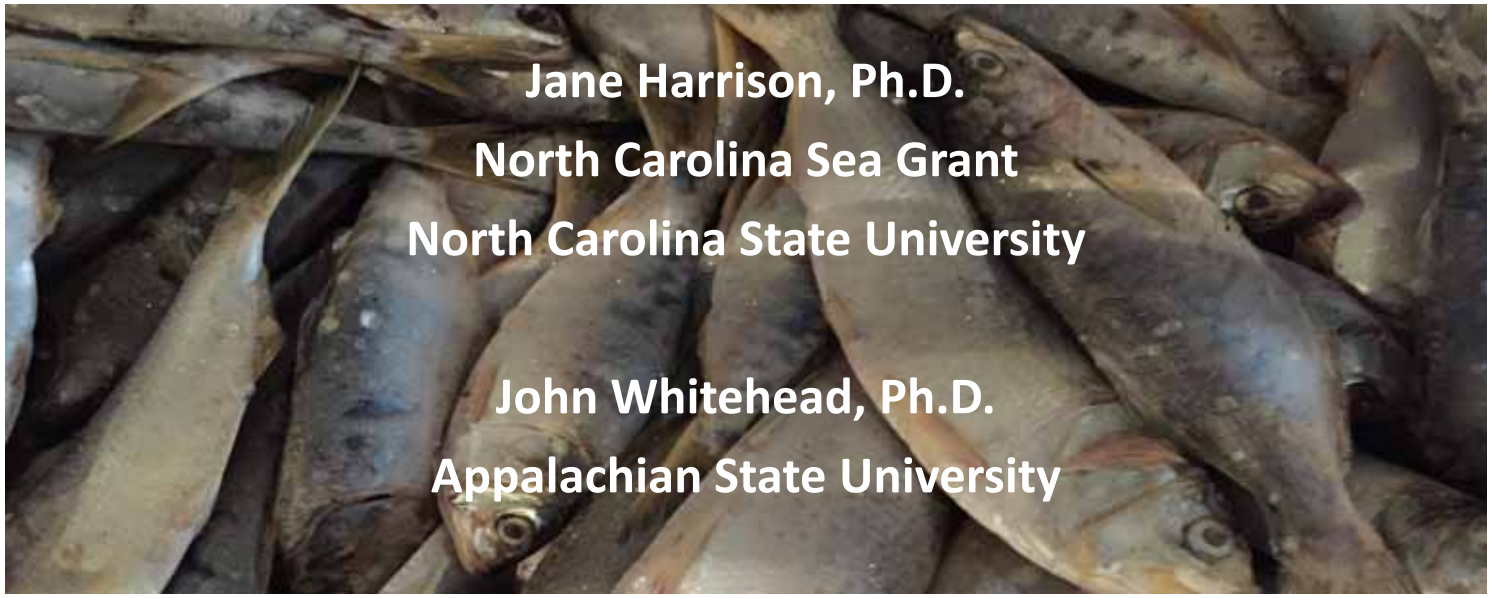
Socioeconomic Analysis of the Atlantic Menhaden Commercial Bait and Reduction Fishery



Jane Harrison, Ph.D.

North Carolina Sea Grant

North Carolina State University

John Whitehead, Ph.D.

Appalachian State University

GOAL: Characterize socioeconomic dimensions of Atlantic menhaden fisheries stakeholders

- Industry Perspectives: Composition and Salient Themes
- Industry Economic Impacts
- Public Opinion Survey

Industry Perspectives

- Goals
  - Characterize the socioeconomic dimensions of Atlantic menhaden fisheries stakeholders
- Quantitative data
  - Surveys with commercial menhaden fishermen and bait dealers
  - Primarily used to validate qualitative data and secondary data sources
- Qualitative data
  - Interviews with commercial menhaden fishermen, bait dealers, industry management, and menhaden end users

Beaufort, NC

Industry Survey Data

- Contacted 2000 potential menhaden fishermen and bait dealers

State	Menhaden Fishermen	Bait Dealers	Totals
Maine	1	5	6
Maryland	8	2	10
New Jersey	23	11	34
New York	7	3	10
North Carolina	12	7	19
Rhode Island	5	3	8
Virginia	14	5	19
Totals	70	36	**106**

Survey Results: Importance of issues to menhaden fishermen and bait dealers

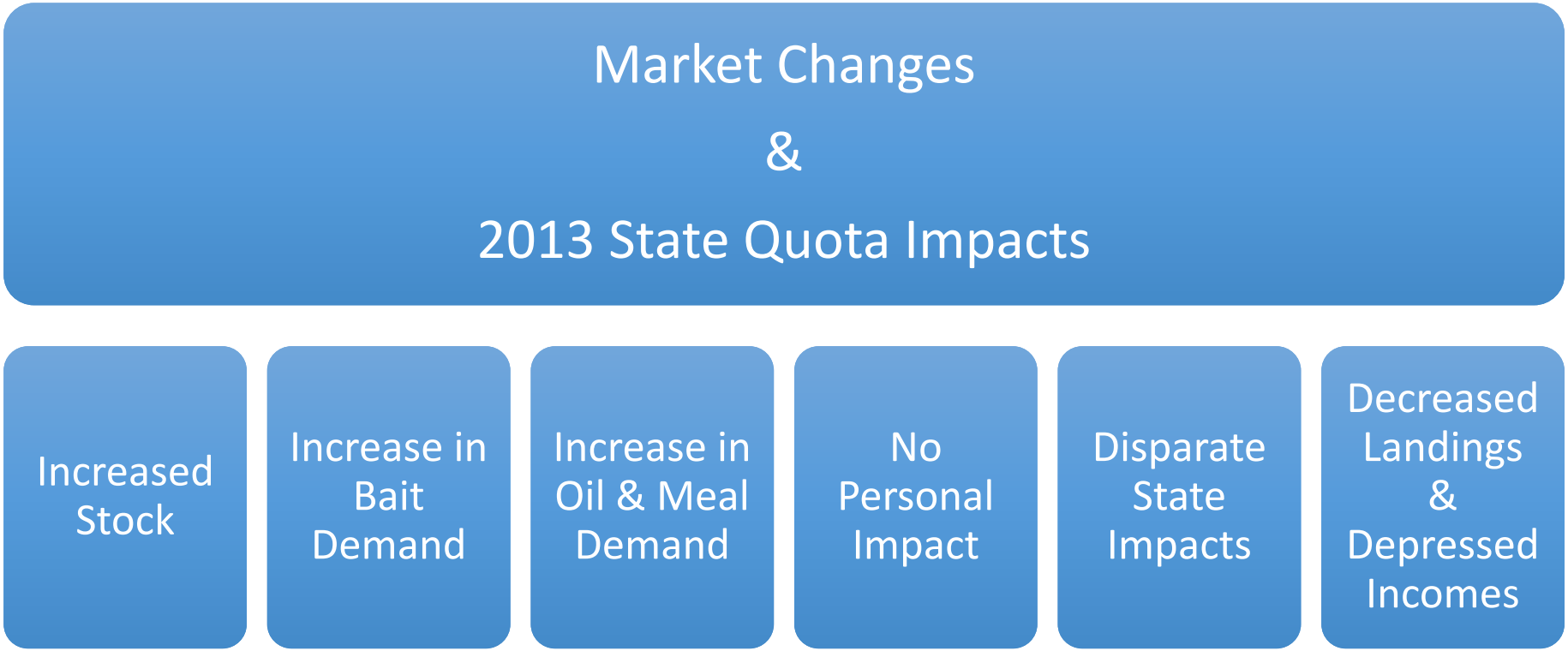
	Extremely Important (1)	Very Important (2)	Moderately Important (3)	Slightly Important (4)	Not at all Important (5)	Mean
Health of menhaden and habitat	45	26	9	2	6	1.84
Quotas	48	12	9	7	12	2.13
Gear restrictions	36	14	11	7	19	2.53
Overfishing	32	17	13	5	22	2.64
Cost of licensing and taxes	23	20	17	9	17	2.73
Record keeping	17	15	25	13	16	2.95
Fuel Prices	21	16	13	12	26	3.07
Competition among fishermen from other states	16	13	18	5	37	3.38
Crew or labor issues	9	14	16	9	40	3.65
Competition among local fishermen	7	8	21	13	38	3.77

Industry Interview Data

- 42 Interviews with menhaden fishermen and bait dealers
- 7 States
- 10 Additional interviews with menhaden management and end users

State	Fishermen	Bait Dealer	Fishermen/Bait Dealer
Maine	1	3	
Maryland	1	1	1
North Carolina	3	1	
New Jersey	9		1
New York	3	2	
Rhode Island	5	2	
Virginia	7	1	1
SubTotal	29	10	3
Total Respondents	**42**		

Interview Data: Salient Themes



Increased Stock

- Menhaden stock healthy and not overfished

Reasons why:

- Cyclical nature of most fisheries
- Warming of waters
- 20% reduction of the TAC in 2013

Fish kill in Shinnecock Canal NY, November 2016

Increase in Bait Demand

- New markets
- Primarily due to bait shortages (i.e. herring)
- Few bait alternatives
  - More expensive
- New England states purchase bait from NJ and other Mid-Atlantic states

Increase in Oil and Meal Demand

Reduction Products

- Global Aquaculture
- Animal Feed
- Pet Food
- Human Supplement

EWOS®

المراعي Almarai

Nestlé PURINA

NORDIC® NATURALS

No Personal Impact due to State Quotas

Relevant to:

- Small-scale fishermen using gill & pound nets
- Those satisfied by the bycatch allowance – 6,000 pounds per day
- Fishermen and bait dealers who catch/sell a mix of species

Trap netting in Rhode Island
Source: Onne Van Der Wal

Disparate State Impact due to State Quotas

Disproportionate loss of TAC according to interviewees

- TAC based on reported historic landings
- Culture of underreported landings for small-scale fishermen in NY, MD, and NJ

Decreased Landings and Depressed Incomes due to State Quotas

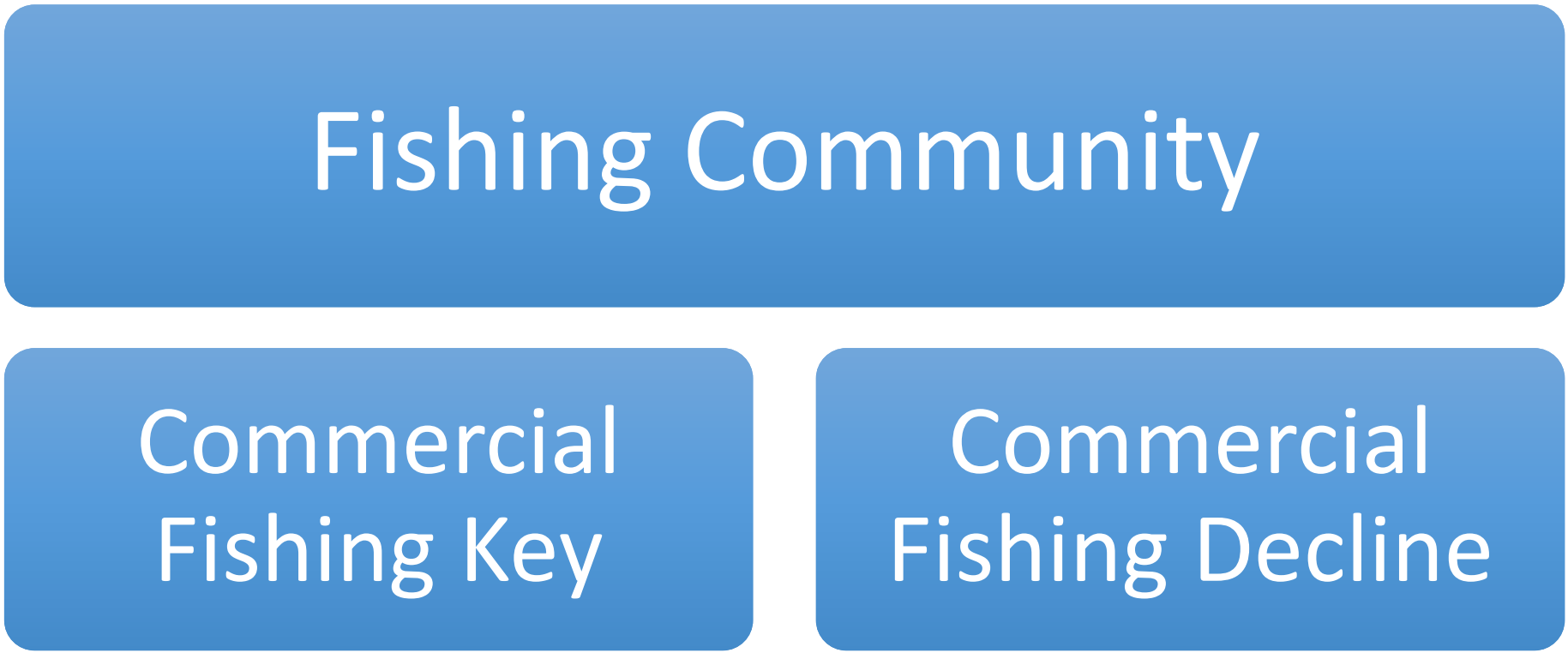
- Predominantly affected medium- and large-scale fishermen and bait dealers

- Difficulty in retaining crew members
  - Layoffs
  - Shorter seasons convert year-round jobs to seasonal positions
  - High job turnover in some states

- Quotas cannot be managed solely by reduction in labor force
  - Significant fixed costs

- Negative impacts on ancillary businesses

Interview Data: Salient Themes



Commercial Fishing Key

- Primary source of well-paying jobs for communities with large-scale operations
- Intergenerational occupation, strong familial and social bonds
- Economic impacts significant
- Tourist draw and key export in some states (i.e. Maine)

Commercial Fishing Decline

- More frequently noted by small-scale operations
  - Regulatory restrictions make it difficult to continue fishing

- Limited economic opportunities outside of fishing
  - High levels of unemployment and underemployment

Industry Economic Impacts

- We will analyze landings and socioeconomic trends and the determinants of those trends in the harvesting sector of both the bait and reduction fisheries. All available commercial and recreational landings and price and **cost** data will be obtained from the Atlantic Coastal Cooperative Statistics Program (ACCSP) …

- Cost data is not available for this project.

AACSP Data

- County level annual landings: 1985-2015
- **County level annual landings (with disposition): 2000-2015**
- State level annual landings and disposition: 1950-2015

These data do not support the economic analysis described in the original proposal.

Data Summary

Variable	N	Mean	Std Dev	Minimum	Maximum
rprice	777	265.26	139.21	82.23	1476.02
tons	777	672.82	3059.29	0.00	29626.54
rhprice	777	251.05	51.89	162.34	314.52
trips	777	129.85	363.28	1.00	4490.00
gear	777	0.10	0.30	0.00	1.00

$\ln(Q) = f(X)$; fixed effects panel model
87 counties, 16 years

Parameter Estimates						
Variable	DF	Estimate	Standard Error	t Value	Pr > |t|	Label
Intercept	1	12.40171	7.0390	1.76	0.0785	Intercept
lntrips	1	1.070747	0.0346	30.93	<.0001	
gear	1	2.6561	0.2179	12.19	<.0001	
lngdp	1	0.027155	1.2236	0.02	0.9823	
lnrhprice	1	-1.12914	0.4348	-2.60	0.0096	

$\ln(P) = f(\widehat{lnQ}, X)$; fixed effects panel model
87 counties, 16 years

Parameter Estimates						
Variable	DF	Estimate	Standard Error	t Value	Pr > |t|	Label
Intercept	1	10.8827	2.0930	5.20	<.0001	Intercept
plntons	1	-0.04279	0.00932	-4.59	<.0001	
lnrhprice	1	-0.76106	0.1310	-5.81	<.0001	
lngdp	1	0.464628	0.3681	1.26	0.2072	

Regional Input-Output Modeling System (RIMS II)

- Type I multipliers include only inter-industry effects
- Output = Direct + Indirect
  - Direct impact = first round of inputs purchased by the industry
  - Indirect impact = subsequent rounds inputs purchased by supporting industries
- Type II multipliers include inter-industry and household spending effects
- Output = Direct + Indirect + Induced
  - Induced impact = the spending of workers whose earnings are affected

RIMS II Multipliers (2007/2015)
Table 3.5 Total Multipliers for Output, Earnings, Employment, and Value Added by State
114000 - Fishing, hunting and trapping (Type I)

STATE	Multiplier					
	Final Demand				Direct Effect	
	Output/1/ (dollars)	Earnings/2/ (dollars)	Employment/3/ (jobs)	Value-added/4/ (dollars)	Earnings/5/ (dollars)	Employment/6/ (jobs)
41. South Carolina	1.2496	0.3670	19.6731	0.8172	1.2476	1.0898
42. South Dakota	1.1809	0.3487	19.2699	0.7843	1.1820	1.0645
43. Tennessee	1.2893	0.3731	15.0686	0.8349	1.2718	1.1160
44. Texas	1.3549	0.3948	19.9794	0.8646	1.3295	1.0964
45. Utah	1.2974	0.3807	18.9064	0.8350	1.2776	1.0971
46. Vermont	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000
47. Virginia	1.2305	0.3634	20.5537	0.8115	1.2258	1.0646
48. Washington	1.2888	0.3749	11.2300	0.8265	1.2750	1.1480
49. West Virginia	1.2107	0.3408	14.4248	0.7927	1.1830	1.0882
50. Wisconsin	1.2309	0.3622	15.0060	0.8063	1.2218	1.0999
51. Wyoming	1.2152	0.3518	19.2233	0.7928	1.1916	1.0613

Economic Impact Analysis - Bait

- Direct Effect = $(\bar{P} \times MU) \times \Delta TAC \times TypeI(II)$
- Markup (MU)
  - NMFS IMPLAN - 63% for wholesalers/distributors
  - Bait dealer and fishermen survey – 356%

For example (356% markup)

2016 VA bait landings = 33.5m lbs, ex-vessel price =0.125

- Direct effect = $4.6m
- Output = $4.6m x **1.2305** = $5.6m
- Earnings = $4.6m x **0.3634** = $1.7m
- Employment = $4.6m x **20.5535** = 94

6.45% increase in TAC – Type I

Impacts			
Output	Earnings	Employment	
2,586	739	0	Connecticut
2,007	518	0	Delaware
2,675	808	0	Florida
198,849	56,783	3	Maryland
119,882	33,161	1	Massachusetts
4	-	-	New Hampshire
1,739,900	498,679	15	New Jersey
7,957	2,306	0	New York
73,607	21,784	1	North Carolina
5,659	1,696	-	Maine
92,264	27,248	2	PRFC
2,578	743	0	Rhode Island
1,214,691	358,731	20	Virginia (Bait)
$ 3,462,660	$ 1,003,195	42	

Alternative increases in TAC – Type I

ΔTAC	Output (m)	Earnings (m)	Employment
6.45%	$3.5	$1.0	42
10%	$5.4	$1.6	66
20%	$10.7	$3.1	131
30%	$16.1	$4.7	197

Alternative increases in TAC – Type II

ΔTAC	Output (m)	Earnings (m)	Employment
6.45%	$4.7	$1.3	51
10%	$5.4	$1.6	66
20%	$10.7	$3.1	131
30%	$16.1	$4.7	197

Economic Impact Analysis - Reduction

- Kirkley et al., VA MRC 2011 (311m lbs)

Table 5.4. Virginia Baseline Economic Impacts of OMEGA Operations in 2008

Virginia Total	Direct	Indirect	Induced	Total
Employment (full- and part-time jobs)	299	114	106	519
Income (thousands)	$12,562	$6,191	$3,988	$22,741
Output (thousands)	$59,919	$15,750	$12,459	$88,127

Table 5.5. Estimated Economic Impacts of OMEGA Operations, Northumberland

Total	Direct	Indirect	Induced	Total
Employment (full- and part-time jobs)	217	75	55	347
Income (thousands)	$9,117	$4,487	$2,441	$16,045
Output (thousands)	$59,919	$11,639	$7,066	$78,624

Scaled up to 2015, 316m lbs

Virginia				
Direct	Indirect	Induced	Total	
304	116	108	528	Employment
$ 14,053,237	$ 6,925,934	$ 4,461,416	$ 23,127,807	Income
$ 67,031,993	$ 17,619,685	$ 13,938,010	$ 89,626,988	Output
Northumberland				
Direct	Indirect	Induced	Total	
221	76	56	528	Employment
$ 10,199,280	$ 5,019,652	$ 2,730,771	$ 16,317,913	Income
$ 67,031,993	$ 13,020,667	$ 7,904,806	$ 79,961,332	Output

6.45% increase in TAC
(assume gross revenues increase in proportion)

	Northumberland		Rest of Virginia	
	Type I	Type II	Type I	Type II
Employment	77	79	12	24
Earnings	1,222,271	1,287,557	348,912	789,483
Output	4,544,498	4,802,182	775,647	2,293,650

Alternative increases in TAC – Type I - Northumberland

ΔTAC	Output (m)	Earnings (m)	Employment
6.45%	$4.5	$1.2	77
10%	$7.0	$1.9	119
20%	$14	$3.8	239
30%	$21	$5.7	358

Alternative increases in TAC – Type I – Rest of VA

ΔTAC	Output (m)	Earnings (m)	Employment
6.45%	$0.78	$0.35	12
10%	$1.2	$0.54	18
20%	$2.4	$1.1	37
30%	$3.6	$1.6	55

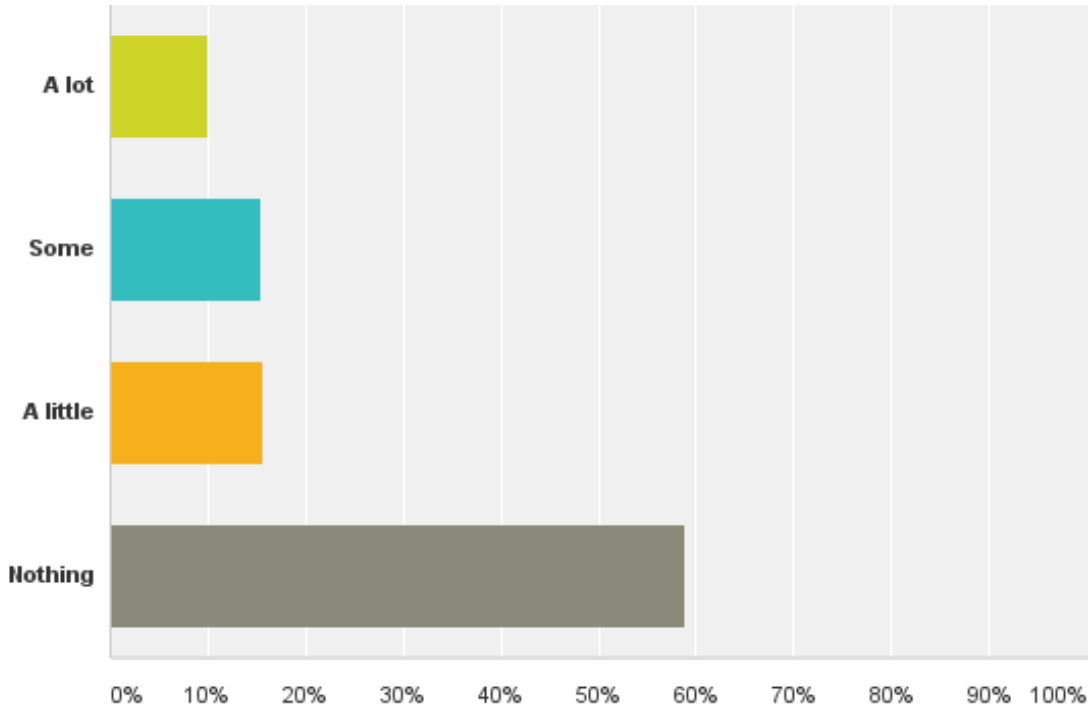
Alternative increases in TAC – Type II - Northumberland

ΔTAC	Output (m)	Earnings (m)	Employment
6.45%	$4.8	$1.3	79
10%	$7.4	$2.0	123
20%	$14.9	$4.0	246
30%	$22.3	$6.0	369

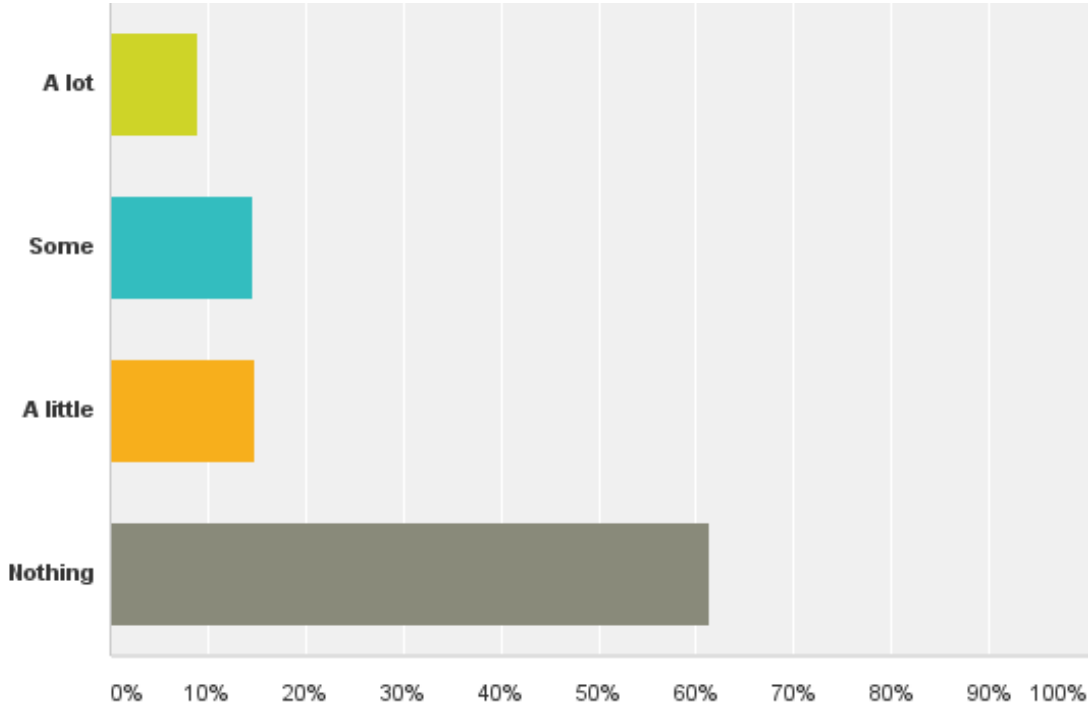
Alternative increases in TAC – Type II – Rest of VA

ΔTAC	Output (m)	Earnings (m)	Employment
6.45%	$2.3	$0.79	24
10%	$3.6	$1.2	37
20%	$7.1	$2.4	74
30%	$10.7	$3.7	110

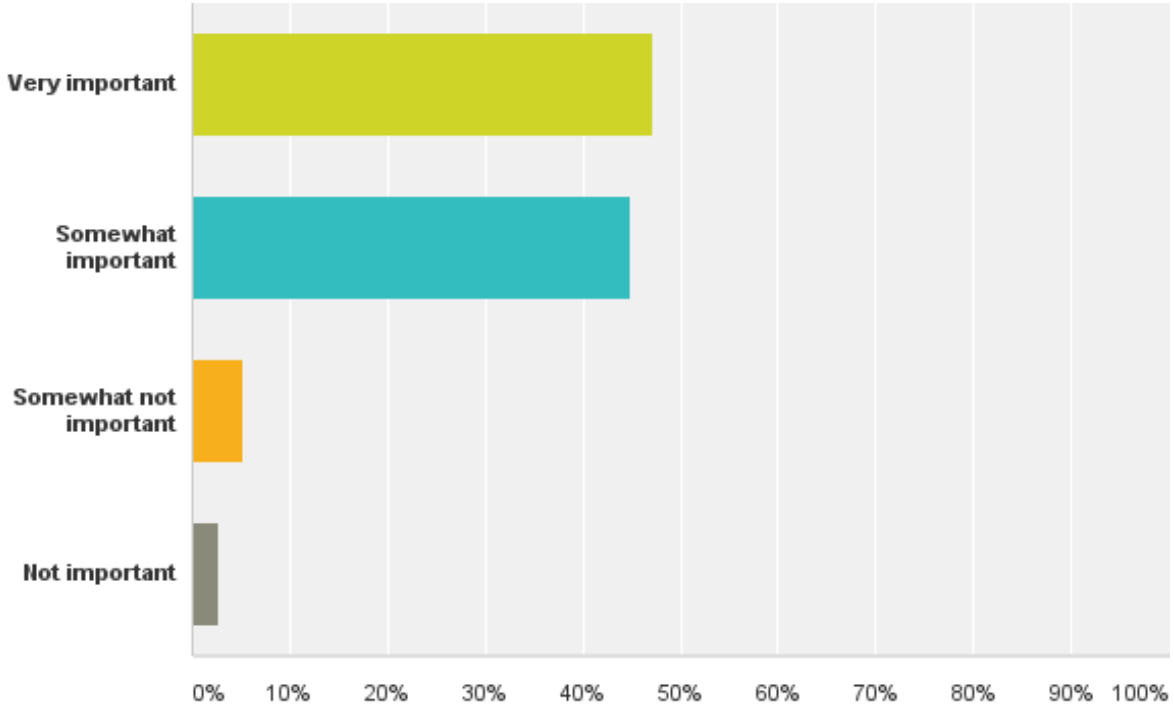
Q2: How much did you know about the ASMFC before this survey?



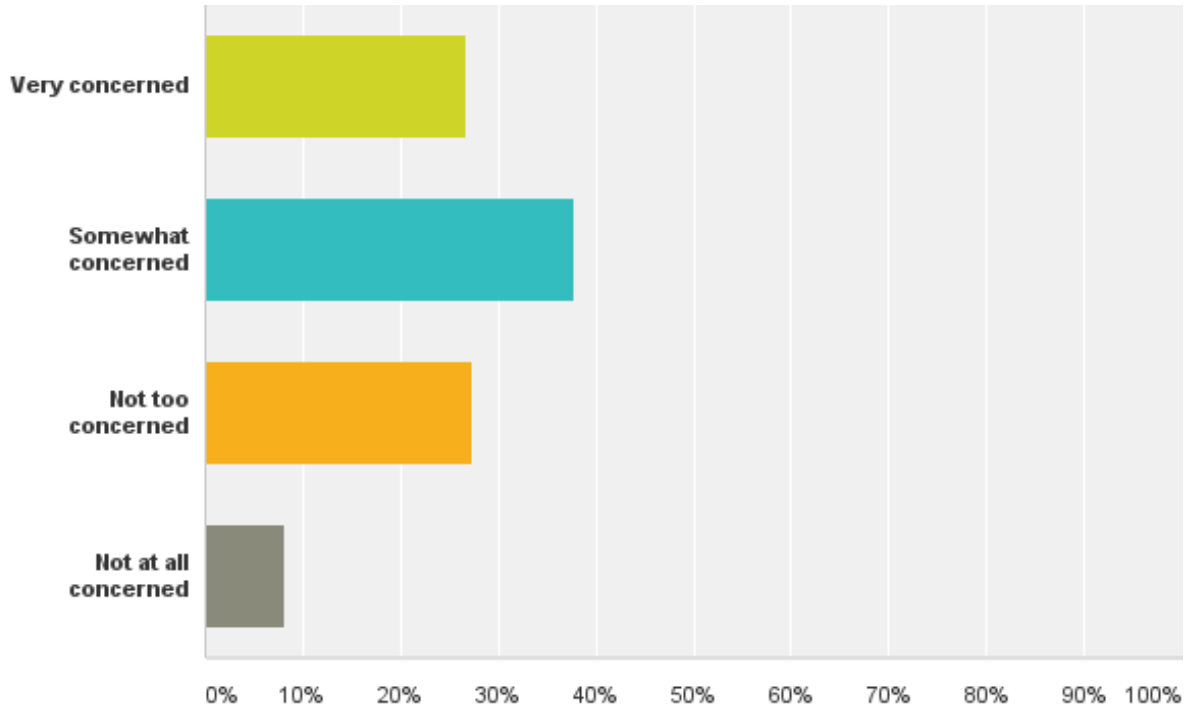
Q4: How much did you know about Atlantic menhaden before this survey?



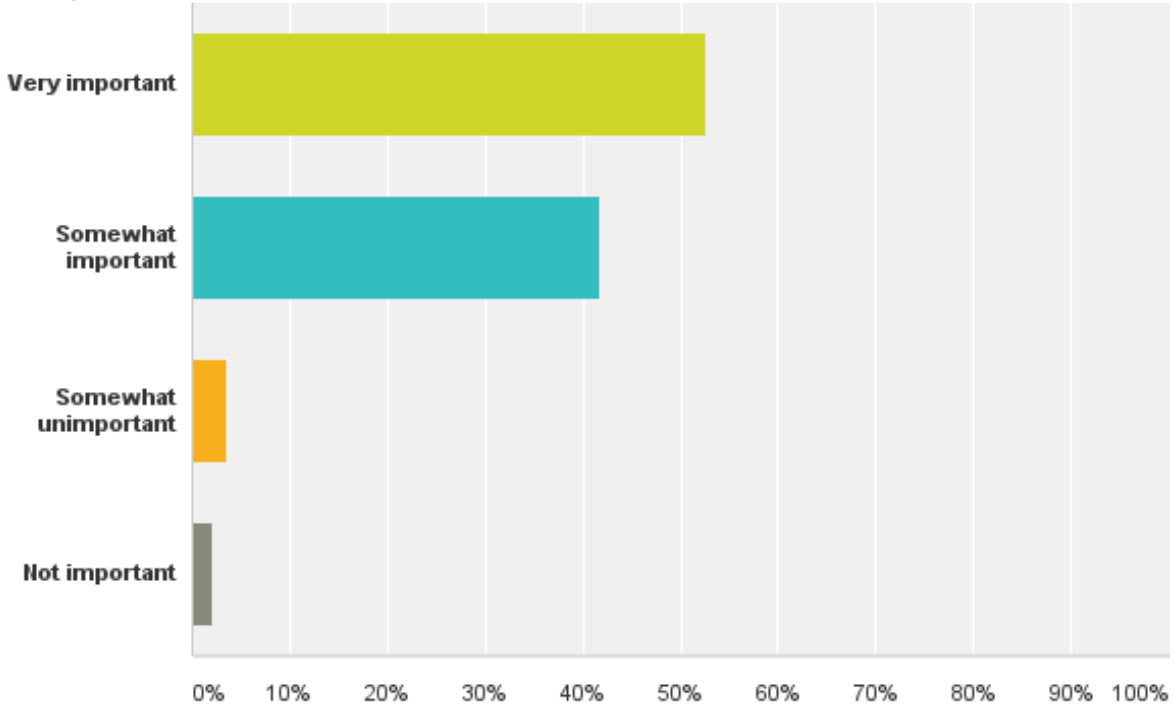
Q5: How important do you think that the Atlantic menhaden commercial fishery is to the economy?



Q6: How concerned are you about overfishing of menhaden?



Q10: How important do you think it is to manage menhaden at the ecosystem level instead of the individual species level?



Choice Questions

- 6 scenarios
  - Low, medium, high price
  - 3 increase TAC
  - 3 decrease TAC
  - Randomly ordered
- ΔTAC= 10%, 20% or 30%
- Jobs = 250, 500, 750
- Gamefish = decrease, no change, increase (-1, 0, 1)
- Shorebirds = -1, 0, 1
- Water quality = -1, 0, 1

Current Quota

- Menhaden landings throughout the Atlantic States are expected to be 410 million pounds and landings revenue is expected to be $38.13 million at an average price of **$0.093** per pound.
- The ASMFC is considering a **10% increase** to each state's individual menhaden quota.
- *< jobs, fish, birds, water >*
- Would you vote for or against the increased quota
  - For
  - Against
  - I don't know

Increase Scenario – RPL Model (n=2022 x 3)

Y	Coefficient	Standard Error	z	Prob. |z|>Z*	95% Confidence Interval	
	Random parameters in utility functions					
REVENUE	.07273***	.01257	5.79	.0000	.04810	.09736
JOBS	.00104***	.00023	4.57	.0000	.00060	.00149
WATER	-.95356***	.12257	-7.78	.0000	-1.19379	-.71333
FISH	-.44118***	.10561	-4.18	.0000	-.64817	-.23420
BIRDS	-.57359***	.11217	-5.11	.0000	-.79344	-.35374
ASCOVER	.70097***	.13421	5.22	.0000	.43792	.96402
	Distns. of RPs. Std.Devs or limits of triangular					
NsREVENU	.06350	.03881	1.64	.1018	-.01256	.13957
NsJOBS	.00395***	.00038	10.52	.0000	.00322	.00469
NsWATER	1.98238***	.27433	7.23	.0000	1.44470	2.52005
NsFISH	1.47119***	.30918	4.76	.0000	.86522	2.07717
NsBIRDS	1.81354***	.29391	6.17	.0000	1.23748	2.38960
NsASCOVE	.84128**	.34029	2.47	.0134	.17433	1.50823

***, **, * ==> Significance at 1%, 5%, 10% level.
Model was estimated on Jan 31, 2017 at 03:01:35 PM

Increase Scenario – Willingness to accept less of the attribute for ex-vessel revenue and jobs

attribute	Revenue (m)	Jobs
Water quality (-1, 0)	$13	914
Gamefish (-1, 0)	6	423
Waterbirds (-1, 0)	8	550

Decrease Scenario – RPL Model (n=2022 x 3)

Y	Coefficient	Standard Error	z	Prob. |z|>Z*	95% Confidence Interval	
	Random parameters in utility functions					
REVENUE	-.02830**	.01241	-2.28	.0226	-.05262	-.00398
JOBS	-.00172***	.00024	-7.30	.0000	-.00218	-.00126
WATER	.62737***	.09561	6.56	.0000	.43999	.81476
FISH	.34824***	.09088	3.83	.0001	.17012	.52635
BIRDS	.24240**	.09822	2.47	.0136	.04990	.43491
	Distns. of RPs. Std.Devs or limits of triangular					
NsREVENU	.16483***	.03172	5.20	.0000	.10265	.22701
NsJOBS	.00491***	.00037	13.44	.0000	.00419	.00562
NsWATER	1.20386***	.24373	4.94	.0000	.72616	1.68156
NsFISH	.92921***	.27098	3.43	.0006	.39811	1.46032
NsBIRDS	.08759	.38321	.23	.8192	-.66349	.83868

***, **, * ==> Significance at 1%, 5%, 10% level.
Model was estimated on Jan 31, 2017 at 03:36:58 PM

Decrease Scenario – Willingness to accept less ex-vessel revenue and jobs for more of the attribute

attribute	Revenue (m)	Jobs
Water quality (0, 1)	$22	365
Gamefish (0, 1)	12	202
Waterbirds (0, 1)	9	141

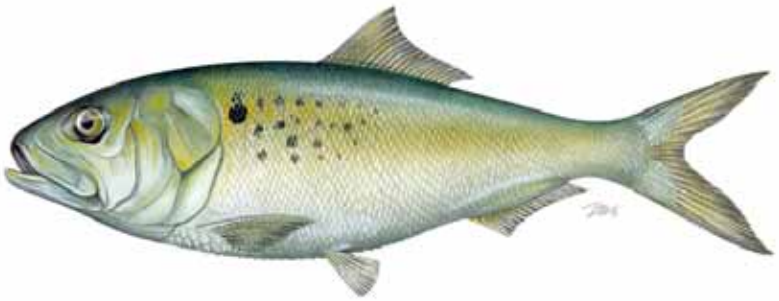
Public Survey

- Survey Sampling International

Answer Choices	Responses	
Florida	10.08%	227
Maine	9.63%	217
Maryland	9.59%	216
New Jersey	21.97%	495
New York	10.47%	236
North Carolina	10.16%	229
Rhode Island	7.01%	158
Virginia	21.08%	475
Total		2,253

Atlantic Menhaden Amendment 3 Public Information Document

Public Comment Summary



February 1, 2017

Overview

- Timeline
- Public Comment
  - Public hearings
  - Written comment
- AP Report
- Board discussion on management alternatives to include in draft Amendment 3
  - Reference point review

Timeline

	Oct 2016	Nov 2016 – Jan 2017	Feb 2017	Mar - July 2017	Aug 2017	Aug – Oct 2017	Nov 2017
Approval of Draft PID by Board	X						
Public Comment on PID		X					
Board review public comment; Board direction on Draft Amendment 3			X				
Preparation of Draft Amendment 3 (May meeting check-in)				X			
Approval of Draft Amendment 3 by Board					X		
Public Comment on Draft Amendment 3						X	
Review and approval of the final Amendment 3 by the Board, Policy Board and Commission							X

Public Comment Summary

Public Hearings

- Conducted 14 hearings in 13 jurisdictions
- ME, NH, MA, RI, CT, NY, NJ, DE, MD, PRFC, VA, NC, FL
- Approx. 300 individuals attended the hearings

Written Comment

- A total of 25,606 comments received
- 75 from organizations, 283 from individuals, 25,248 from form letters

Reference Points

	Single Species	Existing Guidelines	BERP; Single Species	BERP; Existing Guidelines
Individual		7	3	216
Organization	1		5	66
Form Letter				25,248
Hearings				
ME			1	2
NH			1	8
MA				16
RI	2		1	4
CT				5
NY				23
NJ				6
DE	2		1	7
MD	6			8
PRFC				1
VA		1		7
NC			4	5
FL				11
TOTAL	**11**	**8**	**16**	**25,633**

Reference Points

Received a new ERP proposal on osprey:

- Osprey populations in CT and NY sensitive to menhaden abundance
- “2.0 young/successful nest” would serve as reference point for Conn. River Estuary; “1.0 young/active nests” would serve as reference point for Gardiners Bay, NY
- Reproduction below reference points would indicate menhaden depletion
- In 2016, 2.5 Y/SN in Conn. River Estuary and 1.39 Y/AN in Gardiners Bay, NY;
- Ecological conditions also affect osprey abundance

Quota Allocation

	State-by-State	State; Fixed Minimum	Coastwide	Seasonal	Regional	Bait vs. Reduction	Fleet Capacity	Based on TAC Level
Individual	2	15	2	4	4	18	14	1
Organization	4	21	2	3	5	13	12	1
Form Letter								
Hearings								
ME		1	5	7	1	1		
NH		2			1	1	1	
MA		3				3	1	
RI		3			1	1		
CT		1		2	1	1	1	
NY		5		1	1			
NJ		1			1	1	1	
DE	1	1				1	1	
MD	13							
PRFC								
VA		2		1		3	1	
NC	1	1				1		
FL		1				1	1	
TOTAL	**21**	**57**	**9**	**18**	**15**	**45**	**33**	**2**

Quota Allocation

- Coastwide quota distributed by season
- Regional quotas with quarterly seasons
- Fixed minimum quotas with a 4 region split
- Fixed minimum quota with a coastwide winter fishery
- Seasonal quotas with state allocations
- Progressive catch limits as catch gets close to TAC
- Allocation based on biology of species

Allocation Timeframe

	2009-2011	2012-2016	Longer Timeperiod	Weighted Allocation
Individual	1	1	8	2
Organization	1	2	21	2
Form Letter				
Hearings				
ME			3	
NH			4	3
MA			7	2
RI			3	
CT			1	
NY		2		1
NJ			1	
DE			1	1
MD			2	
PRFC				
VA			3	1
NC			1	2
FL			2	
TOTAL	**2**	**5**	**57**	**14**

Quota Transfers

	No Transfers	Support Transfers	Support Quota Reconciliation	Support Accountability Measures
Individual	5	8	3	6
Organization	1	19	2	16
Form Letter				
Hearings				
ME	1			
NH		2		2
MA	1	4		4
RI		1		1
CT	1			
NY		1		
NJ	1	1		1
DE		1	2	1
MD	1			1
PRFC				
VA	4	1		1
NC		2		2
FL	3			
TOTAL	**18**	**40**	**7**	**35**

Quota Rollovers

	No Rollovers	Support Rollovers	Support Limited Rollovers
Individual	24		
Organization	28	4	2
Form Letter	1,406		
Hearings			
ME		1	
NH	5		
MA	5		
RI	2		
CT			2
NY	12	2	
NJ	4		
DE	3		
MD	1	1	
PRFC	1		
VA	8		
NC	1	1	
FL	1	2	
TOTAL	**1,501**	**11**	**4**

Incidental Catch

	Limit Per Vessel	Limit Per Individual	Included in TAC	Cap and Trigger	Percent Composition	Small-Scale Set Aside
Individual		2	37		3	34
Organization	2		23	2		27
Form Letter			2,435			2,074
Hearings						
ME						
NH			2			1
MA			3		1	
RI			2			2
NY			1			2
NJ			1			1
DE	1	1	1			1
MD	4					
PRFC			1			
VA			1	1		3
NC	1		2	1		3
FL			3			3
TOTAL	**8**	**3**	**2,512**	**4**	**4**	**2,151**

Episodic Events

	No Episodic Set Aside	1% Set Aside	>1% Set Aside
Individual	8	1	1
Organization	16	4	2
Form Letter			
Hearings			
ME			2
NH	1		
MA	3		
RI		1	
CT	1		
NY			1
NJ	1		
DE	3	1	
MD		1	
PRFC			
VA	2		
NC			2
FL			
TOTAL	**35**	**8**	**8**

Chesapeake Bay Cap

	Remove Cap	Maintain Cap	Reduce Cap
Individual	1	3	53
Organization		6	30
Form Letter			2,404
Hearings			
ME		5	
NH			2
MA		1	4
RI			1
CT		4	
NY		1	5
NJ			5
DE		4	1
MD		1	3
PRFC			1
VA		2	8
NC	2	2	
FL		3	2
TOTAL	**3**	**32**	**2,519**

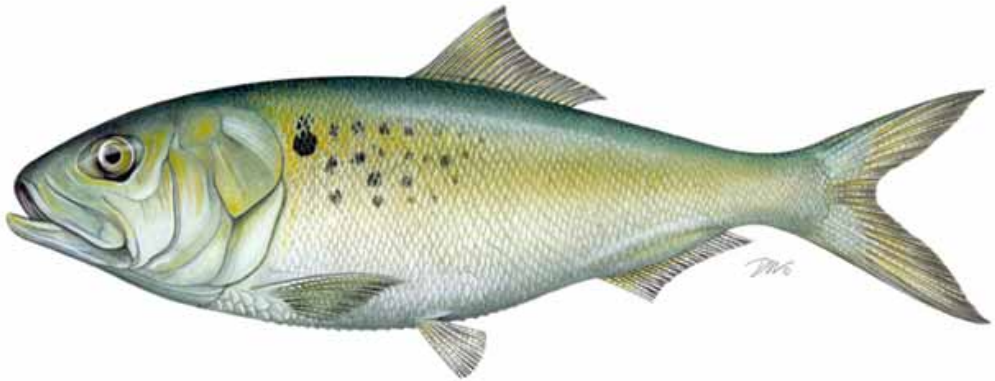
Research Set Aside

	No RSA	Support a RSA
Individual	1	3
Organization	4	2
Form Letter		
Hearings		
ME	1	
NH		
MA		
RI		
CT		1
NY		
NJ	1	
DE		
MD	1	
PRFC		
VA	1	1
NC		
FL		
TOTAL	**9**	**7**

Research Programs

- Enviro. factors that impact recruitment
- New menhaden abundance indices in light of stock expansion
- Map current and historic spawning areas
- Fish kill causes and responses
- Food web dynamics
- Localized depletion
- Water quality services
- Min. size to allow for spawning before harvest
- Further socio-economic studies
- Chesapeake Bay study
- Bycatch in the reduction fishery
- Regional abundance trends
- Specification of regional stocks
- Speciation of menhaden
- Migration patterns
- Seasonal distributions by age class
- Stomach content analysis
- Impacts of climate change
- New fishery independent monitoring strategies
- Tagging and genetic studies
- Expanded surveys in Gulf of Maine
- Models of menhaden life history from egg release to estuarine nurseries
- Eco-physiological studies

Questions?



Advisory Panel Report

AP Report

- Advisory panel met via conference call on January 9th
- 14 members in attendance
  - ME, NH, MA, RIx2, NY, NJx2, DE, MD, VAx2, NC, GA
- Purpose to review comments made at public hearings ahead of the Board meeting
- After staff presented a summary of the public hearings, each AP member was given an opportunity to make a comment

AP Comments on Ref. Points

- 3 members supported Option D: Existing Guidelines for Forage Fish Until ERPS are Developed by the BERP
  - Reference points dictate how the fishery is allocation between all stakeholders
- 1 member stated that a one-size fits all approach to managing forage fish is not appropriate
- 1 member commented that few fisheries are in as good a shape as menhaden so no need to change management strategy
- 1 member noted that ERPs would help the resource and the economy
- 1 member recommended that, because the PID states the possibility of combining the 75% unfished biomass target with the 40% unfished biomass threshold, this 40% biomass threshold should be added to Option D

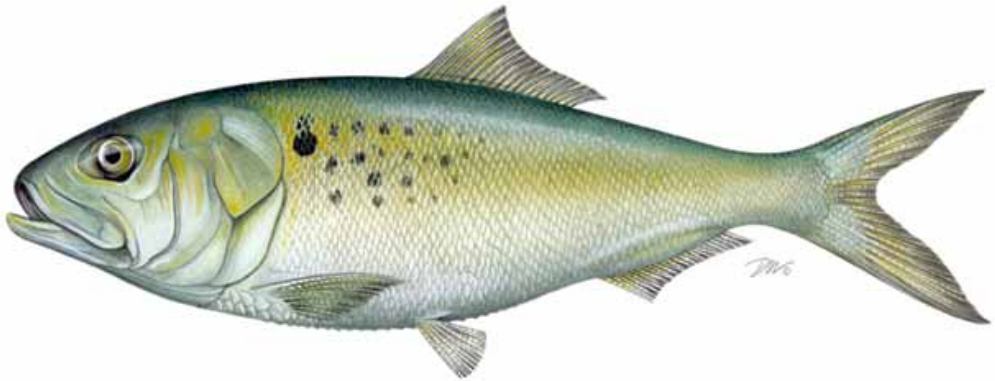
AP Comments on Allocation

- 3 members highlighted need for longer allocation timeframe
  - Historic fisheries in NY and New England states should be accounted for
- 2 members supported Option H: Allocation Strategy Based on TAC Level
  - Need to make fishery whole again and then can distribute additional quota to the bait sector
- 1 member supported Option B: State-Specific Quotas with Fixed Minimum and Option D: Seasonal Quotas
  - Quota should be reserved for seasons when it is needed
- 1 member supported re-allocation

Other AP Comments

- There was a recommendation that a table be added to draft Amendment 3 which compares various reference points on a common currency
- There was a recommendation thata table be added to draft Amendment 3 which summarizes catch by state, gear type, and year

Questions?



Reference Point Options for Menhaden

Reference Point Options

- Single-species reference points
  - From most recent benchmark stock assessment
- Generalized ecological reference points for forage fish
  - Lenfest report, 75%B_{MSY} rule-of-thumb
- BERP products

Reference Point Options

	Reference Point	Value
Amendment 2 BRPs	F15%MSP (Am. 2 threshold)	2.98
	F30% MSP (Am. 2 target)	1.03
Single-species (from 2015 benchmark)	F26%MSP (threshold)	1.26
	F57% MSP (target)	0.38
Lenfest report	F64% MSP (threshold)	0.29
Current Status	**F70% MSP (F in 2013)**	**0.22**

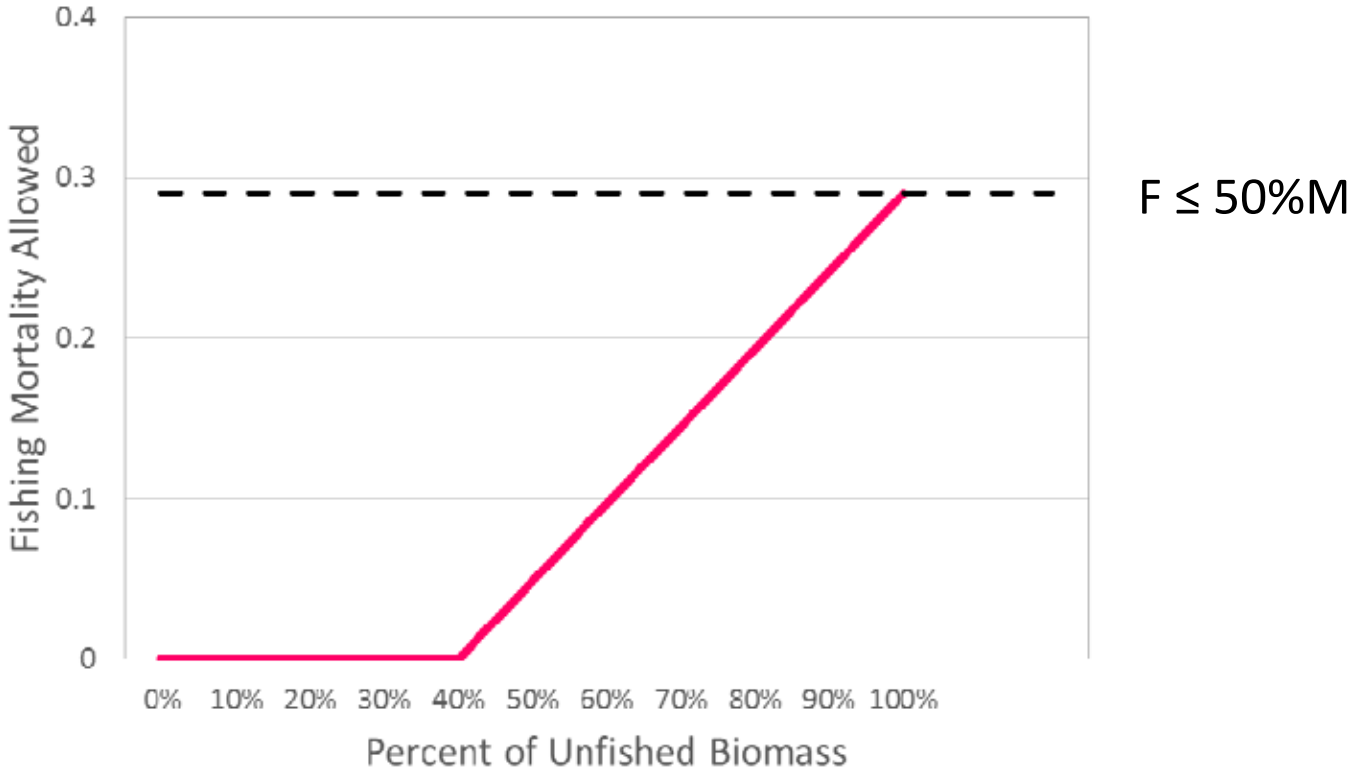
Generalized ERPs for Forage Fish

- Meta-analysis of ecosystem models (EwE, ATLANTIS, etc.) for multiple different forage species/ecosystems

- Provide a generic conservation buffer and control rule

Generalized ERPs for Forage Fish

- Lenfest Report (Pikitch *et al.*, 2012)
  - Menhaden are in the "intermediate information tier": apply hockey stick harvest control rule with $B_{threshold} \geq 40\%B_0$ and $F \leq 50\%M$ or $50\%F_{MSY}$



Generalized ERPs for Forage Fish

- $75\%B_{unfished}$ (Smith *et al.,* 2011)
  - Exploit the population at a level that would leave 75% of the unfished biomass in the water
  - F target = F75%MSP
  - F threshold = F40%MSP

BERP Products

- Menhaden-specific models
  - Includes multi-species statistical catch-at-age model

- Allow evaluation of tradeoffs between menhaden quota, predator biomass, and levels of acceptable risk

Board Goals

- Stakeholders identified goals of ecosystem-based management at the EMO workshop (August 2015)

→ Sustain menhaden to provide for fisheries

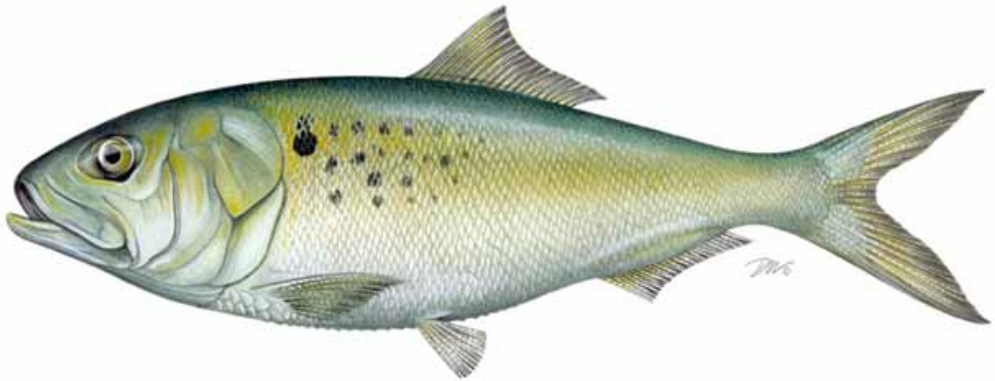
→ Sustain menhaden to provide for predators

→ Provide stability for all types of fisheries

Pros & Cons

	Generalized	BERP
Available now	✓	X (Not until 2019)
Includes birds & mammals	✓	X (Major finfish predators only)
Menhaden-specific	X	✓
Allow evaluation of tradeoffs between menhaden quota and predator biomass	X	✓

Questions?



Board Discussion on Management Alternatives to Include in draft Amendment 3

Reference Points

	Single Species	Existing Guidelines	BERP; Single Species	BERP; Existing Guidelines
Total	11	8	16	25,633

- Which of these options should be included in the draft Amendment?
- Are there any other options that should be added?
- If the Board is interested in existing guidelines, which guidelines would the Board like to pursue?
  - Pikitch et al (2012)
  - 75% rule-of-thumb
  - F target and threshold of 75% and 40% unfished biomass, respectively

Quota Allocation

	State -by- State	Fixed Min.	Coastwide	Seasonal	Regional	Bait vs. Reduction	Fleet	TAC Level
Total	21	57	9	18	15	45	33	2

Other Allocations Methods

- Regional and seasonal allocation
- Coastwide seasonal allocation
- Decreasing catch limits
- Winter fishery

- Which of these options should be included in the draft Amendment?
- If interested in Option E or G, how many fleets or regions?
- Soft or hard quotas?

Allocation Timeframe

	2009-2011	2012-2016	Longer Time Series	Weighted Allocation
Total	2	5	57	14

- Which of these options should be included in the draft Amendment?
- If a longer time series, what time frame?
  - 1985-2016
  - 1955-2016
  - Pre-industrial landings
  - 1980's-1992
- How can the Board be forward thinking?

Quota Transfers

	No Transfers	Support Transfers	Support Quota Reconciliation	Support Accountability Measures
Total	18	40	7	35

- Which of these options should be included in the draft Amendment?
- Is the Board interested in quota reconciliation?
- If additional accountability measures, which ones?
  - Cannot transfer two years in a row
  - Cannot transfer if already exceeded state quota
  - Transfers bounded by regions

Quota Rollovers

	No Rollovers	Support Rollovers	Support Limited Rollovers
Total	1,501	11	4

- Should the three management alternatives above be included in the draft Amendment?
- If interested in limited rollovers, which ones?
  - 100% up to some poundage level
  - 50% unused quota can be rolled over
  - 10% of total quota can be rolled over
  - 5% of total quota can be rolled over

Incidental Catch

	Limit Per Vessel	Limit Per Ind.	Included in TAC	Cap and Trigger	Percent Composition	Small-Scale Set Aside
Total	8	3	2,512	4	4	2,151

- Which of these options should be included in the draft Amendment?
- Does the Board want a management alternative which could remove the bycatch provision?
- Does the Board have any comments on how a small-scale fishery should be defined?

Episodic Events

	No Set Aside	1% Set Aside	>1% Set Aside
Total	35	8	8

- Should the three management alternatives above be included in the draft Amendment?
- Does the Board want a management alternative which could remove the episodic events set aside?
- Should New York be included in the set aside?
- Should there be a management alternative which splits the set aside between ME and the other New England states?

Chesapeake Bay Cap

	Remove Cap	Maintain Cap	Reduce Cap
Total	3	32	2,519

- Should the three management alternatives above be included in the draft Amendment?
- If the Board wants to reduce the Cap, what reduction levels should be included?
  - Recent 5-year average harvest
  - 96 million pounds

Research Set Aside

	No RSA	Support a RSA
Total	9	7

- Does the Board want to include this as an issue in draft Amendment 3?
- If the Board is interested in a RSA, do they have comments on how much TAC should be set aside?