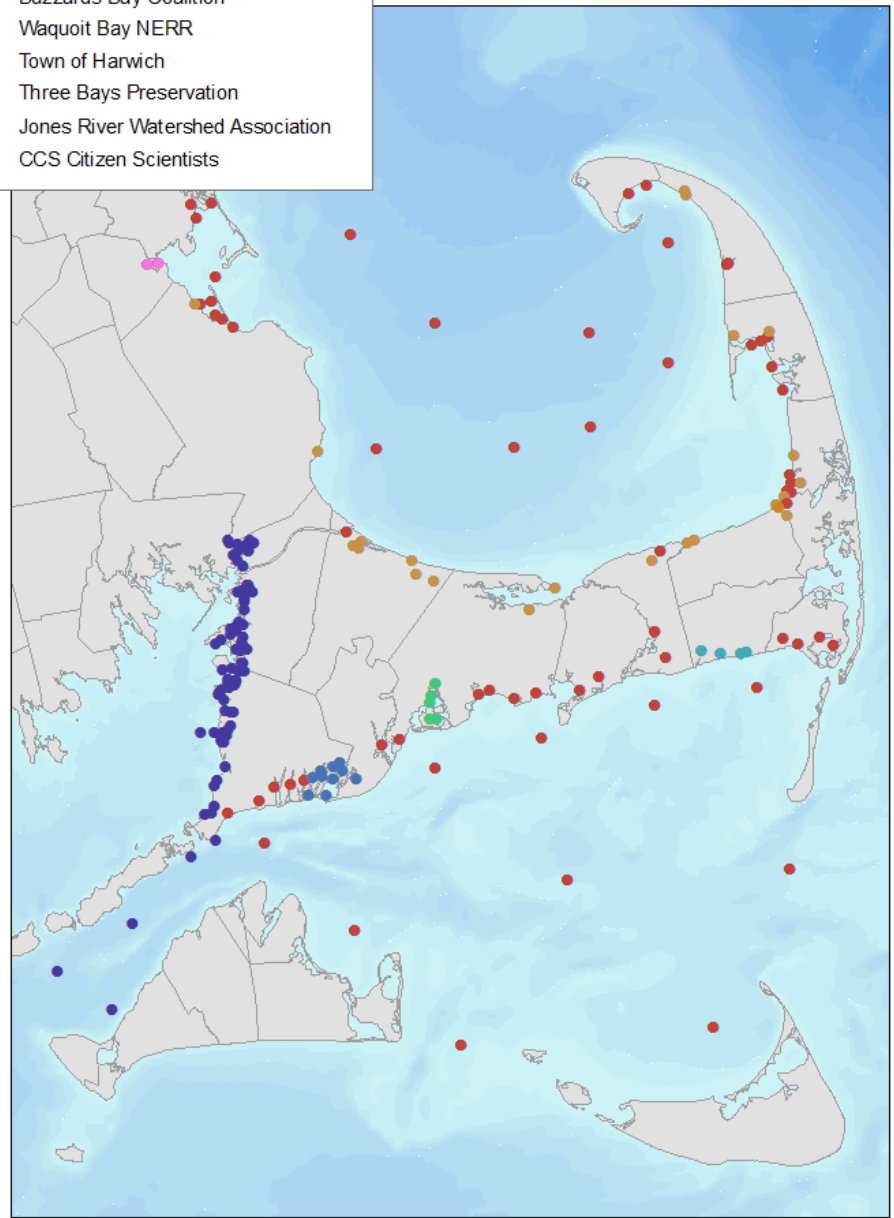


Coastal Water Quality Monitoring Program for: Cape Cod Bay, Buzzards Bay & Nantucket Sound



- Monitoring Stations by Organization**
- Center for Coastal Studies
 - Buzzards Bay Coalition
 - Waquoit Bay NERR
 - Town of Harwich
 - Three Bays Preservation
 - Jones River Watershed Association
 - CCS Citizen Scientists

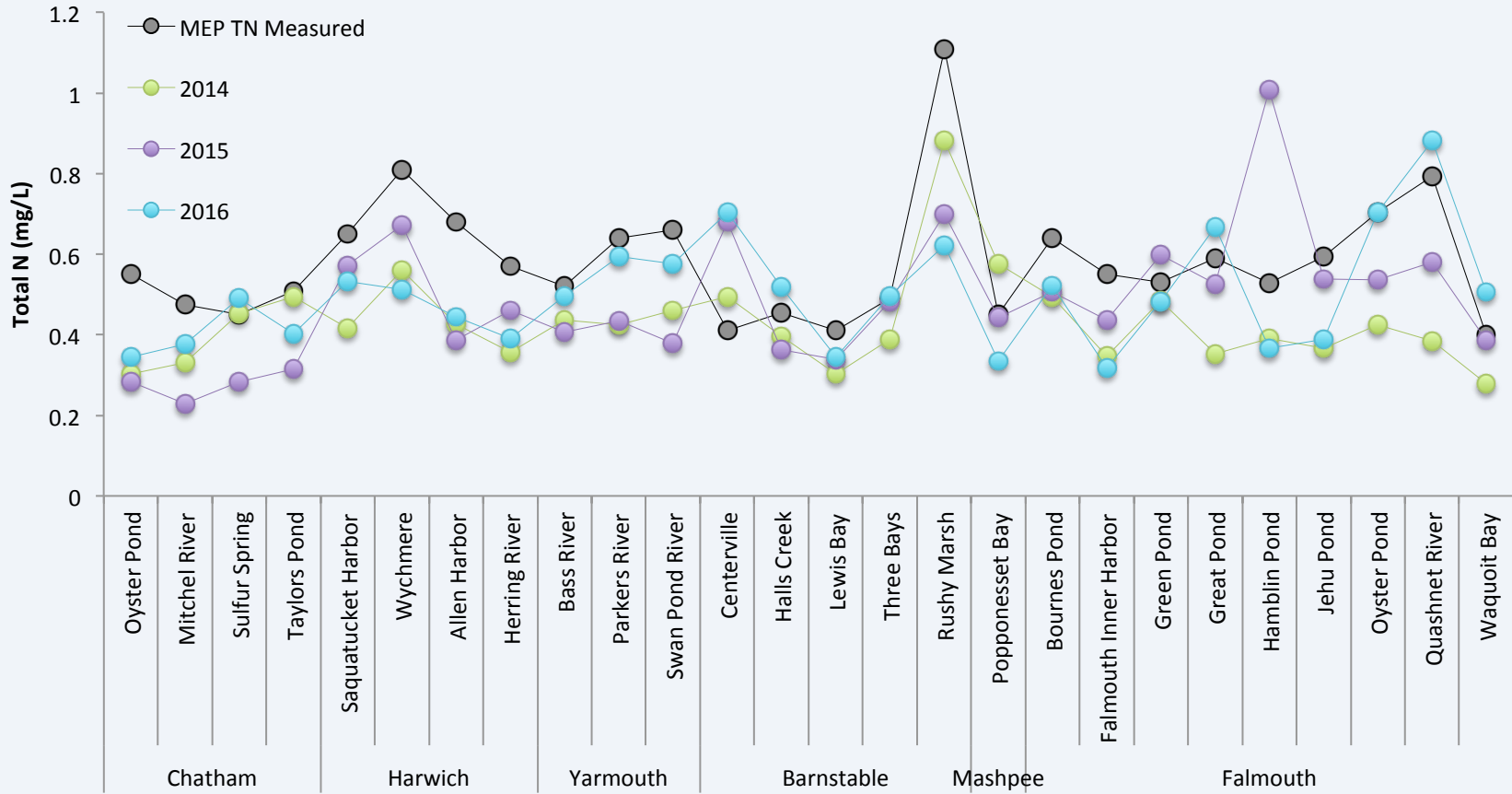


Hydrographic Data
Temperature
Salinity
Depth of sensor
Dissolved oxygen
pH
PAR
Chlorophyll fluorescence
Secchi disk depth
Total water depth
Current weather (including Beaufort Scale and wind direction)

Parameters
Nitrate + nitrite
Ammonium
Total nitrogen
Total dissolved nitrogen
Ortho-phosphate
Extracted chlorophyll
Extracted pheophytin
Silicate
Turbidity
Total phosphorus
Particulate Organic Nitrogen
Particulate Organic Carbon

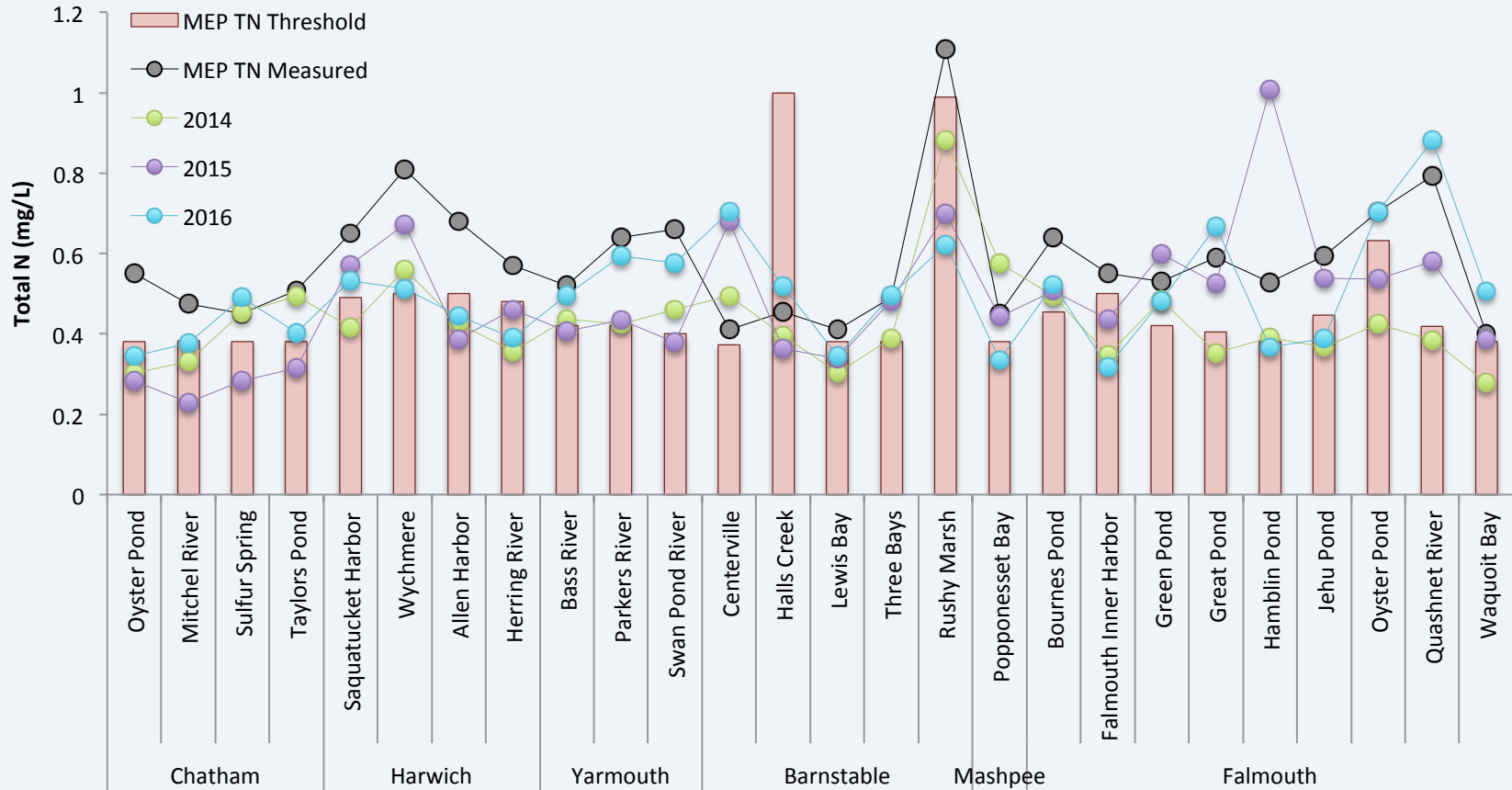
Sentinel Stations

Average TN: July-August



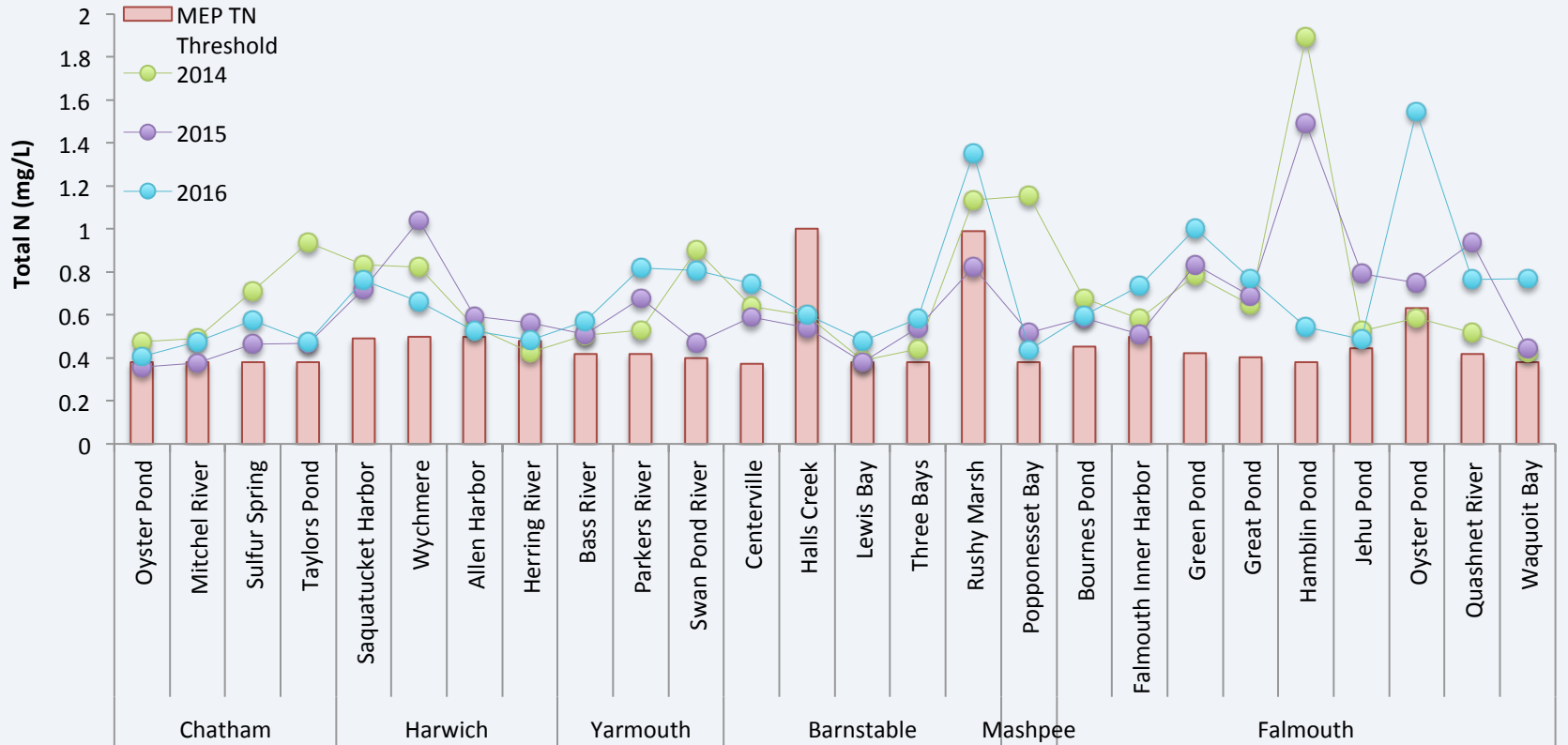
Sentinel Stations

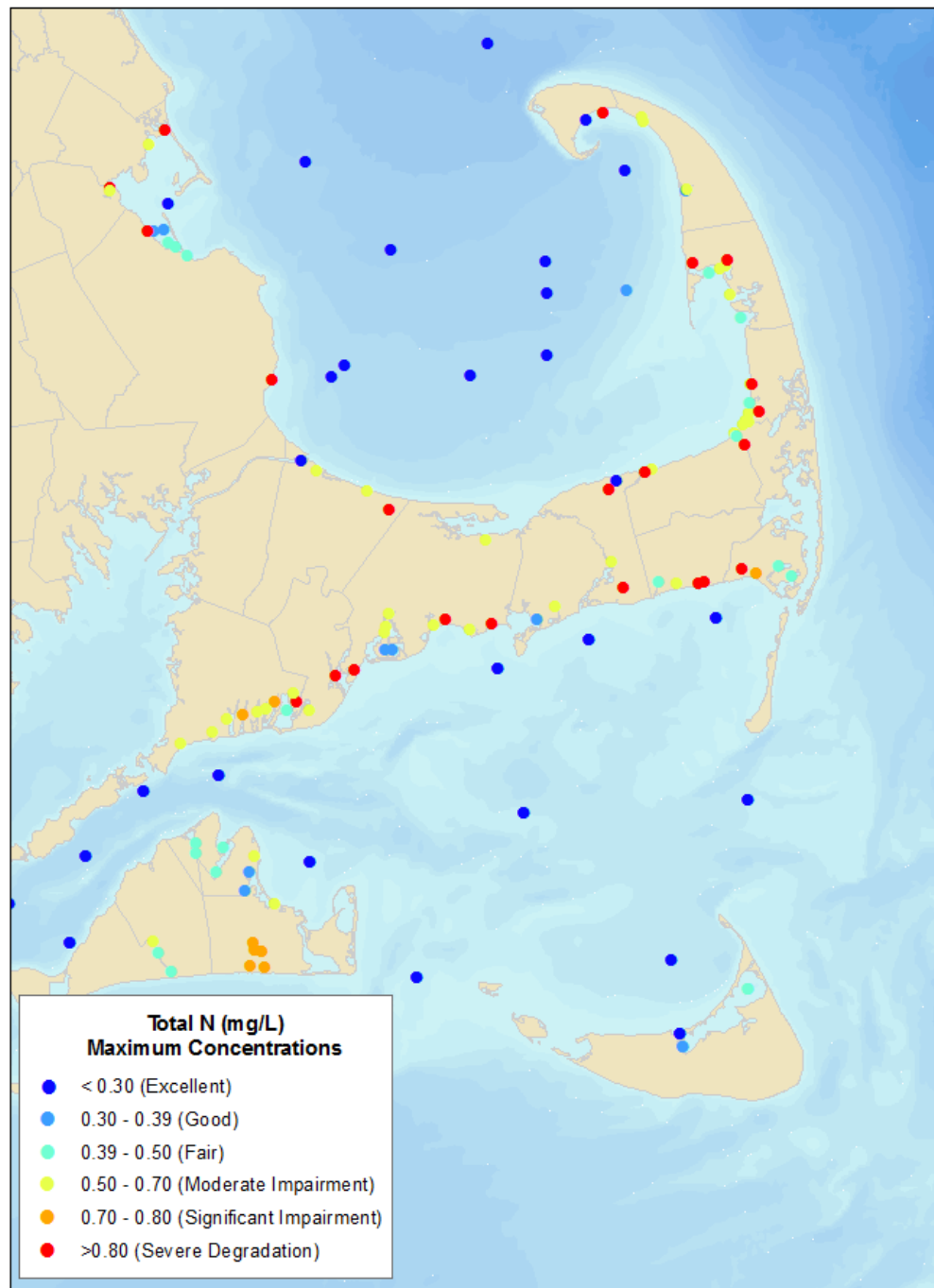
Average TN: July-August



Sentinel Stations

Max TN





Health Index by Embayment

Buzzards Bay

Embayment	2014 Score	Embayment	2014 Score	Embayment	2014 Score
Acushnet River Estuary	21	Little River Inner	15	Sippican Harbor Inner	70
Agawam River Estuary	61	Little River Outer	20	Sippican Harbor Outer	83
Apponagansett Bay Inner	49	Little Sippewisset Marsh	59	Sippican River	51
Apponagansett Bay Mid	56	Manomet Bay	96	Slocums River Head	28
Apponagansett Bay Outer	69	Marks Cove	82	Slocums River Inner	9
Aucoot Cove Inner	58	Mashapaquit Creek	5	Slocums River Outer	22
Aucoot Cove Mid	83	Mattapoisset Harbor Inner	71	Squeteague Harbor	73
Aucoot Cove Outer	91	Mattapoisset Harbor Outer	88	Tub Mill Brook	39
Blankenship Cove	91	Mattapoisset Harbor River Mouth	31	Vineyard Sound	99
Brant Island Cove	86	Megansett Harbor	87	Wareham River Inner	64
Broad Marsh River	58	Nasketucket Bay	93	Wareham River Outer	75
Broad-Muddy Cove	71	Nasketucket River Estuary	16	West End Pond	31
Butler Cove	66	New Bedford Harbor Inner	49	West Falmouth Harbor Head	60
Buttermilk Bay	74	New Bedford Harbor Outer	52	West Falmouth Harbor Outer	80
Center Bay Buoy	93	Nonquit Marsh	55	West Falmouth Harbor Town Dock	61
Clarks Cove Inner	46	Onset Bay East River	83	West Falmouth Mid-Harbor	78
Clarks Cove Outer	57	Onset Bay Inner	84	West Falmouth Snug Harbor	42
Cuttyhunk Pond	90	Onset Bay Outer	88	Westport River East Inner	29
Eel Pond, Bourne	65	Paskamansett River	25	Westport River East Outer	62
Eel Pond, Mattapoisset	38	Penikese Island	80	Westport River East Upper	24
Fiddlers Cove	77	Phinneys Harbor	86	Westport River E-W Inlet	66
Flume Pond	16	Planting Island Cove	90	Westport River West Inner	55
Gunning Point Pond	34	Pocasset Harbor Inner	84	Weweantic River Inner	34
Hadley Harbor Inner	94	Pocasset Harbor Outer	90		
Hammett Cove	43	Pocasset River	67		
Herring Brook	66	Quissett Harbor Inner	92		
Hillers Cove	99	Quissett Harbor Outer	94		
Little Bay	79	Rands Harbor	57		
Little Buttermilk Bay	66	Salters Pond	25		
Little Harbor	52	Shell Point Bay	85		

Parameter	Health Index Score	
	0 Point Value	100 Point Value
Lowest 20 % Oxygen Saturation	40%	85%
Transparency (Secchi)	0.6 meters	3.0 meters
Chlorophyll	10.0 µg/l	3.0 µg/l
DIN	0.14 ppm	0.014 ppm
TON	0.6 ppm	0.28 ppm

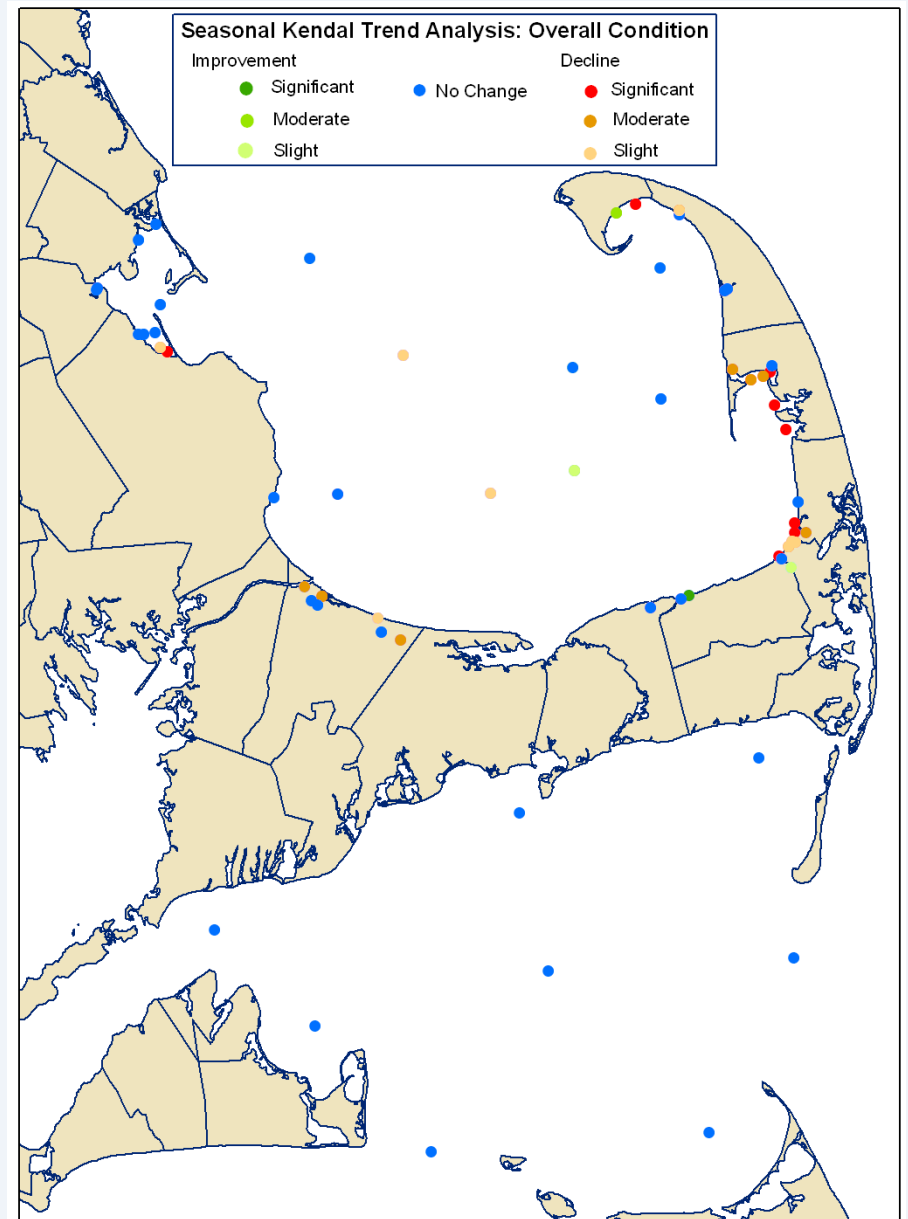
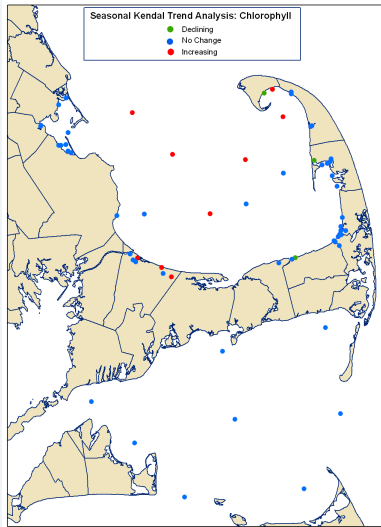
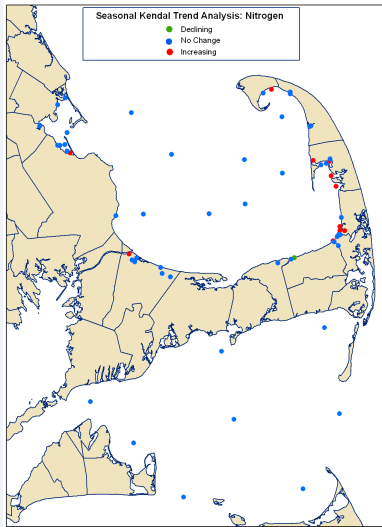
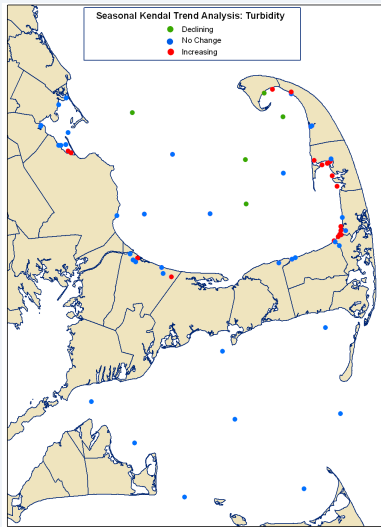
Health Index by Embayment Cape Cod Bay & Nantucket Sound

Town	Embayment	Score		
		Spring	Summer	Fall
Nantucket Sound				
Chatham	Oyster Pond	87	80	85
Chatham	Mitchel River	79	70	81
Chatham	Sulfur Spring	92	66	70
Chatham	Taylors Pond	61	61	78
Harwich	Saquatucket Harbor	49	44	51
Harwich	Wychmere	61	32	47
Harwich	Allen Harbor	66	43	68
Harwich	Herring River	88	57	66
Yarmouth	Swan Pond River	68	61	81
Yarmouth	Bass River	70	51	71
Yarmouth	Parkers River	55	56	67
Yarmouth	Lewis Bay	83	74	95
Barnstable	Stewarts Creek	50	41	46
Barnstable	Halls Creek	75	75	83
Barnstable	Centerville	50	43	44
Barnstable	West Bay	87	83	87
Barnstable	Cotuit Bay	75	68	77
Barnstable	Warrens Cove	60	39	45
Barnstable	North Bay	71	51	49
Barnstable	Rushy Marsh	37	37	60
Mashpee	Popponeset Bay	73	54	61
Falmouth	Jehu Pond	69	62	60
Falmouth	Hamblin Pond	76	61	67
Falmouth	Quashnet River	69	45	37
Falmouth	Waquoit Bay	86	74	84
Falmouth	Childs River	52	43	54
Falmouth	Eel River	61	49	58
Falmouth	Bournes Pond	44	50	68
Falmouth	Green Pond	40	49	51
Falmouth	Great Pond	46	58	49
Falmouth	Falmouth Inner Harbor	58	46	49
Falmouth	Oyster Pond	54	54	46
Nantucket Island				
Nantucket	Nantucket Harbor	100	94	95
Martha's Vineyard				
Edgartown	Edgartown Great Pond	32	42	56
Oak Bluffs	Farm Pond	68	67	64
Oak Bluffs	Sengekontacket Pond		64	79
Tisbury	Lagoon Pond	88	76	90
Tisbury	Tashmoo Pond	47	57	59
W. Tisbury	Tisbury Great Pond	54	20	

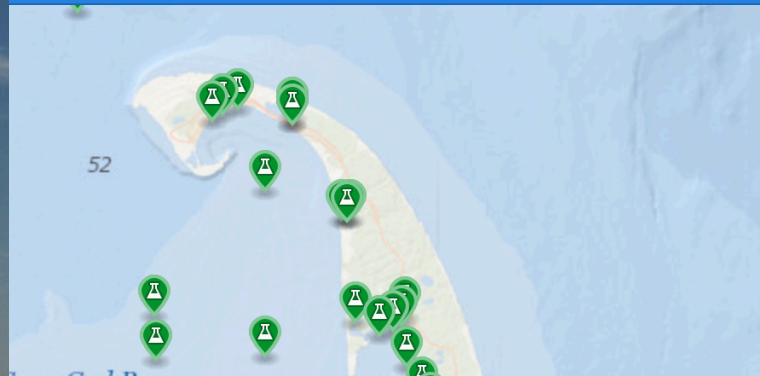
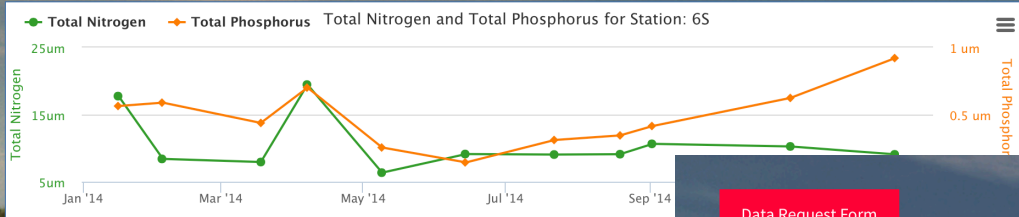
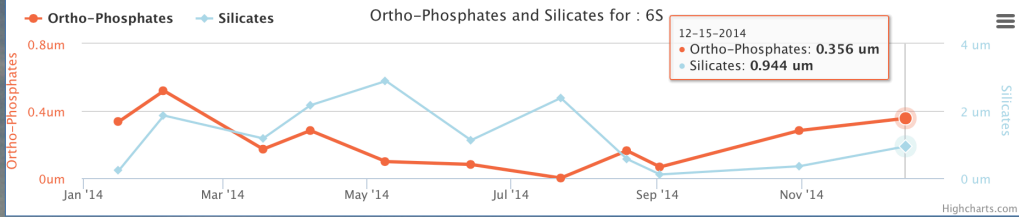
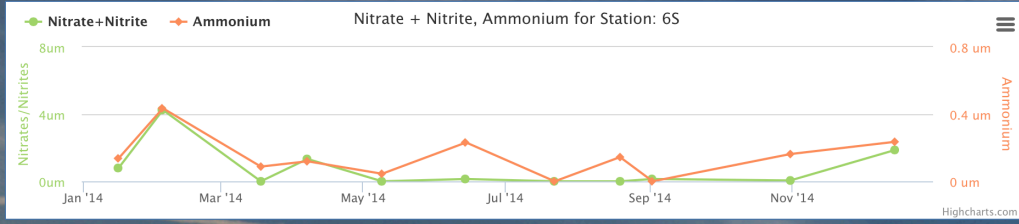
Town	Embayment	Score		
		Spring	Summer	Fall
Cape Cod Bay				
Provincetown	Provincetown Harbor	98	96	93
Truro	East Harbor	78	74	57
Truro	Pamet River	56	64	54
Wellfleet	Duck Creek	25	12	12
Wellfleet	Wellfleet Harbor	55	39	48
Wellfleet	Herring River	80	52	65
Wellfleet	Blackfish Creek	81	70	48
Eastham	Cole Road Brook	57	46	34
Eastham	Sunken Meadow	93	80	76
Eastham	First Encounter	77	64	76
Eastham	Boat Meadow	56	34	48
Eastham	Dyer Prince	54	41	36
Orleans	Rock Harbor	37	48	44
Orleans	Cedar Pond	22	29	32
Orleans	Little Namskaket	75	61	57
Orleans	Namskaket	51	27	43
Brewster	Paines Creek	75	64	66
Brewster	Quivet Marsh	42	38	58
Dennis	Sesuit Creek	49	19	19
Dennis	Inner Sesuit Harbor	78	66	82
Barnstable	Barnstable Harbor	84	72	85
Sandwich	Scorton Creek	61	19	54
Sandwich	Scorton Harbor	80	68	65
Sandwich	Old Harbor	78	74	75
Sandwich	Canal	84	82	82
South Shore				
Plymouth	Ellisville	63	74	38
Plymouth	Eel River	45	70	73
Plymouth	Plymouth Harbor	67	70	80
Kingston	Jones River	27	21	29
Duxbury	Duxbury Harbor	49	63	80
Duxbury	Back River	39	37	63

Table 1. Endpoints for each parameter score used to calculate the Health Index

Parameter	0 Point Value	100 Point Value
Turbidity (NTU)	17	0
Chlorophyll (ug/L)	10	3
DIN (uM)	10	1
TON (uM)	43	20



- More areas are declining rather than improving
- Most significant declines are in the nearshore waters



Data Request Form

Sample Date	Temp	Salinity	DO	Chlorophyll	Pheophytin	Turbidity	Nitrate + Nitrite	Ammonium	Ortho Phosphates
2006-08-30	17.3	31.2	8.85	-	-	-	0.18	-	0.0
2006-08-30	17.3	31.2	8.85	-	-	-	0.18	-	0.0
2006-08-30	17.3	31.2	8.85	-	-	-	0.18	-	0.0
2006-09-27	18.4	31.4	9.76	-	-	-	0.19	-	0.0
2006-09-27	18.4	31.4	9.76	-	-	-	0.19	-	0.0
2006-09-27	18.4	31.4	9.76	-	-	-	0.19	-	0.0
2007-01-14	6.7	31.6	9.94	-	-	-	1.27	-	0.0
2007-02-27	0.8	31.4	12.65	5.76	0.3	-	0	-	0.0
2007-03-27	3.9	31.7	11.41	1.48	0.09	-	0.34	-	0.0
2007-05-02	9	30.5	9.83	0.43	0.03	0.64	0.06	-	0.0
2007-05-23	11.5	29.8	10.07	1.6	0.23	1.77	0	-	0.0
2007-09-24	18.1	31.7	7.82	0.31	0.07	0	0	-	0.0
2007-11-05	11.9	32	8.28	0.35	2.1	0.79	1.57	-	0.0
2007-12-19	4	31.9	11.23	3.69	0.73	0.32	0.05	-	0.0
2008-01-17	4	32.3	11.47	5.55	0	-	0.12	-	0.0

- 9N >
- 9S >
- Allen Harbor >
- Barnstable Harbor >
- Bass River >
- Blackfish Creek >
- Boardwalk >
- Boat Meadow >
- Bournes Pond >
- C3 >
- Canal >

Duplicate Efforts

- ~ 30-40 sentinel stations
- Sampled 5-6 times a season
- 150-240 of the approximately 1850 samples
(CCS: 1500 + BBC: 350)

Station Locations

- Incorporated sentinel stations where identified
- Historically sampled as part of state funded water quality monitoring program
- Farfield Stations
 - Comprehensive water quality monitoring program
 - Background concentrations / flushing
 - Evaluation of alternative technologies (e.g. inlet widening)

Sampling Strategy

- May – October (one winter sampling event)
- Select stations, year round
- Corresponds with majority of other long-term water quality monitoring programs
- Captures seasonal variability

Methodologies

- CCS and BBC operate under Mass DEP approved QAPPs
- Methods used by the analytical laboratories (MBL and CCS) are approved by DEP and EPA
- Methods are similar to those used for MEP