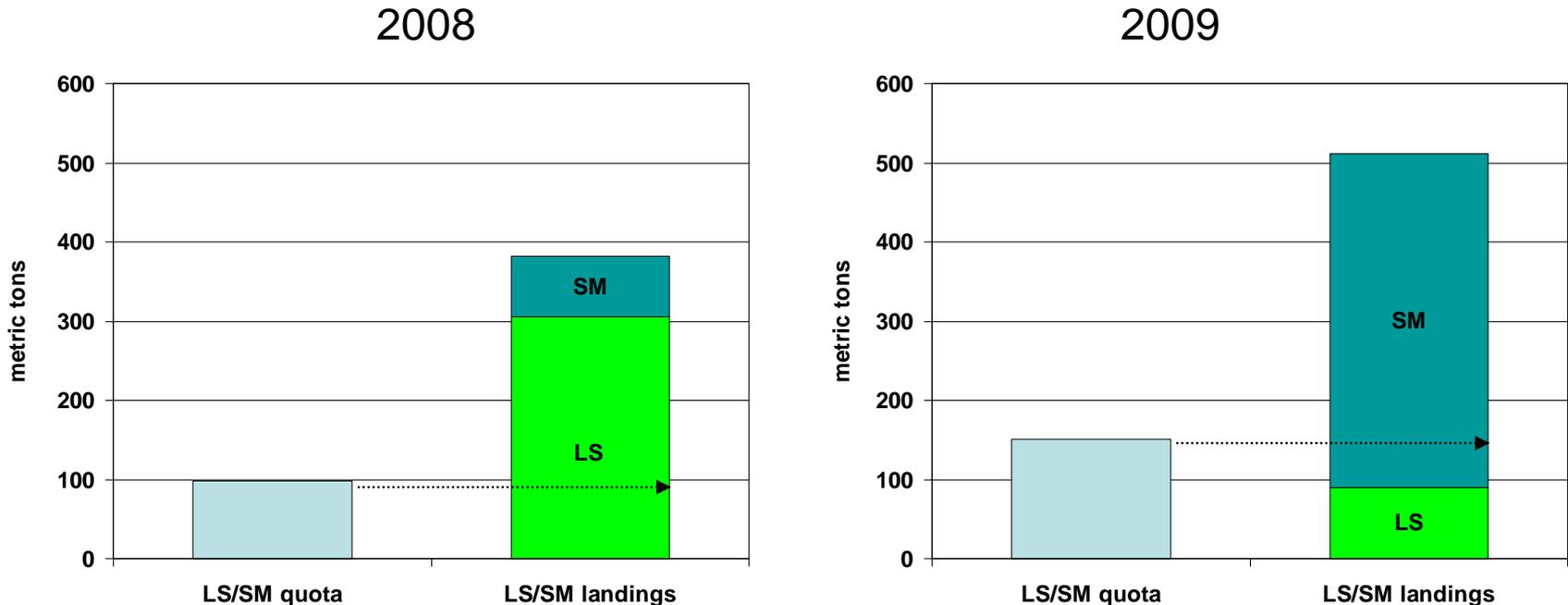
27"

47"

59"

73": Commercial minimum size

2008 and 2009 Recreational Landings of Large School/Small Medium BFT (mt)

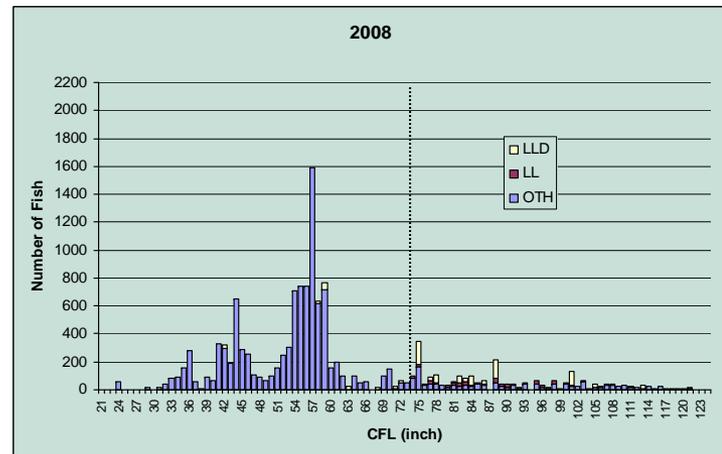
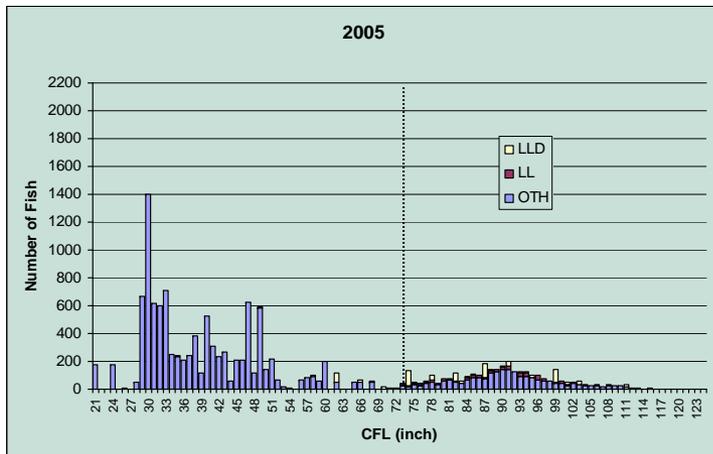
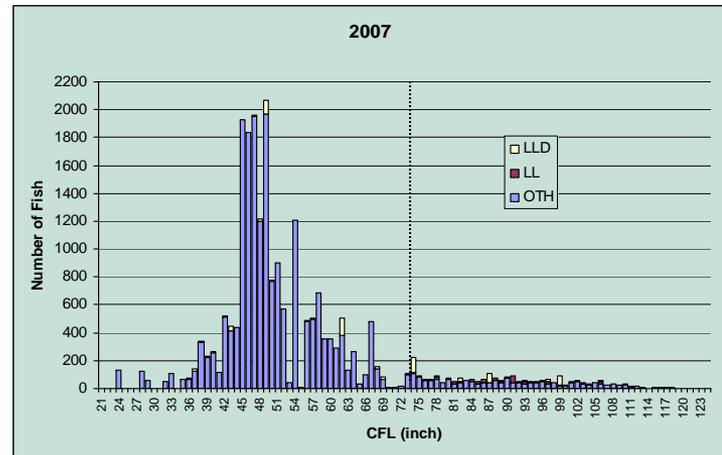
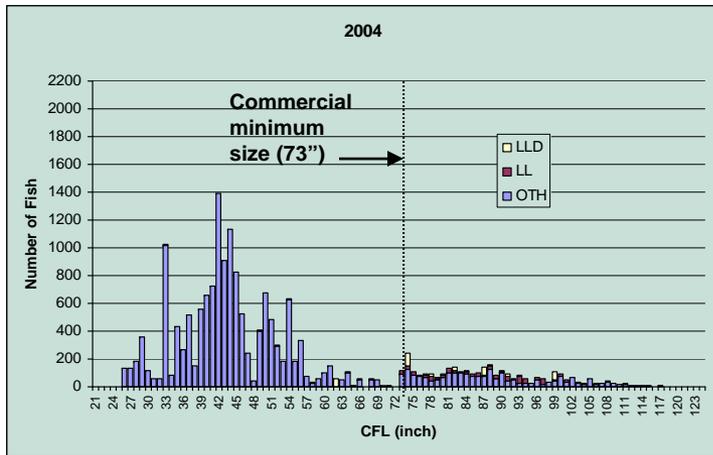
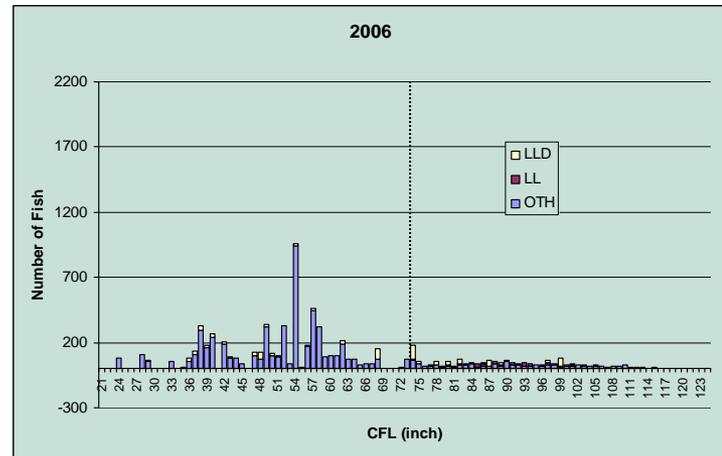


Recreational landings are exceeding available quota, particularly for the large school/small medium size classes and subquotas.

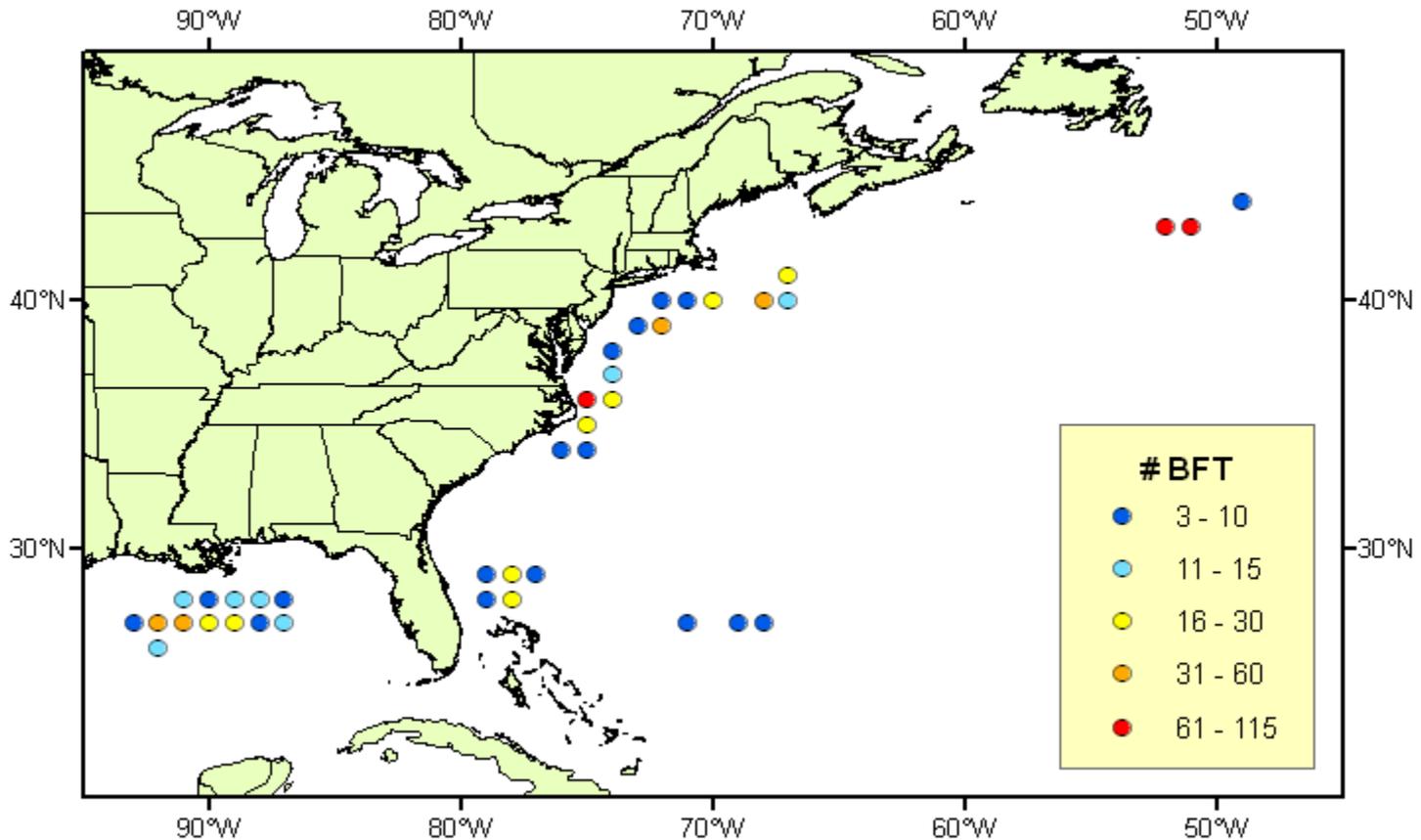
Large school=47 to <59" Small medium=59 to <73"

In 2008 and 2009, a similar *number* of fish in the large school/small medium size class were landed (~7,500), but in 2009, small medium landings *in weight* were about 5 times the large school landings.

Size Frequency Distribution of All U.S. BFT Landings by Gear and Longline Discards, 2004-2008

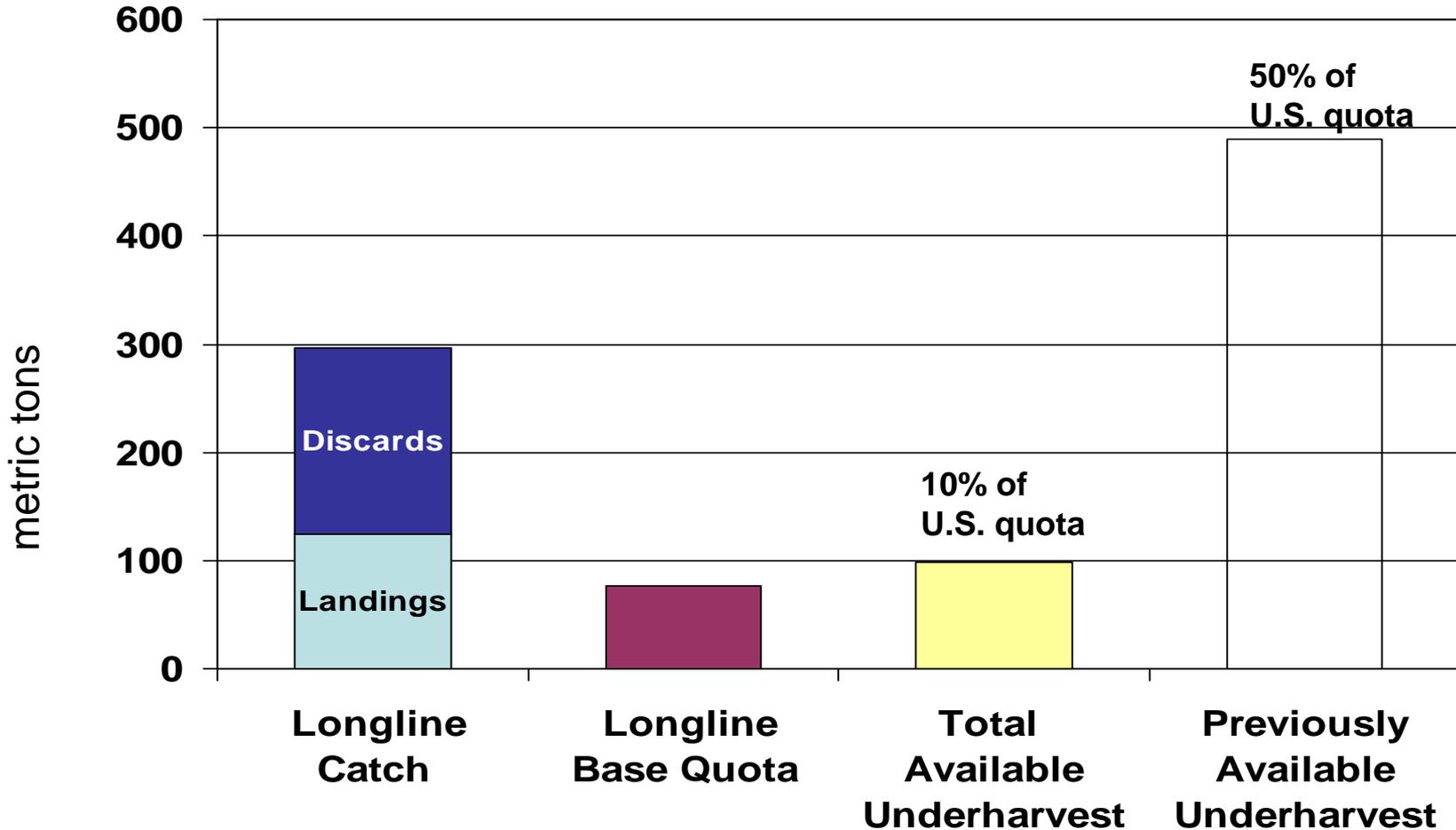


Number of BFT landed and discarded dead in 2009, as reported by logbooks, aggregated and summarized by 1° square



(data has been restricted to comply with confidentiality rules)

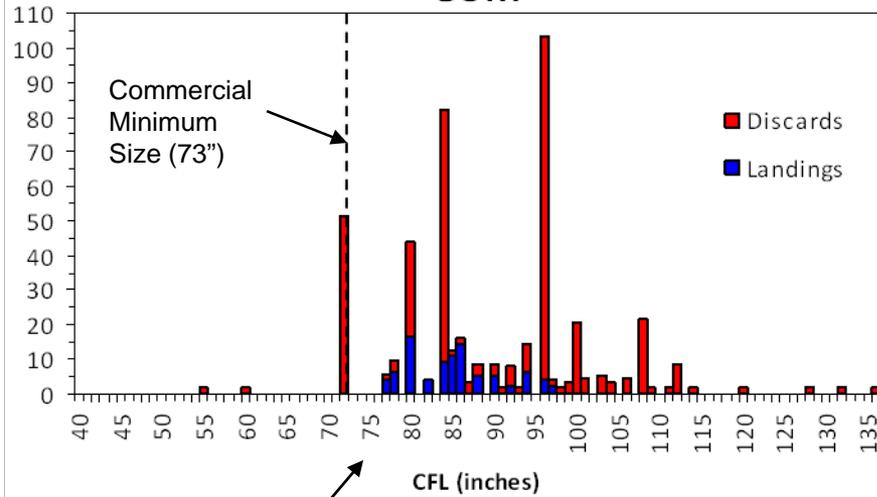
The Longline category needs more underharvest than likely to be available in 2011



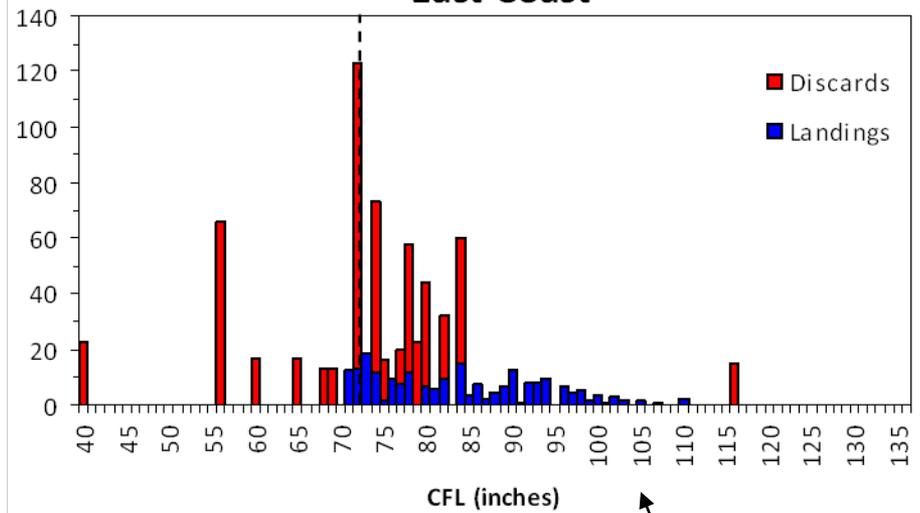
The previous underharvests that allowed NMFS to provide the Longline category sufficient quota to operate during the entire fishing year likely may no longer exist due to: likely same or decreased 2011 ICCAT BFT quota, reduced amount of underharvest that can be carried forward, and expected increased availability of fish to the commercial categories in the next few years.

Size frequency distribution (number of fish) of BFT landed and discarded dead by the PLL fleet by area (2008)

GOM

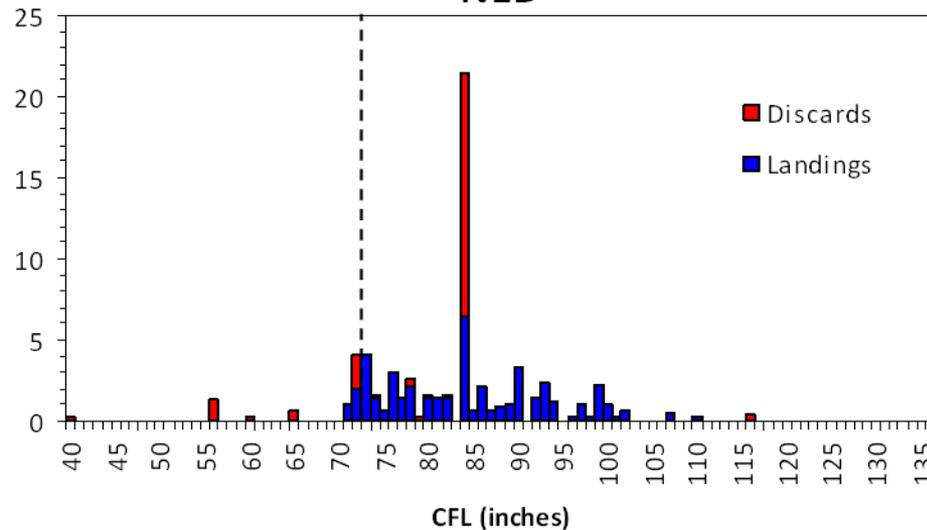


East Coast



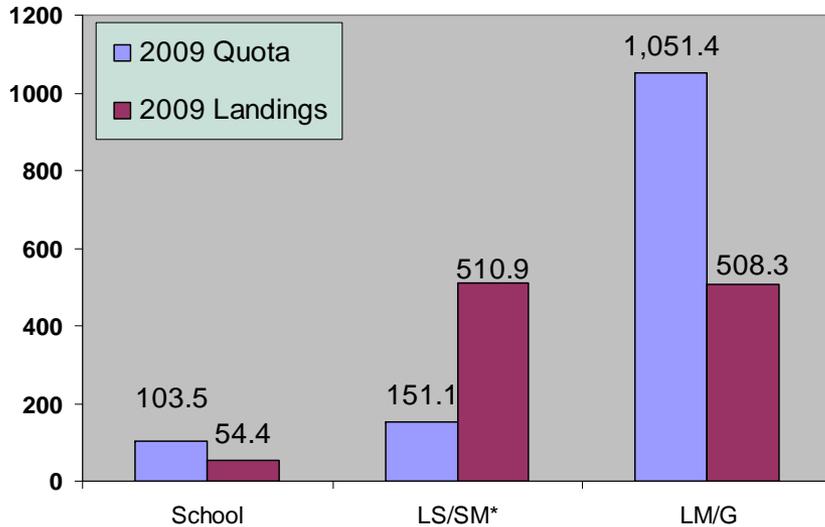
Most Gulf of Mexico (GOM) discards >73"

NED

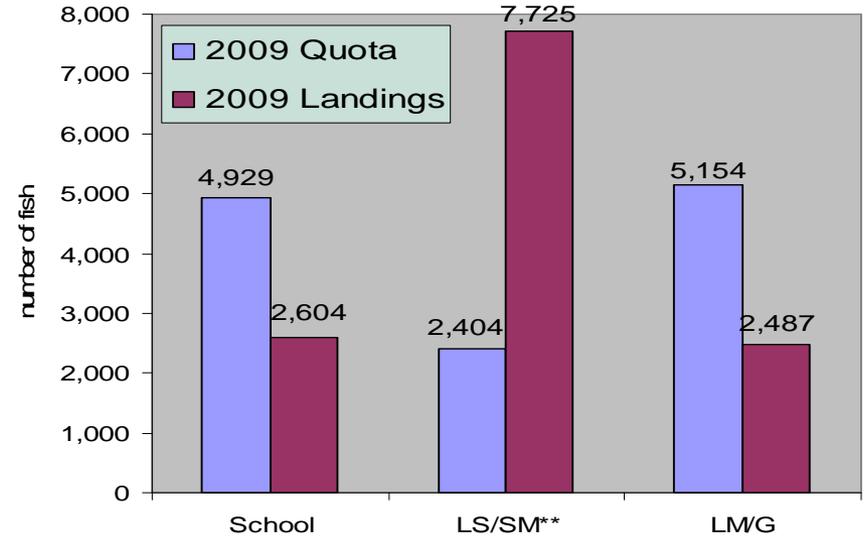


Discards of undersized BFT (<73") occur mostly outside Gulf of Mexico

2009 Recreational and Commercial Quota and Landings (in mt and number of fish)



*[Total mt landed=510.9: 89.7 mt (18%) LS and 421.2 mt SM (82%)]. **In 2008: 80% LS and 20% SM.**



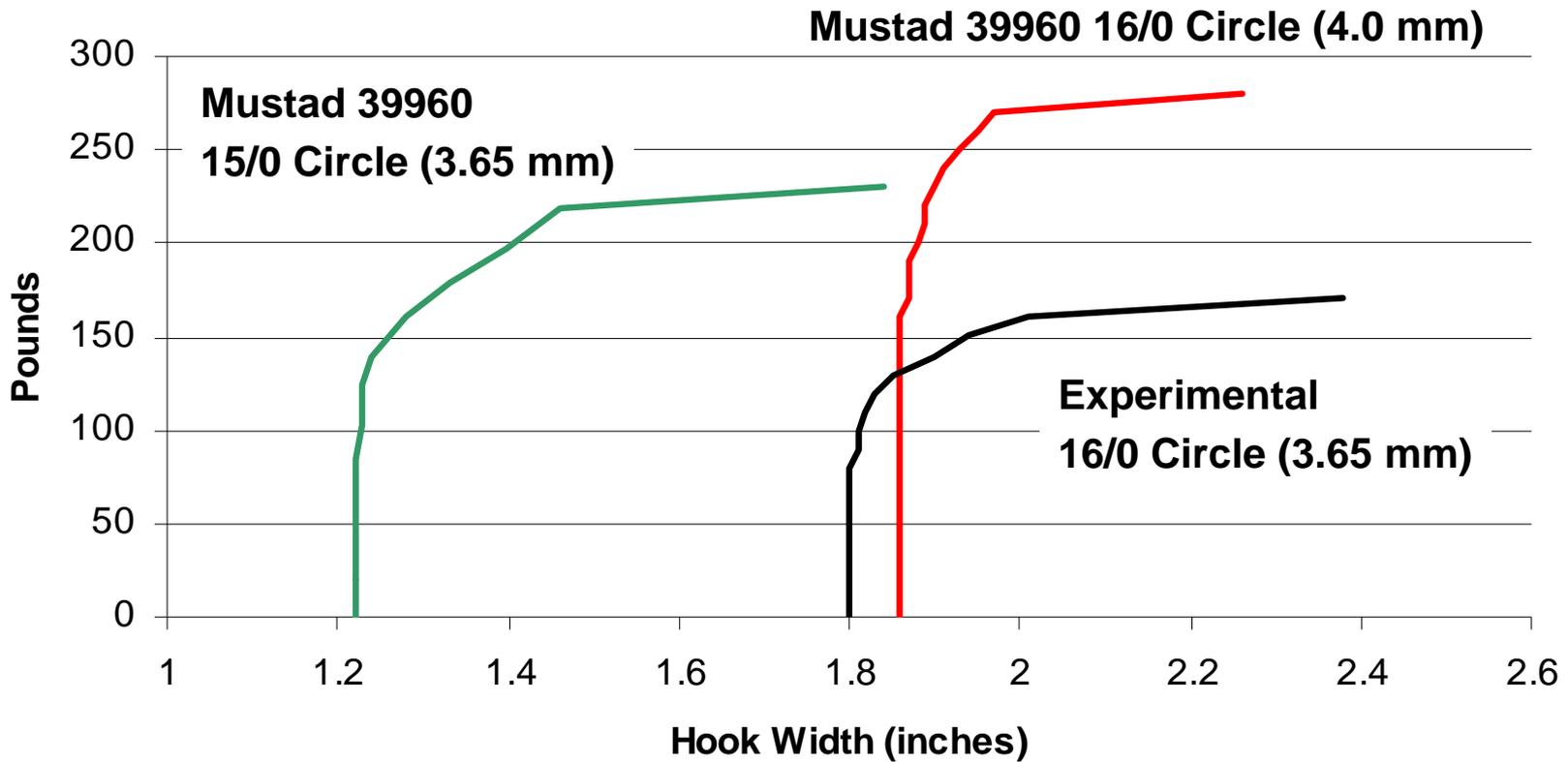
[Total number landed=7,725: 2,045 LS (26%) and 5,680 SM (74%)] **In 2008: 86% LS and 14% SM.

<u>Size Class</u>	<u>2009 Avg Wt</u>
School	46 lb (21 kg)*
Large School	97 lb (44 kg)*
Small Medium	163 lb (74 kg)*
Large Medium/Giant	449 lb (204 kg)

Examining quota and landings in numbers vs. weight allows consideration of the potential biological impacts of various decisions in a fishery that is managed by weight (quota in mt).

Experiments in the
Gulf of Mexico to Evaluate BFT
Bycatch Mitigation Measures
in the Yellowfin Tuna Fishery

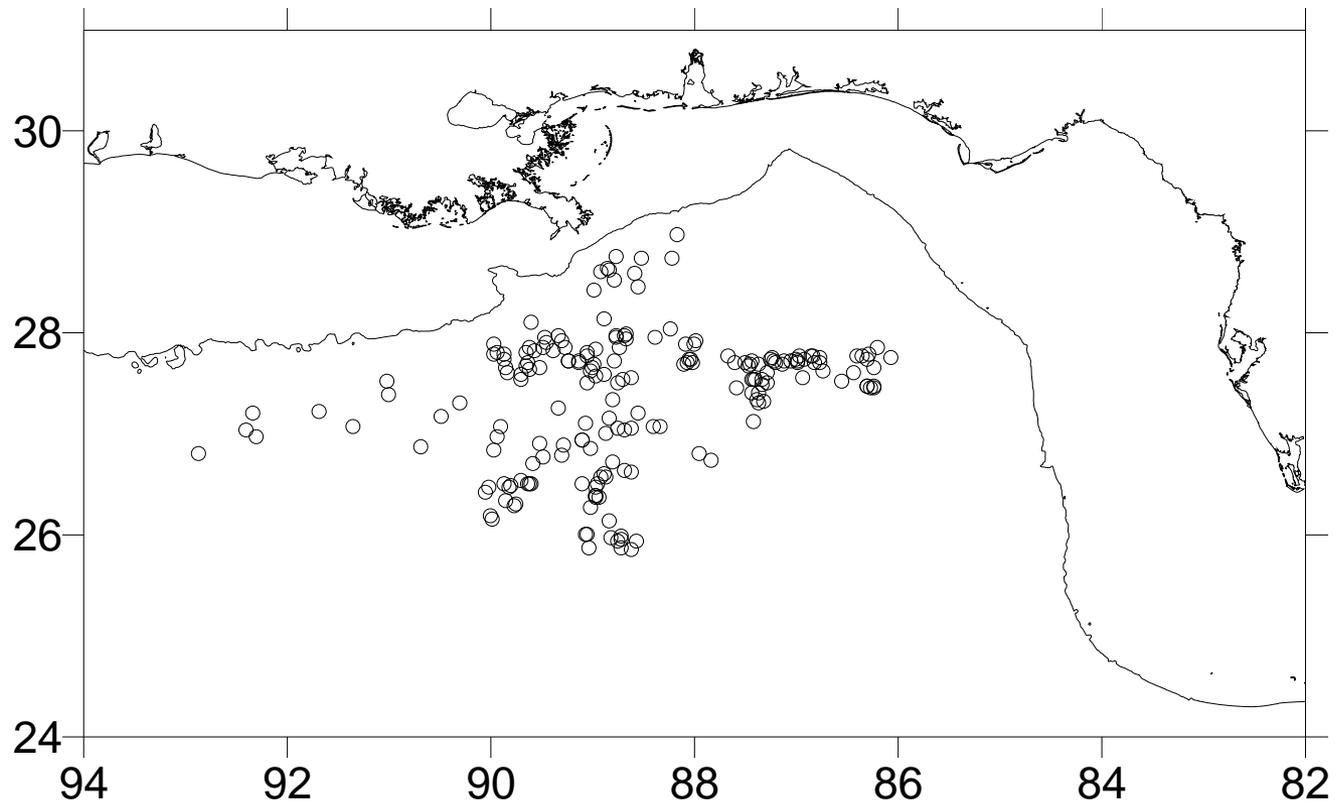
Hook Pull vs. Strain



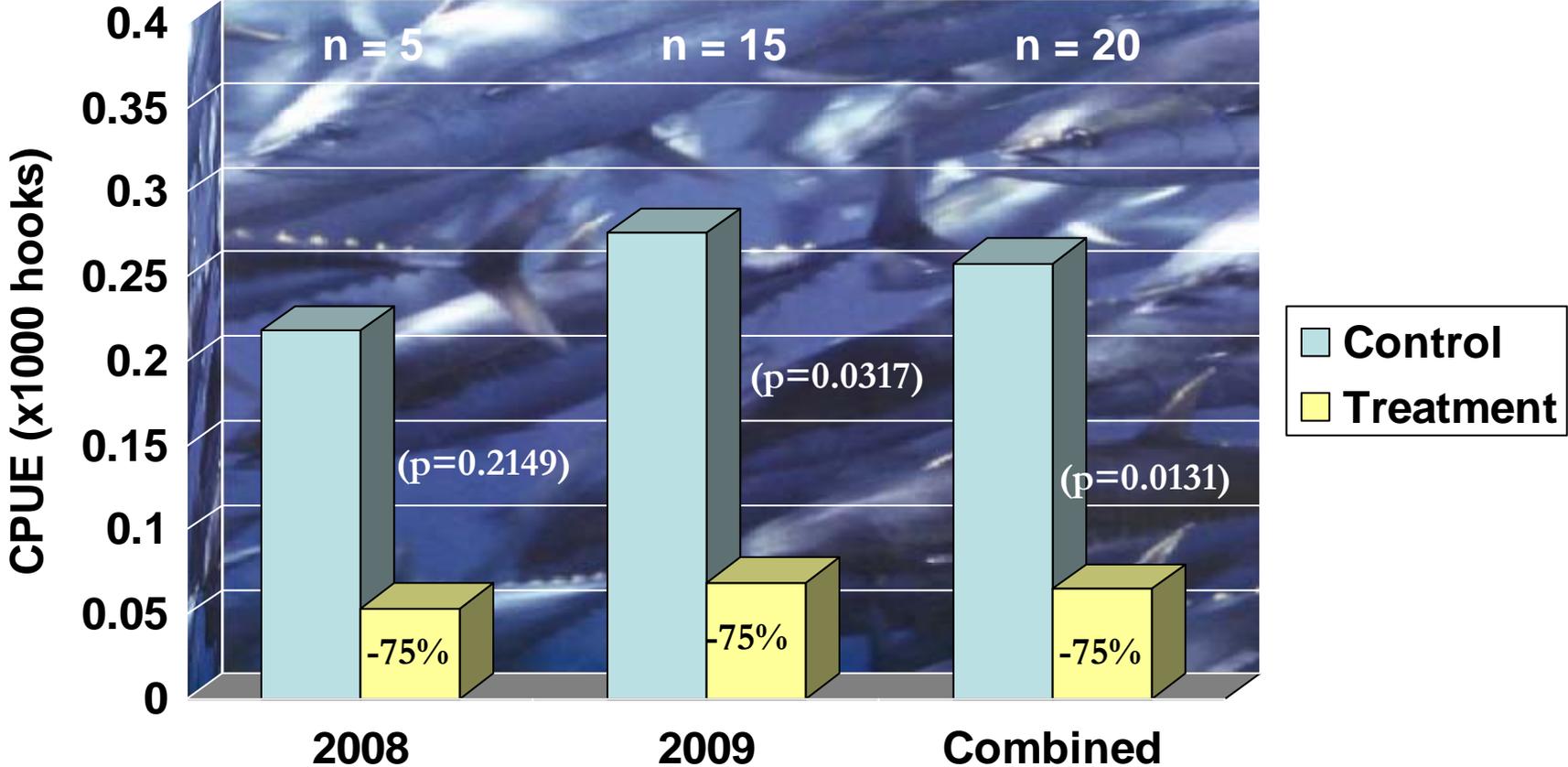
2008-09 Gulf of Mexico PLL Bluefin Tuna Mitigation Research

- 2008 Research
 - 2 Vessels
 - 72 Sets
 - 36,766 hooks
- 2009 Research
 - 5 Vessels
 - 125 Sets
 - 87,106 hooks
- 2008-2009 5 vessels
 - 123,872 hooks

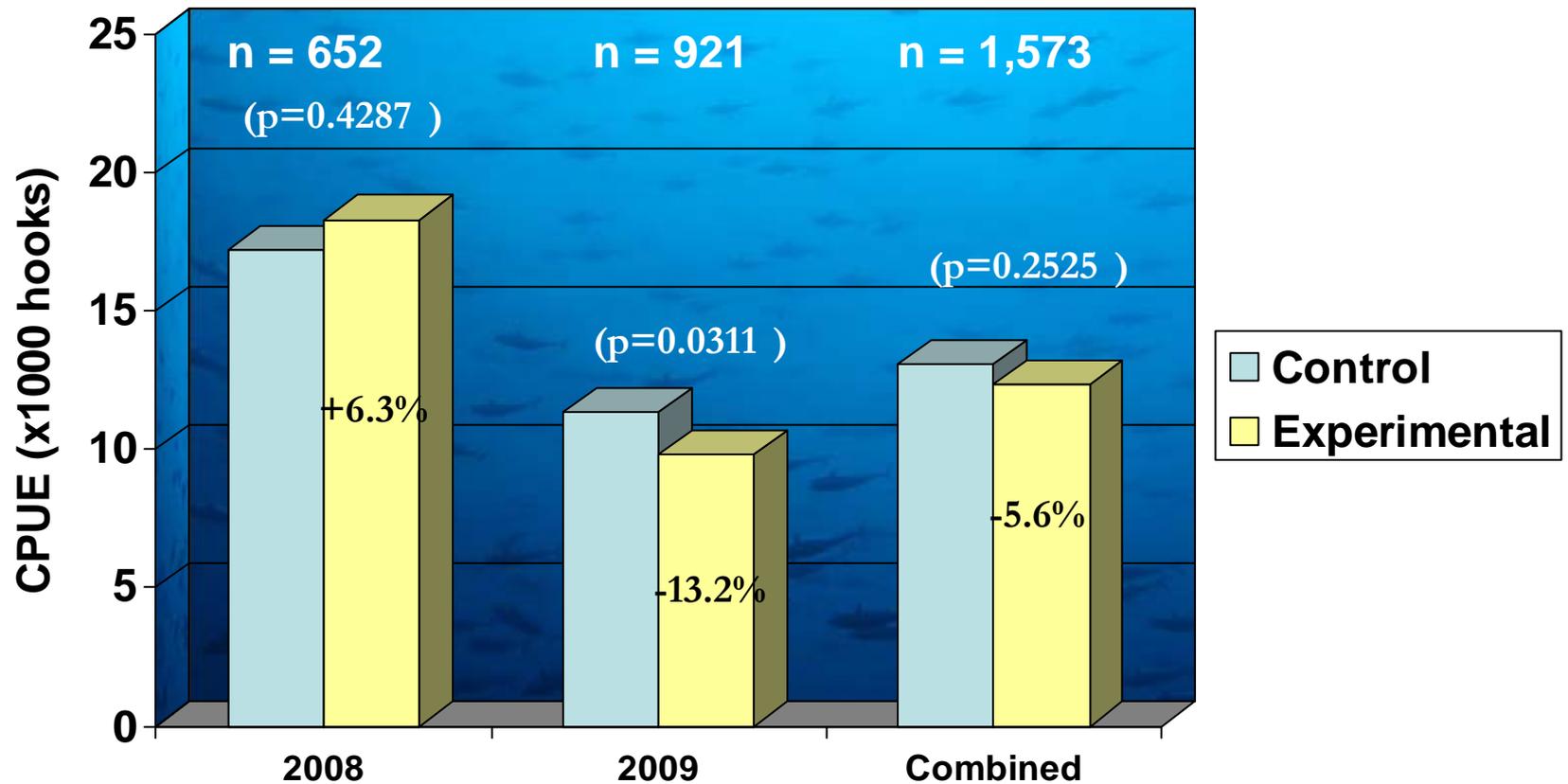
2008-2009 Effort Distribution



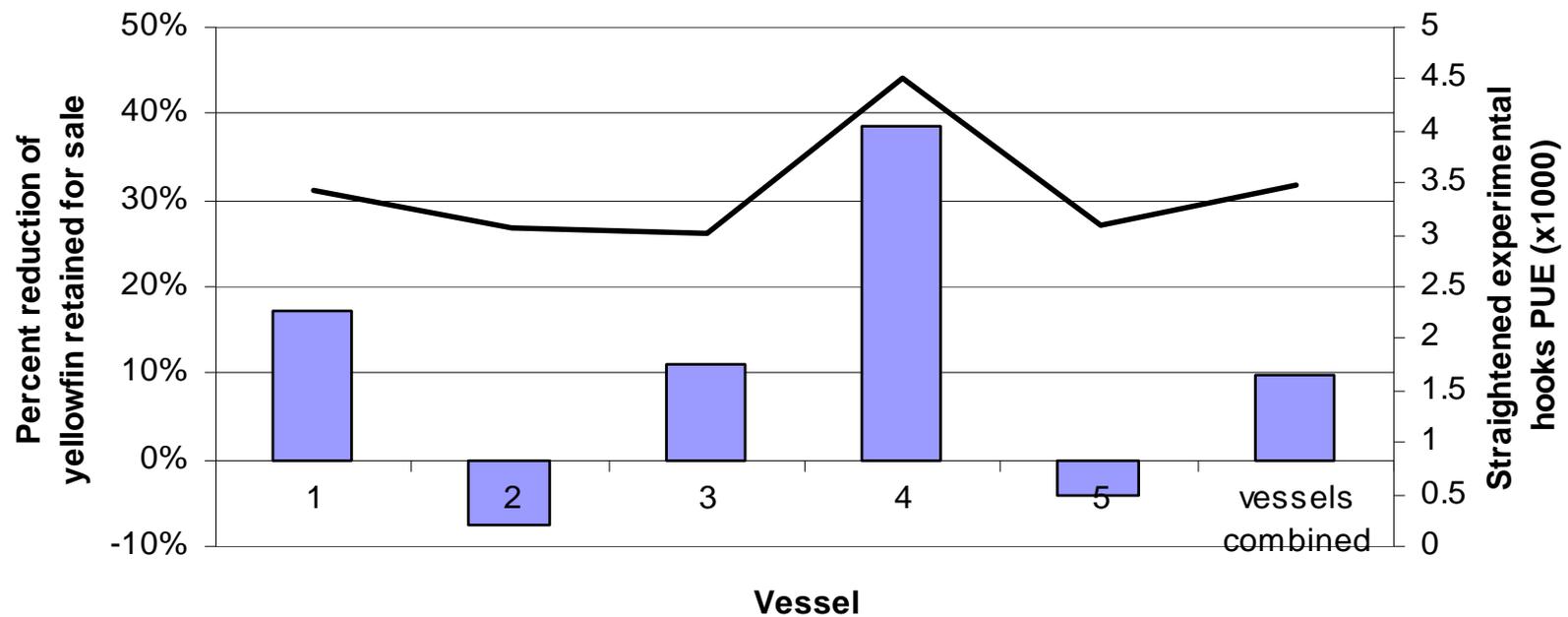
Bluefin CPUE



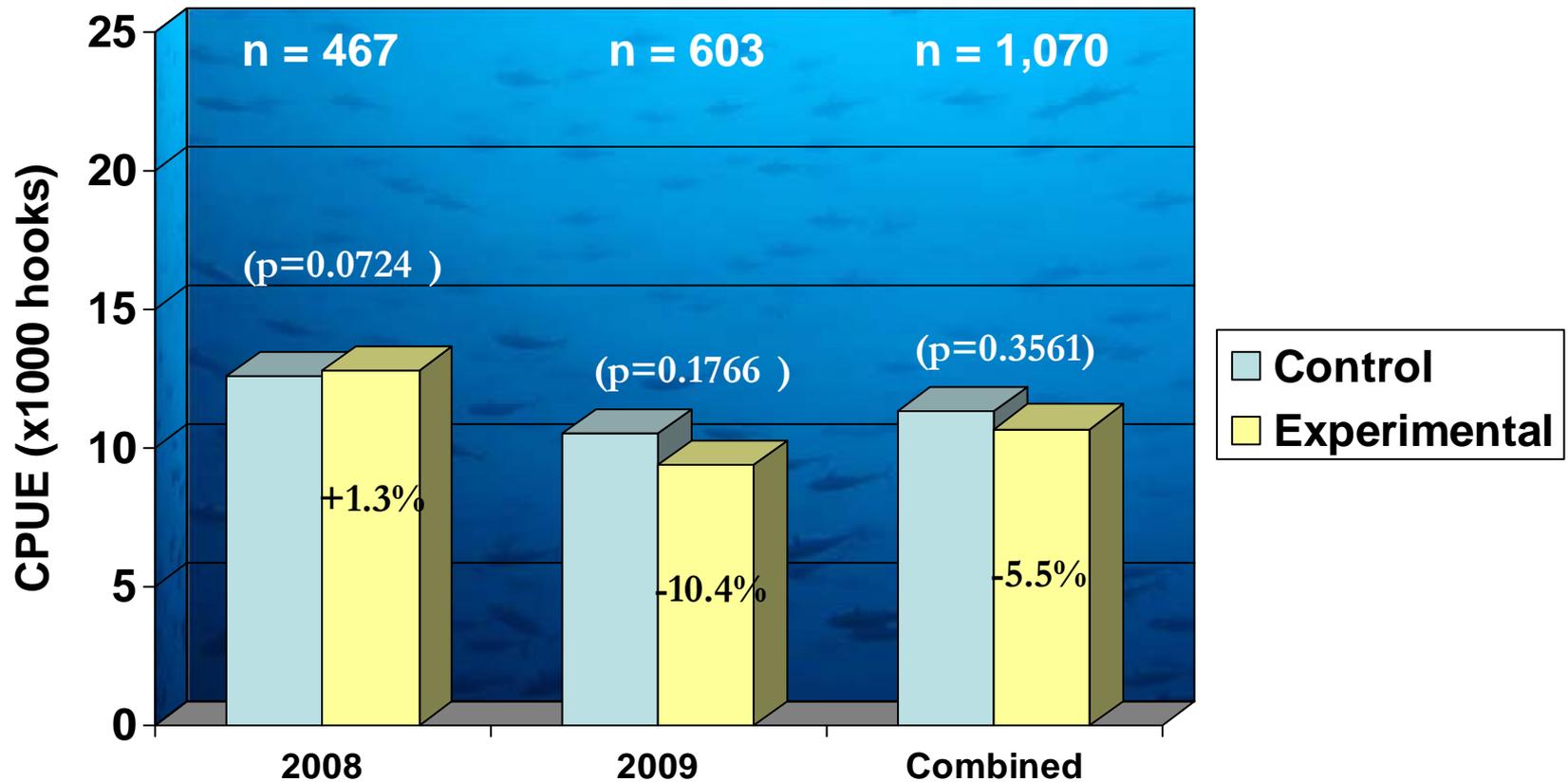
Total Yellowfin CPUE



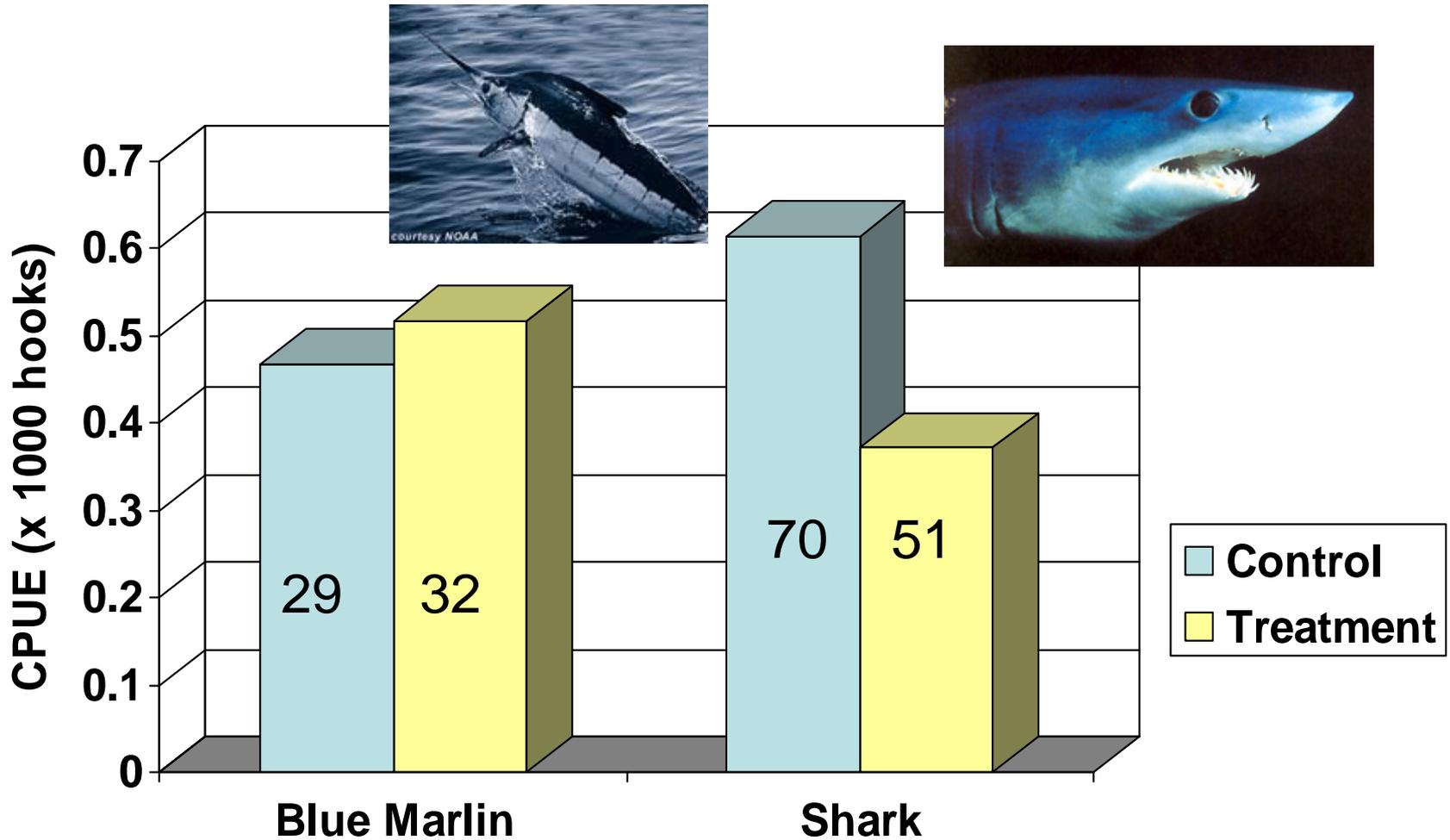
Yellowfin Reduction and Straightened Experimental Hooks



Marketable Yellowfin CPUE Minus Vessel #4 Data



Other Potential Mitigation Benefits



Summary

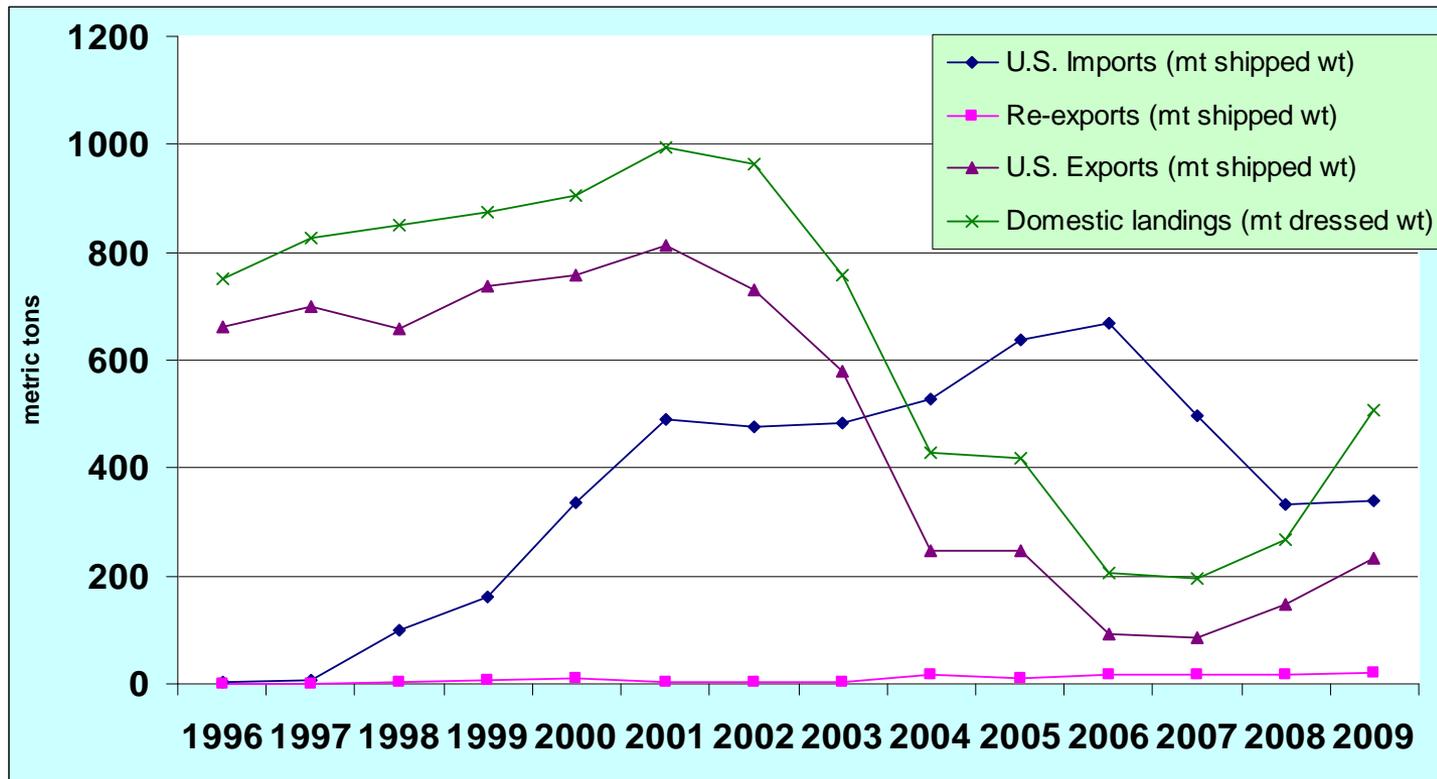
- New 16/0 hook design bends with less force
- Observed 75% (significant) reduction in Bluefin
- Observed 5.6% (non-significant) reduction in Yellowfin

Future Testing:

- Additional Bluefin data with current design
- Test the new hook design later in the season for yellowfin tuna catch

BFT Trade

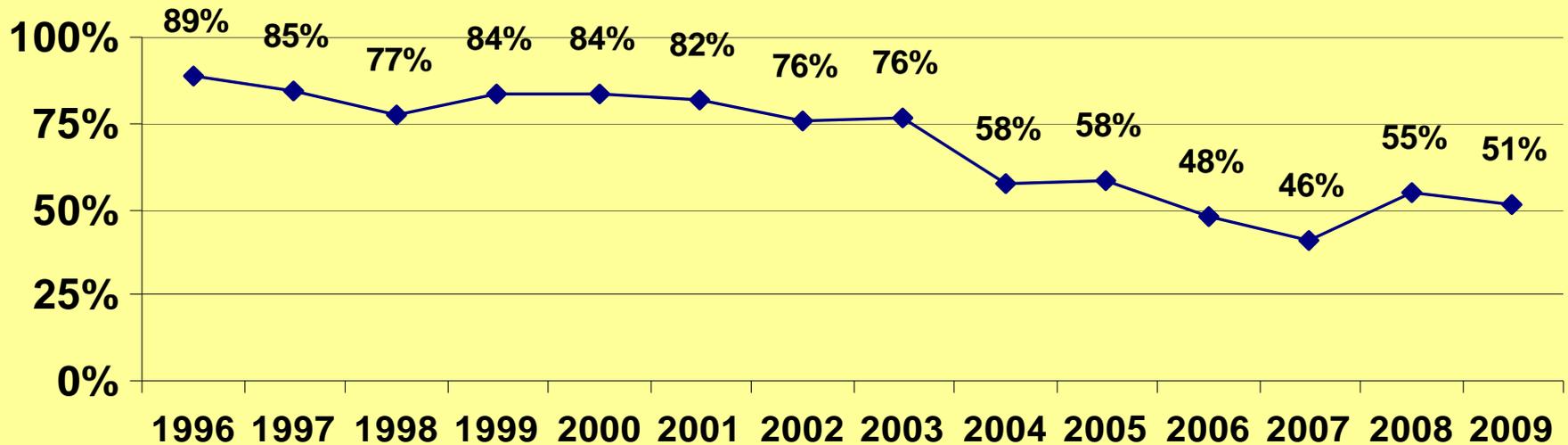
Atlantic BFT Landings and Trade (mt)



This figure shows total U.S. imports, re-exports, and exports. Note the switch in 2004 from the United States being a net exporter to a net importer.

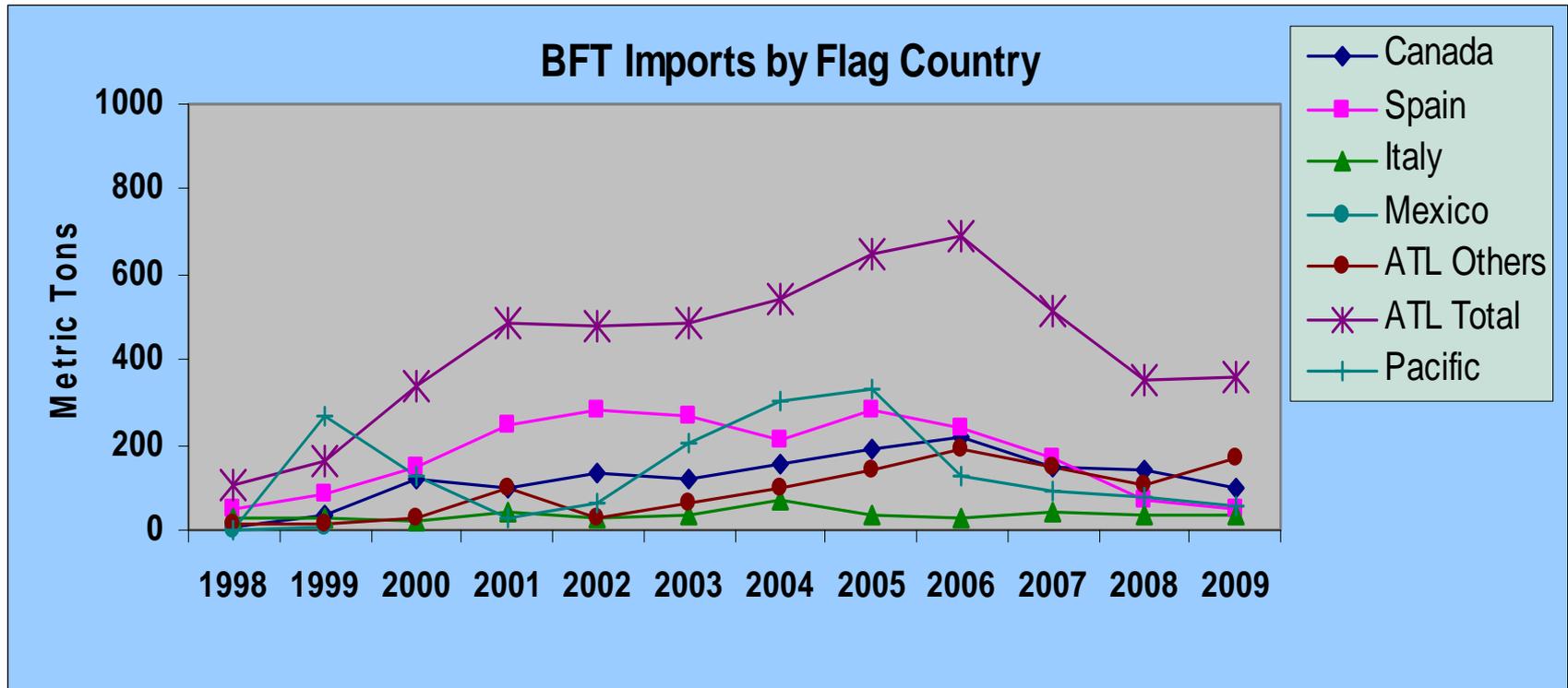
BFT Exports

Percent of U.S. Atlantic BFT Exported (by weight)



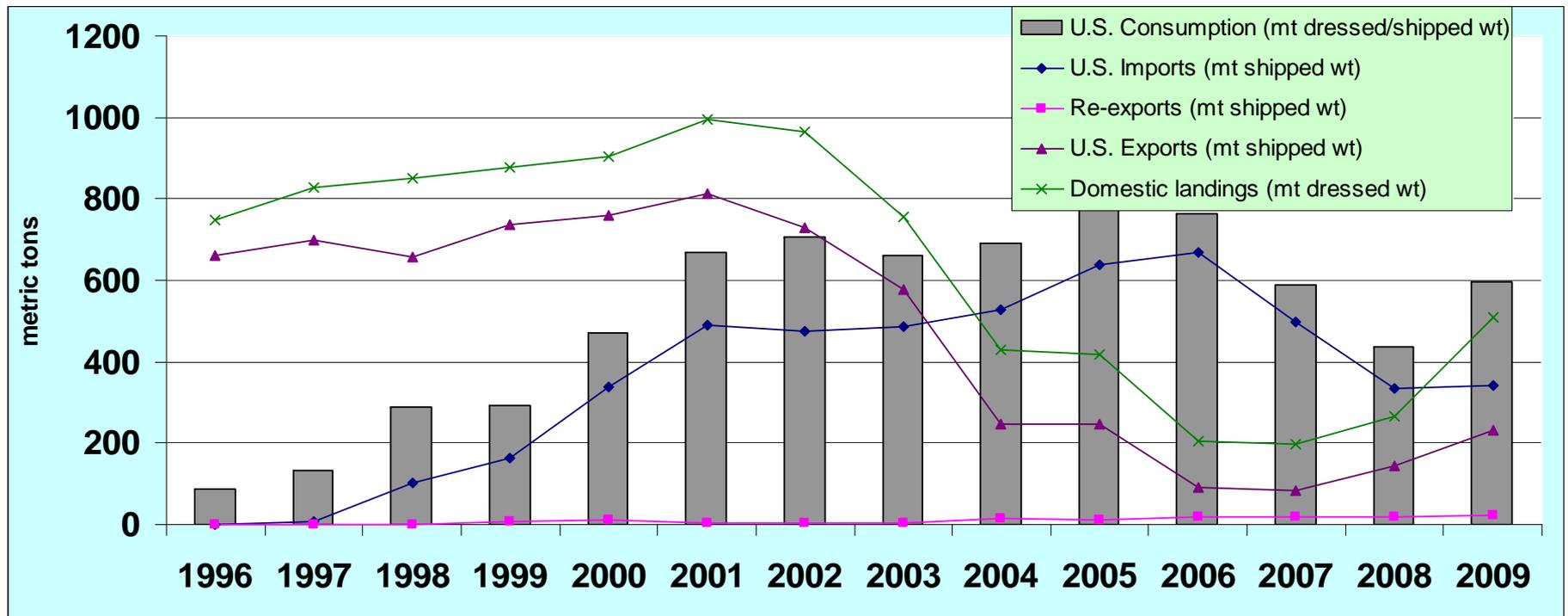
This figure shows the relative proportion of U.S. commercial landings that have been exported since 1996. The United States used to export over 90% of its landed BFT product, but now exports about half (51% in 2009).

BFT Imports



This graph, which ***includes Pacific origin BFT*** shows the amount of BFT imported by the United States from the major exporters (Spain, Canada, Mexico, and Italy, in order).

Atlantic BFT Domestic Consumption (mt)



This figure adds in total U.S. Consumption.

Consumption = Landings + Imports – Exports - Re-exports

International Reporting

A Complex Journey with the United States as a Runway

