2017 Stock Assessment Update

2012 Benchmark

- Methods
  - Biological data
  - Local, regional, coastwide indices
  - Multiple trend analyses (Mann-Kendall, ARIMA)
  - Data poor assessment model (DBSRA)

- Findings
  - Significant declines in multiple surveys
  - DBSRA not endorsed
  - No overfishing, overfished determination could be made based on analyses performed (trend analyses)
  - Stock status: depleted

2017 Update

- Initiated in 2016 after reviewing data, research, literature since benchmark
- Update report → did not recreate the entire wheel
- Heavy references to benchmark report
- Intro sections updated with new literature where available

2017 Update

- Updated indices and trend analyses with data through 2016 where available

- Methods consistent with benchmark where possible but a few tweaks necessary

- Did not update DBSRA
  - no overfishing determination

2017 Update

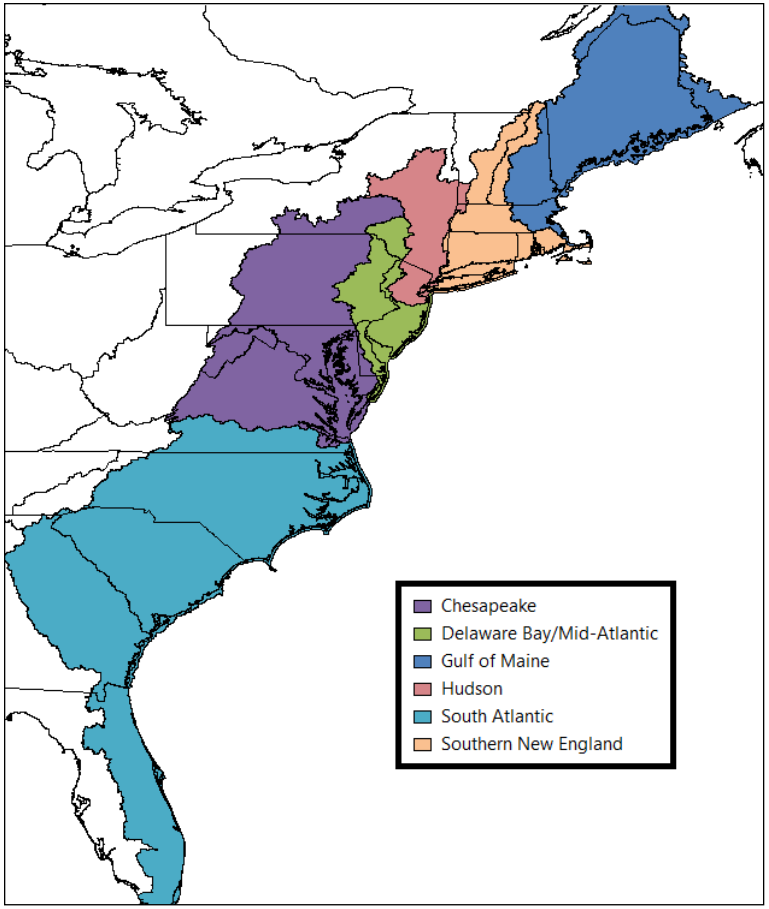
- Report was made available in meeting materials

- 2017 American Eel Stock Assessment Update
  - Presentation of Assessment Update *(J. Brust)*
  - Consider Management Response to Stock Assessment Update (*J. Clark*) **Possible**

- Many thanks to Eel SASC, Eel TC, ASMFC staff

Management unit and regions

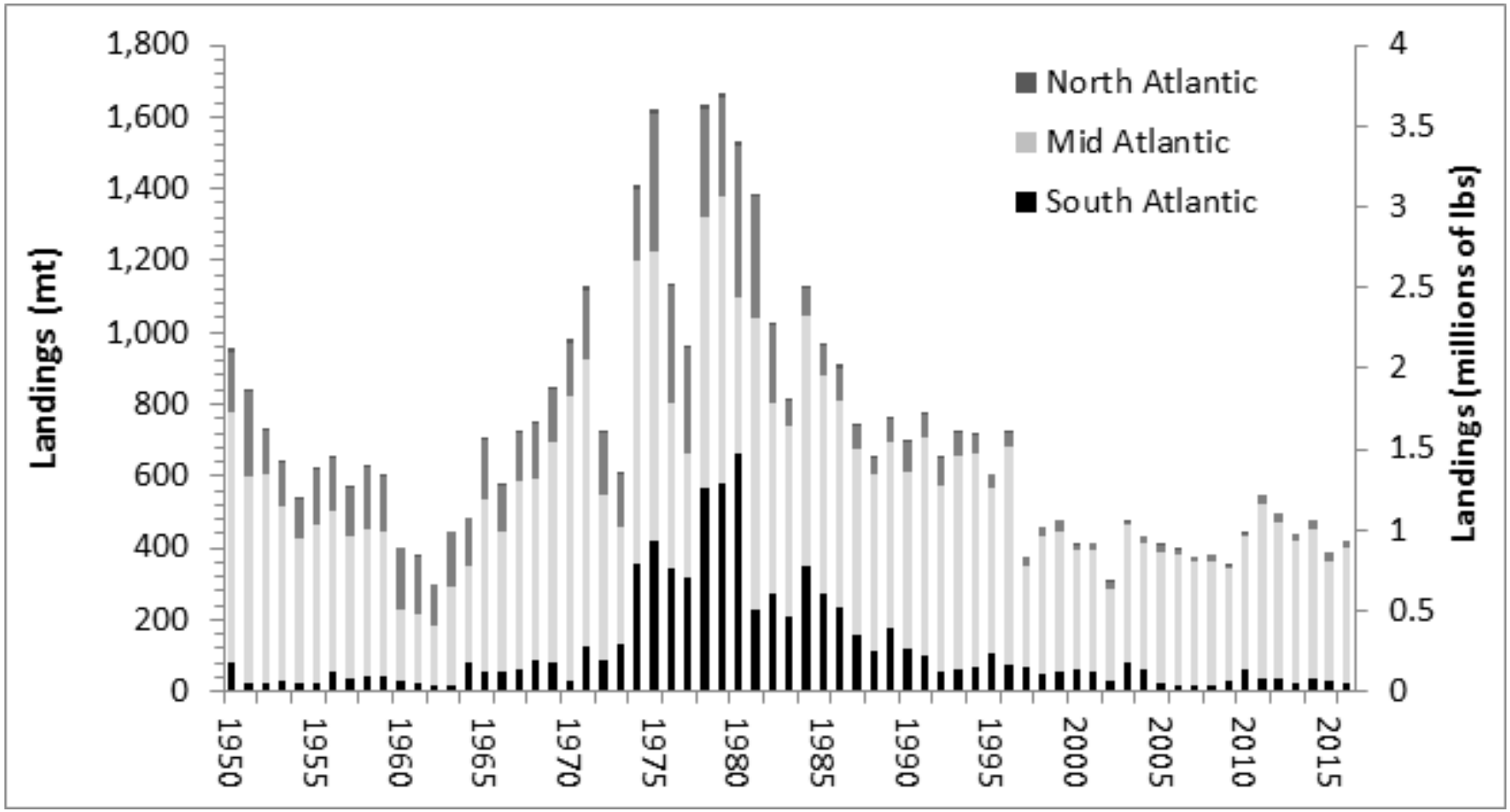
- Stock unit = that portion of the American eel population occurring in the territorial seas and inland waters along the Atlantic coast from Maine to Florida



Data Sources - Commercial

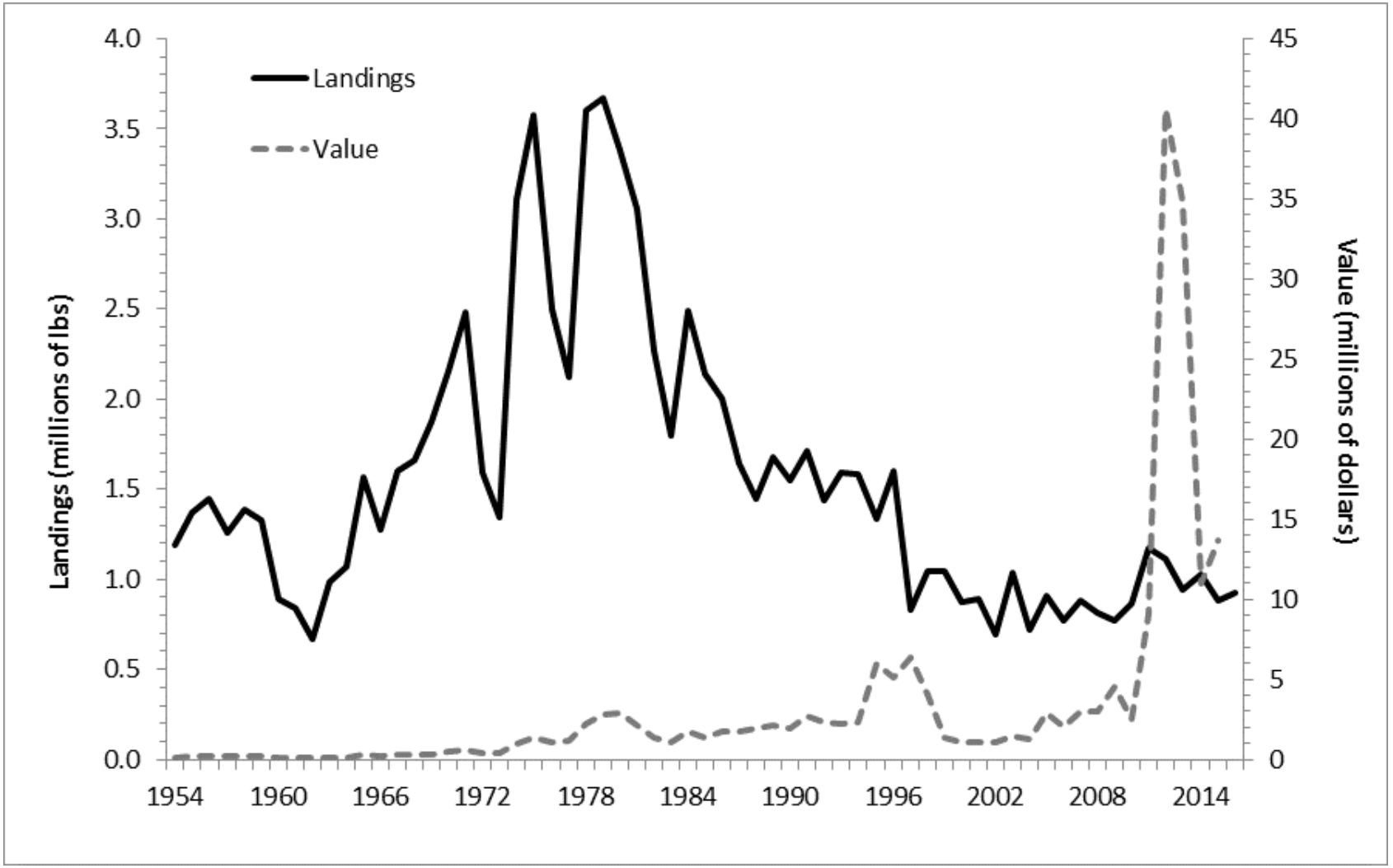
- Landings data updated through 2016
- Tried to corroborate state, federal, ACCSP landings
- Biases
  - No jurisdiction in freshwater
  - Insufficient reporting
- Improvements in reporting through Addendum 4

Total Commercial Landings



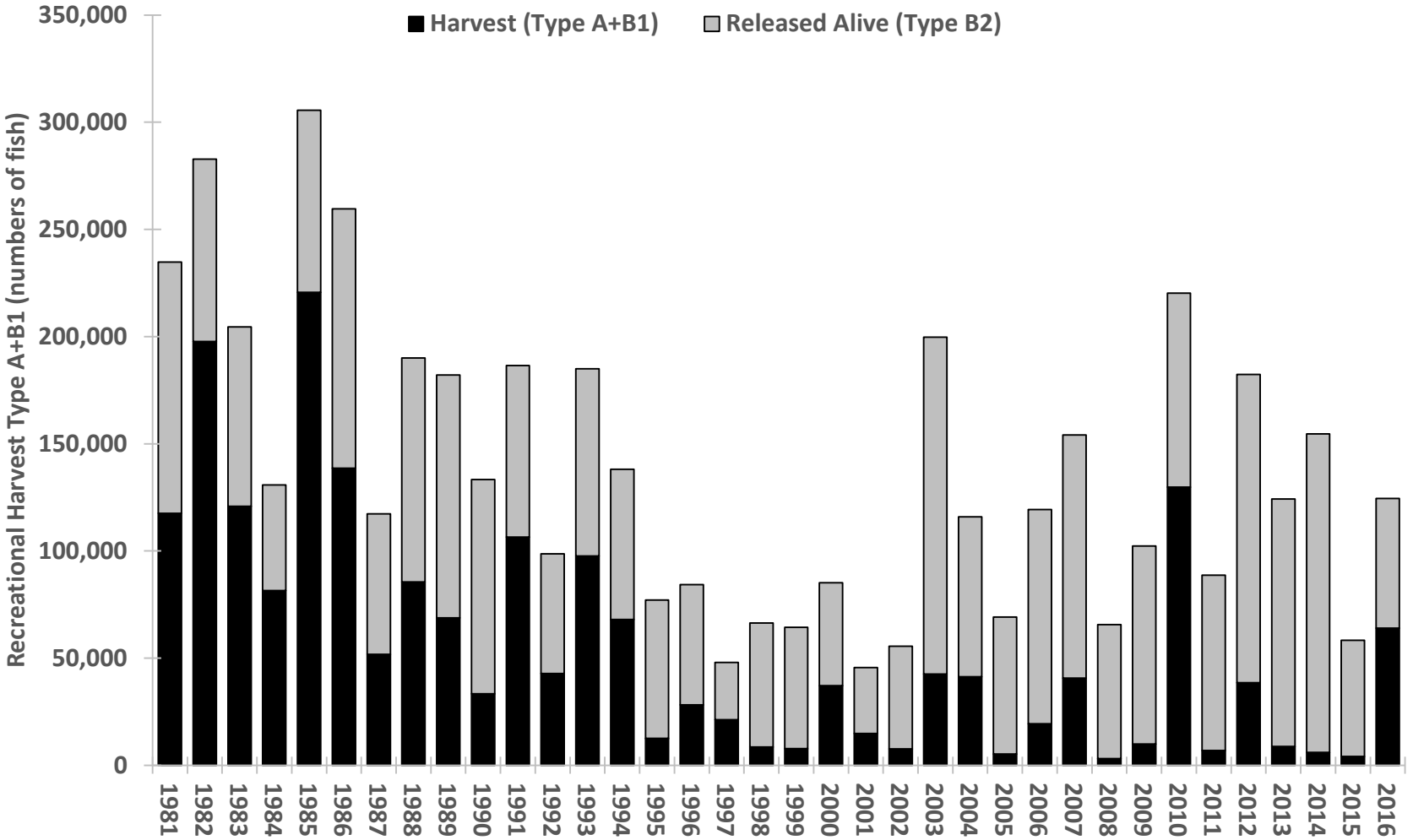
This is the old regional breakdown

Landings and Value



Data Sources - Recreational

- MRFSS-MRIP calibration used



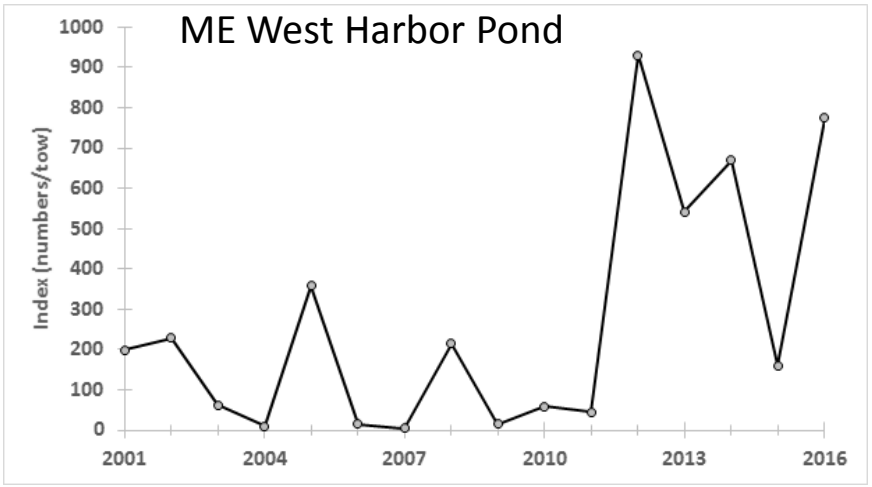
Data Sources – YOY Indices

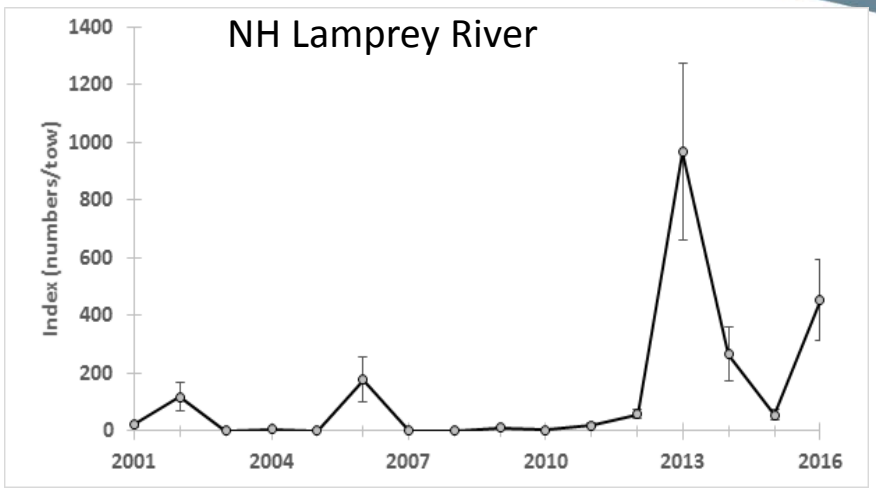
- 20 state mandated surveys; 2 non-mandated
- Standardized using GLM where possible

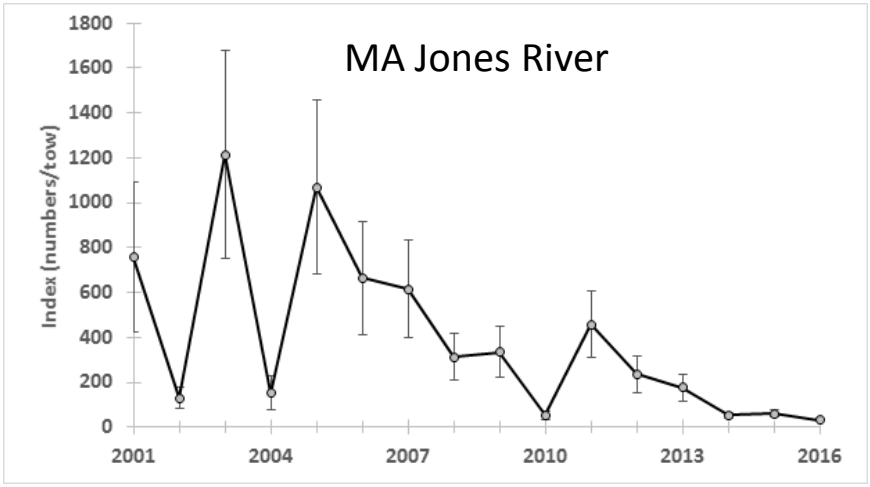
computed, nominal indices computed as ratio estimators.

Region	State	Site	Years	Gear	GLM?	Error	Predictors	Phi
Gulf of Maine	ME	West Harbor Pond	2001-2016	Irish Elver Ramp	N			
	NH	Lamprey River	2001-2016	Irish Elver Trap	Y	NB	Year+WaterTemp	1.48
	MA	Jones River	2001-2016	Sheldon Elver Trap	Y	NB	Year+Discharge	1.08
Southern New England	CT	Ingham Hill	2007-2016	Irish Elver Ramp	N			
	RI	Gilbert Stuart Dam	2000-2016	Irish Elver Ramp	Y	NB	Year+WaterTemp+WaterLevel	1.38
	RI	Hamilton Fish Ladder	2004-2016	Irish Elver Ramp	Y	NB	Year+WaterLevel	1.43
	NY	Carman's River	2000-2016	Fyke Net	Y	NB	Year+WaterTemp	1.74
Hudson River	NY	HRE Monitoring *	1974-2013	Epibenthic Sled and Tucker Trawl	Y	Delta-gamma	Year + Month + Strata + Rivermile + Volume	0.66
Delaware Bay/ Mid-Atlantic Coastal Bays	NJ	Patcong Creek	2004-2016	Fyke Net	N			
	NJ	Little Egg Inlet Ichthyoplankton *	1992-2015	Plankton Net	Y	NB	Year + Month + Flow meter + River discharge	1.07
	DE	Millsboro Dam	2000-2016	Fyke Net	Y	NB	Year+Discharge	1.76
	MD	Turville Creek	2000-2016	Irish Elver Ramp	N			
Chesapeake Bay	PRFC	Clark's Millpond	2000-2013	Irish Elver Ramp	N			
	PRFC	Gardy's Millpond	2000-2016	Irish Elver Ramp	N			
	VA	Bracken's Pond	2000-2016	Irish Elver Ramp	N			
	VA	Kamp's Millpond	2000-2016	Irish Elver Ramp	N			
	VA	Wareham's Pond	2003-2016	Irish Elver Ramp	Y	NB	Year+WaterTemp	1.31
	VA	Wormley Creek	2001-2016	Irish Elver Ramp	Y	NB	Year+WaterTemp	1.54
South Atlantic	NC	Beaufort Bridgenet Ichthyoplankton	1987-2007	Plankton Net	Y	NB	Year + Month + River discharge	1.27
	SC	Goose Creek	2000-2015	Fyke Net	Y	NB	Year+WaterTemp	1.09
	GA	Altamaha Canal	2001-2010	Fyke Net	Y	LN	Year+WaterTemp	1.11
	FL	Guana River Dam	2001-2016	Dip Net	N			

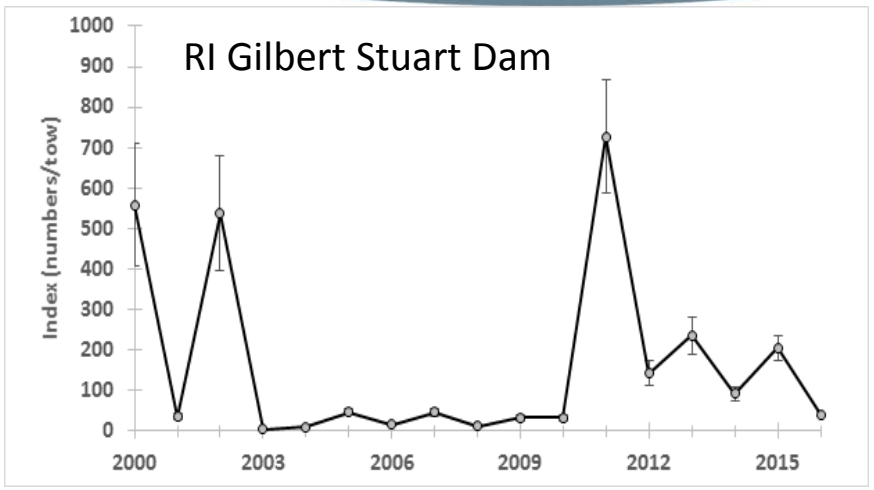
Gulf of Maine YOY

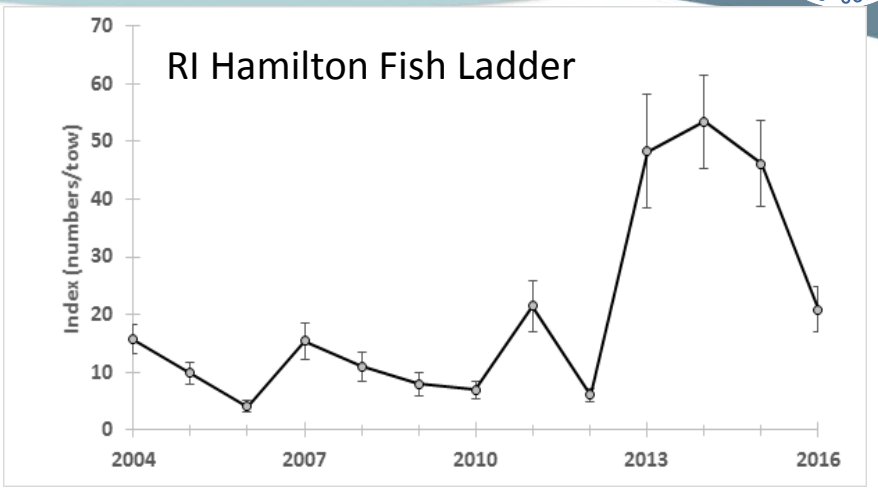


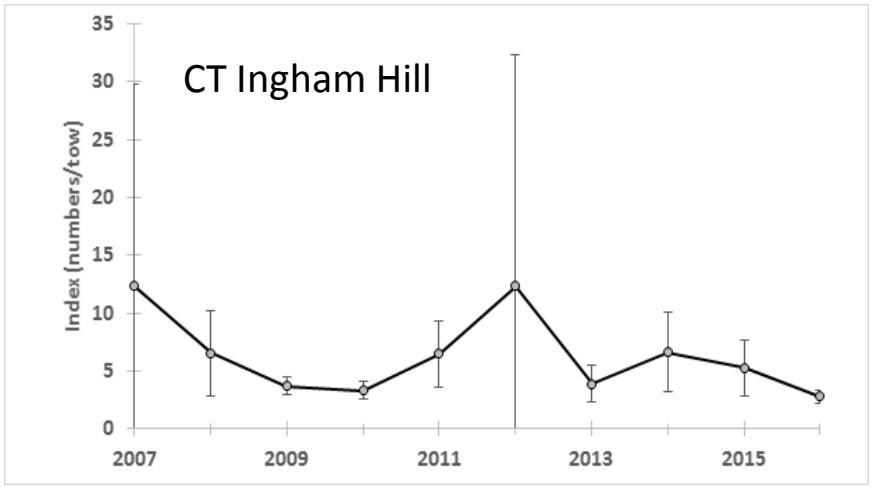


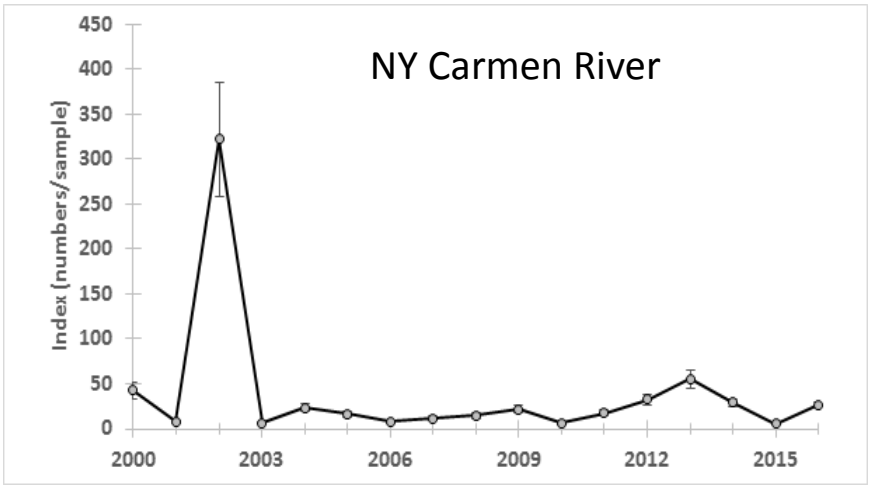


Southern NE YOY

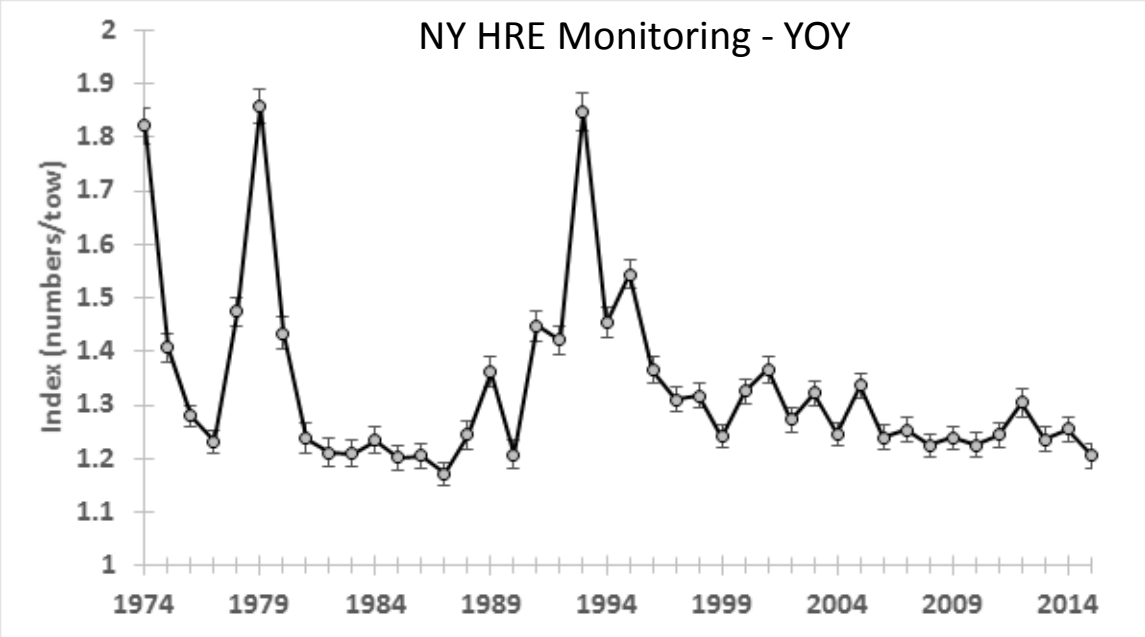




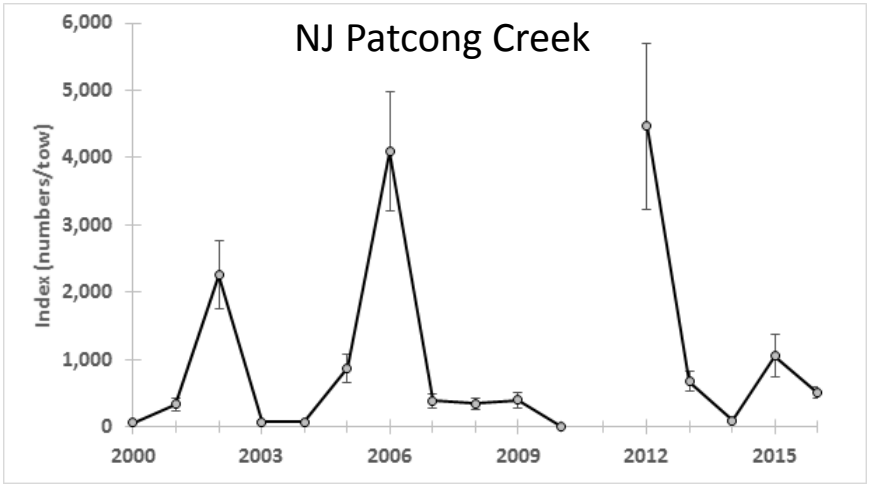


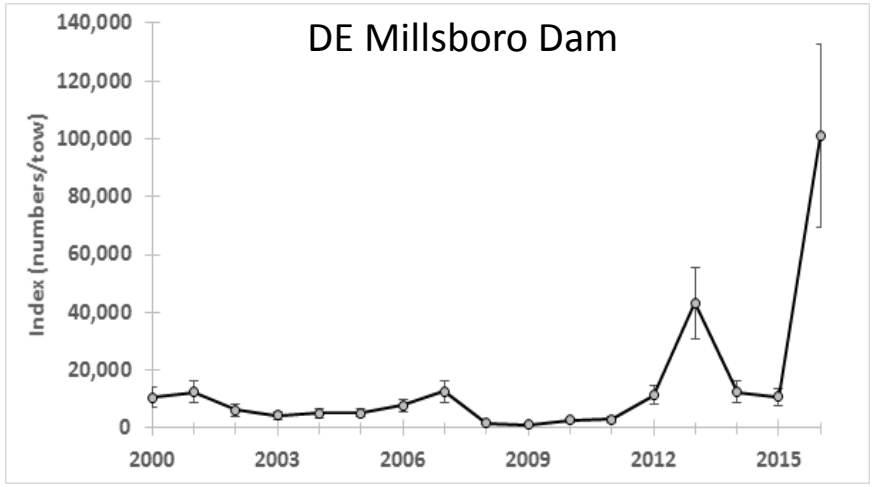


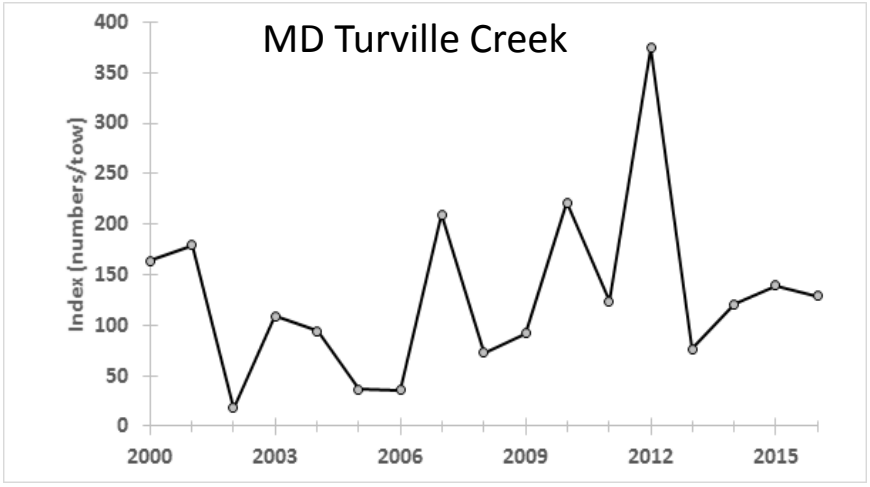
Hudson River YOY

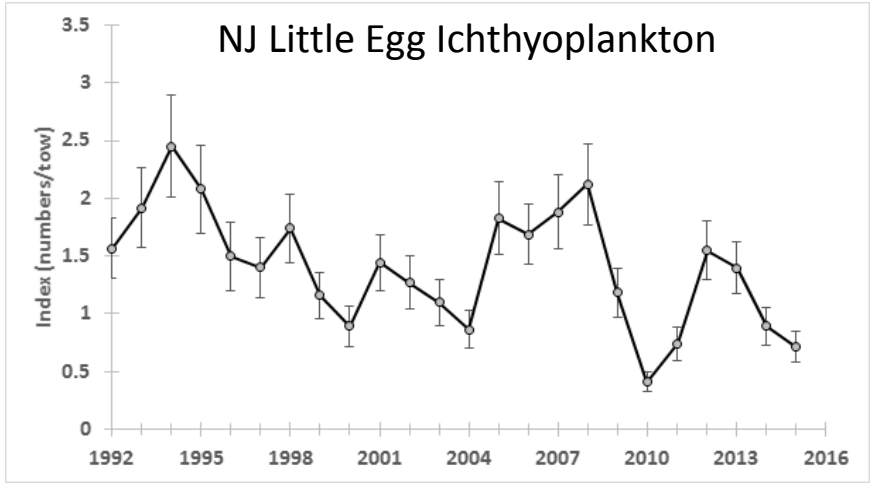


DB/Mid-Atl Coastal Bays YOY

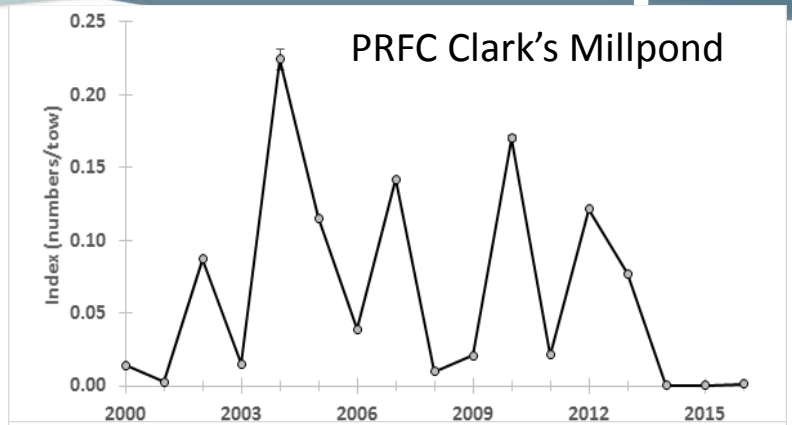


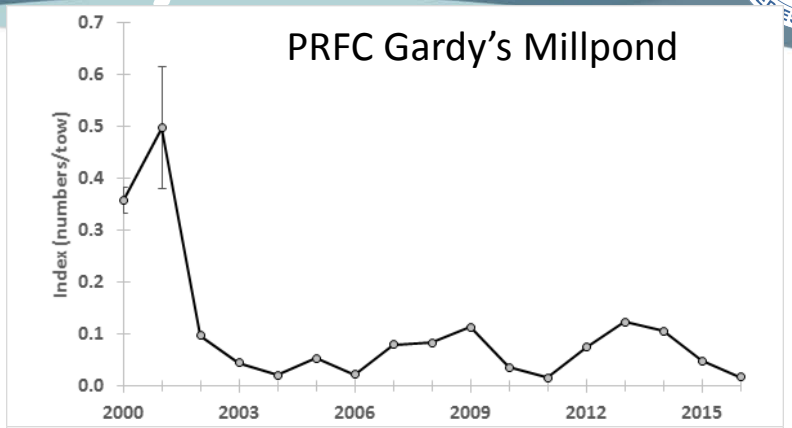


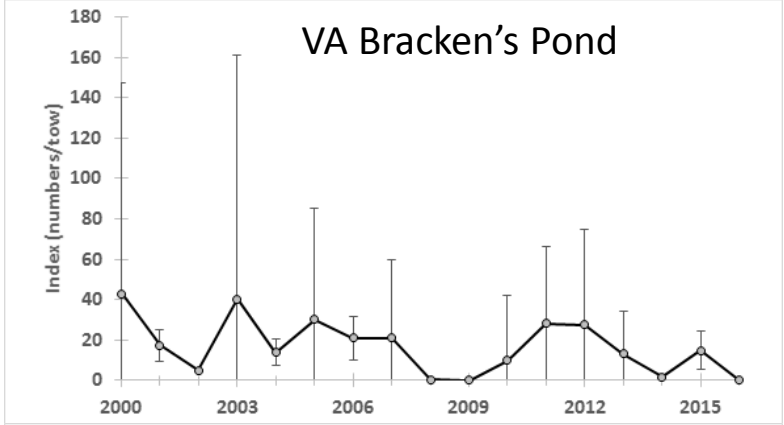


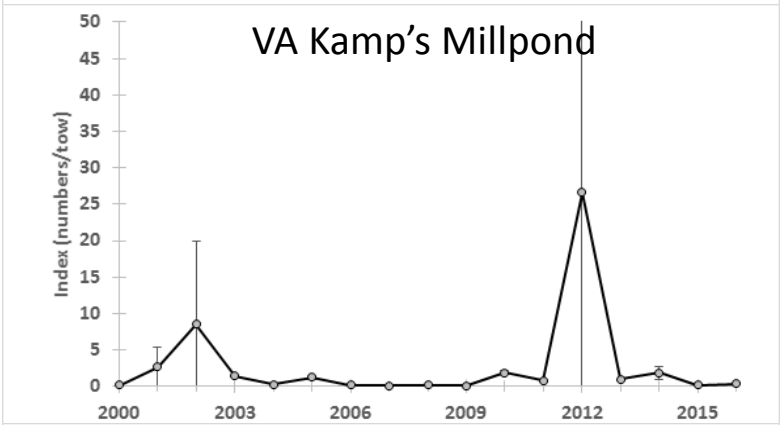


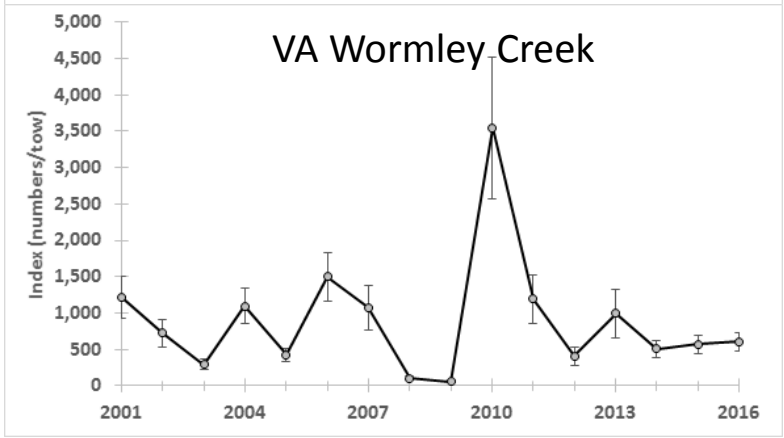
Chesapeake Bay YOY

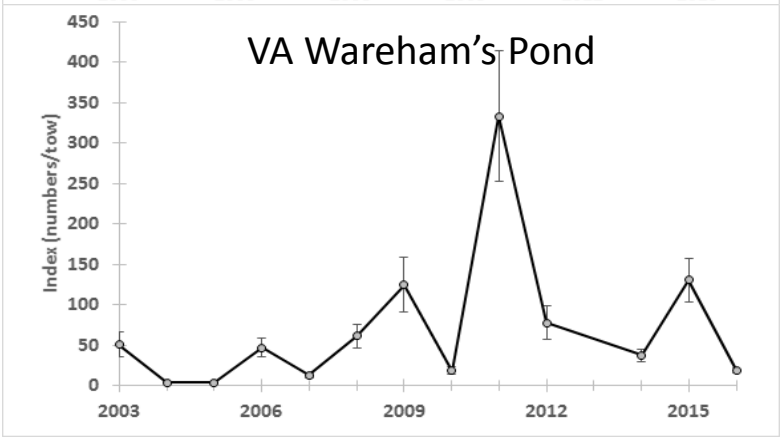




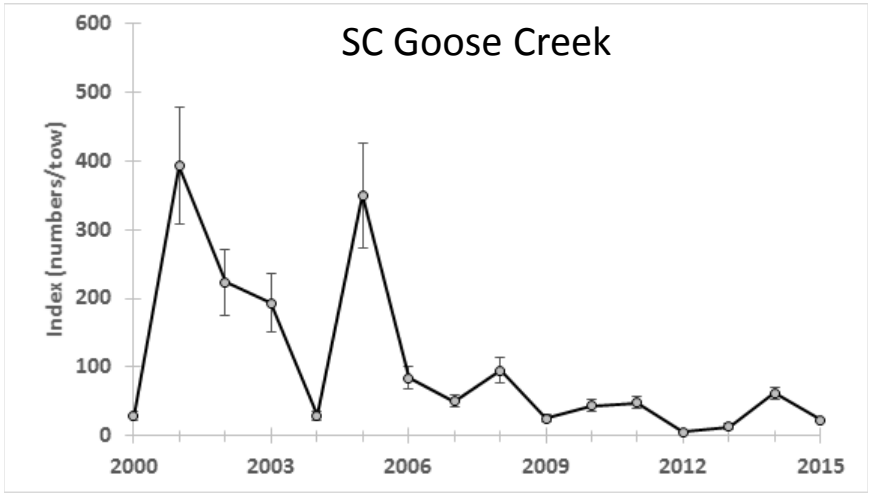


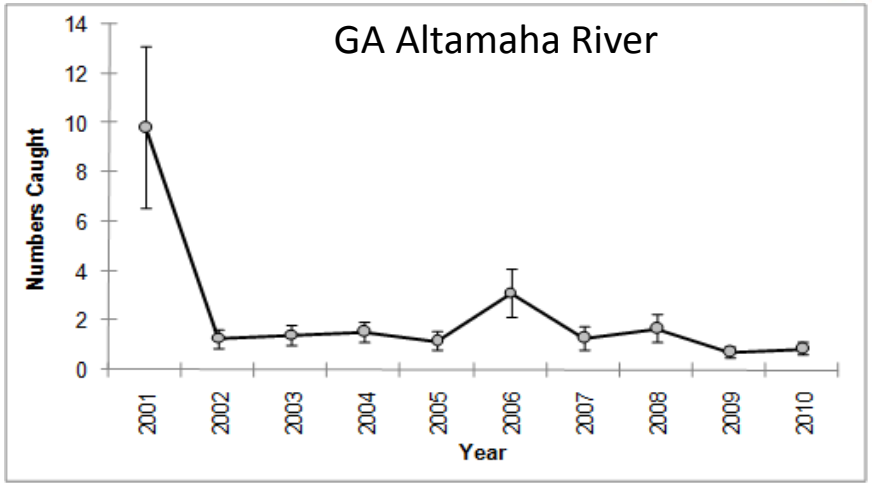


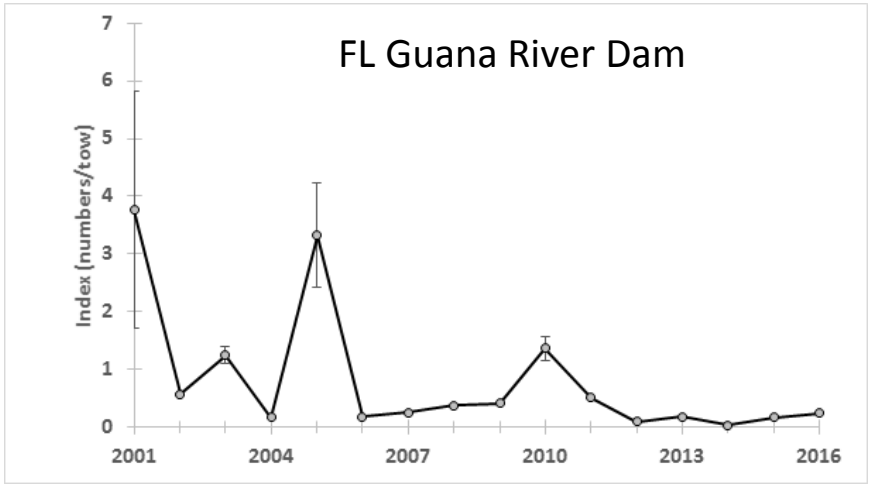


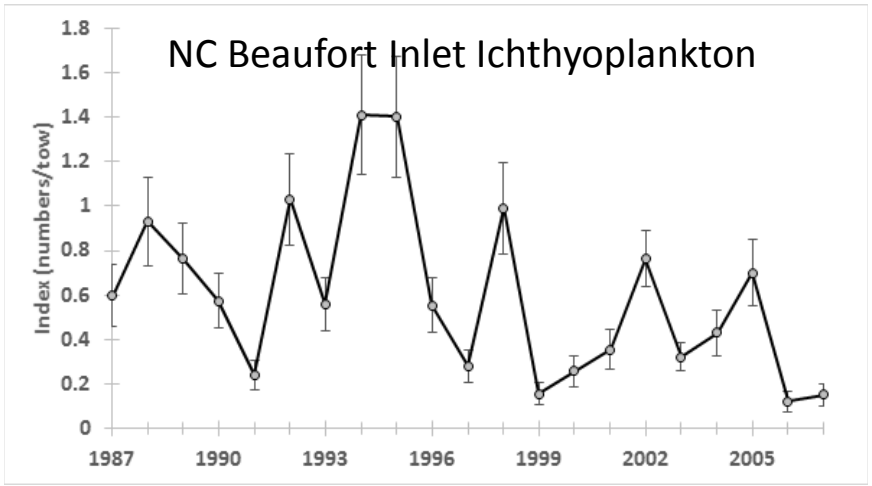


South Atlantic YOY









YOY Comparison

- 20 significant correlations, all positive
  - Benchmark had 10 positive and 3 negative

	Region	Gulf of Maine			Southern New England				Delaware Bay/Mid-Atl			Chesapeake Bay						South Atlantic		
Region	Survey Site	West Harbor Pond (ME)	Lamprey River (NH)	Jones River (MA)	Ingham Hill (CT)	Gilbert Stuart Dam (RI)	Hamilton Ladder (RI)	Carman's River (NY)	Patcong Creek (NJ)	Mills-boro Dam (DE)	Turville Creek (MD)	Clarks Millpond (PRFC)	Gardys Millpond (PRFC)	Brackens Pond (VA)	Kamps Millpond (VA)	Wareha ms Pond (VA)	Wormley Creek (VA)	BBISP (NC)	Goose Creek (SC)	Altamah a Canal (GA)
Gulf of Maine	Lamprey River (NH)	***0.532***																		
	Jones River (MA)	-0.362	-0.503																	
Southern New England	Ingham Hill (CT)	0.079	-0.224	***0.455***																
	Gilbert Stuart Dam (R	***0.418***	***0.476***	-0.288	0.236															
	Hamilton Fish Ladder	0.220	0.363	-0.467	-0.030	***0.505***														
	Carman's River (NY)	***0.506***	***0.535***	-0.359	0.127	***0.502***	0.319													
Delaware Bay/Mid-Atl	Patcong Creek (NJ)	0.343	***0.446***	0.032	0.183	0.332	-0.266	0.224												
	Millsboro Dam (DE)	***0.432***	***0.585***	-0.253	0.042	***0.368***	***0.434***	0.294	0.265											
	Turville Creek (MD)	0.029	-0.109	-0.203	0.176	0.157	0.049	-0.233	-0.335	0.294										
Chesapeake Bay	Clarks Millpond (PRFC	-0.332	-0.326	0.132	0.115	-0.103	-0.462	0.118	0.009	-0.221	-0.005									
	Gardys Millpond (PRF	0.276	0.106	0.094	0.188	0.230	0.115	0.324	-0.091	0.211	0.002	-0.235								
	Brackens Pond (VA)	-0.179	-0.321	***0.685***	***0.564***	0.228	-0.154	-0.162	-0.029	0.032	0.235	0.208	-0.096							
	Kamps Millpond (VA)	***0.597***	0.256	-0.132	0.127	0.206	0.093	0.162	0.053	0.145	0.174	0.115	0.061	0.074						
	Warehams Pond (VA)	0.126	0.258	0.005	0.000	0.330	0.126	-0.049	0.343	-0.297	0.126	-0.511	0.077	-0.038	-0.104					
	Wormley Creek (VA)	-0.385	0.171	-0.071	-0.224	0.109	-0.005	-0.218	-0.118	0.206	0.194	0.335	-0.300	0.162	0.103	-0.291				
South Atlantic	BBISP (NC)	***0.679***	0.107	-0.286	NA	0.214	0.400	0.452	0.071	-0.452	-0.429	0.214	0.119	-0.452	***0.786***	-0.700	-0.429			
	Goose Creek (SC)	0.021	-0.271	***0.496***	0.183	-0.288	-0.112	-0.259	-0.132	-0.141	-0.379	-0.144	0.021	0.074	0.221	-0.434	0.061	0.476		
	Altamaha Canal (GA)	-0.079	0.164	0.309	0.600	-0.345	0.107	-0.212	-0.006	***0.455***	-0.067	-0.442	-0.067	0.236	0.103	0.000	0.297	-0.536	0.394	
	Guana River Dam (FL)	-0.147	-0.456	***0.491***	-0.455	-0.115	-0.280	-0.371	-0.275	-0.388	-0.094	0.085	0.100	0.203	0.215	-0.115	0.124	0.286	***0.629***	-0.200

Data Sources – Yellow Indices

- 15 elver / yellow eel surveys
- Standardized using GLM where possible
- Some changes to data used
- Some models different than benchmark

Region	State	Survey	Location	Years	Gear	Life Stage(s)	GLM ?	Error	Predictors	Phi
Southern New England	CT	CTDEP Electrofishing Survey	Farmill River	2001-2014	Electrofishing	Elver & Yellow	N			
	NY	NY Western Long Island Survey	Western Long Island	1984-2016	Seine	Yellow	Y	NB	Year + Month + Lat	0.48
Hudson River	NY	HRE Monitoring Program	Hudson River	1974-2013	Epidbenthic Sled and Tucker Trawl	Yearling & older	Y	NB	Year + Gear + Month + Strata + Rivermile +Volume	1.91
	NY	NYDEC Alosine Beach Seine Survey	Hudson River	1980-2016	Seine	Elver & Yellow	Y	NB	Year + Month + Rivermile	1.23
	NY	NYDEC Striped Bass Beach Seine Survey	Hudson River	1980-2016	Seine	Elver & Yellow	Y	NB	Year + Month + Longitude	1.31
Delaware Bay/ Mid-Atlantic Coastal Bays	NJ	NJDFW Striped Bass Seine	Delaware River	1980-2016	Seine	Yellow	Y	NB	Year + Water temp + Salinity	1.02
	DE	Delaware Trawl Survey	Delaware River	1982-2016	Trawl	Elver & Yellow	Y	NB	Year + Month + Surf_Temp + Surf_Sal	2.18
	DE	PSEG Trawl Survey	Delaware River	1998-2016	Trawl	Elver & Yellow	Y	NB	Year + Month + Bot_S	1.95
	PA	Area 6 Electrofishing Survey	Delaware River	1999-2016	Electrofishing	Elver	Y	NB	Year + Site	1.16

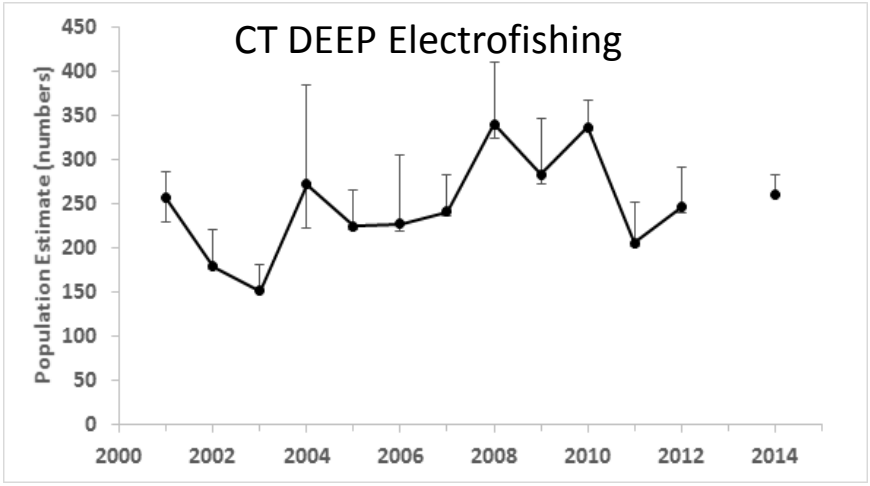
Table 9. *Continued.*

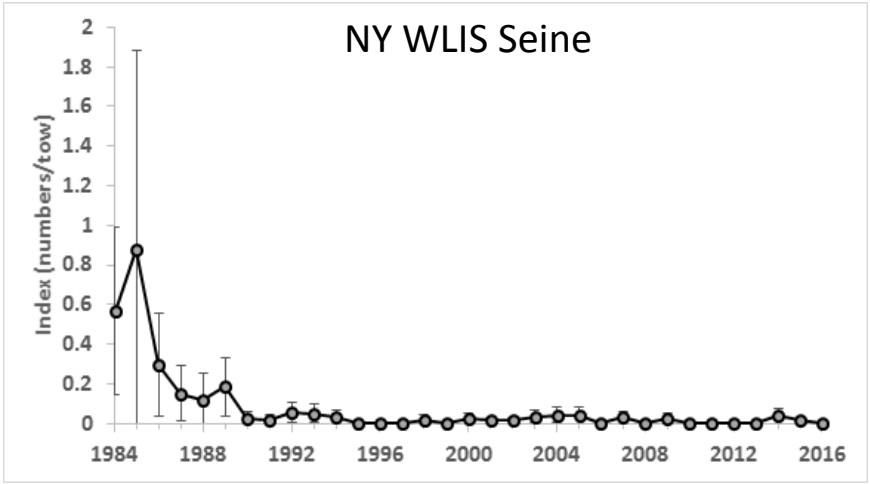
Region	State	Survey	Location	Years	Gear	Life Stage(s)	GLM ?	Error	Predictors	Phi
Chesapeake Bay	MD	MDDNR Striped Bass Seine	Chesapeake Bay	1966-2016	Seine	Yellow	Y	NB	Year + Month + Salinity	0.95
	VA	North Anna Electrofishing Survey	North Anna River	1990-2009	Electrofishing	Elver & Yellow	Y	NB	Year+GearType+TimePeriod+Station	1.20
	VA	VIMS Juvenile Striped Bass Seine Survey - long	Lower Ches Bay & Trib	1967-2016	Seine	Yellow	Y	NB	Year + SYSTEM	1.69
	VA	VIMS Juvenile Striped Bass Seine Survey - short	Lower Ches Bay & Trib	1989-2016	Seine	Yellow	Y	NB	Year + STATION TYPE	1.38
South Atlantic	NC	NCDMF Estuarine Trawl Survey	NC waters	1989-2016	Trawl	Elver & Yellow	Y	NB	Year + Lat + Lon + Bottomtype	1.29
	SC	SC Electrofishing Survey	SC waters	2001-2016	Electrofishing	Elver & Yellow	Y	NB	Year + Strata + Water temp + Salinity + Tide Stage	1.10

Gulf of Maine Yellow

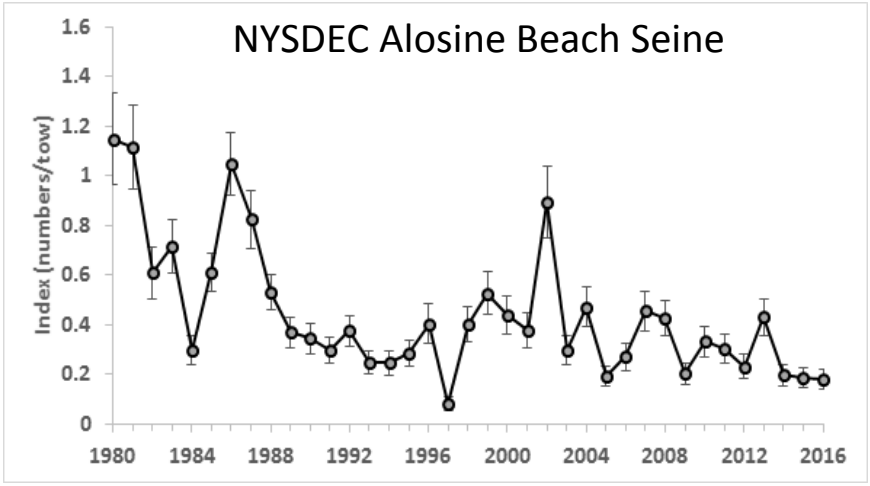
No available yellow eel indices in Gulf of Maine

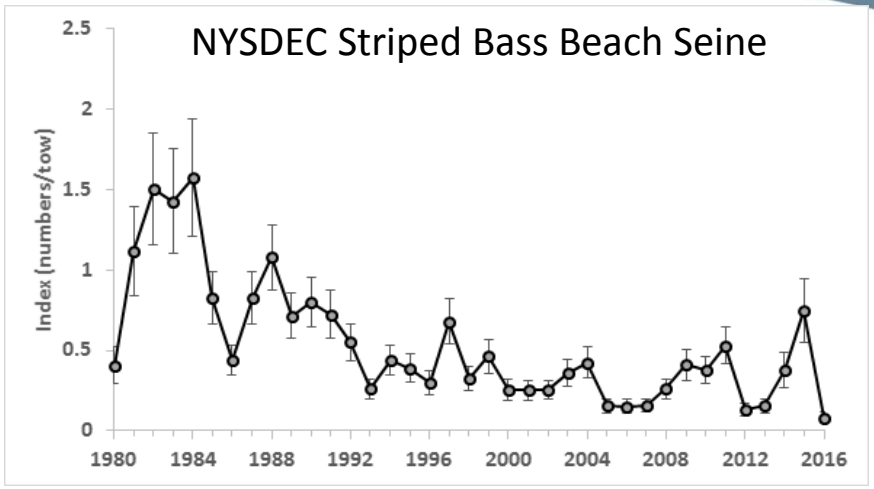
Southern NE Yellow

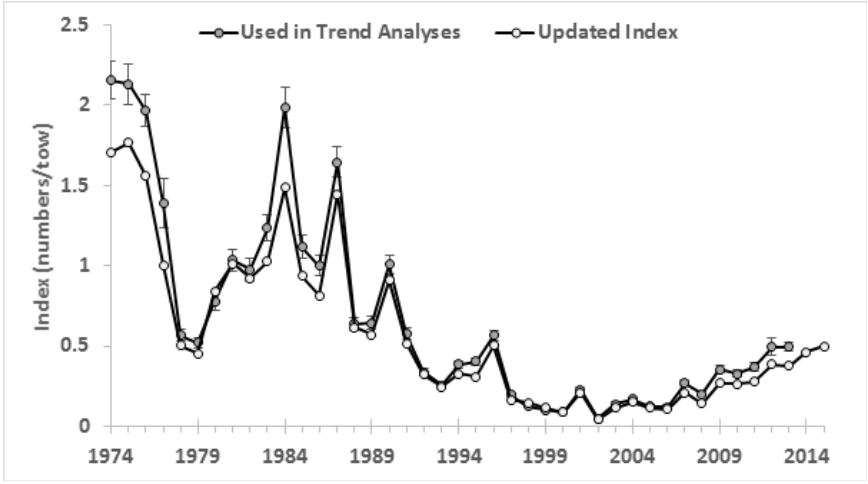




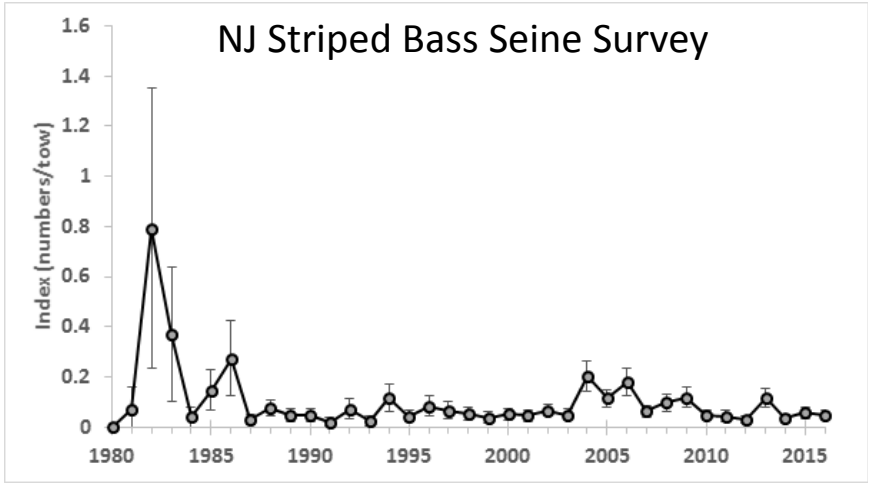
Hudson River Yellow

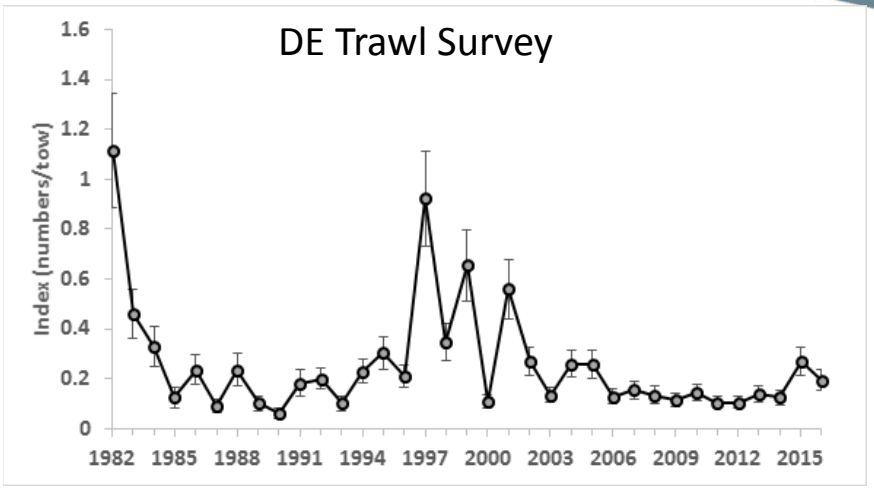


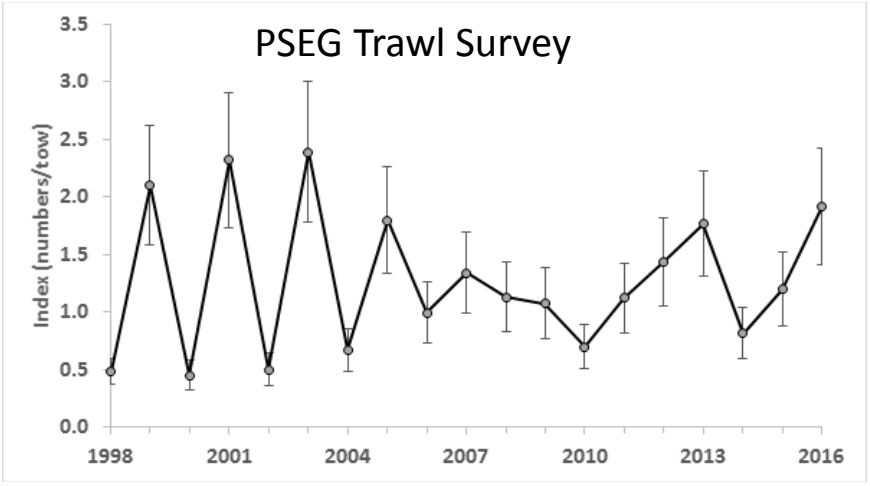


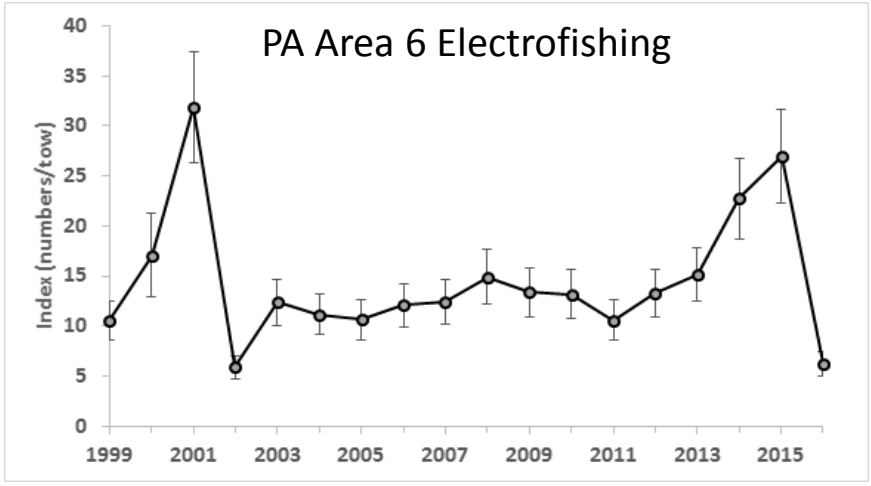


DB/Mid-Atl Coastal Bays Yellow

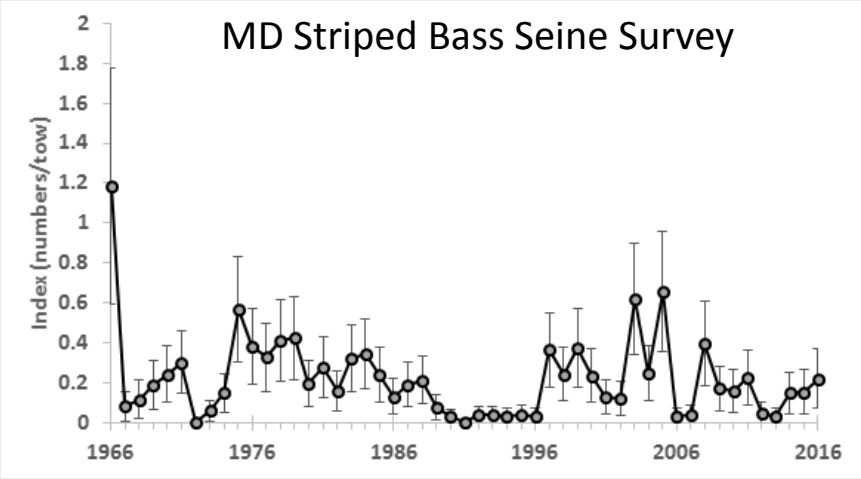


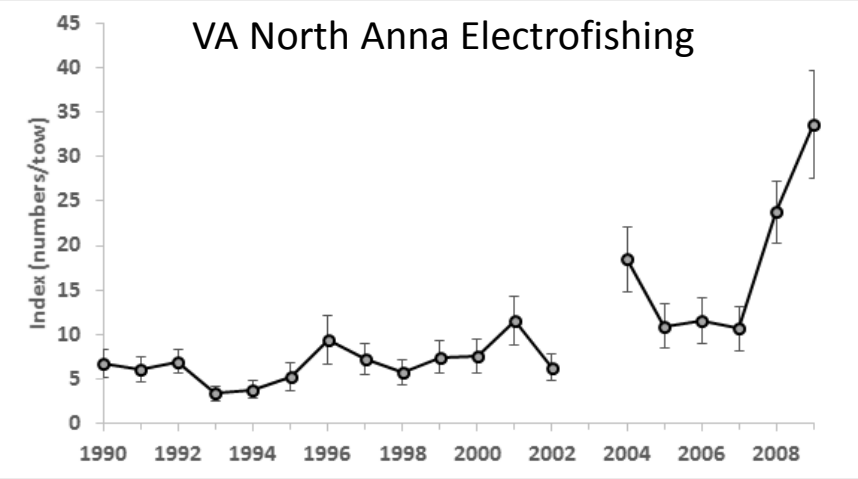


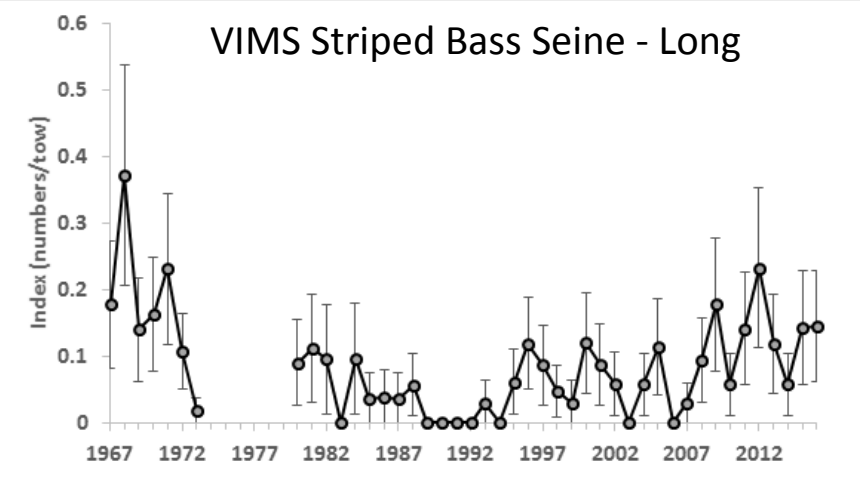


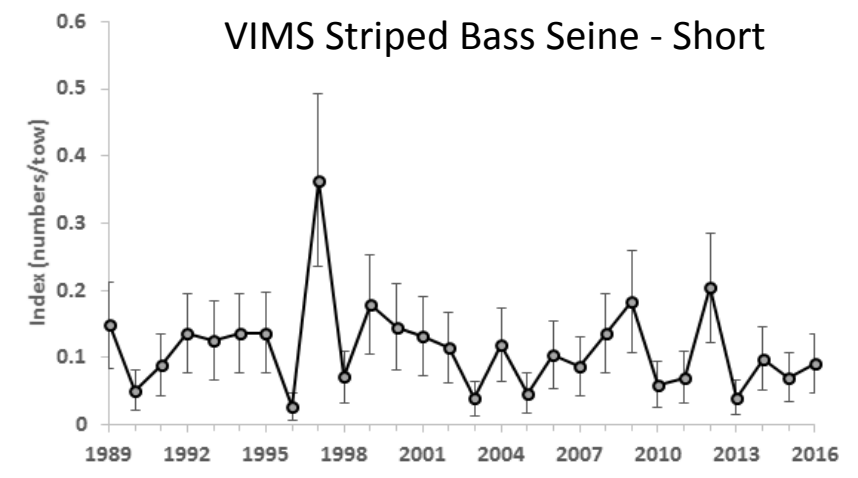


Chesapeake Bay Yellow

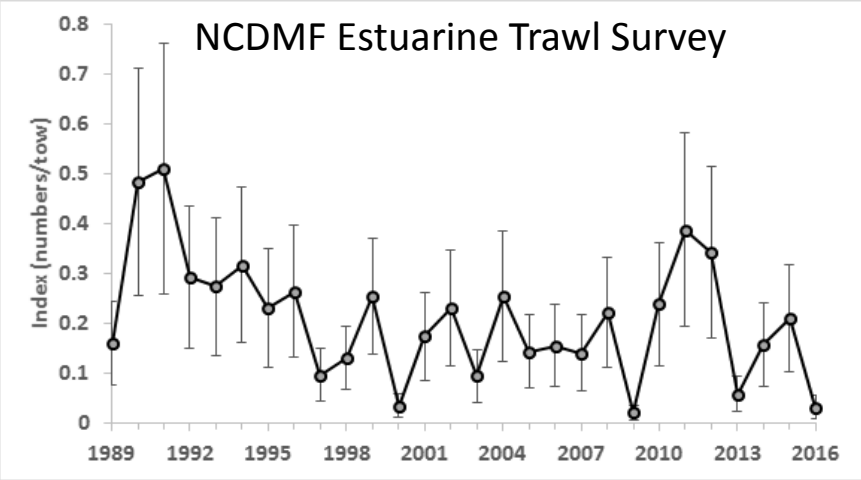


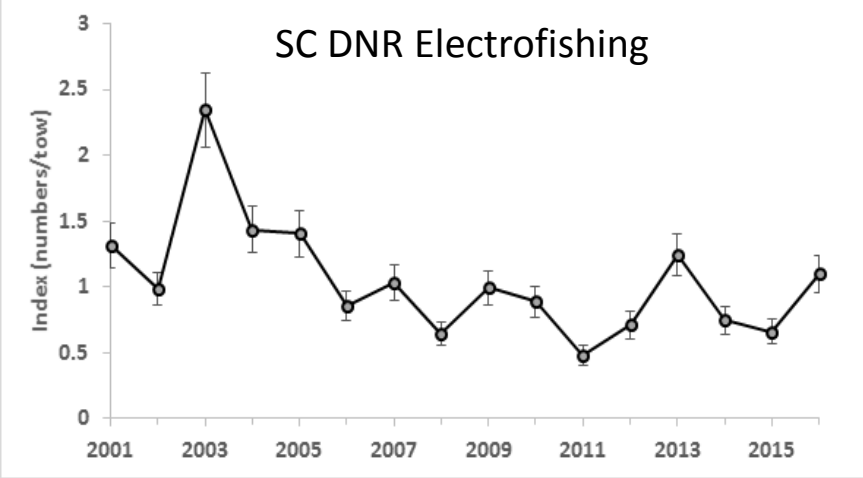






South Atlantic Yellow





Yellow Eel Comparison

- 23 significant correlations, all positive

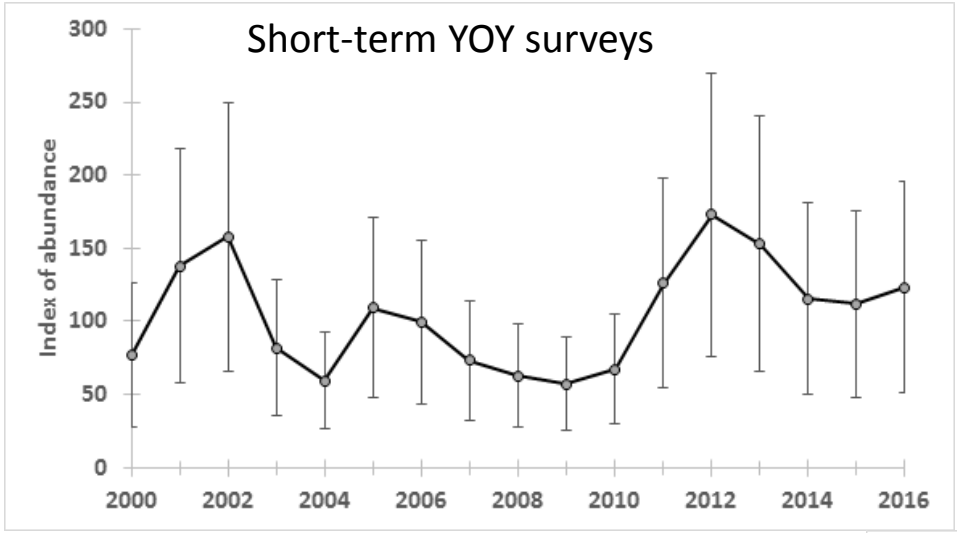
	Region	S. New England		Hudson River			Delaware Bay/Mid-Atl				Chesapeake Bay			South Atlantic
Region	Survey Site	CTDEP (CT)	W. Long Island (NY)	HRE Monitoring (NY)	NYDEC Alosine Beach Seine	NYDEC Striped Bass Beach	NJDFW Striped Bass Seine	Delaware Trawl (DE)	PSEG Trawl Survey (DE)	Area 6 Electrofishing (PA)	MDDNR Striped Bass Seine	North Anna (VA)	VIMS Juvenile Striped Bass Seine	NCDMF Estuarine Trawl Survey (NC)
S. New England	W. Long Island Study (NY)	-0.254												
Hudson River	HRE Monitoring (NY)	***0.406***	***0.440***											
	NYDEC Alosine Beach Seine (NY)	0.091	***0.279***	***0.284***										
	NYDEC Striped Bass Beach Seine (NY)	0.168	***0.492***	***0.726***	***0.290***									
Delaware Bay/Mid-Atl	NJDFW Striped Bass Seine (NJ)	0.147	0.129	-0.033	***0.237***	0.085								
	Delaware Trawl (DE)	-0.063	-0.162	-0.087	0.120	0.171	***0.296***							
	PSEG Trawl Survey (DE)	-0.217	-0.203	0.158	-0.275	-0.235	-0.226	0.198						
	Area 6 Electrofishing	***0.706***	0.087	***0.493***	-0.183	0.110	-0.042	-0.187	-0.028					
Chesapeake Bay	MDDNR Striped Bass	-0.007	0.105	0.047	0.131	0.184	0.099	***0.296***	0.096	-0.247				
	North Anna (VA)	***0.857***	-0.171	-0.337	0.147	-0.377	***0.575***	-0.107	0.264	***0.455***	***0.389***			
	VIMS Juvenile Striped Bass Seine —short (VA)	***0.552***	-0.077	-0.201	-0.083	0.057	-0.055	0.117	-0.175	0.115	0.139	0.072		
South Atlantic	NCDMF Estuarine Trawl Survey (NC)	0.098	0.024	***0.461***	0.111	***0.426***	-0.346	-0.098	-0.056	-0.218	-0.445	-0.491	-0.006	
	SC Electrofishing Survey (SC)	-0.217	***0.534***	-0.436	0.168	-0.238	***0.382***	***0.468***	***0.388***	-0.174	0.206	-0.167	-0.282	-0.491

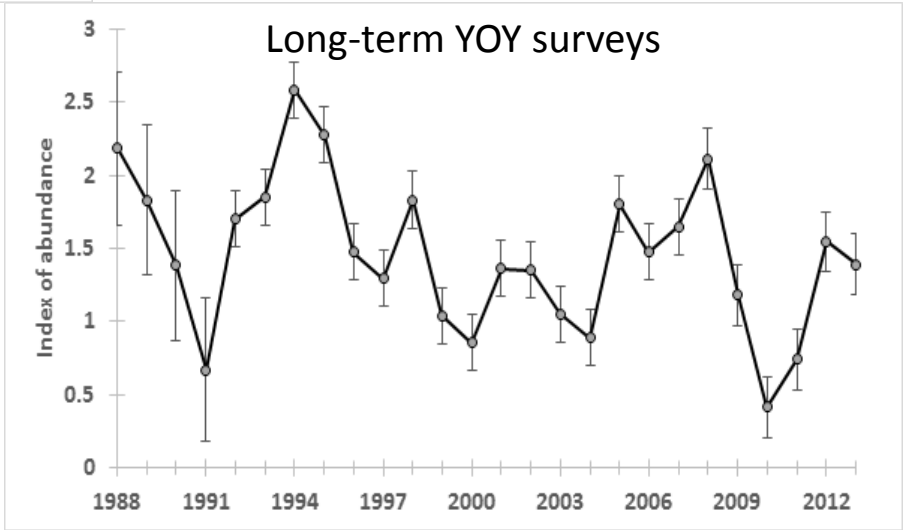
Assessment Methods

- Coastwide indices
  - YOY long-term and short-term
  - Yellow 40+ years, 30+ years, 20 years
- Regional indices
  - YOY and yellow
- Trend analysis
  - Power analysis
  - Mann-Kendall
  - Manly
  - ARIMA
- Life history characterization

Assessment Methods

- Coastwide recruitment indices



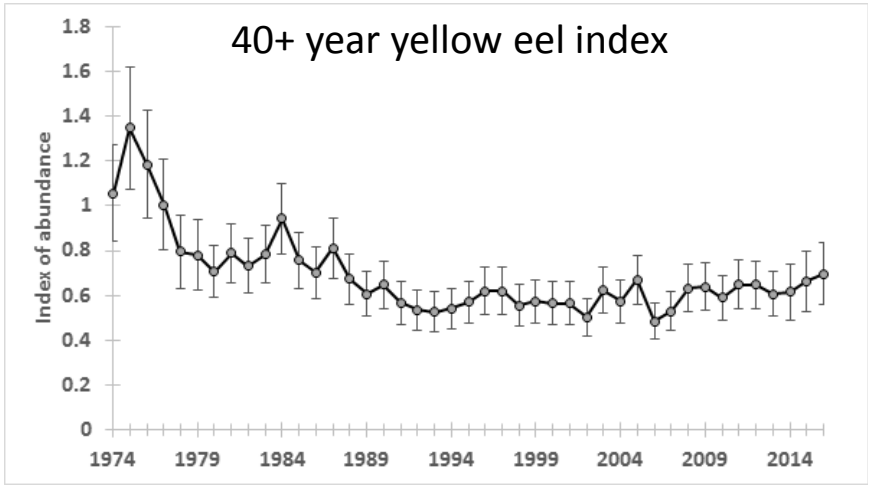


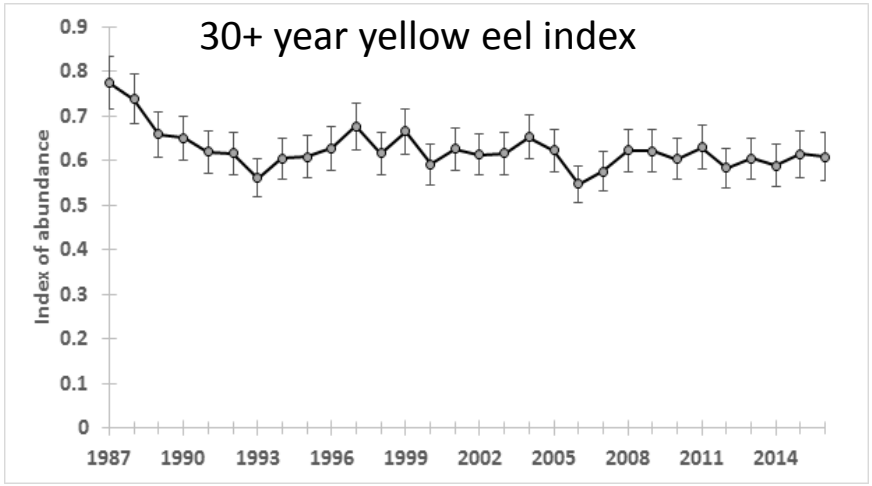
Assessment Methods

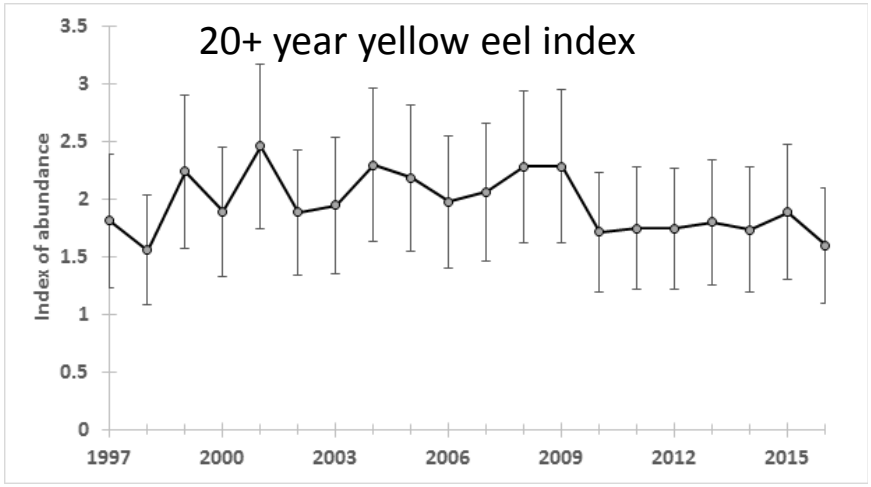
- Coastwide yellow eel
  - 20, 30, 40+ year indices

Region	State	Survey	Years	40+	30	20
Southern New England	CT	CTDEP Electrofishing Survey	2001-2012			
	NY	Western Long Island Study	1984-2016		X	X
Hudson River	NY	HRE Monitoring Program	1974-2013	X	X	X
	NY	NYDEC Alosine Beach Seine Survey	1980-2016		X	X
	NY	NYDEC Striped Bass Beach Seine Survey	1980-2016		X	X
Delaware Bay/ Mid-Atlantic Coastal Bays	NJ	NJDFW Striped Bass Seine	1980-2016		X	X
	DE	Delaware Trawl Survey	1982-2016		X	X
	DE	PSEG Trawl Survey	1998-2016	Removed		X
	PA	Area 6 Electrofishing Survey	1999-2016			X
Chesapeake Bay	MD	MDDNR Striped Bass Seine	1966-2016	X	X	
	VA	North Anna Electrofishing Survey	1990-2009			X
	VA	VIMS Juvenile Striped Bass Seine Survey - long	1967-2016	X	X	
	VA	VIMS Juvenile Striped Bass Seine Survey - short	1989-2016			X
South Atlantic	NC	NCDMF Estuarine Trawl Survey	1989-2016			X
	SC	SC Electrofishing Survey	2001-2016			X

Coastwide Yellow Eel

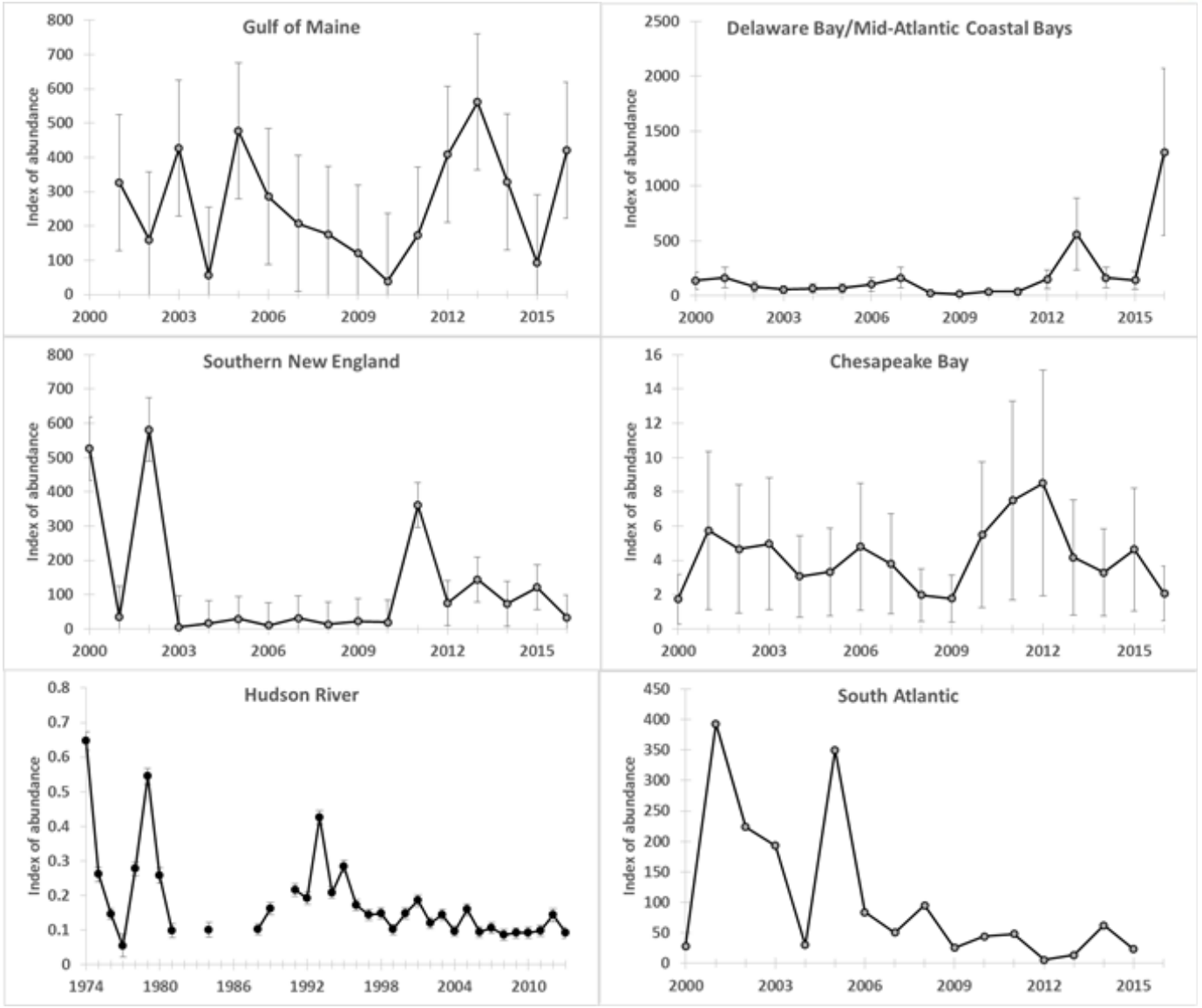






Assessment Methods

- Regional YOY indices



Regional YOY Comparison

- All significant correlations were positive

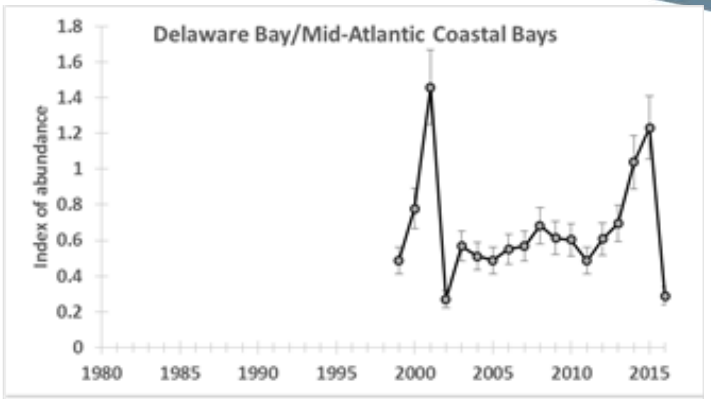
	Gulf of Maine	Southern New England	Hudson River	Delaware Bay/Mid-Atlantic	Chesapeake Bay
Southern New England	0.053				
Hudson River	***0.500***	0.345			
Delaware Bay/Mid-Atlantic	***0.535***	***0.417***	***0.486***		
Chesapeake Bay	0.050	0.096	0.244	0.029	
South Atlantic	0.221	-0.285	***0.415***	-0.141	0.091

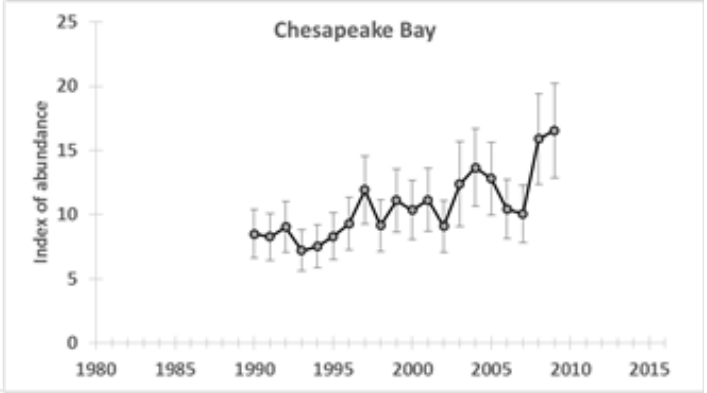
Assessment Methods

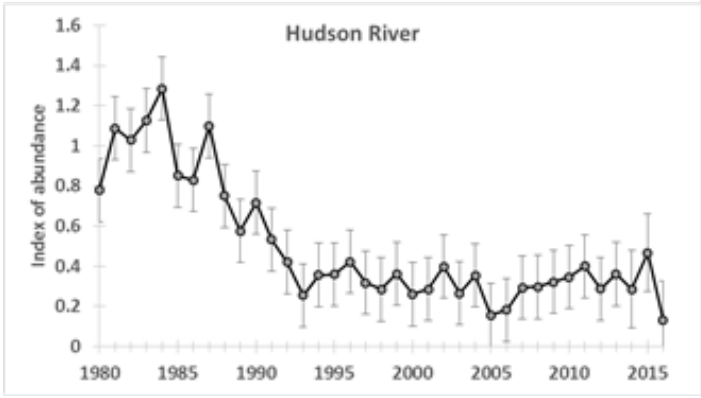
- Regional yellow indices

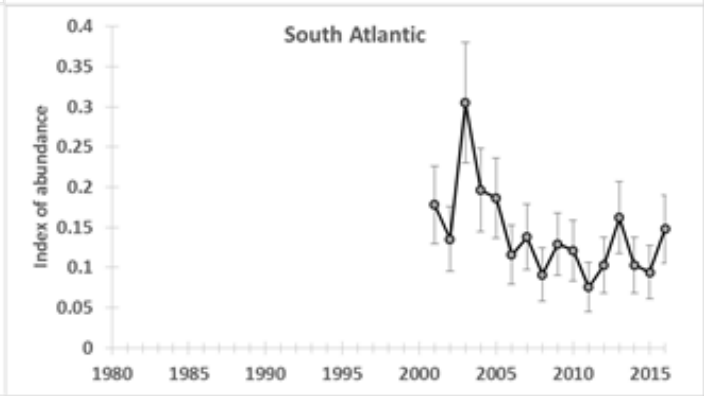
Gulf of Maine:
No yellow indices to combine

Southern New England:
Indices not compatible for combining









Regional Yellow Comparison

- No significant correlations

- More negative than positive

	Hudson River	Delaware Bay/ Mid-Atlantic Coastal Bays	Chesapeake Bay
Delaware Bay/ Mid-Atlantic Coastal Bays	-0.026		
Chesapeake Bay	-0.367	0.227	
South Atlantic	-0.372	-0.215	-0.050

YOY and Yellow Comparison

- Compared regional YOY with lagged regional yellow indices
- Several significant positive correlations

Region	Yellow vs.	Lag (years)	ρ	$P > \lvert\rho\rvert$
Hudson River	YOY	0	0.011	0.477
		1	***0.269***	0.087
		2	***0.277***	0.085
		3	***0.476***	0.008
		4	***0.521***	0.004
Delaware Bay/ Mid-Atlantic Coastal Bays	YOY	0	0.199	0.222
		1	0.194	0.228
		2	-0.126	0.684
		3	0.039	0.446
		4	0.349	0.110
Chesapeake Bay	YOY	0	-0.370	0.861
		1	-0.091	0.612
		2	***0.734***	0.005
		3	0.137	0.328
		4	-0.024	0.536
South Atlantic	YOY	0	0.300	0.138
		1	***0.714***	0.003
		2	***0.473***	0.053
		3	0.364	0.123
		4	***0.573***	0.035

Assessment Methods

- Trend analyses on state, regional, and coastwide indices
- Power analysis: Probability of detecting a trend of ±50% over ten years if it actually occurs
- Mann-Kendall: Identifies significant monotonic trend over time
- Manly: Meta analysis to test for consensus among surveys for coastwide decline
- ARIMA: Smoothing process; can compare to “reference point”

Power Analysis

- Higher CV = lower chance of detecting trends

Region	Life Stage	Survey	State	Median CV	Linear trend		Exponential Trend	
					50%	-50%	50%	-50%
Gulf of Maine	YOY	YOY Survey--Jones River	MA	0.347	0.33	0.46	0.34	0.48
	YOY	YOY Survey--Lamprey River	NH	0.316	0.37	0.52	0.38	0.54
	YOY	YOY Survey - West Harbor Pond	ME	33.245	0.05	0.05	0.07	0.08
Southern New England	Elver & Yellow	CTDEP Electrofishing	CT	0.043	1	1	1	1
	Yellow	NY Western Long Island Survey	NY	1.061	0.1	0.13	0.12	0.16
	YOY	YOY Survey - Carman's River	NY	0.19	0.7	0.87	0.7	0.88
	YOY	YOY Survey - Gilbert Stuart Dam	RI	0.205	0.64	0.83	0.65	0.84
	YOY	Hamilton Fish Ladder	RI	0.205	0.64	0.83	0.65	0.84
	YOY	Ingham Hill	CT	0.455	0.23	0.32	0.24	0.35
Hudson	Elver & Yellow	NYDEC Alosine Beach Seine	NY	0.176	0.76	0.91	0.76	0.92
	Elver & Yellow	NYDEC Striped Bass Beach Seine	NY	0.231	0.56	0.74	0.56	0.76
	Yearling +	HRE Monitoring Program	NY	0.067	1	1	1	1
	YOY	HRE Monitoring Program	NY	0.111	0.98	1	0.98	1
Delaware Bay/Mid-Atlantic Coastal Bays	Elver	Area 6 Electrofishing	PA	0.182	0.73	0.9	0.74	0.9
	Elver & Yellow	Delaware Trawl Survey	DE	0.222	0.58	0.77	0.59	0.78
	Elver & Yellow	PSEG Trawl Survey	DE	0.265	0.47	0.66	0.46	0.64
	Yellow	NJ Striped Bass Seine Survey	NJ	0.501	0.21	0.28	0.22	0.31
	YOY	Little Egg Inlet Ichthyoplankton Survey	NJ	0.18	0.74	0.9	0.74	0.91
	YOY	YOY Survey--Millsboro Dam	DE	0.295	0.4	0.56	0.41	0.58
	YOY	YOY Survey--Patcong Creek	NJ	1.391	0.09	0.1	0.1	0.14
	YOY	YOY Survey--Turville Creek	MD	5.5	0.06	0.06	0.08	0.09

- Better chance of detecting decreasing trend than increasing trend

Mann-Kendall Test YOY

Region	State	Location	Gear	Time Period	*P*-value	Trend 2012	Trend 2016
Gulf of Maine	ME	West Harbor Pond	Irish Elver Ramp	2001–2016	0.137	NS	NS
	NH	Lamprey River	Irish Elver Trap	2001–2016	0.065	NS	NS
	MA	Jones River	Sheldon Elver Trap	2001–2016	0.005	NS	↓
Southern New England	RI	Hamilton Fish Ladder	Irish Elver Ramp	2004-2016	0.200	-	NS
	RI	Gilbert Stuart Dam	Irish Elver Ramp	2000–2016	0.387	NS	NS
	CT	Ingham Hill	Irish Elver Ramp	2007-2016	0.371	-	NS
	NY	Carman's River	Fyke Net	2000–2016	0.840	NS	NS
	NY	HRE Monitoring	Irish Elver Ramp	1974-2013	0.000	-	↓
Delaware Bay/ Mid-Atlantic Coastal Bays	NJ	Little Egg	Plankton Net	1992-2015	0.016	-	↓
	NJ	Patcong Creek	Fyke Net	2004–2016	0.260	NS	NS
	DE	Millsboro Dam	Fyke Net	2000–2016	0.303	NS	NS
	MD	Turville Creek	Irish Elver Ramp	2000–2016	0.343	NS	NS

M-K Test YOY (continued)

Region	State	Location	Gear	Time Period	*P*-value	Trend 2012	Trend 2016
Chesapeake Bay	PRFC	Clark's Millpond	Irish Elver Ramp	2000–2016	0.434	NS	NS
	PRFC	Gardy's Millpond	Irish Elver Ramp	2000–2016	0.303	NS	NS
	VA	Warehams Pond	Irish Elver Ramp	2003-2016	0.161	-	NS
	VA	Bracken's Pond	Irish Elver Ramp	2000–2016	0.077	NS	NS
	VA	Kamp's Millpond	Irish Elver Ramp	2000–2016	0.837	NS	NS
	VA	Wormley Creek	Irish Elver Ramp	2001–2016	0.620	NS	NS
South Atlantic	NC	Beaufort	Plankton Net	1987-2007	0.032	-	↓
	SC	Goose Creek	Fyke Net	2000–2015	0.022	NS	↓
	GA	Altamaha Canal	Fyke Net	2001–2010	0.211	NS	NS
	FL	Guana River Dam	Dip Net	2001–2016	0.032	NS	↓

Mann-Kendall Test Yellow

Region	Survey	Gear	Life Stage	Time Period	*P*-value	Trend 2012	Trend 2016
Southern New England	CTDEP Electrofishing Survey	Electrofishing	Elver & Yellow (50–590 mm)	2001–2012	0.244	↑	NS
	Western Long Island Study	Seine	Yellow (35–770 mm)	1984–2016	0.000	↓	↓
Hudson River	HRE Monitoring Program	Epibenthic Sled and Tucker Trawl	Yearling and Older	1974–2013	0.000	↓	↓
	NYDEC Alosine Beach Seine	Seine	Elver & Yellow	1980–2016	0.000	↓	↓
	NYDEC Striped Bass Beach Seine	Seine	Elver & Yellow	1980–2016	0.000	↓	↓
Delaware Bay/ Mid-Atlantic Coastal Bays	NJDFW Striped Bass Seine Survey	Seine	Yellow (50–750 mm)	1980–2016	0.592	NS	NS
	Delaware Trawl Survey	Trawl	Elver & Yellow (55–690 mm)	1982–2016	0.201	NS	NS
	PSEG Trawl Survey	Trawl	Elver & Yellow (97–602 mm)	1970–2016	0.363	↑	NS
	Area 6 Electrofishing	Electrofishing	Elver	1999–2016	0.225	NS	NS
	MDDNR Striped Bass Seine Survey	Seine	Yellow (77–687 mm)	1966–2016	0.252	NS	NS

M-K Test Yellow (continued)

Region	Survey	Gear	Life Stage	Time Period	*P*-value	Trend 2012	Trend 2016
Chesapeake Bay	North Anna Electrofishing Survey	Electrofishing	Elver & Yellow (32–726 mm)	1990–2009	0.000	↑	↑
	VIMS Juvenile Striped Bass Seine Survey—long	Seine	Yellow	1989–2016	0.951	NS	NS
	VIMS Juvenile Striped Bass Seine Survey—short	Seine	Yellow	1967–2016	0.323	↓	NS
South Atlantic	NCDMF Estuarine Trawl Survey	Trawl	Elver & Yellow (26–921 mm)	1989–2016	0.028	↓	↓
	SC Electrofishing Survey	Electrofishing	Elver & Yellow (44–890 mm)	2001–2016	0.053	↓	NS

M-K Test: Regional, Coast-wide

Region	Life Stage	Time Period	*P*-value	2012 Trend	2017 Trend
Gulf of Maine	YOY	2001–2016	0.964	NS	NS
Southern New England	YOY	2000–2016	0.537	NS	NS
	Yellow	2001–2010		NS	-
Hudson River	YOY	1974–2009		↓	-
	Yellow	1980–2016	0.000	↓	↓
Delaware Bay/ Mid-Atlantic Coastal Bays	YOY	2000–2016	0.303	NS	NS
	Yellow	1999–2016	0.256	NS	NS
Chesapeake Bay	YOY	2000–2016	0.967	NS	NS
	Yellow	1990–2009	0.000	↑	↑
South Atlantic	YOY	2001–2015	0.022	NS	↓
	Yellow	2001–2016	0.034	↓	↓
Atlantic Coast	YOY (short-term)	2000–2016	0.537	NS	NS
	YOY (long-term)	1987–2013	0.094	NS	NS
	Yellow (40+ year)	1974–2016	0.000	NS	↓
	Yellow (30-year)	1987–2016	0.010	↓	↓
	Yellow (20-year)	1997–2016	0.206	NS	NS

Assessment Methods

- Mann-Kendall synthesis

- Data are not 100% compatible, but results are somewhat less optimistic than benchmark

		Positive	Negative	Not signif
YOY	Benchmark	0	0	16
	Update	0	6	16
Yellow	Benchmark	3	7	5
	Update	1	5	9
Regional	Benchmark	1	4	11
	Update	1	5	8

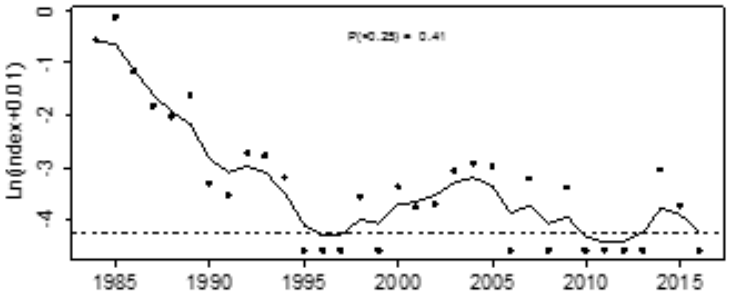
Manly results

- At least one index in each life stage shows decline
- Consensus for decline in both life stages
- Similar results to benchmark

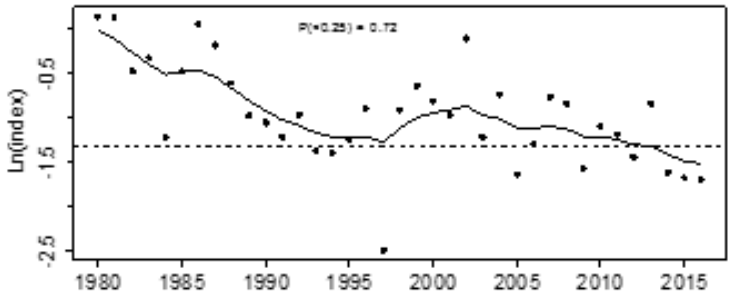
Life Stage	Survey	n	p	Meta-analysis statistics	
Yellow	Area 6 Electrofishing	17	0.887		
	CTDEP Electrofishing Survey	11	0.878		
	NYDEC Alosine Beach Seine	36	0.000	S_1:	115.88
	NYDEC Striped Bass Beach Seine	36	0.000	*df*:	30
	Delaware Trawl Survey	34	0.101	$P(X^2>S_1 \mid df)$:	<0.01
	PSEG Trawl Survey	18	0.819		
	North Anna Electrofishing Survey	19	1.000	S_2:	-5.05
	NCDMF Estuarine Trawl Survey	27	0.142	$P(Z>S_2)$:	<0.01
	SC Electrofishing Survey	16	0.026		
	HRE Monitoring	39	0.000		
	NY Western Long Island Survey	32	0.000		
	NJDFW Striped Bass Seine Survey	36	0.296		
	MD Striped Bass Seine Survey	50	0.126		
	VIMS Juvenile Striped Bass Seine --short	19	0.476		
	VIMS Juvenile Striped Bass Seine--long	49	0.838		
YOY	West Harbor Pond	16	0.932		
	Lamprey River	16	0.968		
	Jones River	13	0.003	S_1:	95.22
	Hamilton Fish Ladder	13	0.900	*df*:	42
	Gilbert Stuart Dam	17	0.807	$P(X^2>S_1 \mid df)$:	<0.01
	Ingham Hill	10	0.186		
	Carman's River	17	0.580	S_2:	-16.03
	HRE Monitoring	34	0.000	$P(Z>S_2)$:	<0.01
	Little Egg Inlet Ichthyoplankton Survey	24	0.008		
	Patcong Creek	12	0.870		
	Millsboro Dam	17	0.849		
	Turville Creek	17	0.829		
	Clarks Millpond	17	0.217		
	Gardys Millpond	17	0.152		
	Brackens Pond	17	0.039		
	Kamps Millpond	17	0.419		
	Wormley Creek	17	0.310		
	Beaufort Bridgenet Ichthyoplankton	21	0.016		
	Goose Creek	16	0.011		
	Altamaha Canal	10	0.106		
	Guana River Dam	16	0.016		

ARIMA - Hudson

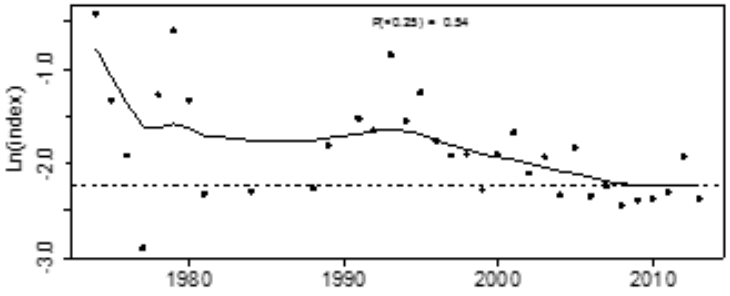
Western Long Island Sound Survey, Yellow Eel



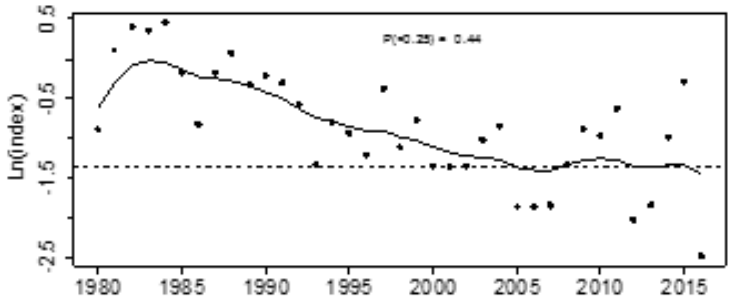
NYDEC Alosine Beach Seine, Elver & Yellow Eel



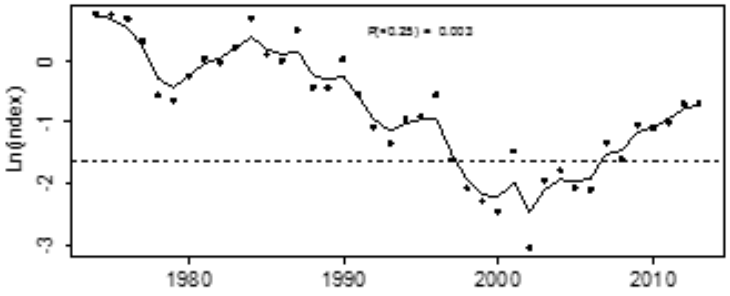
Hudson River Estuary Monitoring Program, YOY Eel



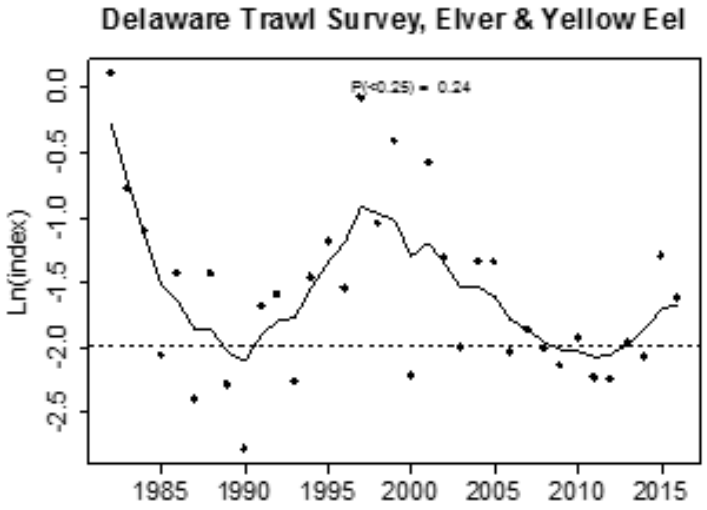
NYDEC Striped Bass Beach Seine, Elver & Yellow Eel

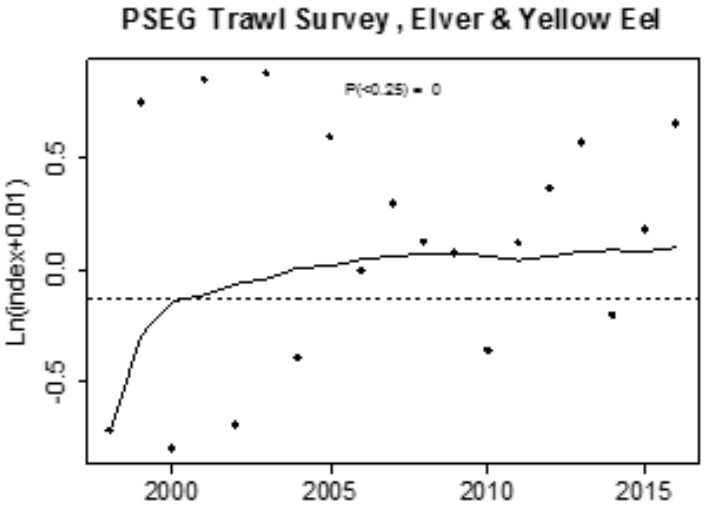


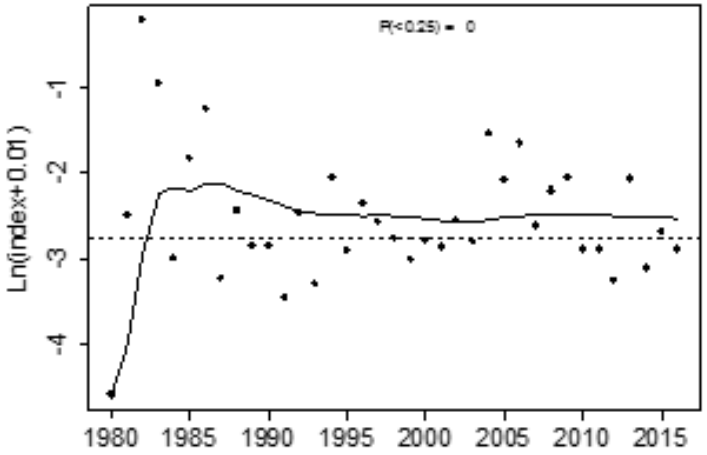
Hudson River Estuary Monitoring Program, Yearling and Older Eel

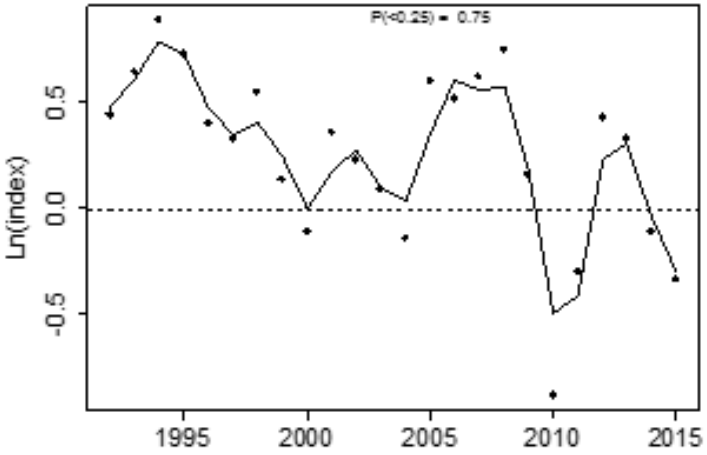


ARIMA – Del Bay

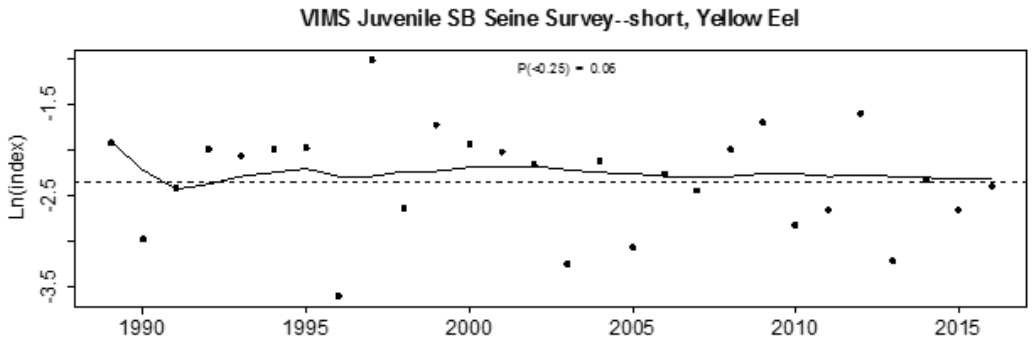


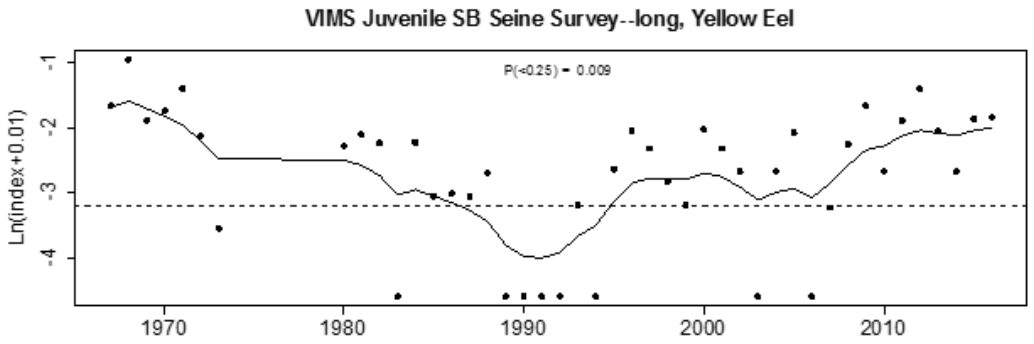


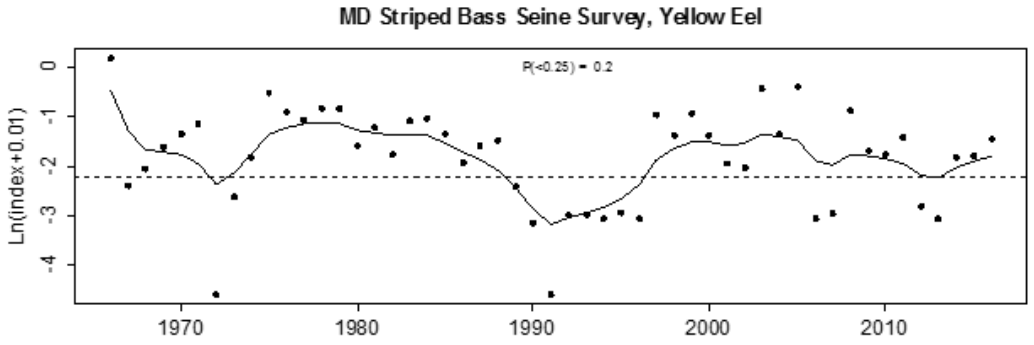




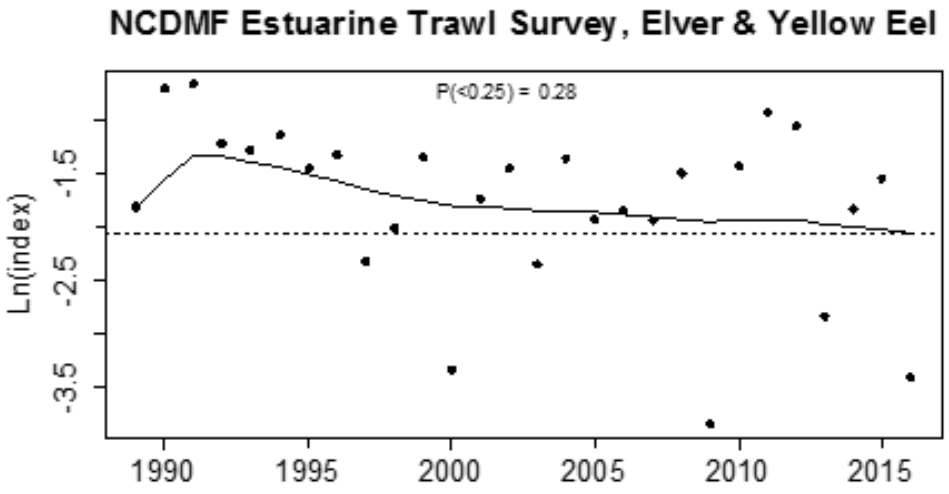
ARIMA – Ches Bay

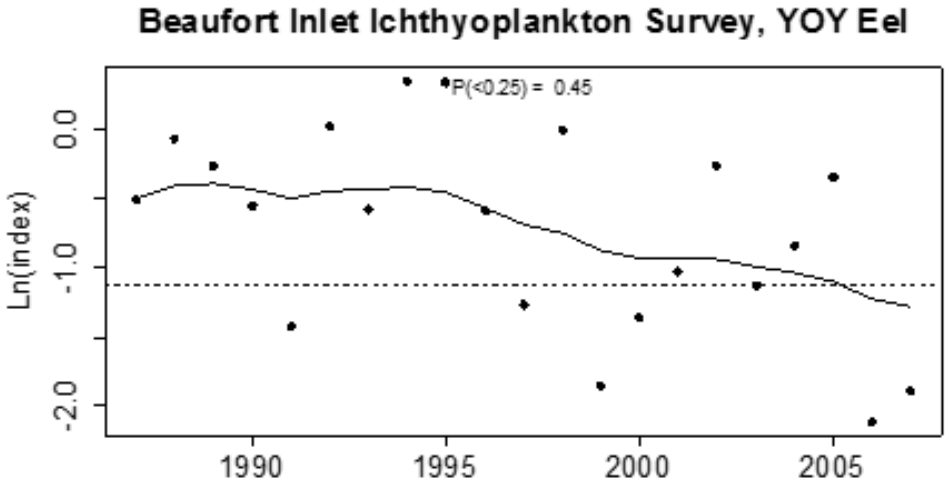






ARIMA – S Atlantic





ARIMA results

Region	Survey	Life Stage	Years	P(<0.25) in 2010	P(<0.25) in terminal year
Hudson River	Western Long Island Sound Survey	Yellow	1984 - 2016	0.462	0.412
	Hudson River Estuary Monitoring Program	YOY	1974 - 2013	0.516	0.544
	Hudson River Estuary Monitoring Program	Yearling and Older	1974 - 2013	0.034	0.003
	NYDEC Alosine Beach Seine	Elver & Yellow	1980 - 2016	0.344	0.72
	NYDEC Striped Bass Beach Seine	Elver & Yellow	1980 - 2016	0.286	0.446
Delaware Bay/Mid-Atlantic Coastal Bays	Little Egg Inlet Ichthyoplankton Survey	YOY	1992 - 2015	0.722	0.755
	NJ Striped Bass Seine Survey	Yellow	1980 - 2016	0	0
	Delaware Trawl Survey	Elver & Yellow	1982 - 2016	0.479	0.242
	PSEG Trawl Survey	Elver & Yellow	1998 - 2016	0.002	0
Chesapeake Bay	MD Striped Bass Seine Survey	Yellow	1966 - 2016	0.155	0.202
	VIMS Juvenile SB Seine Survey - short	Yellow	1989 - 2016	0.085	0.066
	VIMS Juvenile SB Seine Survey - long	Yellow	1967 - 2016	0.006	0.009
South Atlantic	Beaufort Inlet Ichthyoplankton Survey	YOY	1987 - 2007		0.454
	NCDMF Estuarine Trawl Survey	Elver & Yellow	1989 - 2016	0.192	0.284

- P(<0.25) is the probability of the survey being below the 25th percentile in the terminal year

ARIMA

- ARIMA synthesis

- Results similar to benchmark
  - Benchmark had 2 surveys with p > 50%
  - Update had 3 surveys with p > 50%

- For the most part, P(<0.25) has not changed much since 2010 - indicates relatively stable indices.
  - Changes since 2010 are generally small with no consistent directionality

Recap

- Individual YOY and yellow eel indices
  - Highly variable; no consistent patterns
- Coastwide and regional YOY and yellow eel indices
  - Highly variable; no consistent patterns
- Multiple types of trend analysis
  - Power analysis → many indices with low power
  - Mann-Kendall → several with significant declines (mostly longer time series); results similar to benchmark
  - Manly → Consensus for decline over time; similar to benchmark
  - ARIMA → Most are likely not below 25th percentile; comparison with 2010 suggests indices relatively stable in recent years

Stock status

- No biological reference points
- “Official” stock status can not be determined
- Trend analyses detected significant declines in several indices over the time period examined
- Indices generally stable over last decade

Stock status

- ASMFC 2012 concluded that the prevalence of significant downward trends in multiple surveys across the coast was cause for concern.

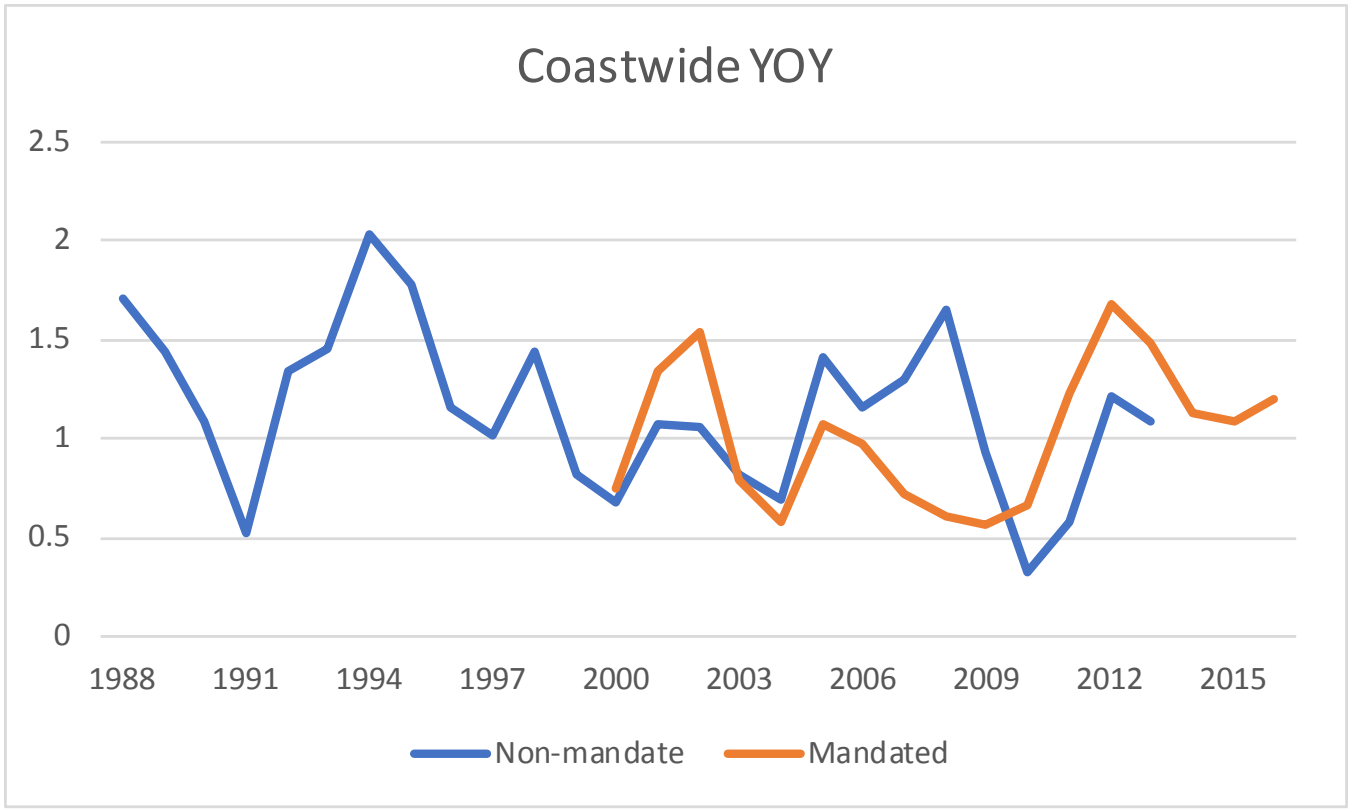
- The trend analysis results in this stock assessment update are consistent with the ASMFC 2012 results, with few exceptions.

- Stock remains depleted

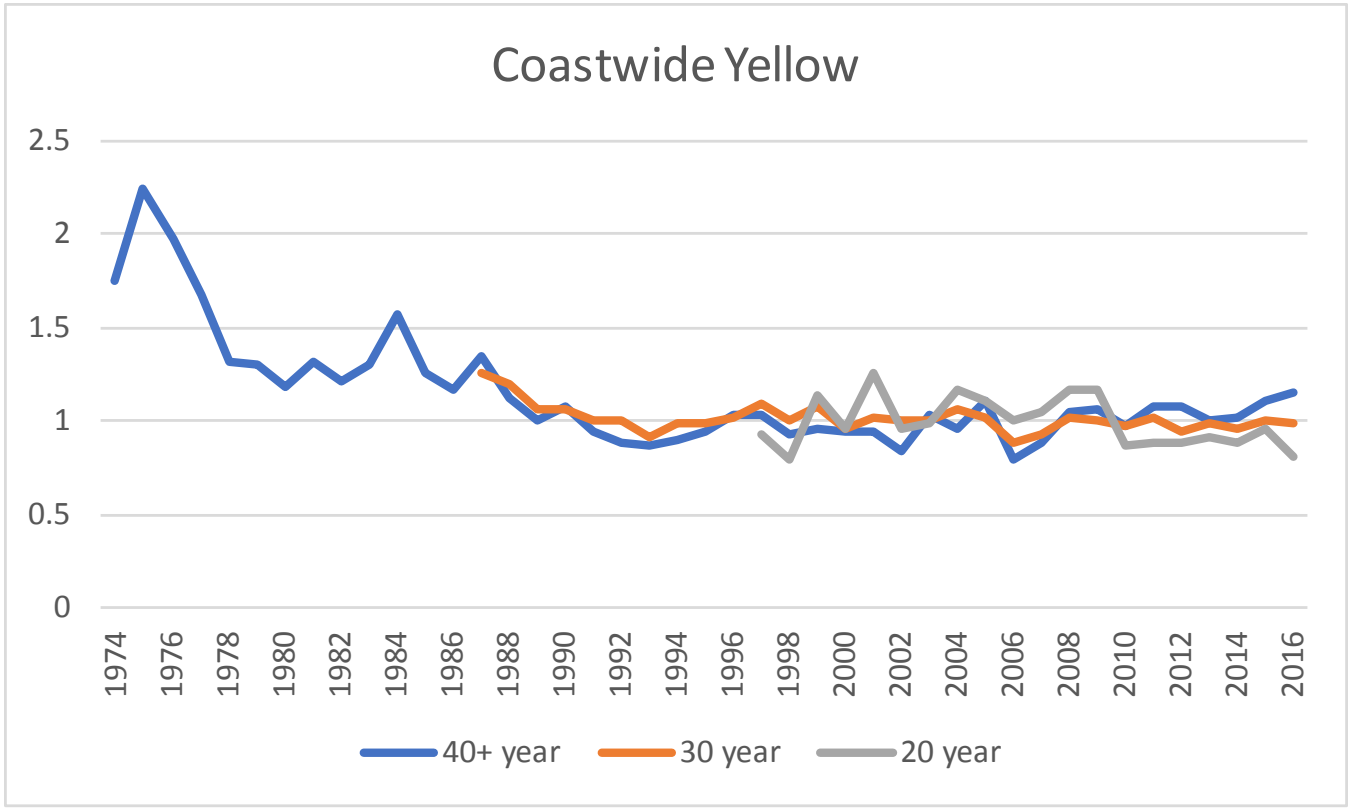
The End

QUESTIONS?

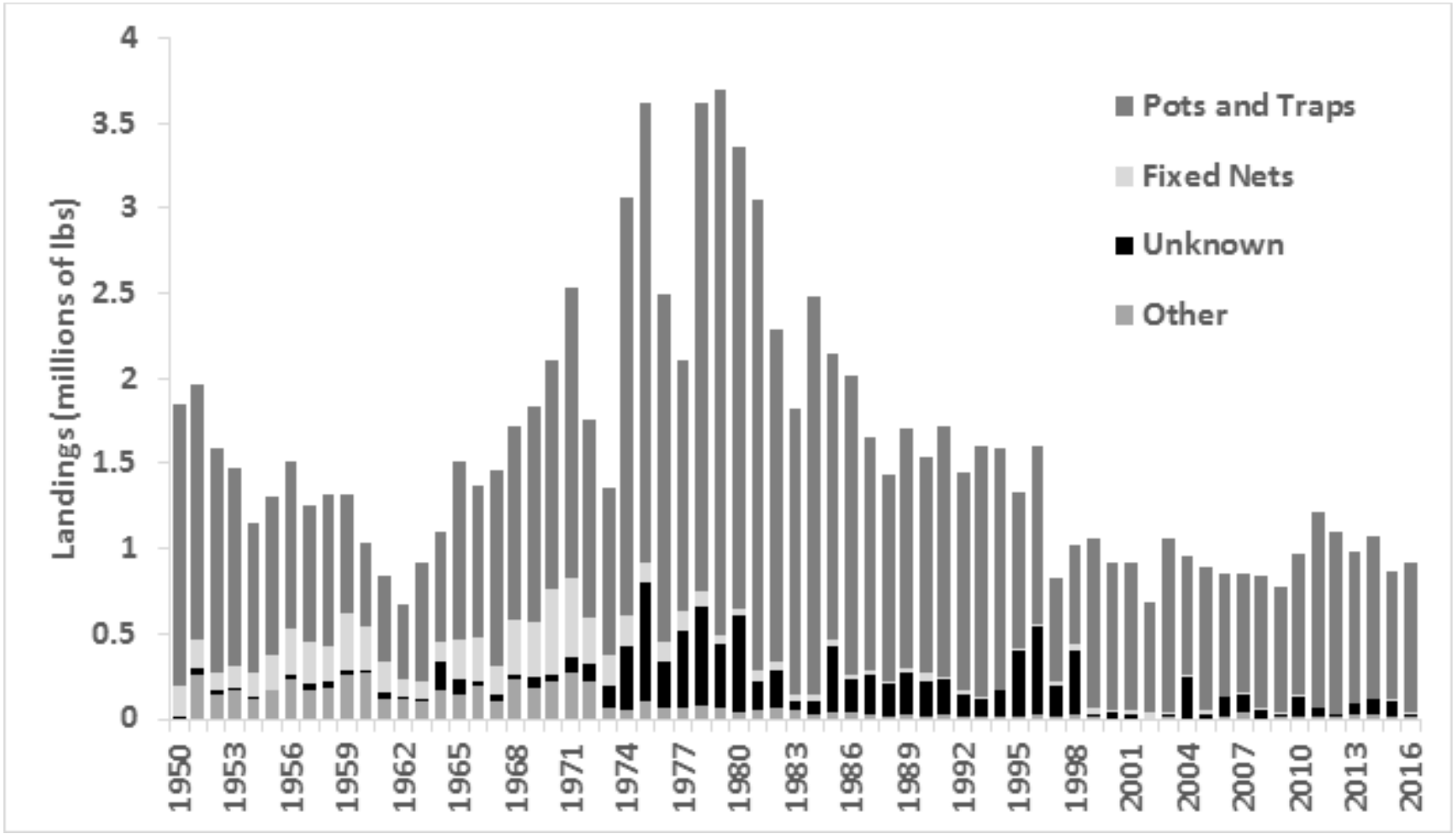
Extra slides



Extra slides



Extra slides



2018 Glass Eel Quota for Maine

American Eel Management Board
October 17th, 2017

Outline

- Addendum IV Provisions
- Prior WG (2014) recommendations
- Current WG (2017) recommendations
- Next Steps
- Questions

ME Glass eel Quota

- Addendum IV (2014)
  - Established Maine Glass eel Quota (**9,688 pounds**)
  - Based on 2014 landings level (WG recommendation)
  - Quota specified for 2015-2017
  - The quota will be re-evaluated after 3 years
    - Prior to the start of the 2018 fishing season

WG (2014) reasons for recommended Quota level for 2015-2017

- 1) uncertainty in the added conservation benefits with a lower quota
- 2) socio-economic impacts to local communities
- 3) expected increased level poaching and enforcement problems
- 4) <u>expected</u> inability for Maine to complete important life history study*

ME Glass Eel Harvest 2007-2017

Year	Landings	Value	Addendum IV	Value
2007	3,714	$1,287,479	3,713	$1,287,485
2008	6,951	$1,486,353	6,951	$1,486,355
2009	5,199	$514,629	5,119	$519,559
2010	3,158	$592,405	3,158	$584,850
2011	8,585	$7,656,345	8,584	$7,653,331
*2012	21,610	$38,791,627	20,764	$38,760,490
2013	18,081	$32,926,991	18,076	$32,926,991
2014	9,688	$8,440,333		
2015	5,260	$11,389,891		
**2016	9,399	$13,388,040		
**2017	9,282	>$12,000,000		

*Discrepancy in landings information

** Preliminary landings

- Does not include landings seized by Law Enforcement (2014-2016)

Current WG (2017) recommendations

- One WG member suggested increasing Maine's glass eel quota to the 2014 quota level of 11,479 pounds.
- Recommendation: **maintain Maine's glass eel quota for 2018 at the status quo quota level (9,688 pounds) that has been in place from 2015-2017**

Next Steps

Consider specifying Maine's glass eel quota for 2018

Questions?

American Eel Allocation WG Recommendations

American Eel Management Board
October 17, 2017

Outline

- Background
- Issues items and Recommendations
  - A) Implementation of state by state quotas for the yellow eel fishery
  - ~~B) Maine's 2018 glass eel quota~~
  - C) State by state yellow eel quotas
- Questions

Background

- Addendum IV (2014)
  - Yellow eel Quota Management & Allocation (Coastwide)
  - Glass Eel Management (ME)
- Summer 2016
  - Proposal from NY to change state by state quotas
  - Shelved until after stock assessment update
- Summer 2017
  - 2016 Prelim. landings = '1A' of triggering state by state
  - Formed Allocation WG
- September 2017
  - Rec WG met via conference call twice & developed recommendations

Addendum IV (2014)

- Established Coastwide Cap (**907,671 pounds**)
  - Based on average landings from 1998-2010
- Accountability: 2 management triggers
  - The coastwide catch cap is exceeded by more than 10% in a given year (998,438 pounds).
  - The coastwide catch cap is exceeded for 2 consecutive years
- If 'tripped', state-by-state quotas implemented
  - New coastwide quota would be **907,669 pounds**
  - **State Quota overage = pound for pound payback**
  - Quota transfers allowed

Implementation of state by state quotas

- Addendum IV implement plans: states needed to demonstrate they could monitor landings in a timely manner to manage quota
  - Many states still on monthly reporting, not weekly, limiting ability to monitor landings under a quota
  - Many state's rule making process would create challenges to immediate implementation of quota mid-season.

2016 Validated Yellow Eel Landings

State/Jurisdiction	Landings
Maine	4,509
Massachusetts	1,705
Rhode Island	2,651
Connecticut	2,662
New York	36,371
New Jersey	67,428
Delaware	44,558
Maryland	569,964
PRFC	58,223
Virginia	91,026
North Carolina	39,911
Florida	6,520
Total	925,798

Landings Caveats

- American Eel landings that have been **validated** by the states during the period from mid-August to early-October of 2017

- Includes validated landings from all partners for American Eel 2016, with the exception of CT whose landings are included but did not respond to the request for validation

- PRFC data were not validated by gear type and the data provided by PRFC and used in the state landings were provided after the states of MD and VA validated their data

- New York 2015-2016 landings: they added any non-dealer fisher landings to the dealer landings. Since the dealer reports don't always list the correct gear, they distribute the total dealer landings amongst the gears reported by fishers that sold to a dealer.

Allocation WG

- ‘Automatic’ triggering of state by states quotas problematic given timetable of finalizing 2016 Landings will be later this fall
  - Concern over using preliminary landings to evaluate management triggers
- Recommendations:

1) **move to implement state by state quotas beginning Jan. 1 2019 if the management triggers has been exceeded based on final 2017 landings information**
2) **Initiate a new addendum to consider alternative allocations, management triggers, and coastwide caps to the current management program**

Commercial yellow eel state by state quotas

- Allocation WG: based on the stock assessment information presented, interest in considering different baseline for basing allocation on landings from 1998-2016
  - Interest stems from regulatory changes made since 2014
- Prior TC recommendation was for 12% reduction from baseline period; ultimately not implemented

2016 Validated Yellow Eel Landings

State/Jurisdiction	Landings	Quota	% of Quota
Maine	4,509	3,907	**115**
Massachusetts	1,705	2,000	85
Rhode Island	2,651	4,642	57
Connecticut	2,662	2,000	**133**
New York	36,371	15,220	**239**
New Jersey	67,428	94,899	71
Delaware	44,558	61,632	72
Maryland	569,964	465,968	**122**
PRFC	58,223	52,358	**111**
Virginia	91,026	78,702	**116**
North Carolina	39,911	107,054	37
Florida	6,520	13,287	49
Total	925,798	907,669	**102**

Questions?