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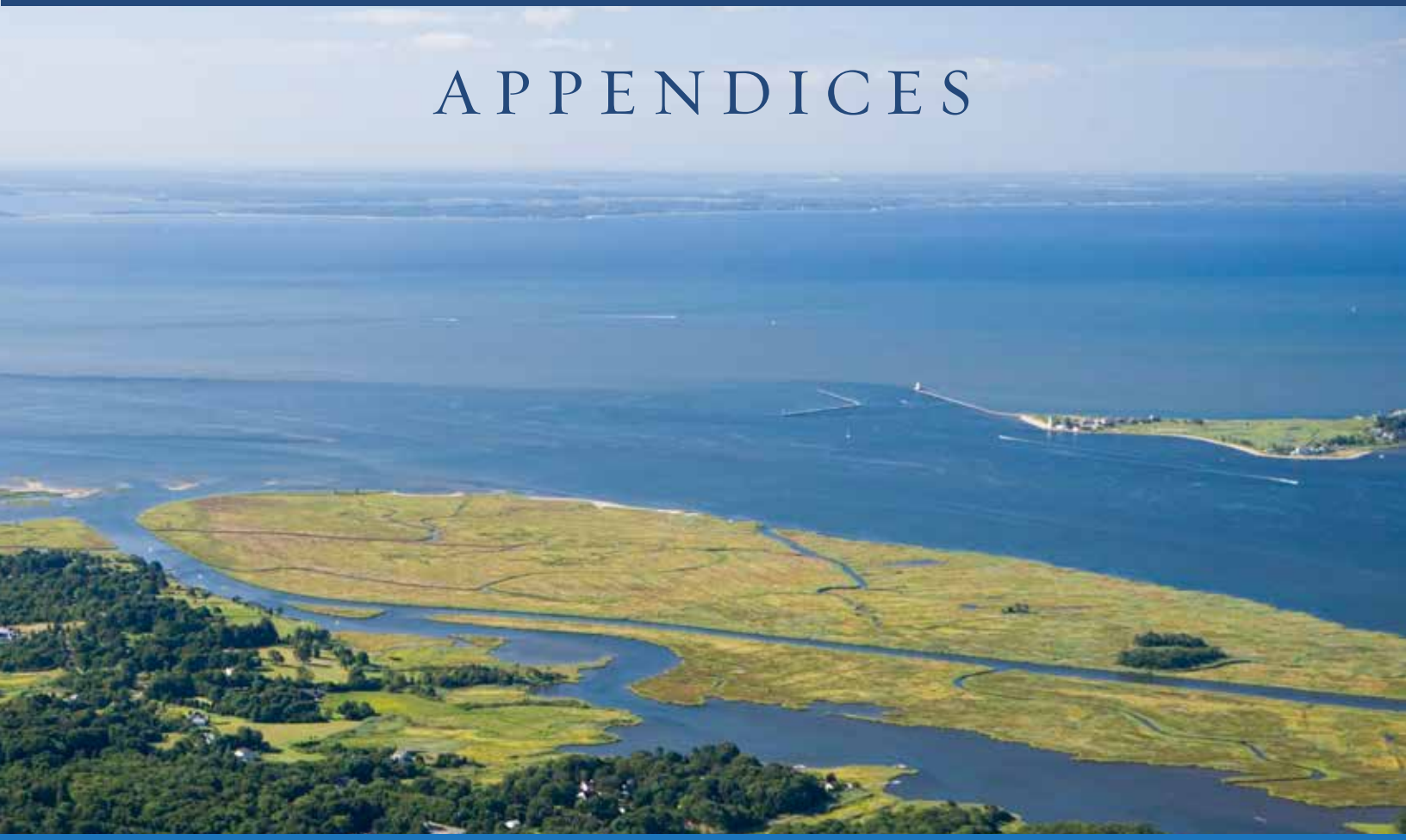
The Long Island Sound Ecological Assessment

APPENDICES



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Appendix A – Detailed Methodolgies

i. Organism classification

This appendix is an expansion of the methods described under the organism classification section in Chapter 5: Seafloor Habitats of Long Island Sound. It further details the seafloor samples and subsequent data preparation steps that were used to determine the benthic communities of the Sound.

The seafloor habitat portion of the assessment was made possible by access to 1958 samples of abundance and biomass data from four sources:

1) A compilation of Long Island Sound and Block Island Sound samples collected as part of NOAA benthic surveys was provided by the National Marine Fisheries Service (NMFS) (1,165 samples). The Service's Northeast Fisheries Science Center conducted a quantitative survey of macrobenthic invertebrate fauna from the mid-1950s to the early 1990s. Organisms collected in each sample were identified to species, genus, or family. A thorough discussion of their sampling methodology, gear types, history, and an analysis of the benthic dataset, including the distribution and ecology of the organisms, can be found in the publications of Wigley and Theroux (1981 and 1998). For consistency, only those samples collected with Smith-McIntyre type grabs were used (1,165 samples).

2) Peconic Bay samples were provided by R. Cerrato and Suffolk County, NY (380 samples). Between 2001 and 2008, researchers from Stony Brook University's School of Marine and Atmospheric Sciences (SoMAS) collected one or more bottom grabs (mod-Van-veen grab, 0.04m2) from regions that were stratified by acoustic provinces as determined by visual examination of acoustic backscatter data (multibeam and sidescan sonar) where backscatter signal was taken as a proxy for bottom type. Samples were washed through a 0.5mm sieve.

3) Long Island Sound samples collected by Reid et al. (1979) were provided by P. Auster (142 samples). In the summer of 1972, 142 samples were collected along a regular grid pattern across Long Island Sound (Smith-McIntyre grab, 0.1m2). Stations were every 3-5 km on north-south transects spaced 8.7 km apart (on consecutive 5' longitude lines). Samples were washed through a 1.0mm sieve. These samples are also included in the 1,165 samples from NMFS.

4) Long Island Sound samples collected by Pelligrino and Hubbard (1983) were provided by R. Zajac (413 samples). In the summers of 1981 and 1982, 413 samples were collected along a regular grid pattern across the northern half of Long Island Sound (mod-Van-veen grab, 0.04m2). This is the most concentrated array of sampling locations, but it is restricted to the northern half of Long Island Sound in Connecticut waters. Samples were washed through a 1.0mm sieve.

The objective of the organism classification was to classify these 1321 seafloor samples into a smaller number of groups (benthic communities) such that each group contained samples with similar species composition. Individual samples contained from 1 to 40 species and our methods used percent similarity between two samples as the criteria for clustering them into communities. After classifying the samples into benthic communities, we determined the depth range, sediment types, and seabed forms associated with those community types. From these data we calculated the thresholds within each of these factors that best separated one group of communities from another.

Prior to compilation of this combined dataset, misspellings were corrected, non-faunal entries (e.g. egg cases, plant material) and unknown species entries were removed from the datasets, and taxonomic synonyms were resolved. Two online databases were used to identify the most recent accepted name: WoRMS, the World Register of Marine Species (http://www.marinespecies.org/index.php) and

ITIS, the Integrated Taxonomic Information System (http://www.itis.gov/index.html). In the few cases where the taxonomy was confusing and there were multiple acceptable names, we deferred to the name used in WoRMS as the definitive answer and made a note in the cells with taxonomic synonyms.

After correcting for synonyms we combined the entire 1321 samples into a sample-by-species table with the count of each species within each sample. Where possible, all analysis was done at the species level but in some cases a genus was treated as a species such as when an organism was abundant in many samples but only identified to genus. Species that only occurred in one sample were removed from the data set; otherwise, all species were used in the clustering process. All clustering was done on presence-absence data (no abundance information) to ensure that the clusters were identified on their full species composition not on the dominance of any one species.

Exploration revealed that clusters derived from the analysis always grouped first by individual data source. This appeared to be due to fundamental differences in sampling methodologies, geographic distribution, and perhaps taxonomist. These differences were reflected as consistent differences in both species richness and composition between the sources. Because we were unable to remove this bias from the combined dataset, we analyzed the datasets separately for each source and then looked for overlap between the datasets. The exception to this was the Reid and NMFS data set that were inextricably linked and treated as one source.

For each data source, samples with similar species composition and abundance were grouped together using hierarchical cluster analysis (McCune and Grace, 2002). This technique starts with pairwise contrasts of every sample combination then aggregates the pairs most similar in species composition into a cluster. Next, it repeats the pairwise contrasts, treating the clusters as if they were single samples, and joins the next most similar sample to the existing clusters. The process was repeated until all samples were assigned to one of the many clusters. For our analysis, the Sorenson similarity index and the flexible beta linkage technique with Beta set at 25 was used as the basis for measuring similarity (McCune and Grace, 2002). After grouping the samples, indicator species analysis was used to identify those species that were faithful and exclusive to each organism group (Dufrene and Legendre, 1997).

To identify diagnostic species for each organism group or 'cluster', Monte Carlo tests of significance were run for each species relative to the organism groups using the criterion of a p-value less than or equal to 0.10 (90% probability). The number of clusters (we tested 5, 10 or 20) was determined by seeing which set of clusters had the strongest set of indicators (the lowest average p-value). Our final results yielded 10 clusters for each data set, and 30 for the entire Sound.

ii. Sediment interpolation

This appendix elaborates on the spatial interpolation methods for creating a continuous sediment map of the study area as described in the 'Soft Sediments' section of Chapter 5: Seafloor Habitat of Long Island Sound.

All geostatistical modeling steps were performed in ESRI ArcGIS 10. Deterministic mean trend was estimated using local polynomial interpolation using second degree (quadratic) polynomials, a single-sector circular search neighborhood with a 16,085 m axis, and Gaussian kernel weights. At least 10 and no more than 1000 data from each sector were used to produce each trend prediction. Residuals of the sediment values were obtained by subtracting the trend surface prediction at each data location from the observed data value, and were checked for nor-

mality. A sample semivariogram of the residuals was then calculated (Figure 5.4). Statistics were as follows: major range = 3,199, nugget = 1.36, partial sill = 1.1. Finally, we interpolated the residuals of the sediment data set in GIS using ordinary kriging with a search radius matching the major range (3,199 m) consisting of the four nearest neighbors. An eight sector neighborhood search was used to mitigate the effects of uneven sample distribution.

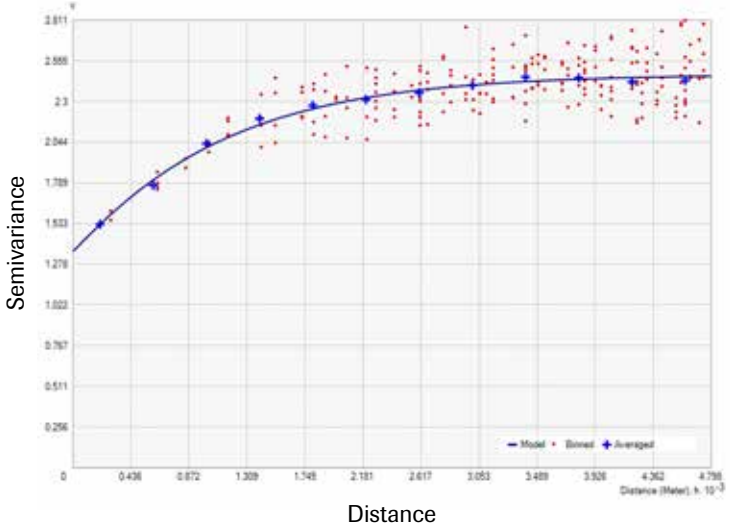

Figure A1. Semivariogram of the 14,691 sediment points after correcting for bias in parsed and extracted data. Pairs of points that are spatially closer are more similar until the graph levels at around 3,199 m.

Appendix B – Additional Data and Figures

i. Physical data

Variability in physical parameters such as salinity, temperature, dissolved oxygen and Secchi depth can be important for explaining why certain organisms are found in some geographic areas and not others. While we gathered data and produced maps for these physical factors, we did not complete an analysis of the correlation between these variables with our biological data. This will be an important analysis to conduct as a follow-up to LISEA.

Salinity, temperature, dissolved oxygen and Secchi depth data from the Connecticut DEEP Long Island Sound Water Quality Monitoring Program were interpolated for the Sound using Kriging. The resulting data grids were then summarized by the 1x2 nautical mile cells of the CT DEEP trawl data. These cells form the spatial foundation of our species based analyses of persistence.

For the maps shown below, the data used is from 1991 to 2011. For each 1x2 nautical mile cell, the data is averaged over this 20 year period to get the result shown for each of cells.

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Fall average dissolved oxygen (mg/L)

3 - 4	6 - 7
4 - 5	7 - 8
5 - 6	8 - 9

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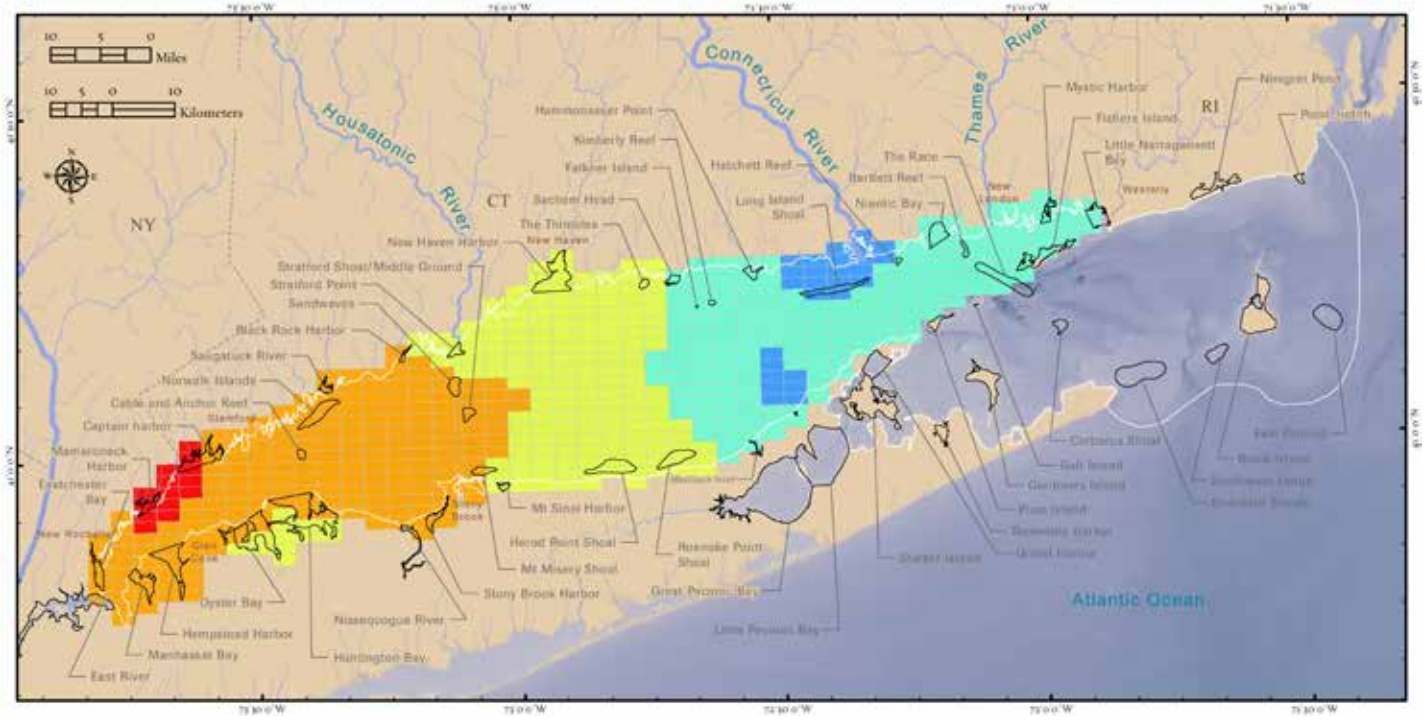

Long Island Sound Ecological Assessment

Spring average dissolved oxygen
(mg/L)

3 - 4	6 - 7
4 - 5	7 - 8
5 - 6	8 - 9

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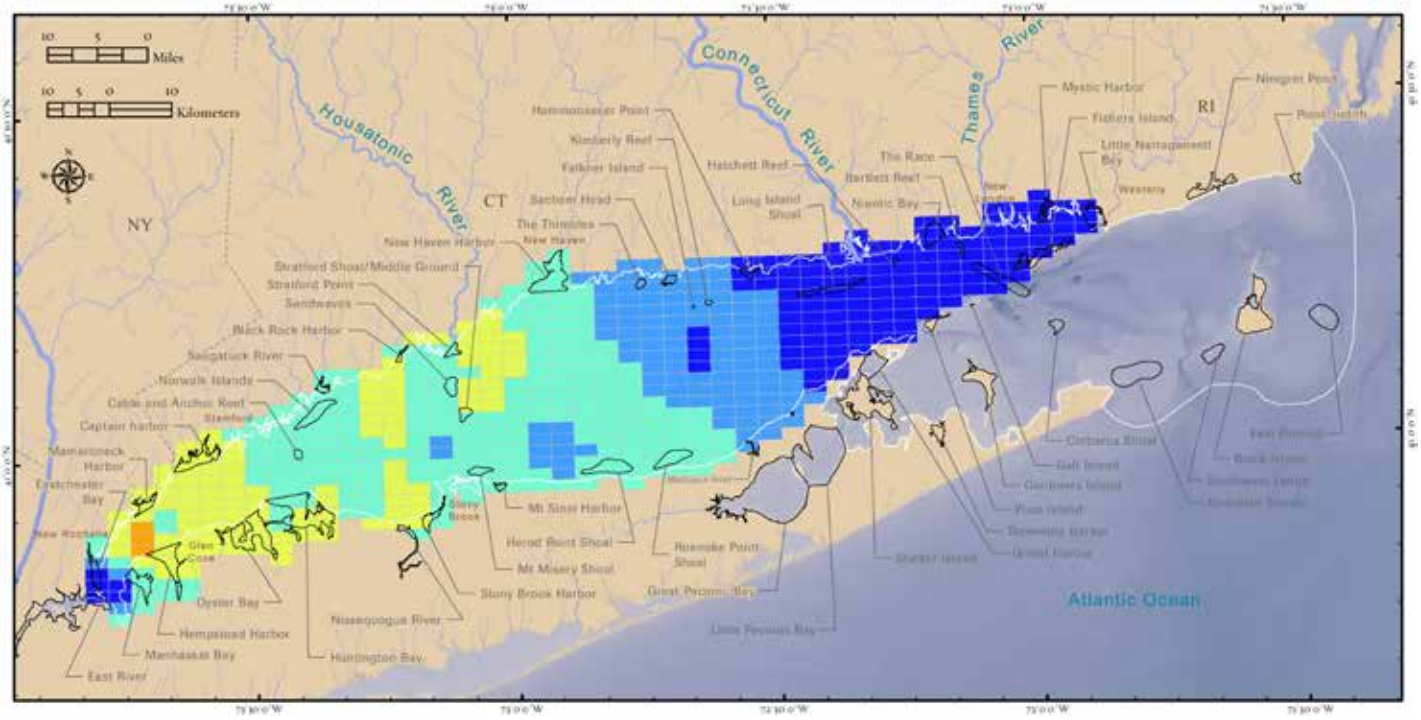

Long Island Sound Ecological Assessment

Average distance to river outfalls
(kilometers)

- 0 - 5
- 5 - 10
- 10 - 15
- 15 - 20
- 20 - 25
- 25 - 30
- 30+
- size 2 river outfalls

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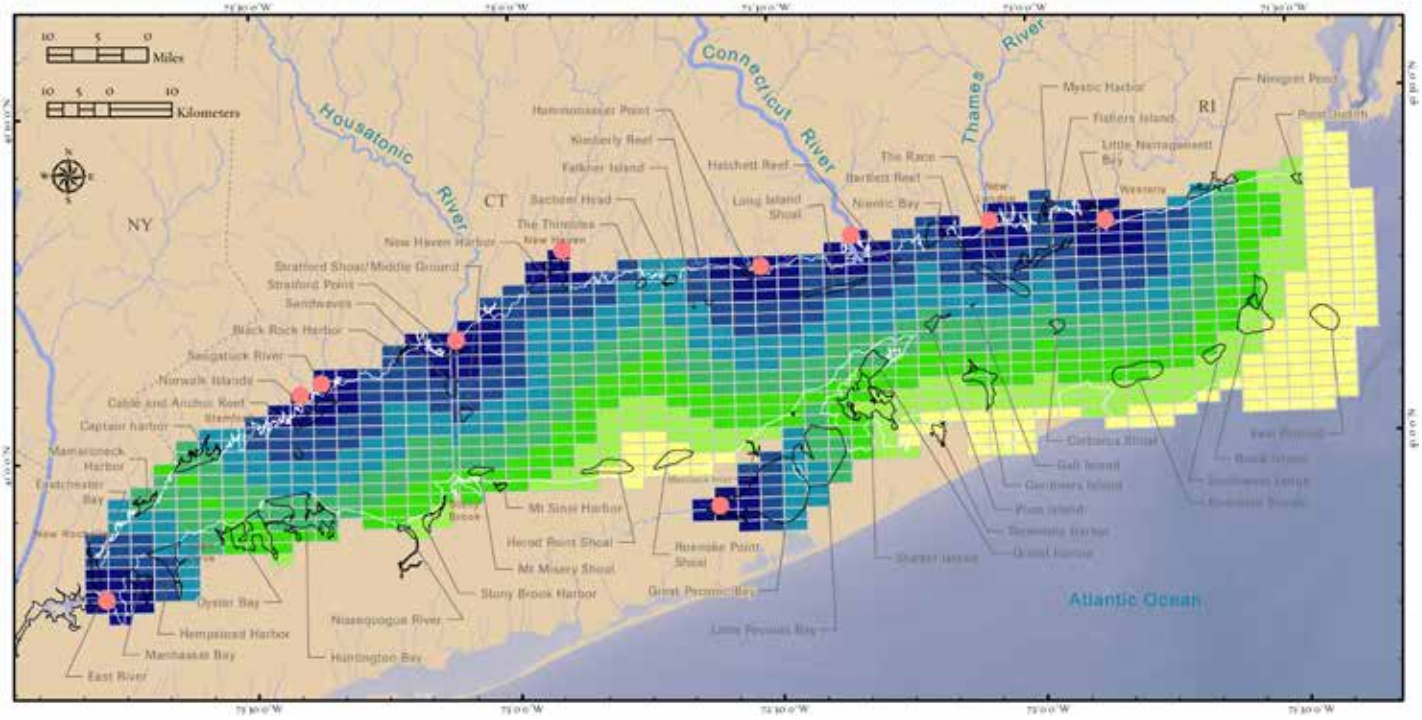

Long Island Sound Ecological Assessment

Fall average bottom salinity
(parts per thousand)

- 24 - 25
- 25 - 26
- 26 - 27
- 27 - 28
- 28 - 29
- 29 - 30
- 30 - 31

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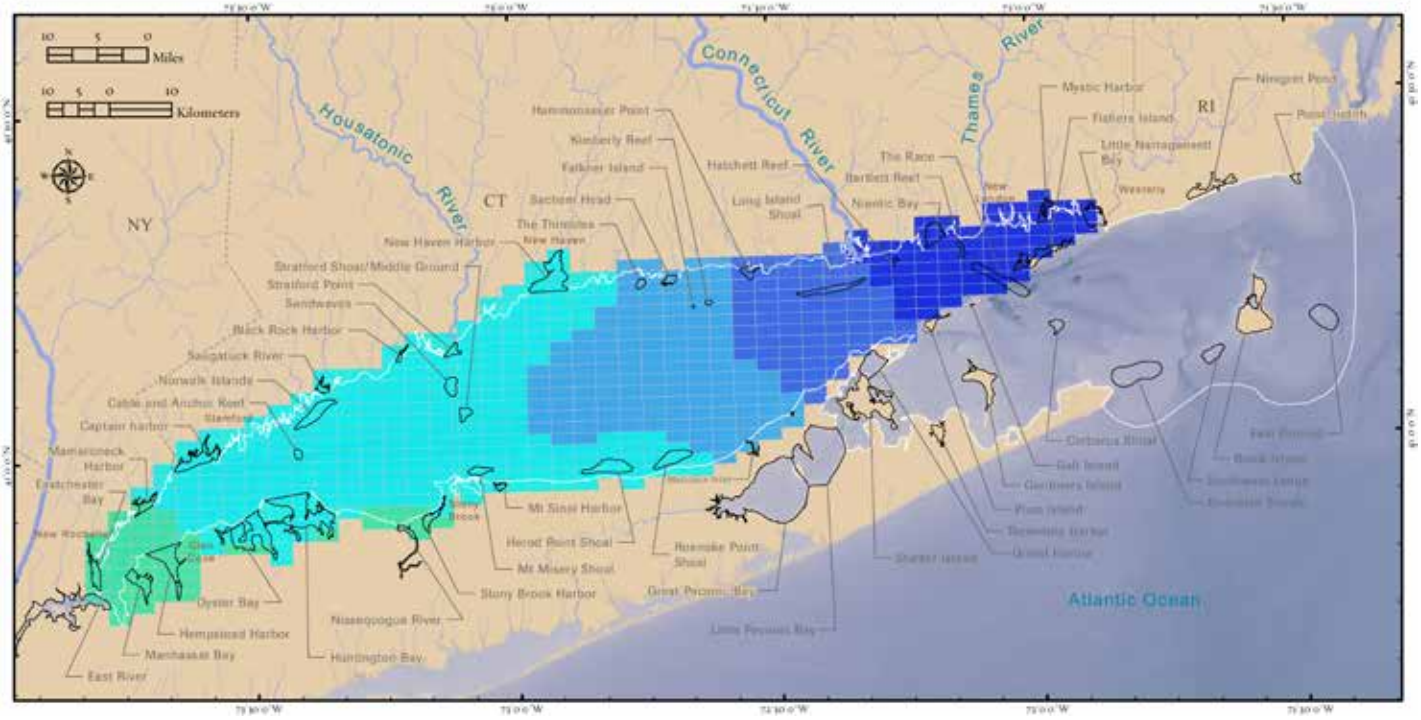

Long Island Sound Ecological Assessment

Spring average bottom salinity
(parts per thousand)

- 24 - 25
- 25 - 26
- 26 - 27
- 27 - 28
- 28 - 29
- 29 - 30
- 30 - 31

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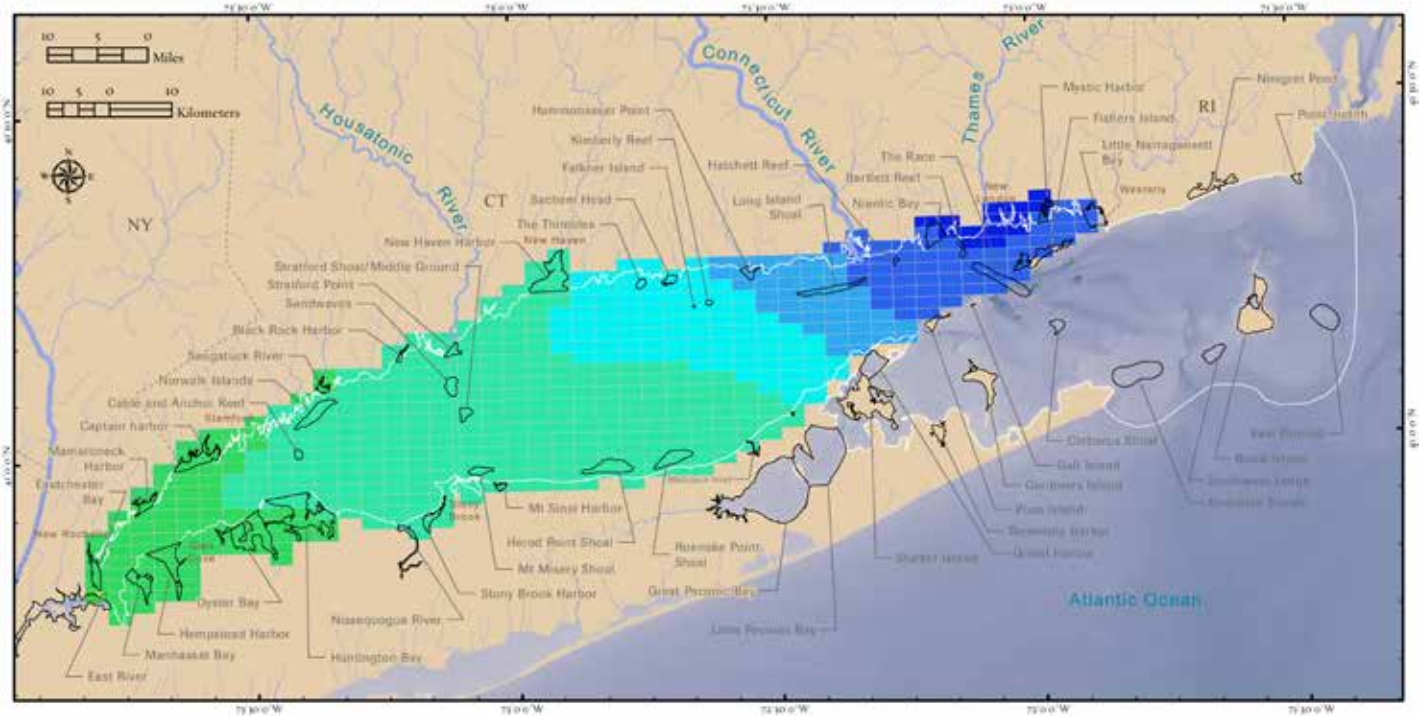

Long Island Sound Ecological Assessment

Fall average surface salinity
(parts per thousand)

24 - 25	28 - 29
25 - 26	29 - 30
26 - 27	30 - 31
27 - 28	

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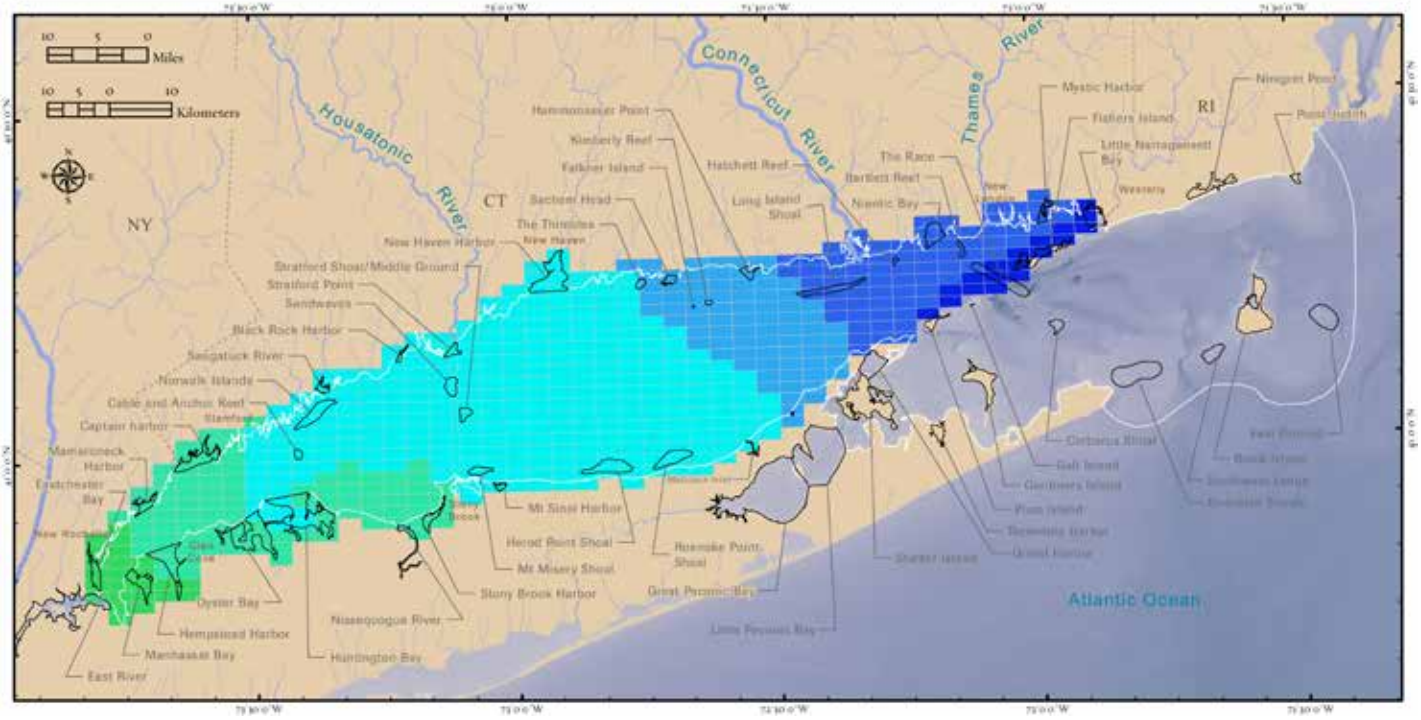

Long Island Sound Ecological Assessment

Spring average surface salinity
(parts per thousand)

24 - 25	28 - 29
25 - 26	29 - 30
26 - 27	30 - 31
27 - 28	

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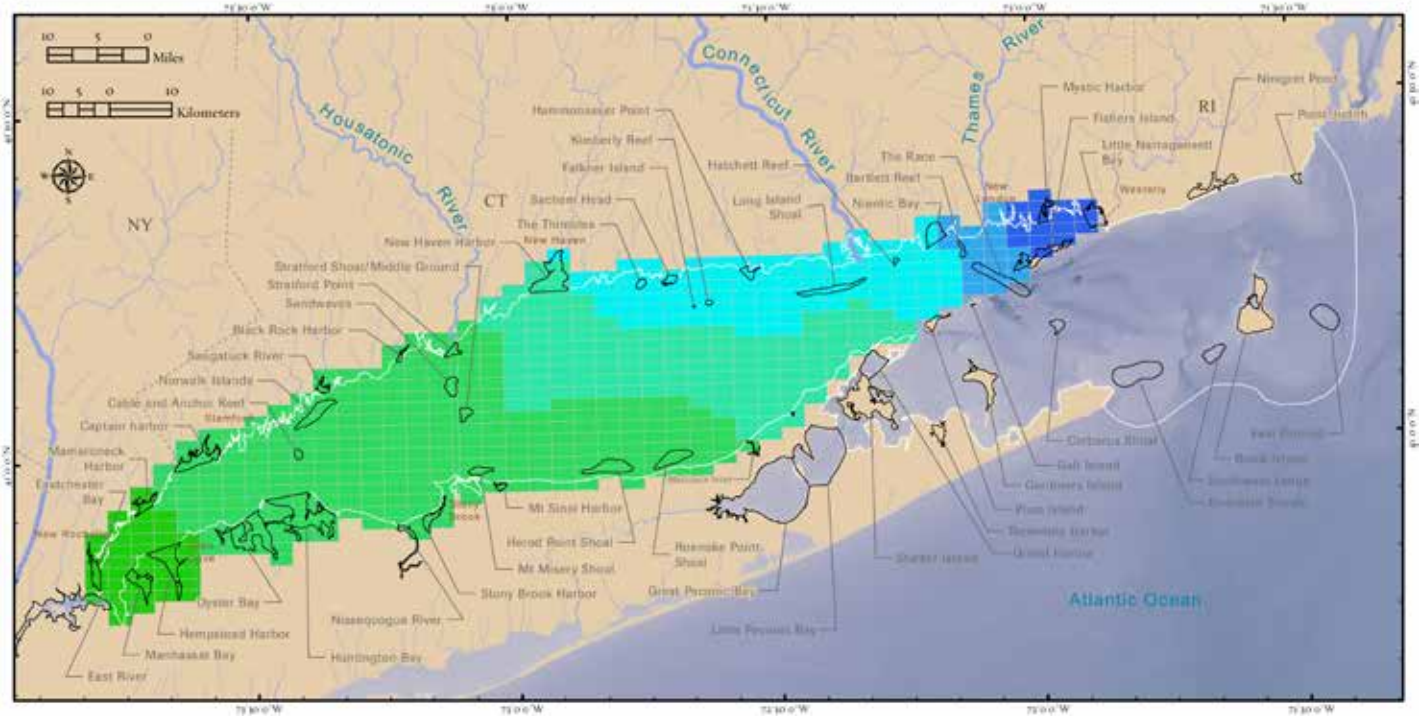

Long Island Sound Ecological Assessment

Fall average Secchi depth
(meters)

0 - 1
1 - 2
2 - 3
3 - 4
4 - 5

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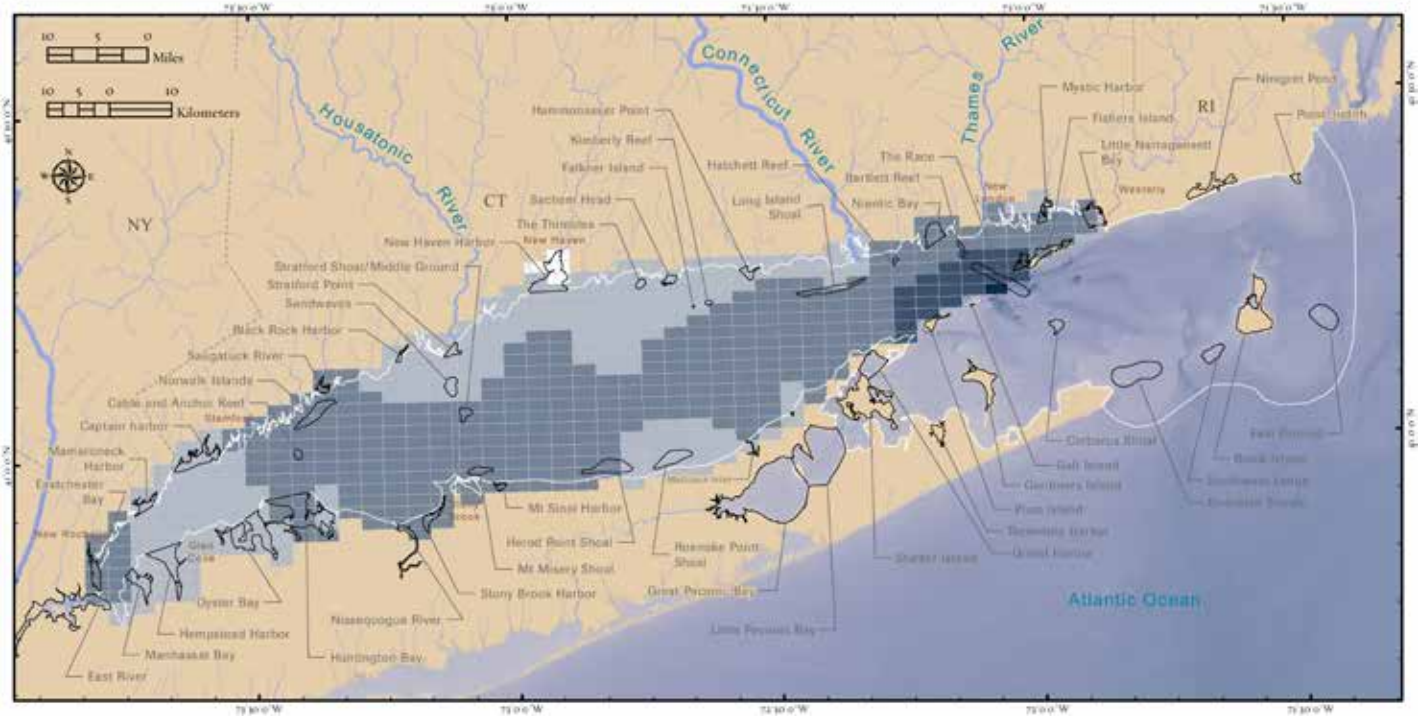

Long Island Sound Ecological Assessment

Spring average Secchi depth
(meters)

0 - 1
1 - 2
2 - 3
3 - 4
4 - 5

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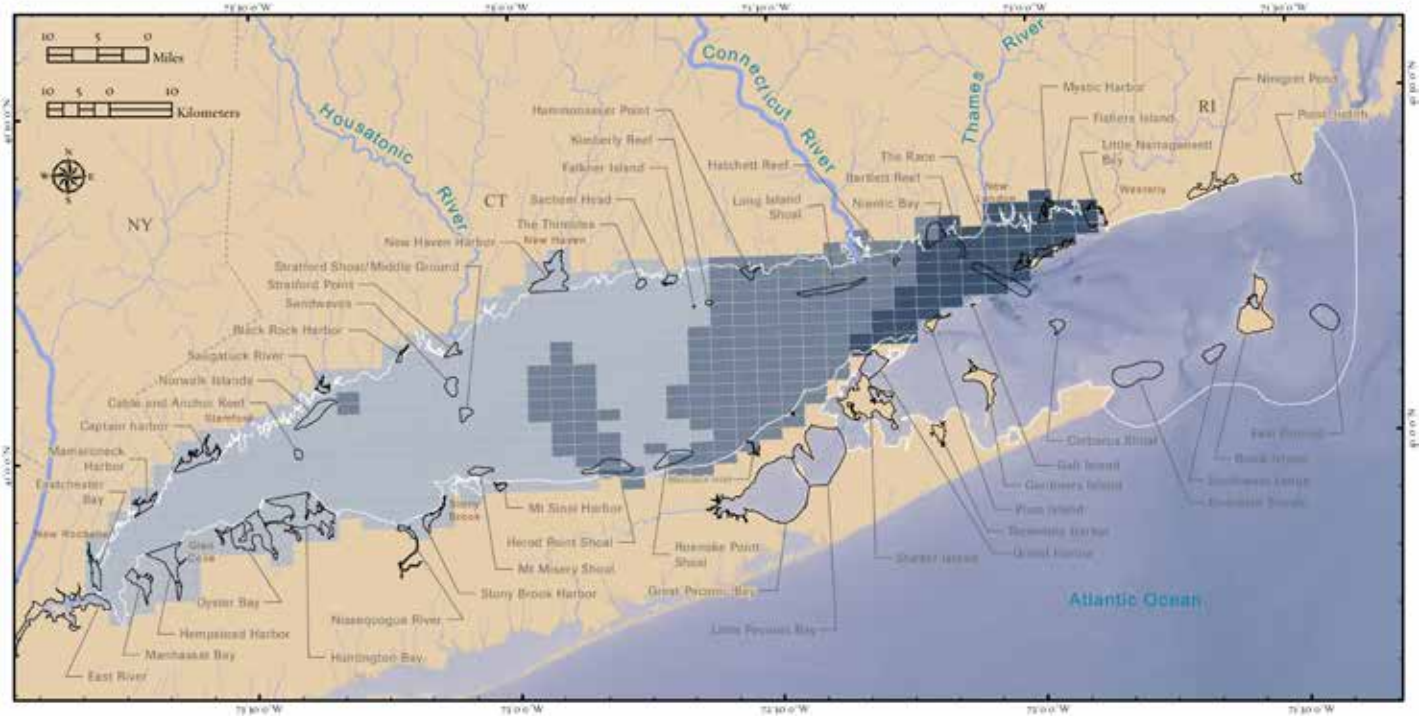

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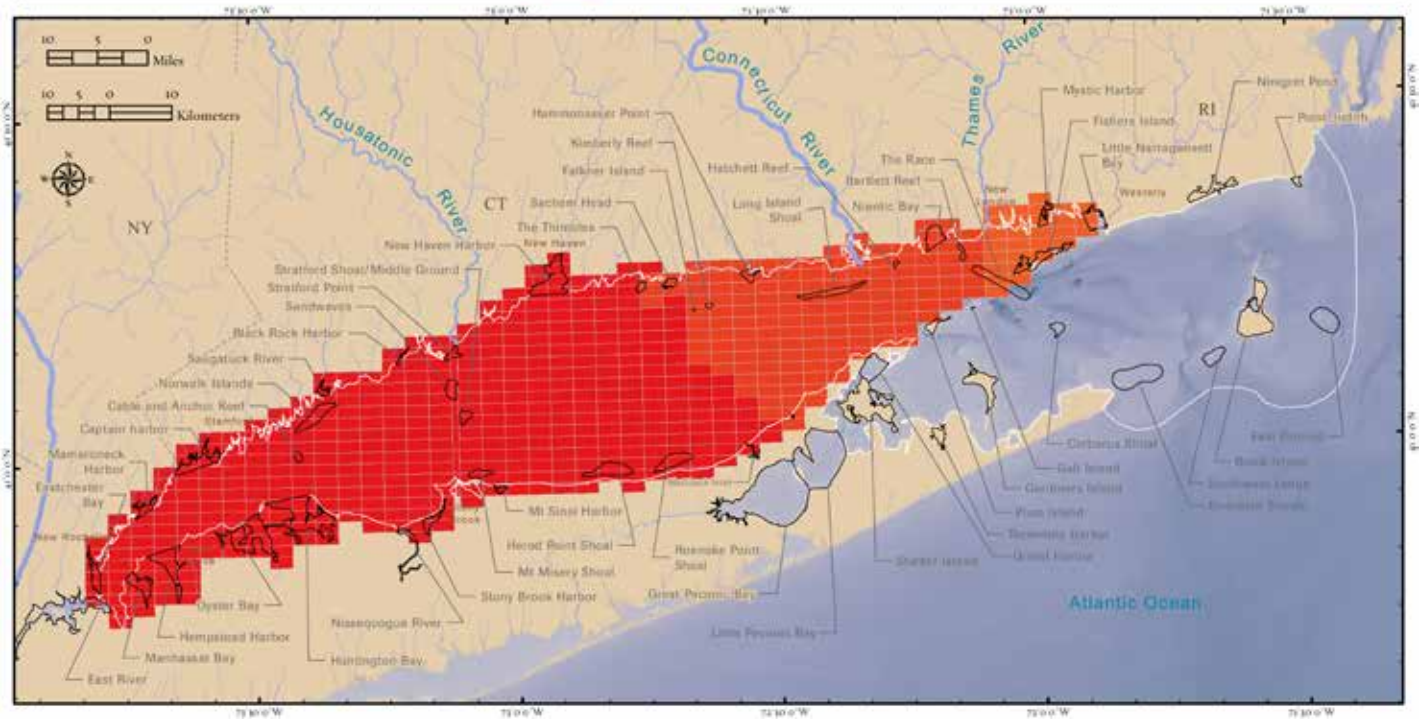

Long Island Sound Ecological Assessment

Spring average bottom temperature
(degrees celsius)

6 - 7	10 - 11	14 - 15	18 - 19
7 - 8	11 - 12	15 - 16	19 - 20
8 - 9	12 - 13	16 - 17	20 - 21
9 - 10	13 - 14	17 - 18	21 - 22
			22 - 23

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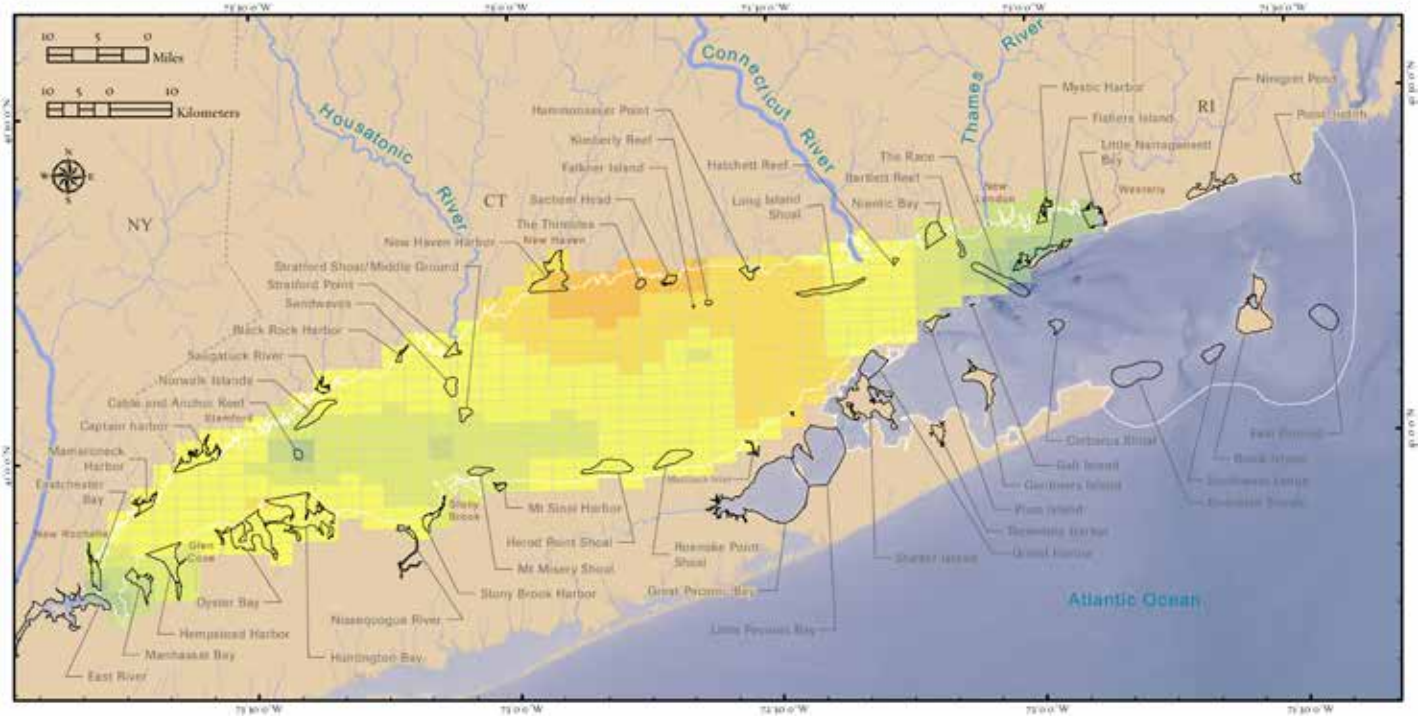

Long Island Sound Ecological Assessment

Fall average surface temperature
(degrees celsius)

6 - 7	10 - 11	14 - 15	18 - 19
7 - 8	11 - 12	15 - 16	19 - 20
8 - 9	12 - 13	16 - 17	20 - 21
9 - 10	13 - 14	17 - 18	21 - 22
			22 - 23

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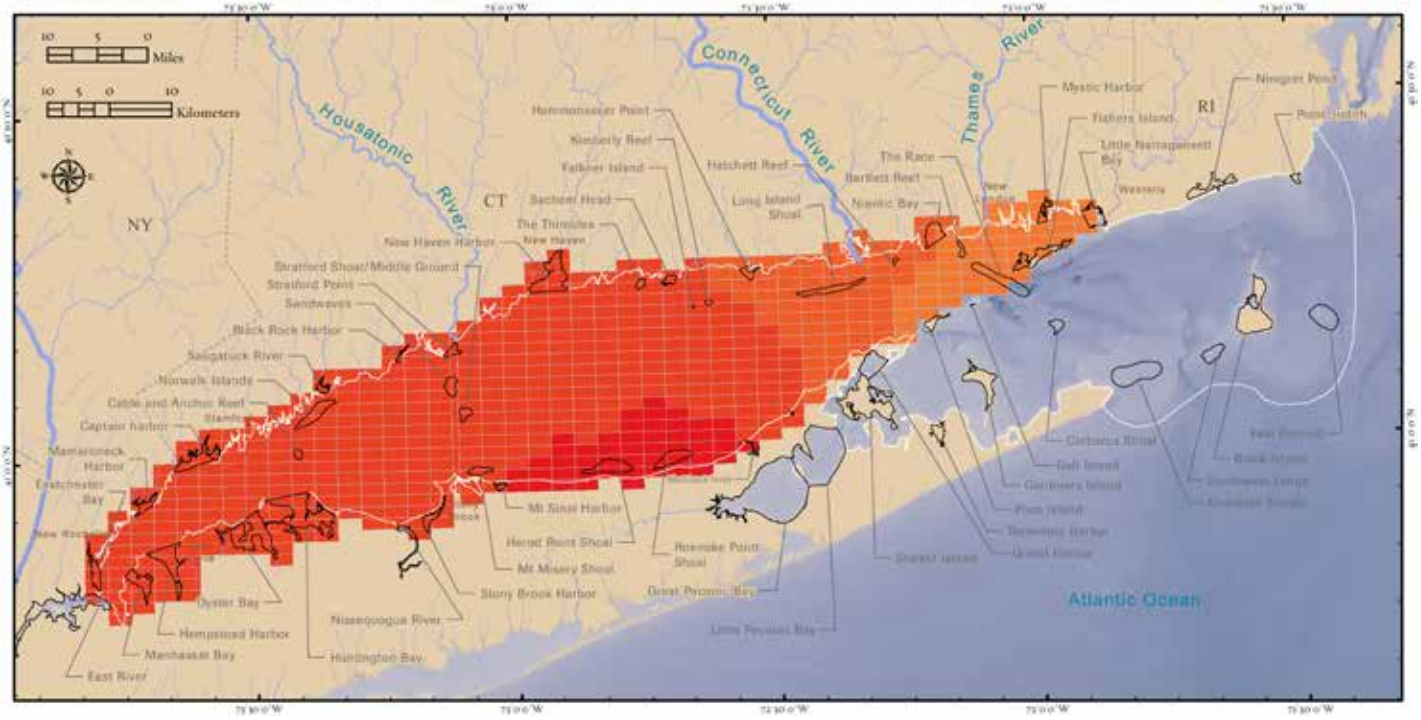

Long Island Sound Ecological Assessment

Spring average surface temperature
(degrees celsius)

6 - 7	10 - 11	14 - 15	18 - 19
7 - 8	11 - 12	15 - 16	19 - 20
8 - 9	12 - 13	16 - 17	20 - 21
9 - 10	13 - 14	17 - 18	21 - 22
			22 - 23

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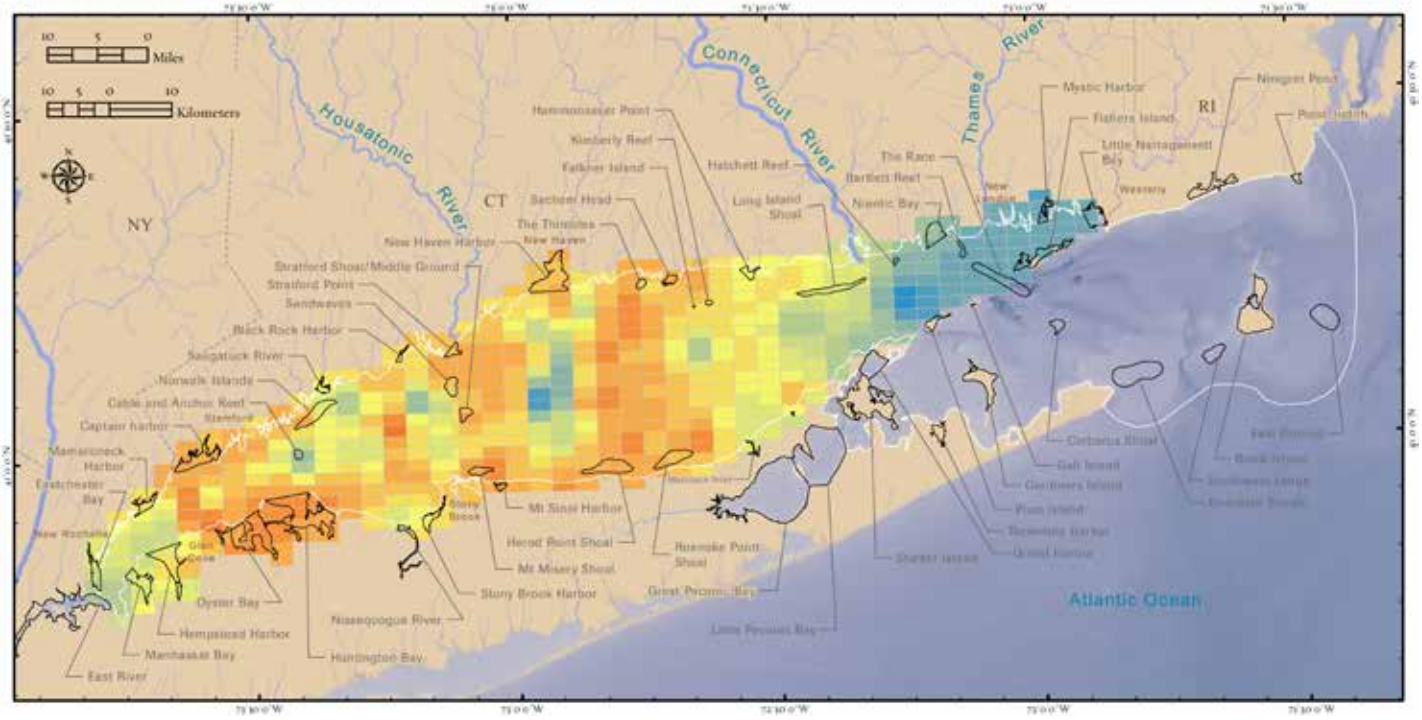
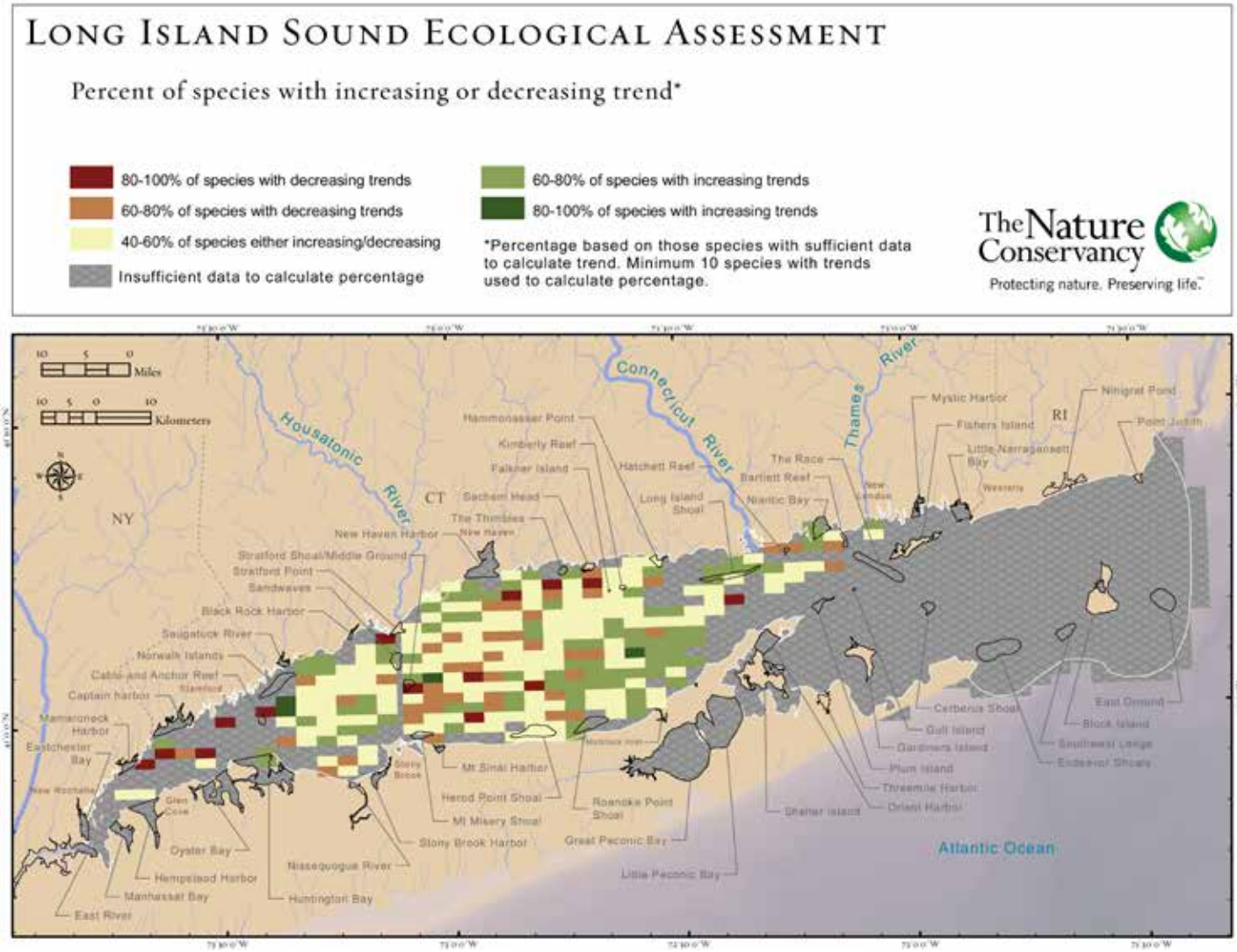


ii. Individual species trends figures

This appendix expands on the 'Trends in abundance' section of Chapter 6: Species Persistence Patterns in Long Island Sound, and includes individual species trends figures for all available datasets with three octads (1984-1992, 1993-2001, and 2002-2009) of sampling (65 species total).



Long Island Sound Ecological Assessment

Count of species with trend greater than one

(based on slope of residuals across three octads)

0	10 - 15
1 - 5	15 - 20
5 - 10	20 - 25

Insufficient data to calculate trend

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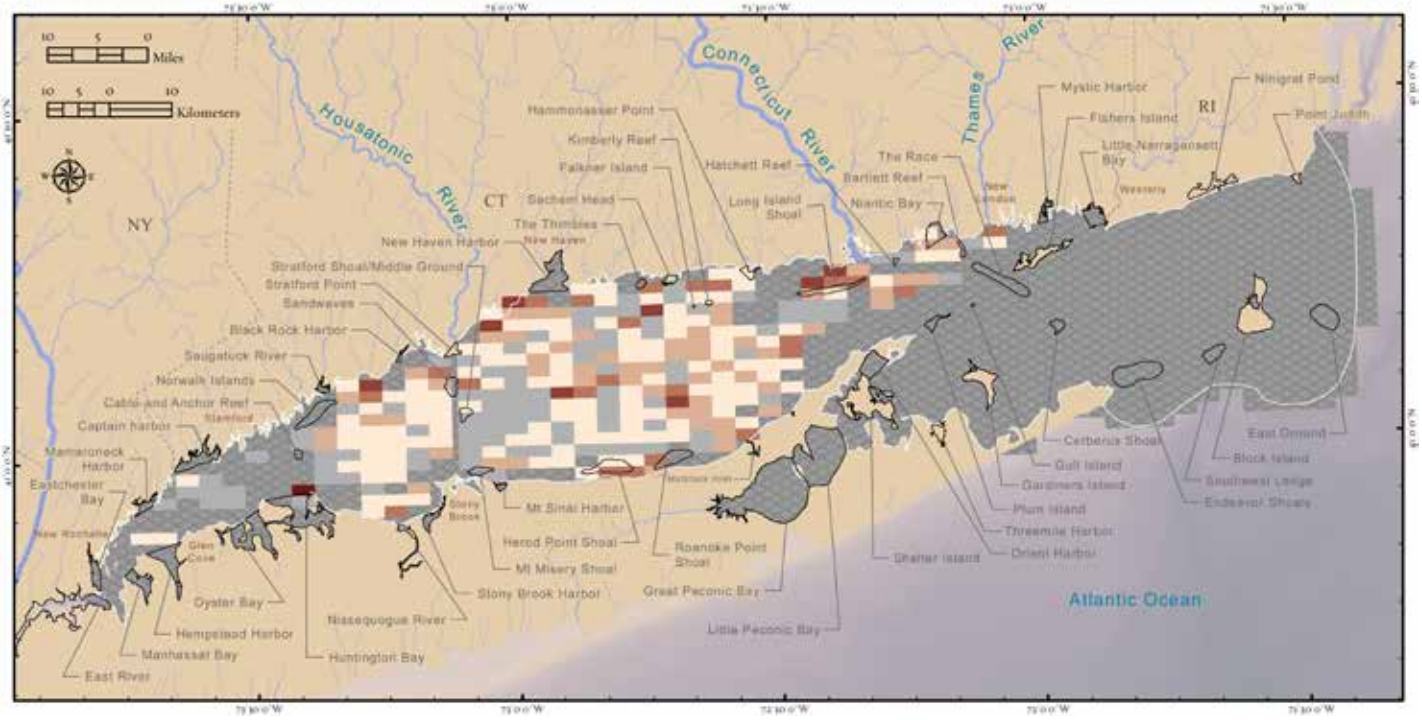

Long Island Sound Ecological Assessment

Count of species with trend greater than two

(based on slope of residuals across three octads)

1 - 5
5 - 10
10 - 15
15 - 20
20 - 25
0
Insufficient data to calculate trend

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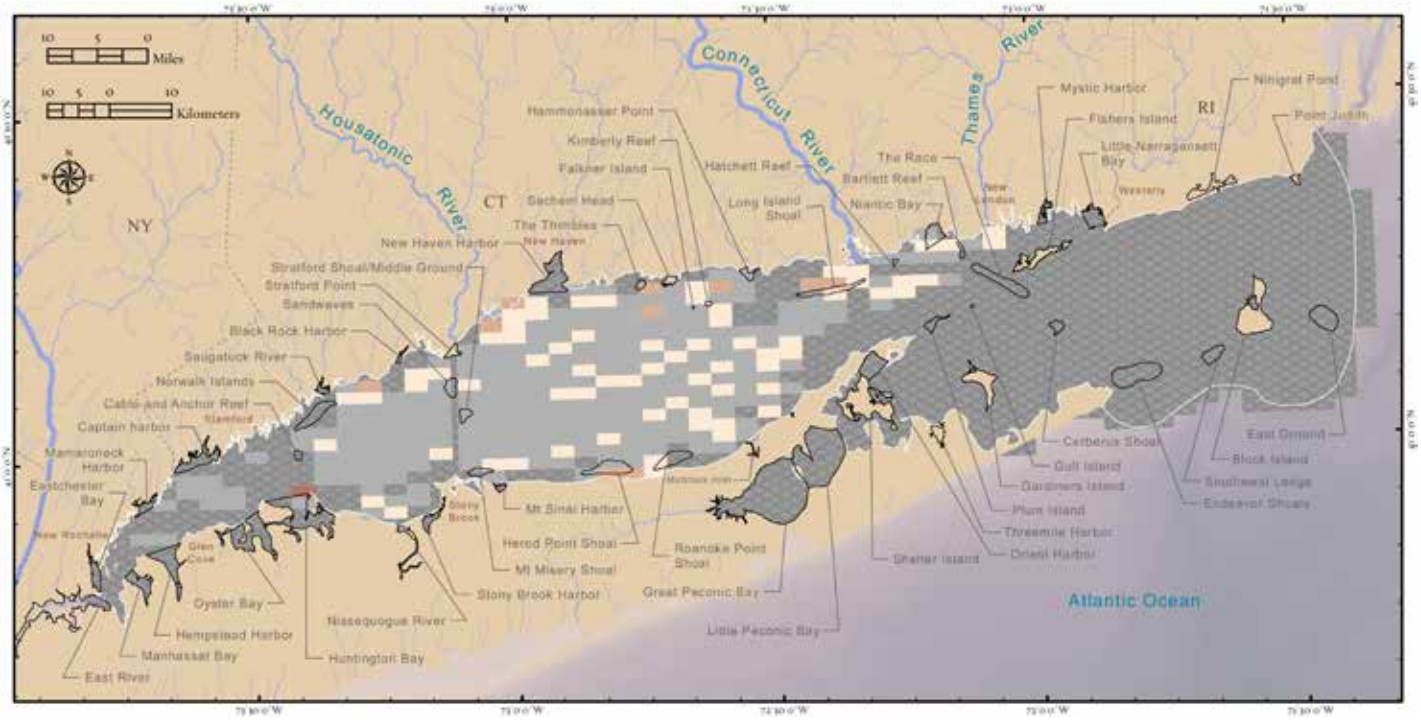

Long Island Sound Ecological Assessment

Count of species with trend greater than three

(based on slope of residuals across three octads)

1 - 5
5 - 10
10 - 15
15 - 20
20 - 25
0
Insufficient data to calculate trend

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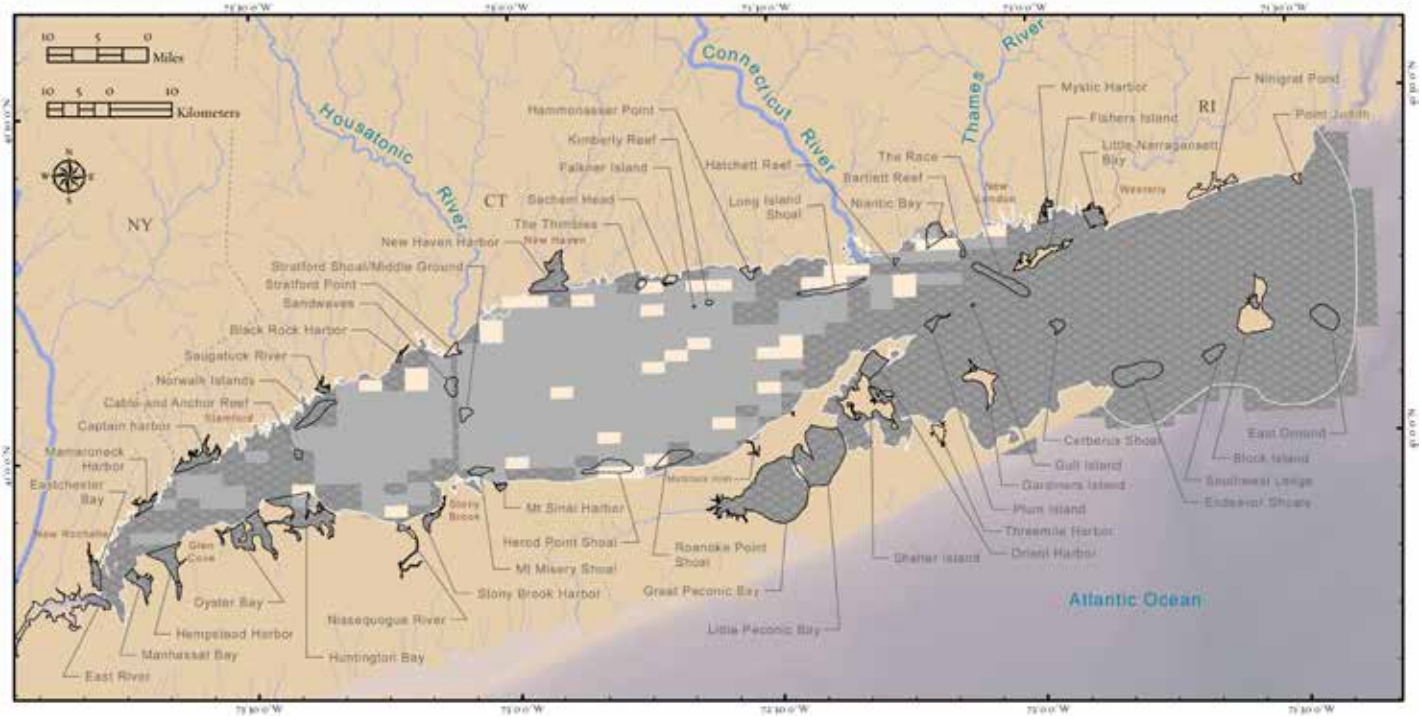

Long Island Sound Ecological Assessment

Count of species with trend less than negative one

(based on slope of residuals across three octads)

0	5 - 7
1 - 3	7 - 10
3 - 5	10 - 15

Insufficient data to calculate trend

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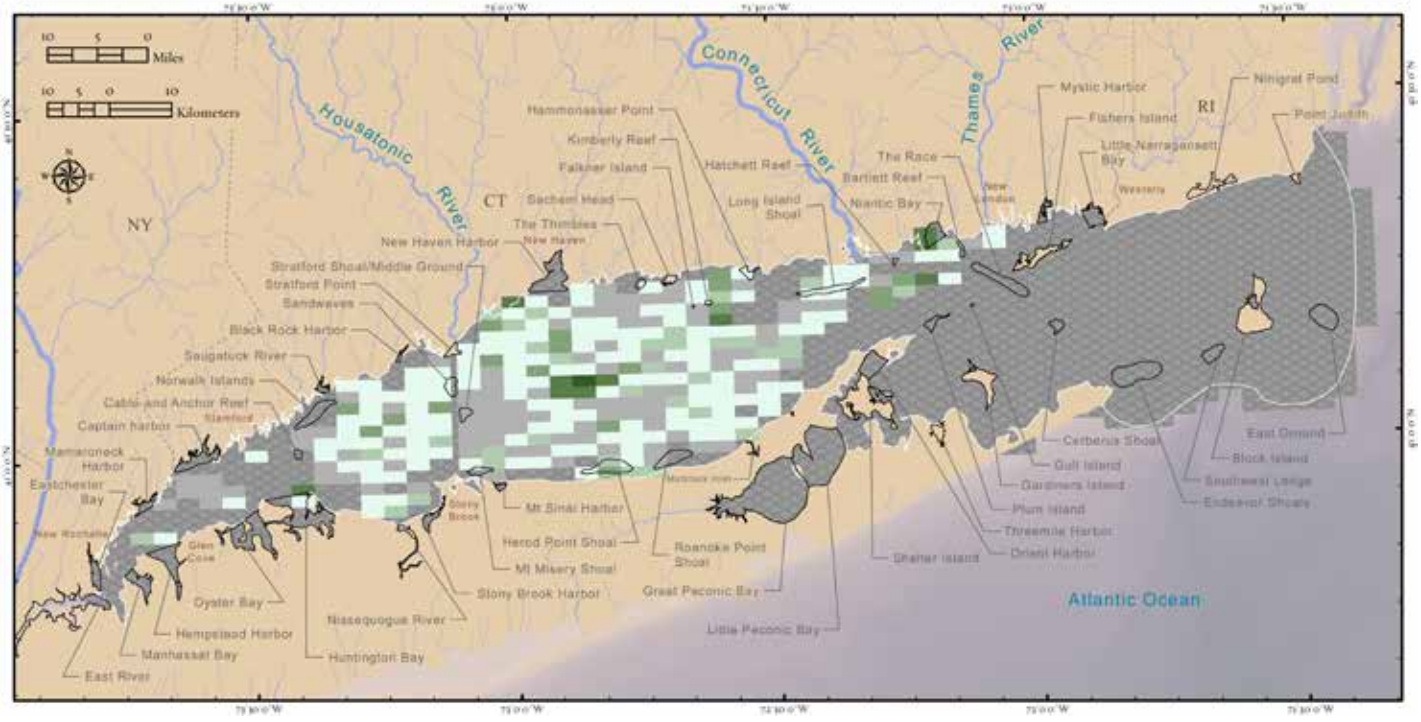

Long Island Sound Ecological Assessment

Count of species with trend less than negative two

(based on slope of residuals across three octads)

0	5 - 7
1 - 3	7 - 10
3 - 5	10 - 15

Insufficient data to calculate trend

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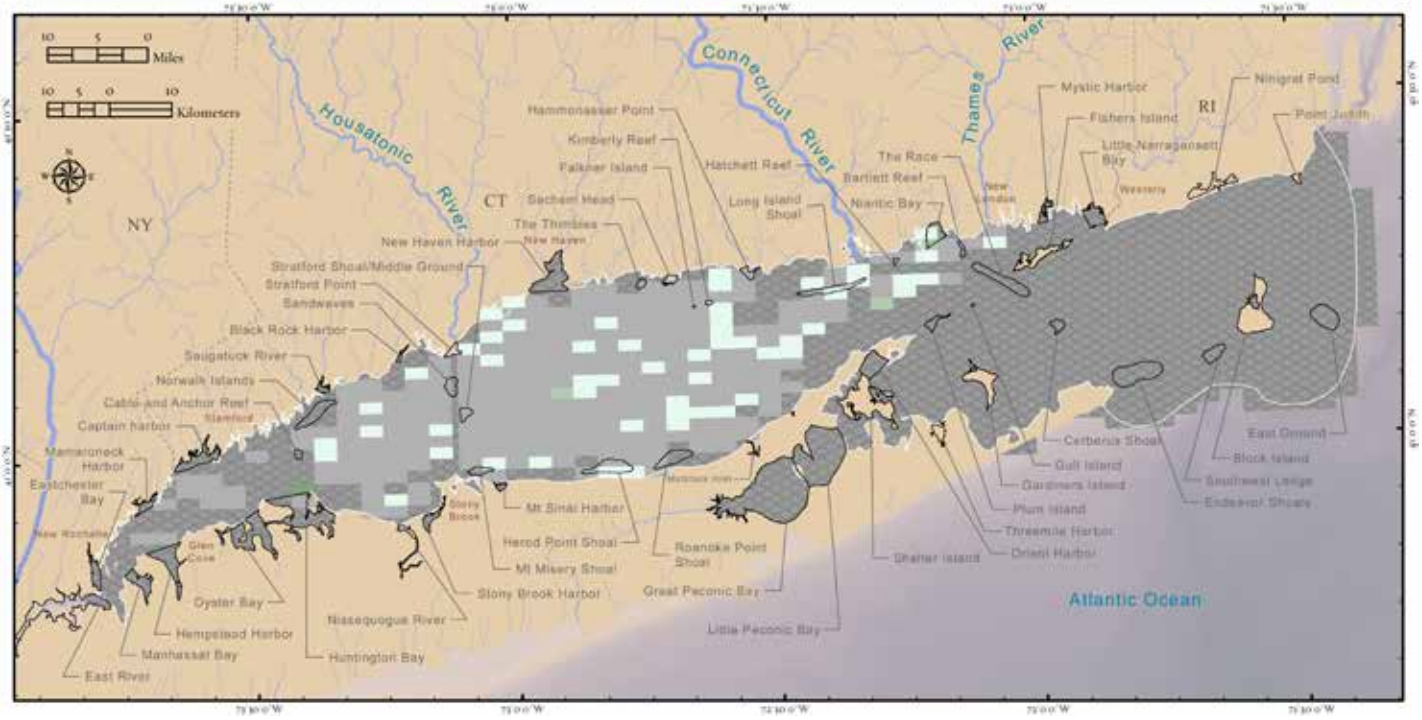

Long Island Sound Ecological Assessment

Count of species with trend less than negative three

(based on slope of residuals across three octads)

0
1 - 3
3 - 5
5 - 7
7 - 10
10 - 15
Insufficient data to calculate trend

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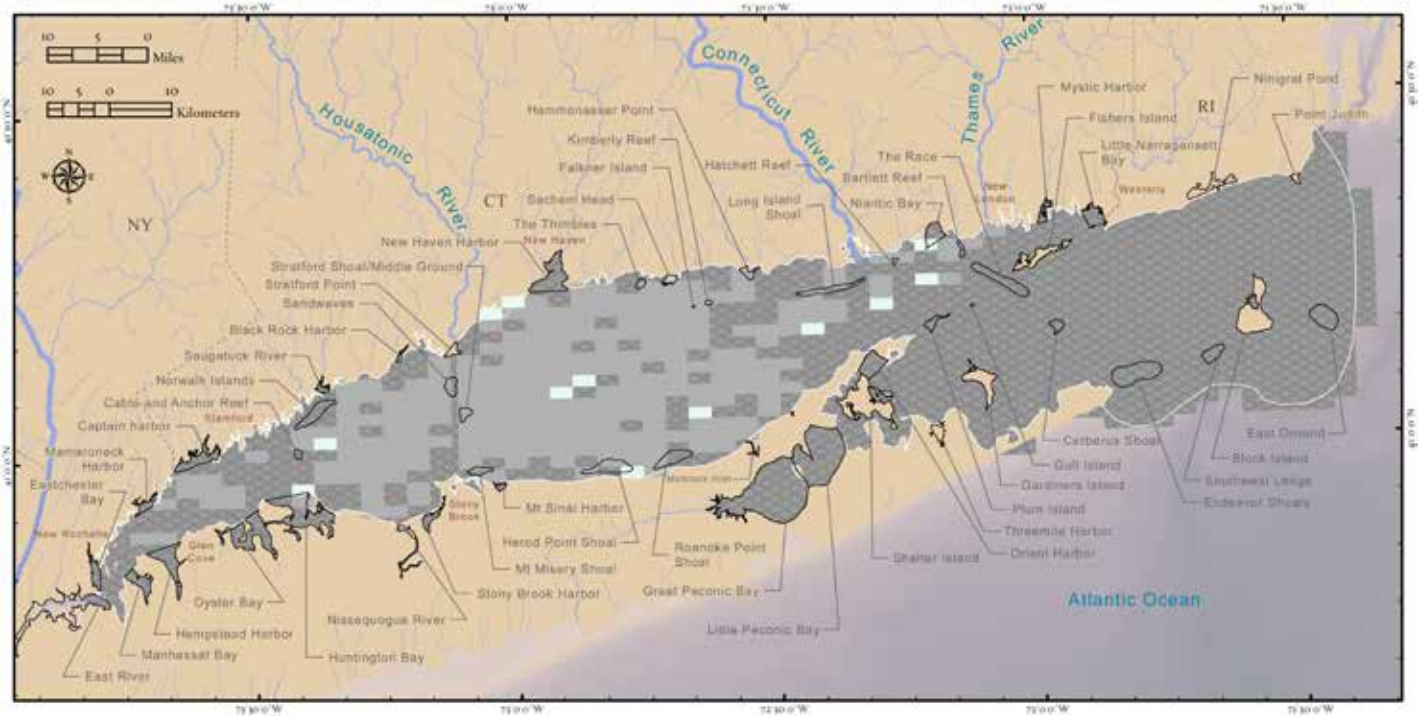

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Areas with one or more species with very significantly increasing and/or decreasing trends

(greater than 3 or less than negative 3 slope)

- One or more species with slope > 3
- One or more species with slope < -3
- One or more species with slope > 3 and < - 3
- No species with trend greater than 3 or less than -3
- Insufficient data to calculate trend

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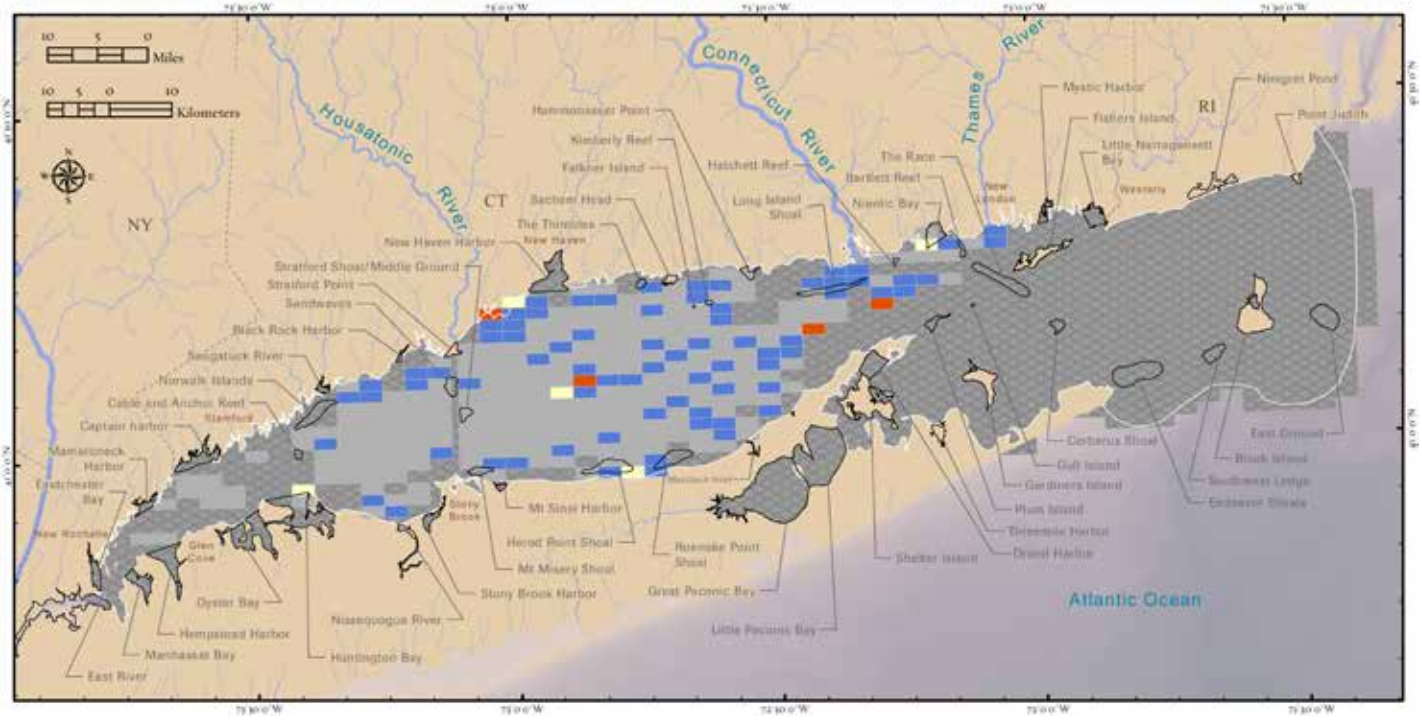


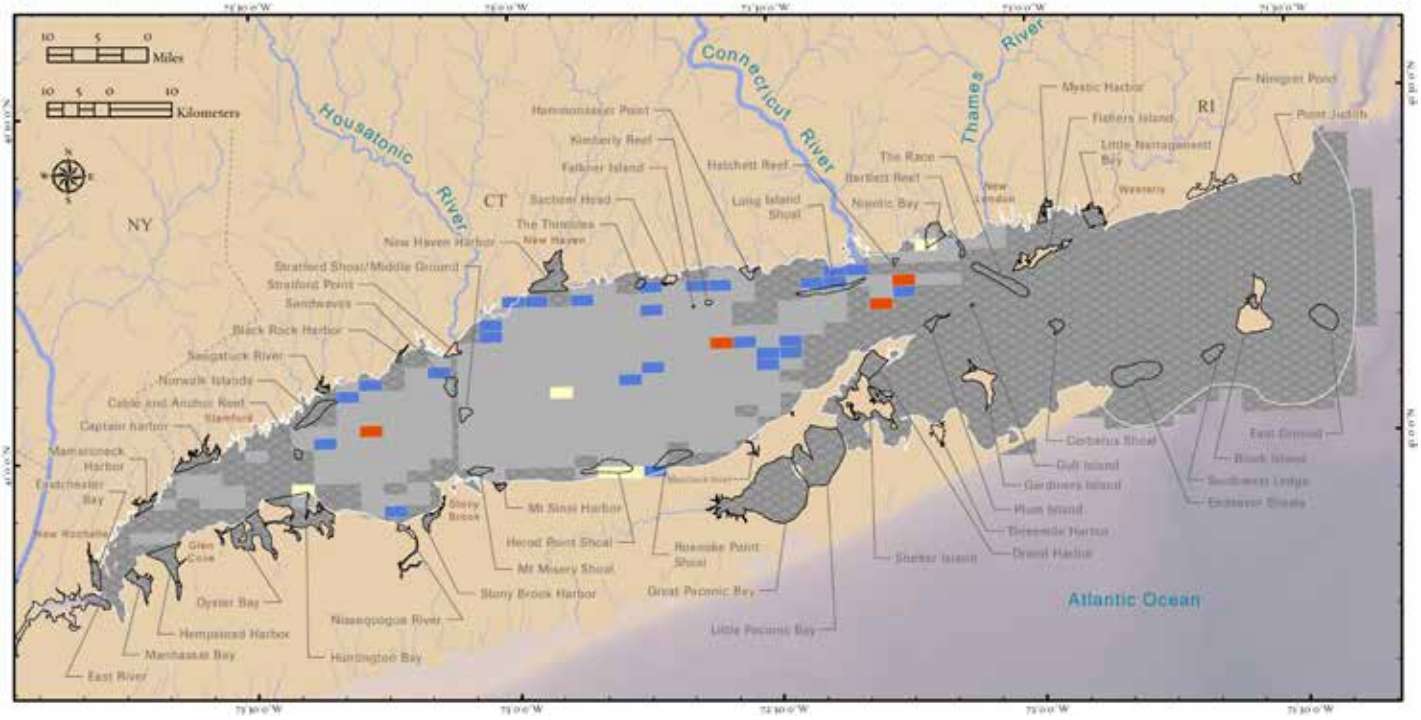
Long Island Sound Ecological Assessment

Areas with three or more species with significantly increasing or decreasing trends

(greater than 2 or less than negative 2 slope)

- 3 or more species with slope > 2
- 3 or more species with slope < -2
- 3 or more species with slope > 2 and < -2
- Less than 3 species with trend greater than 2 or less than -2
- Insufficient data to calculate trend

The Nature Conservancy
Protecting nature. Preserving life.

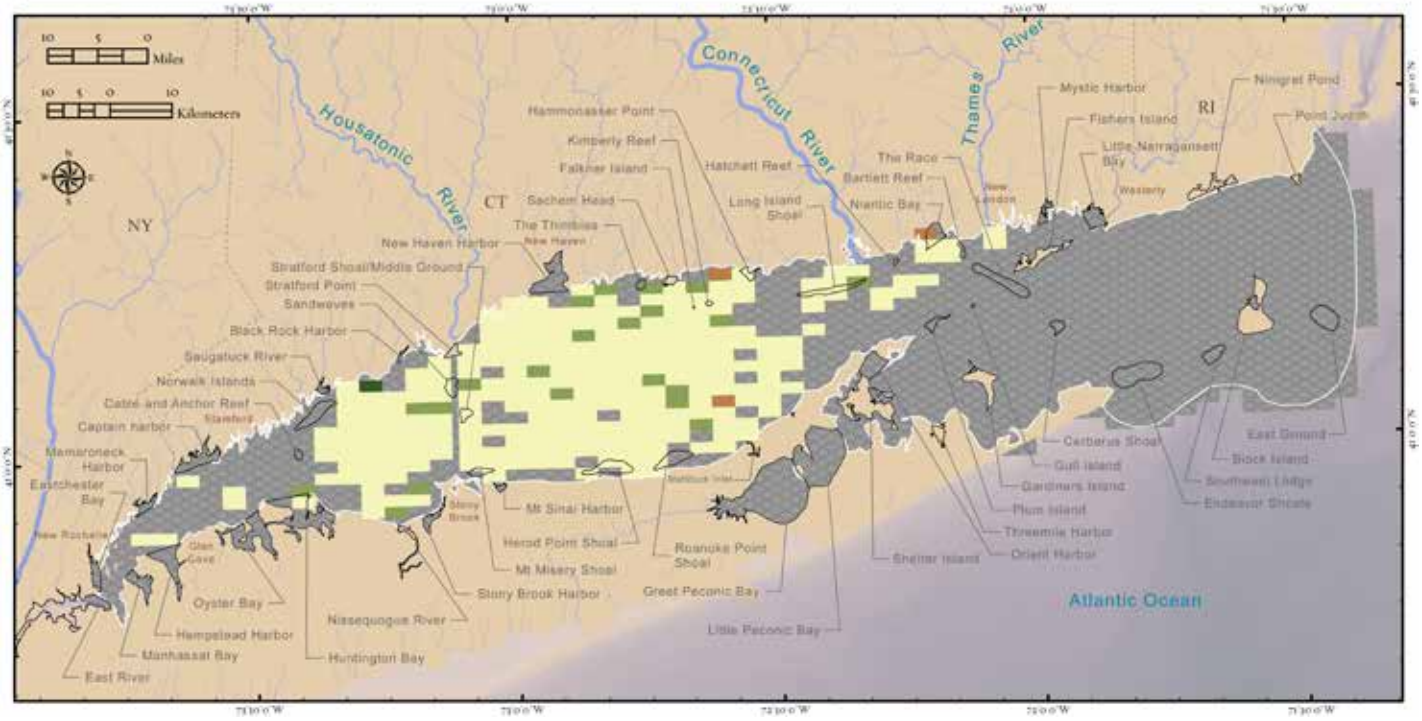


Long Island Sound Ecological Assessment

Alewife

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

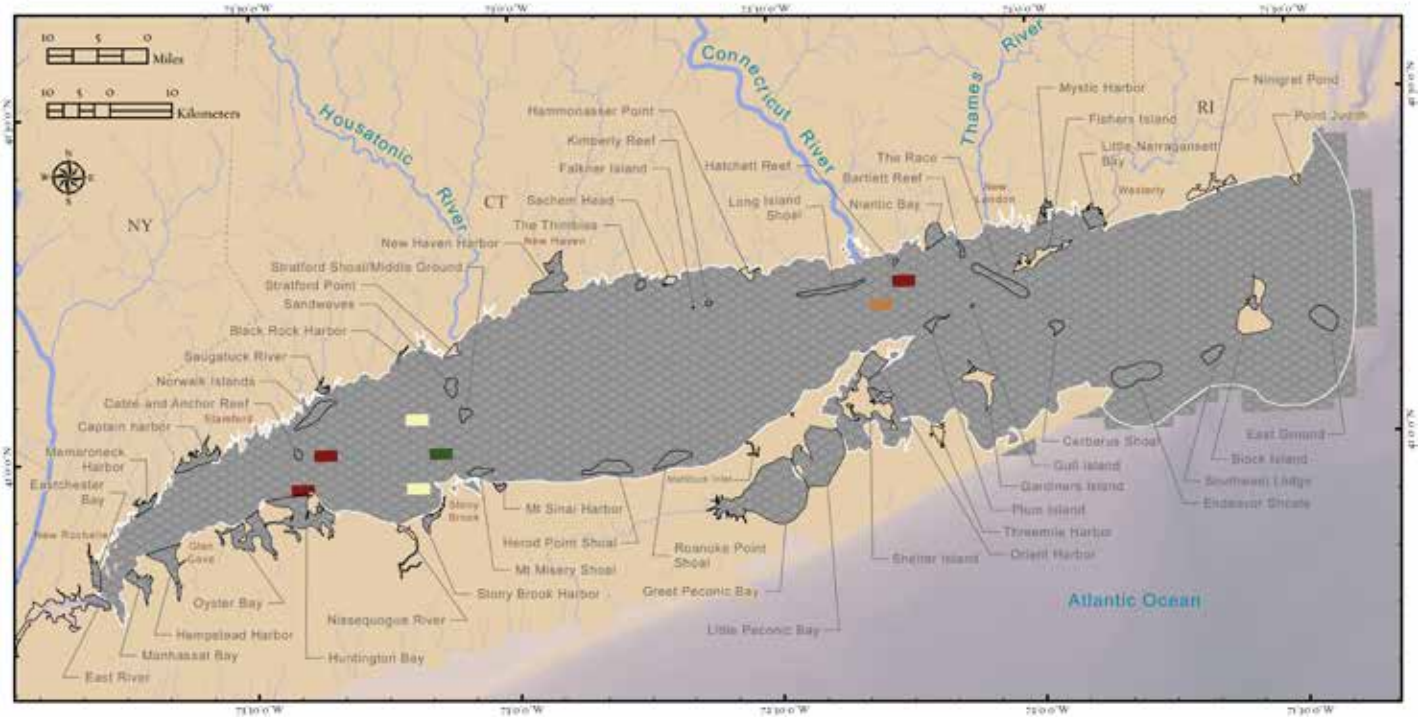


Long Island Sound Ecological Assessment

American Eel

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

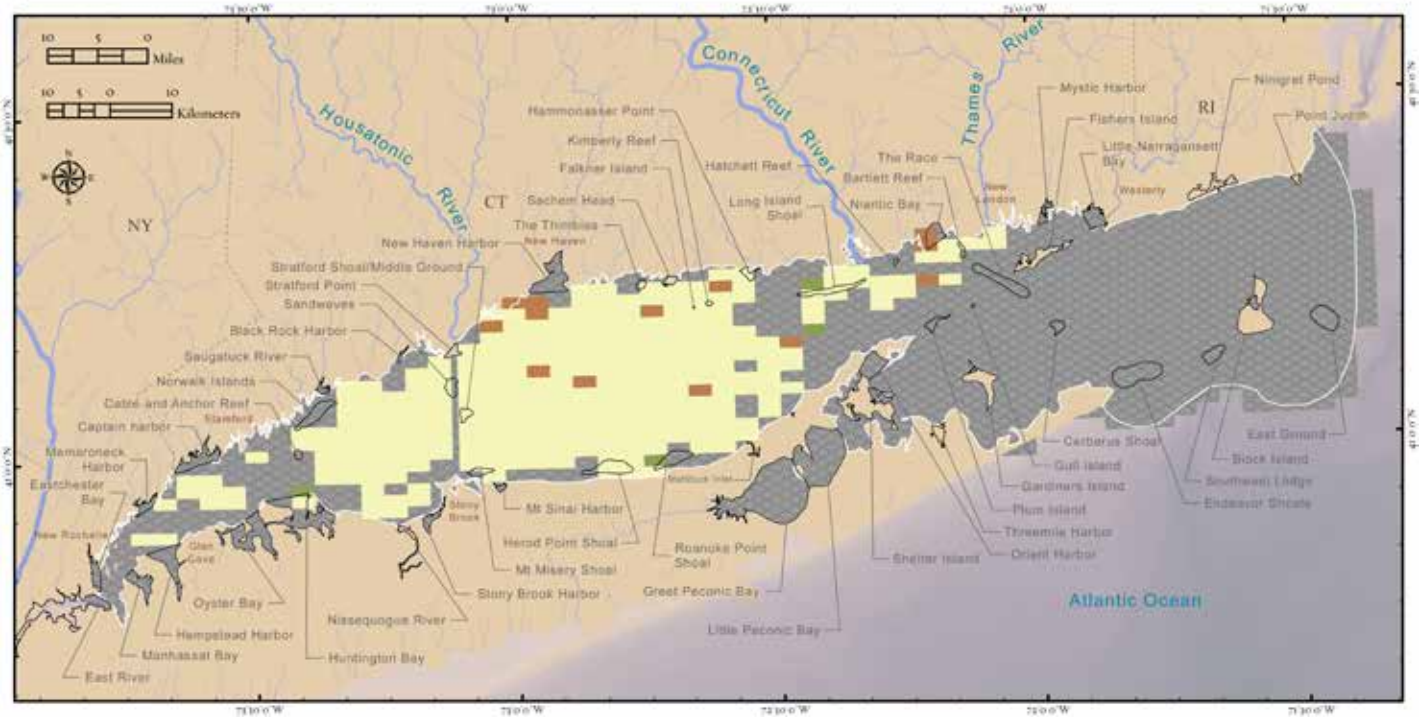


Long Island Sound Ecological Assessment

American Lobster

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

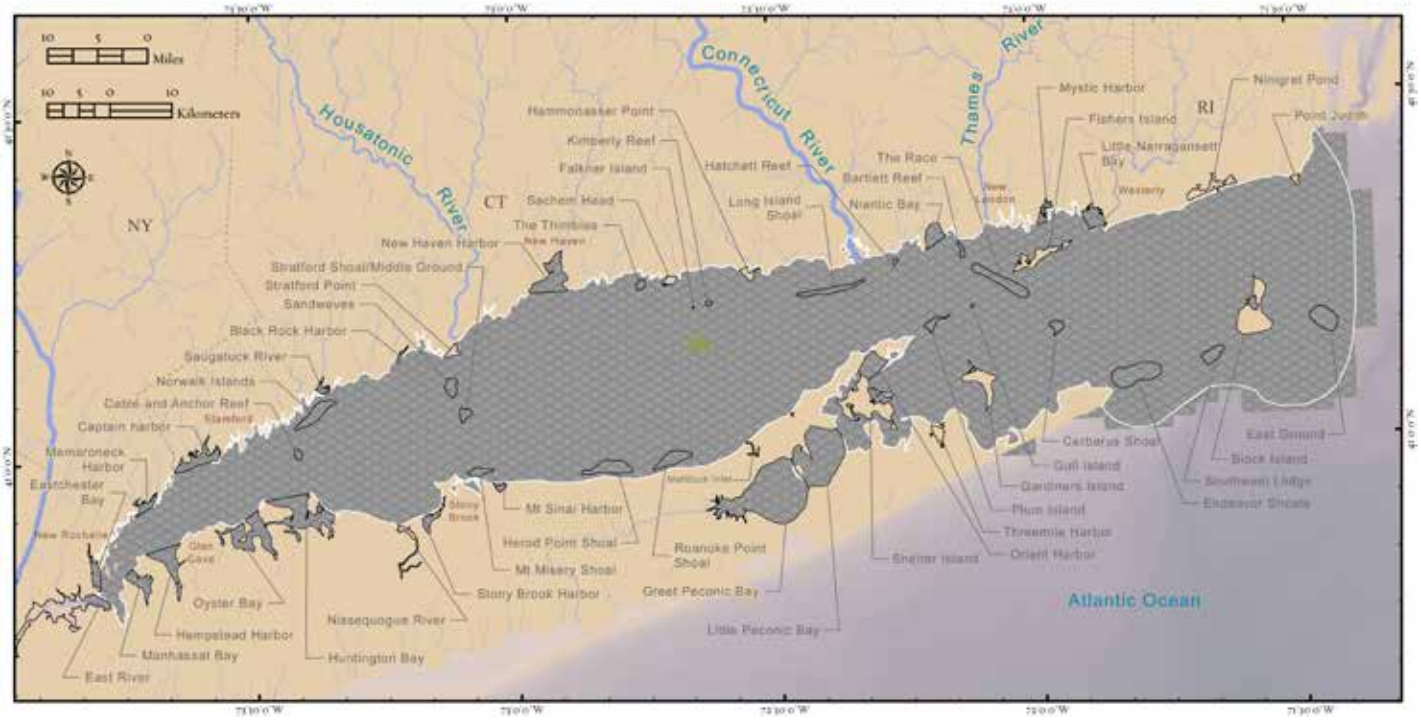


Long Island Sound Ecological Assessment

American Plaice

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

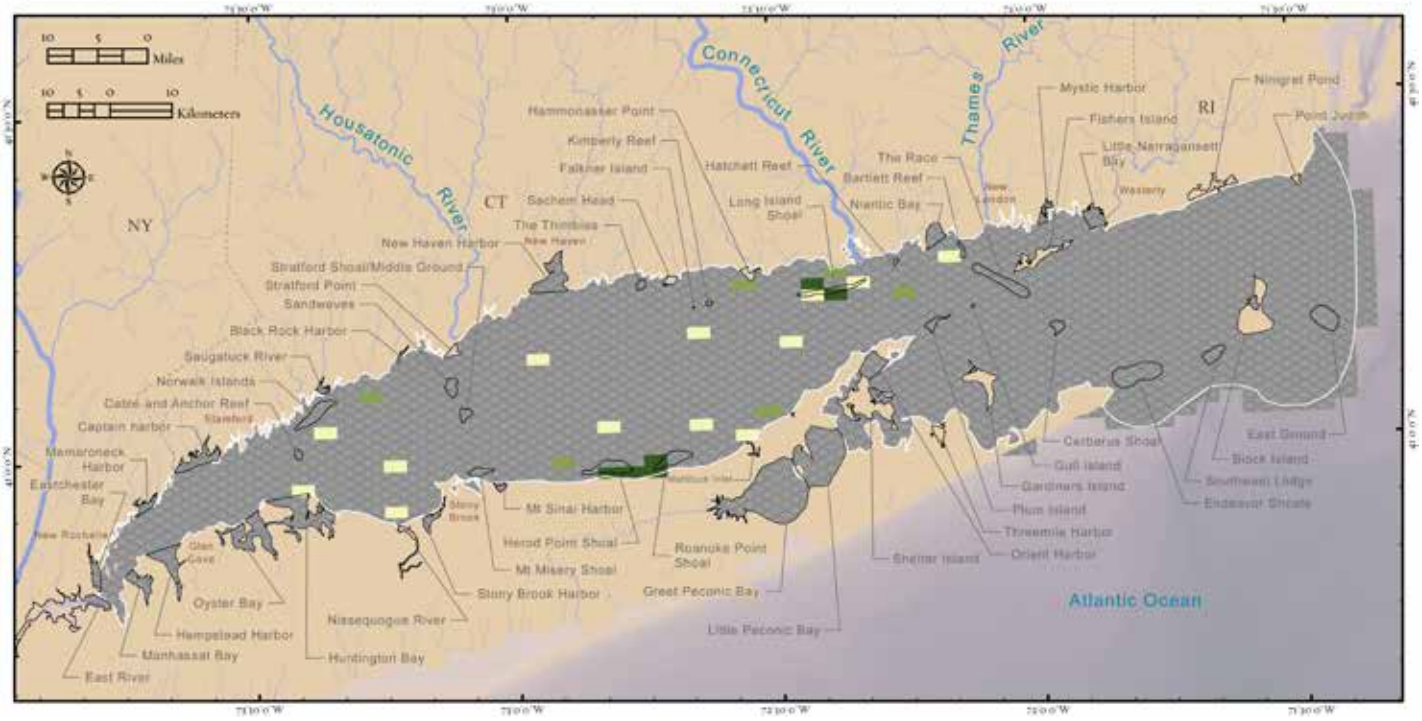


Long Island Sound Ecological Assessment

American Sand Lance

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

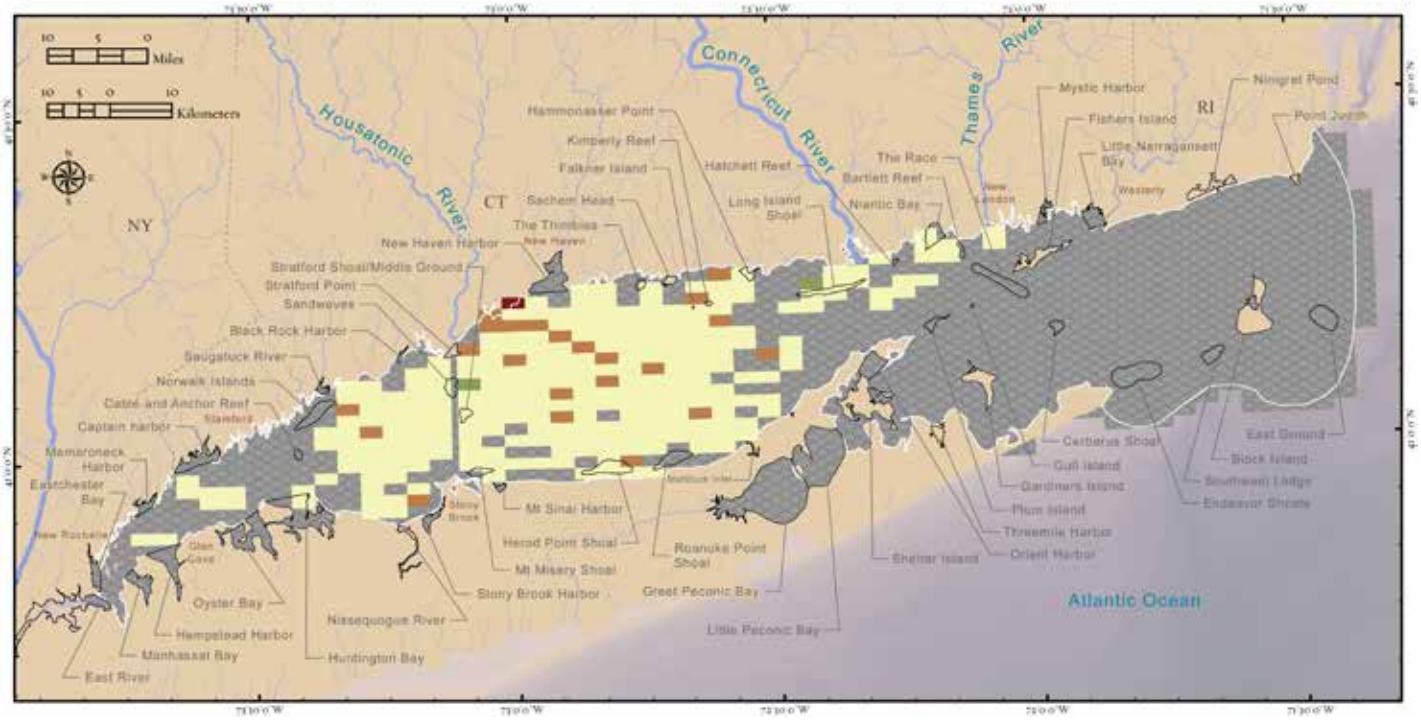


Long Island Sound Ecological Assessment

American Shad

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

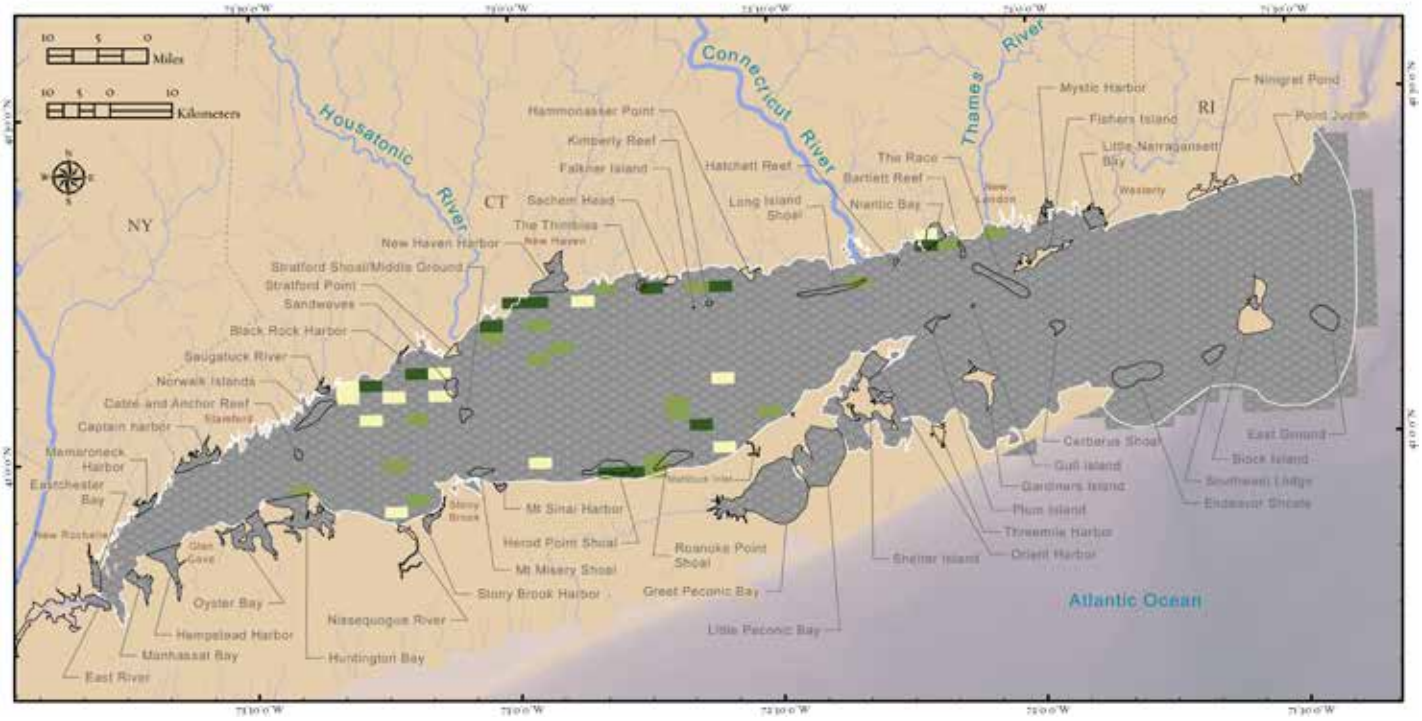


Long Island Sound Ecological Assessment

Anchovy

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

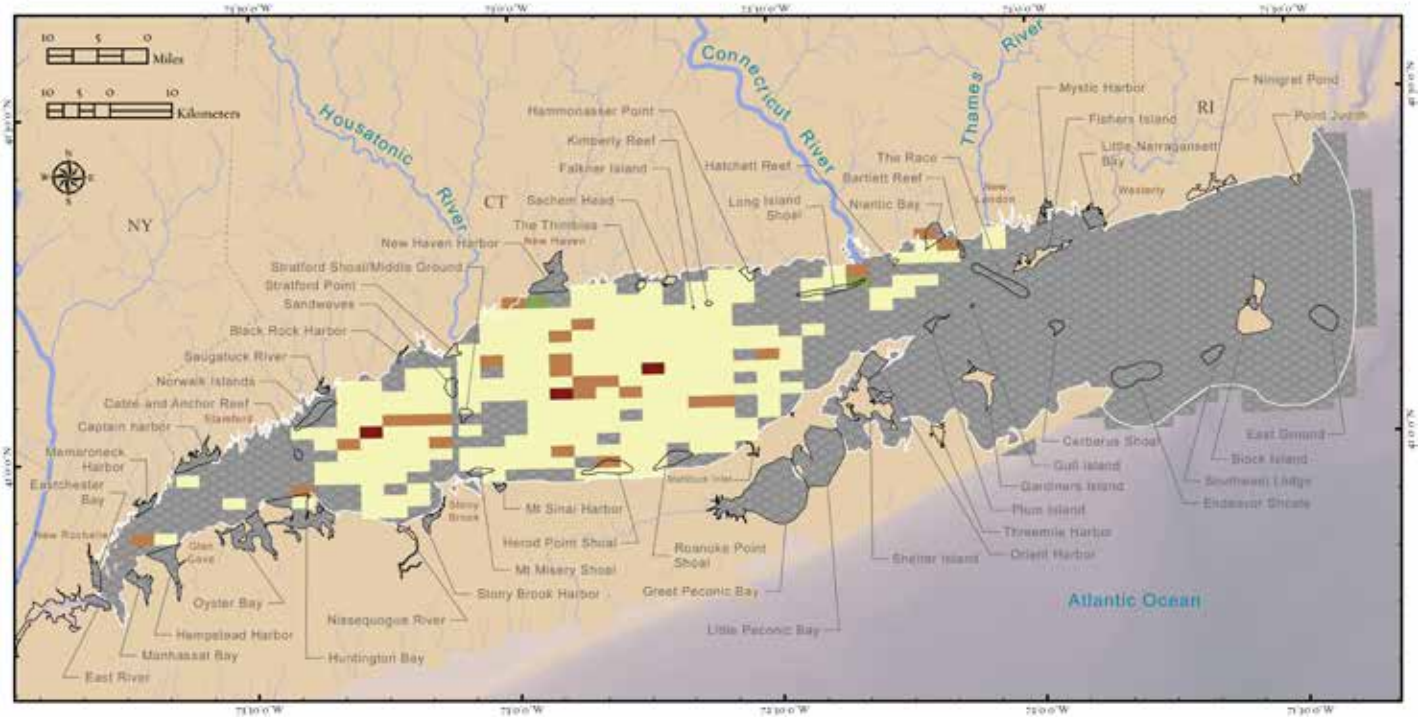


Long Island Sound Ecological Assessment

Atlantic Herring

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

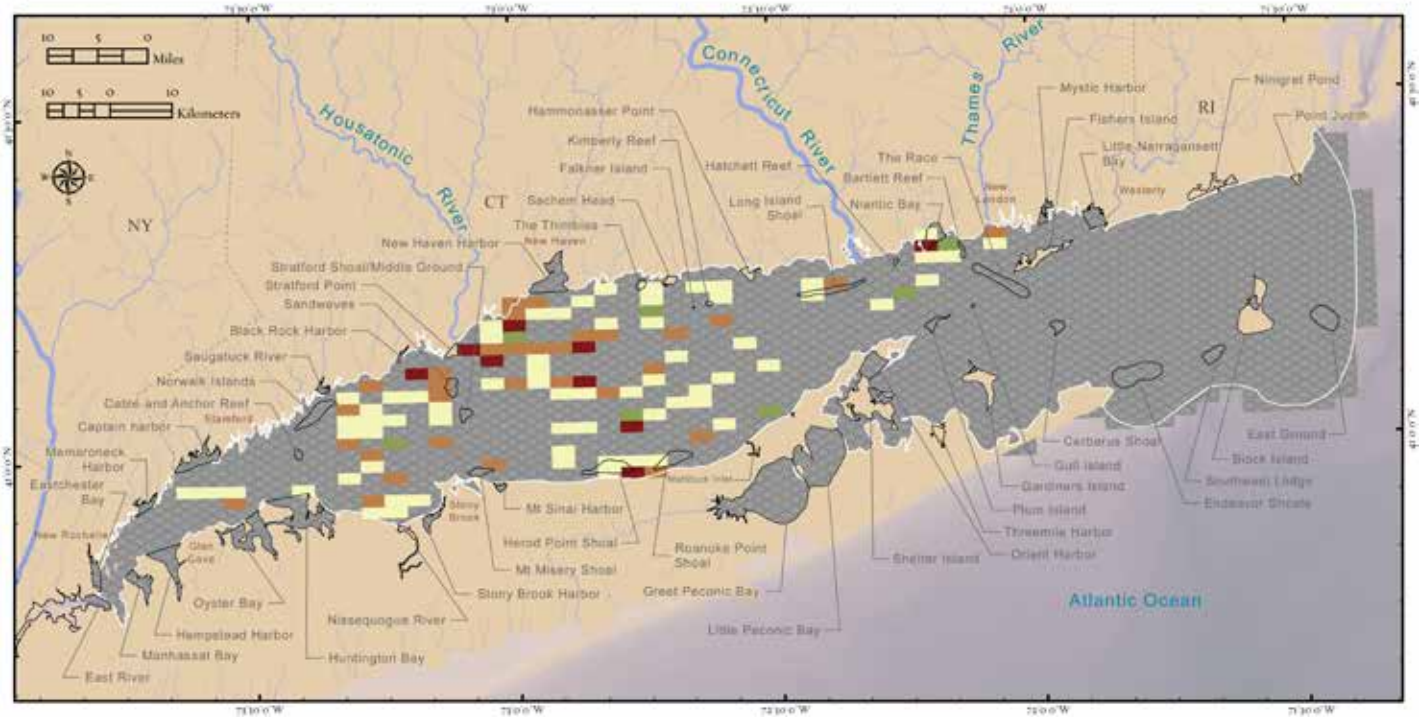


Long Island Sound Ecological Assessment

Atlantic Mackerel

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

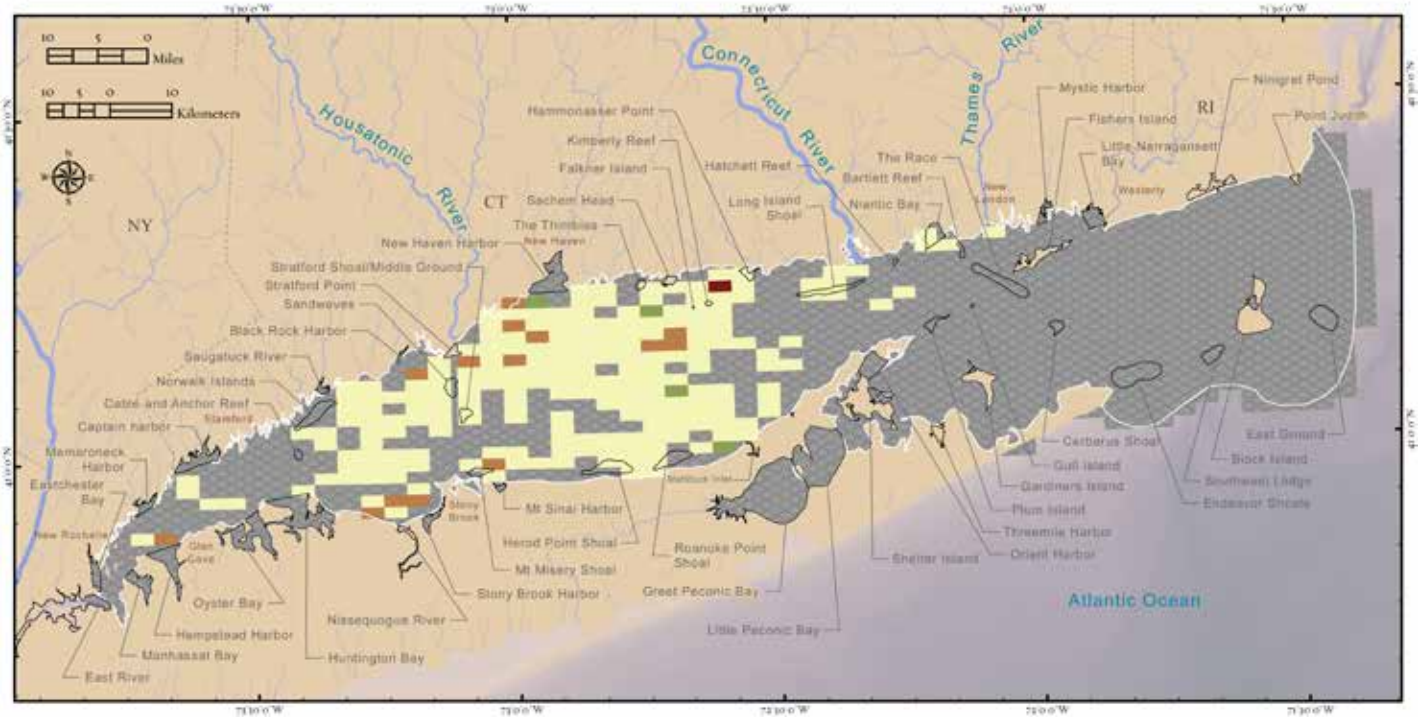


Long Island Sound Ecological Assessment

Atlantic Menhaden

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

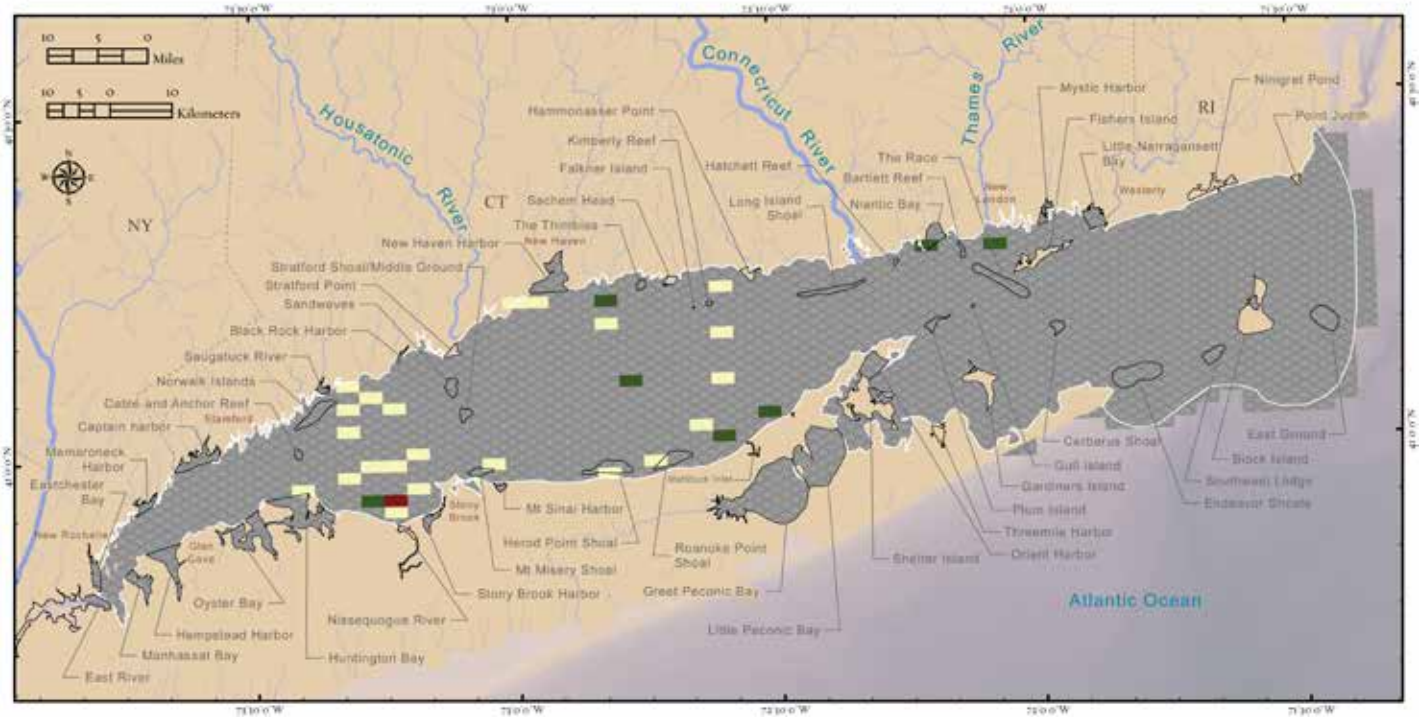


Long Island Sound Ecological Assessment

Atlantic Silverside

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

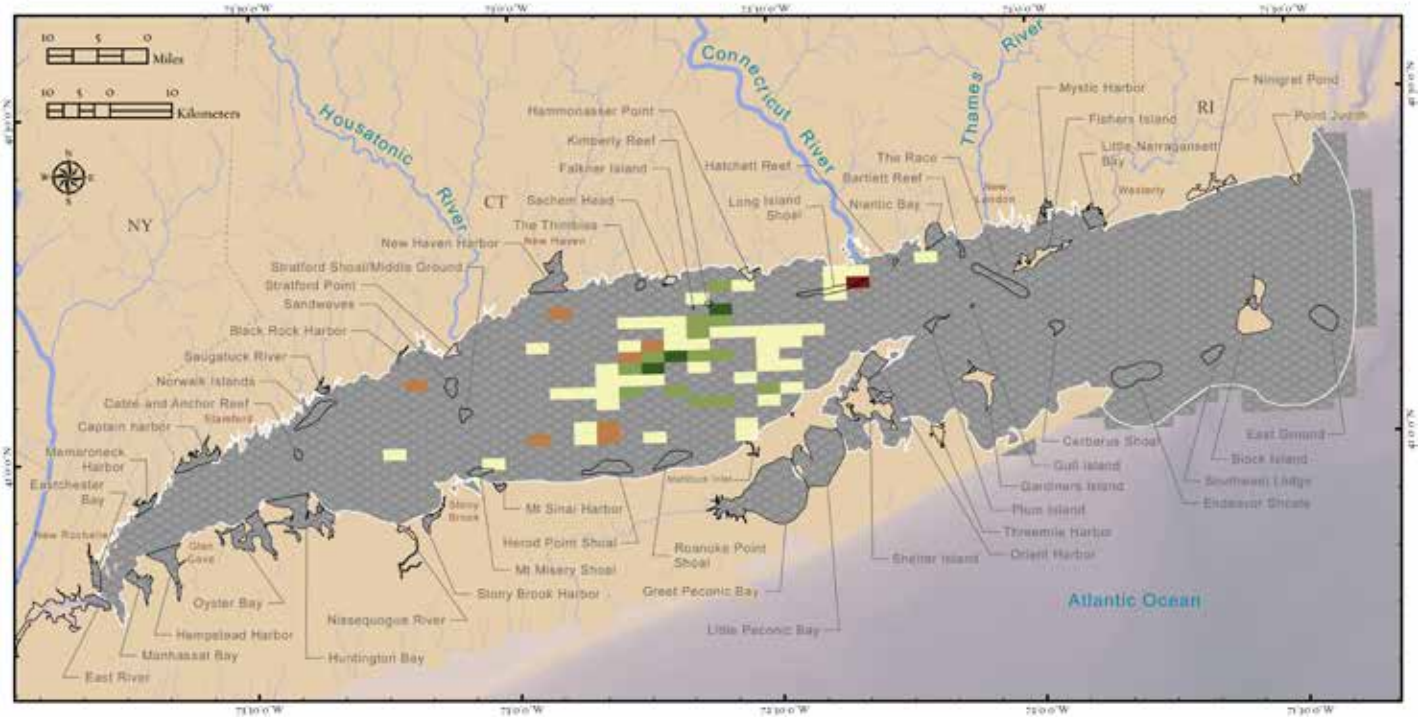


Long Island Sound Ecological Assessment

Atlantic Sturgeon

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

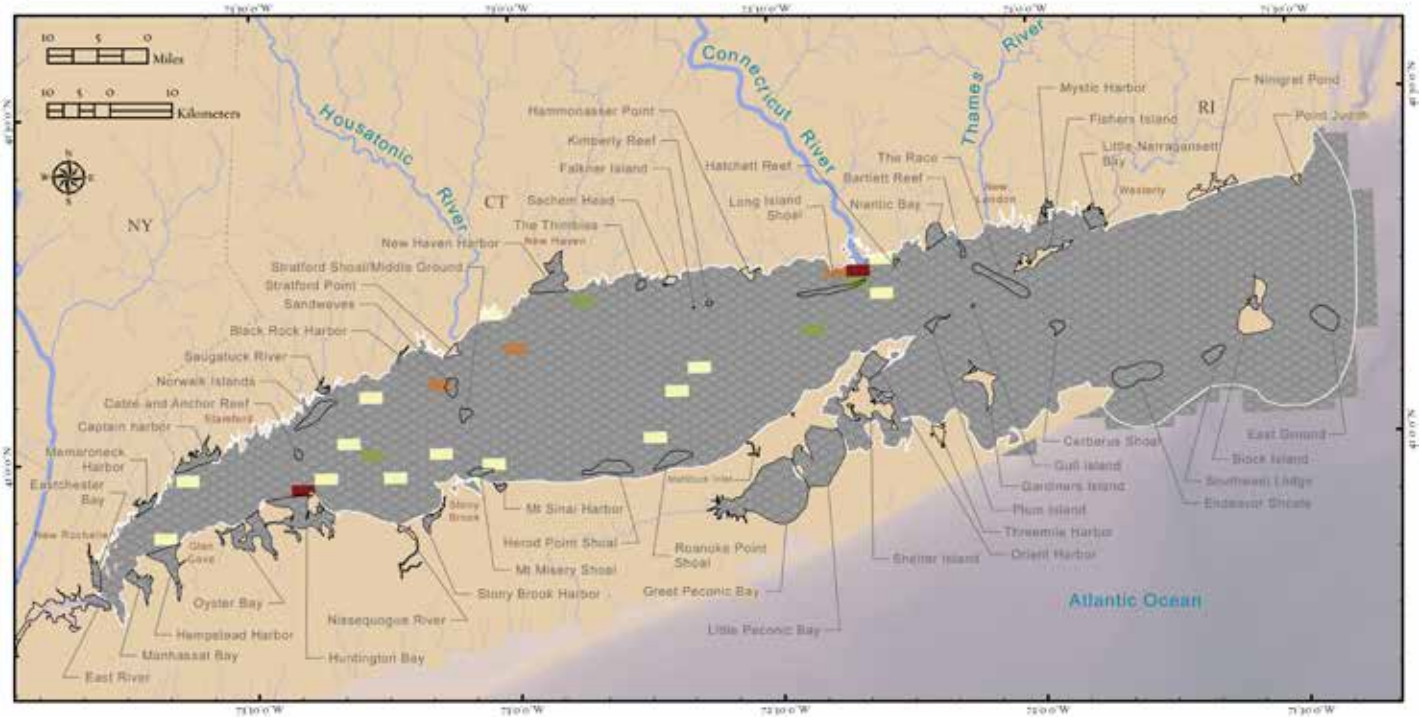


Long Island Sound Ecological Assessment

Atlantic Tomcod

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

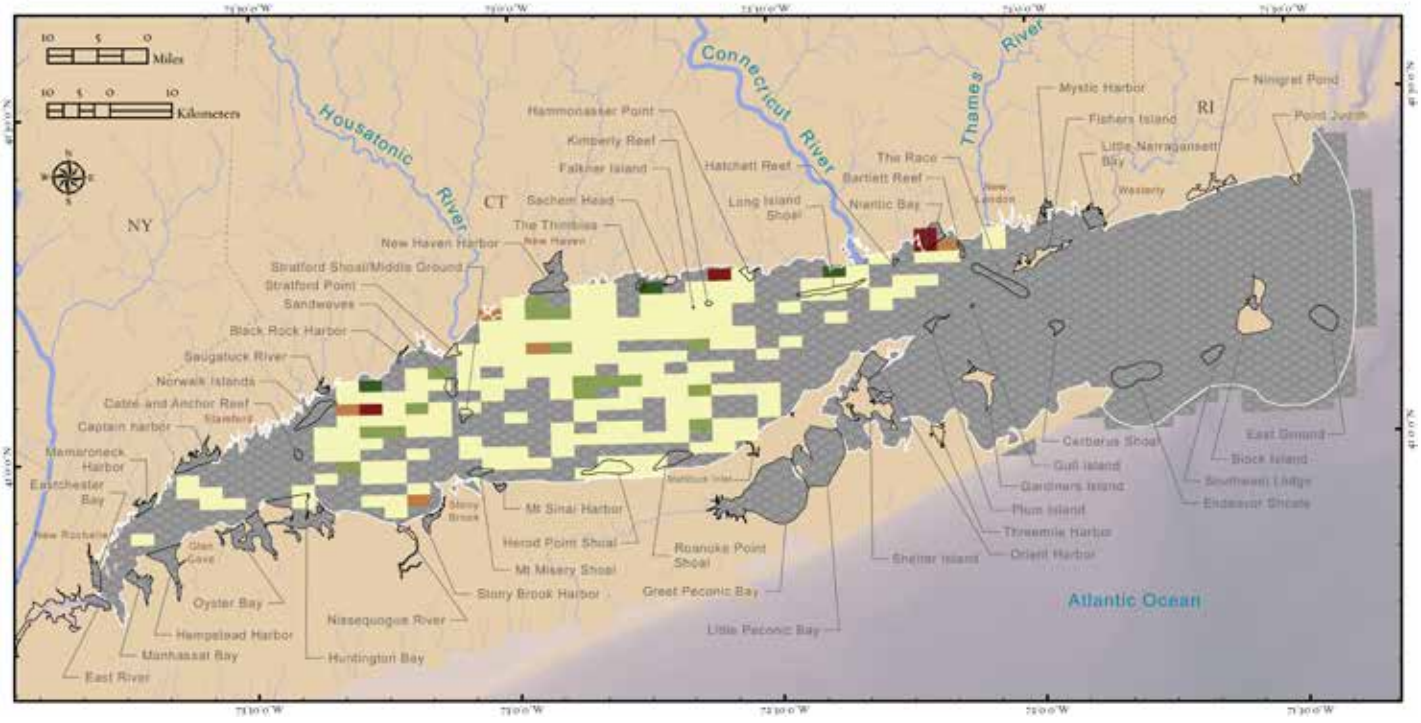


Long Island Sound Ecological Assessment

Blueback Herring

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

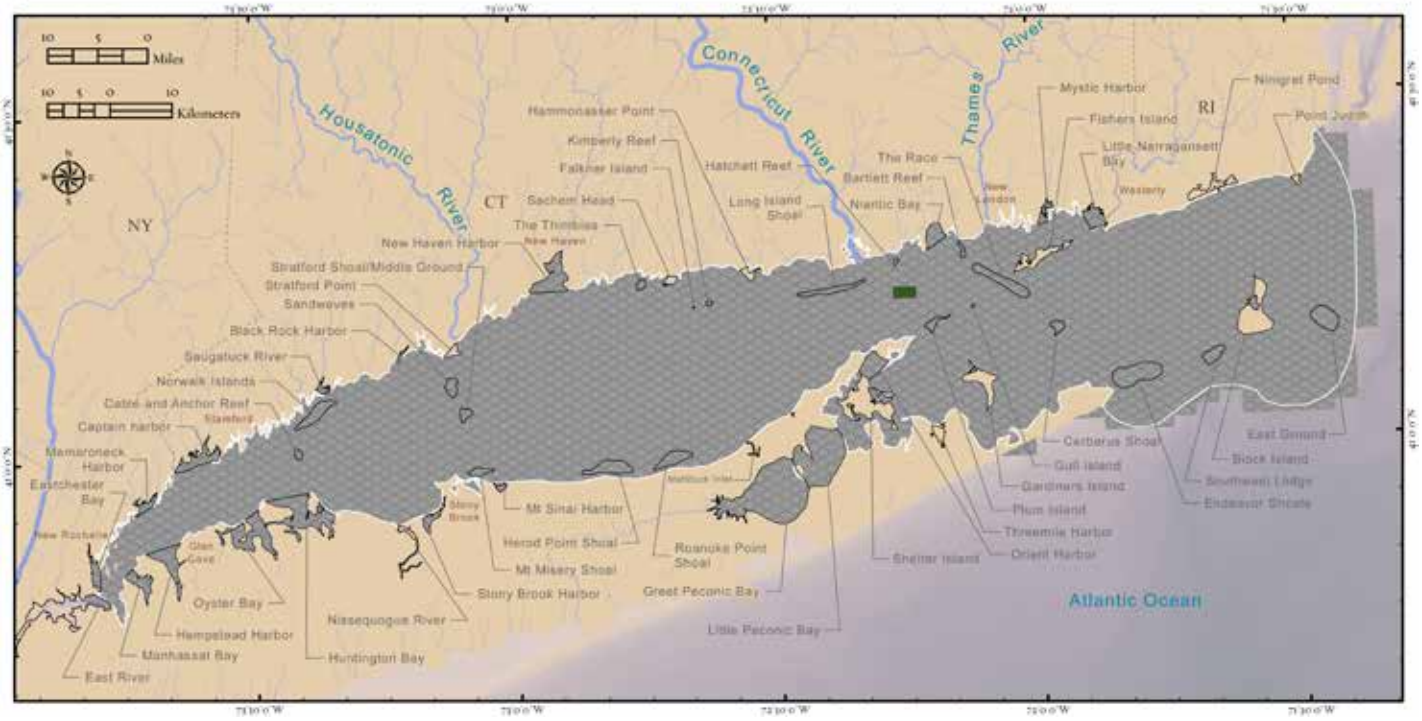


Long Island Sound Ecological Assessment

Barndoor Skate

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

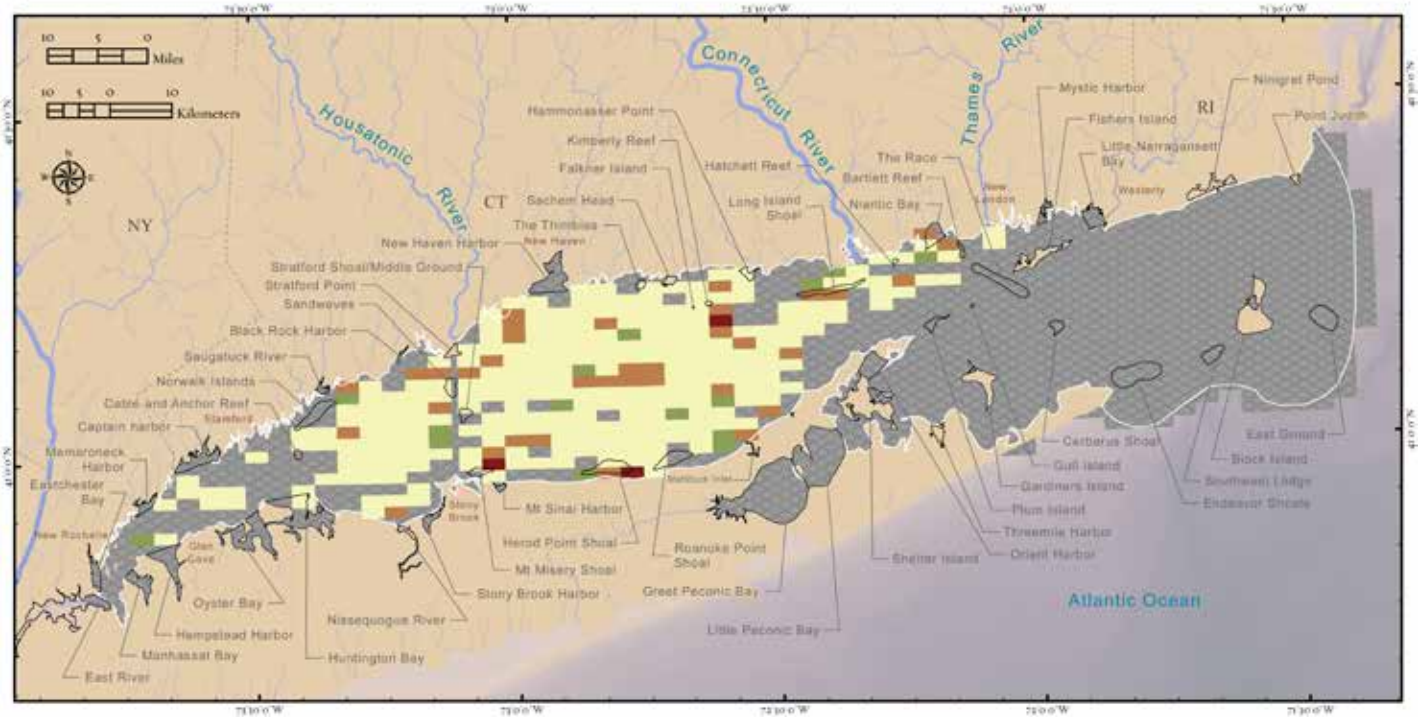


Long Island Sound Ecological Assessment

Bluefish

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

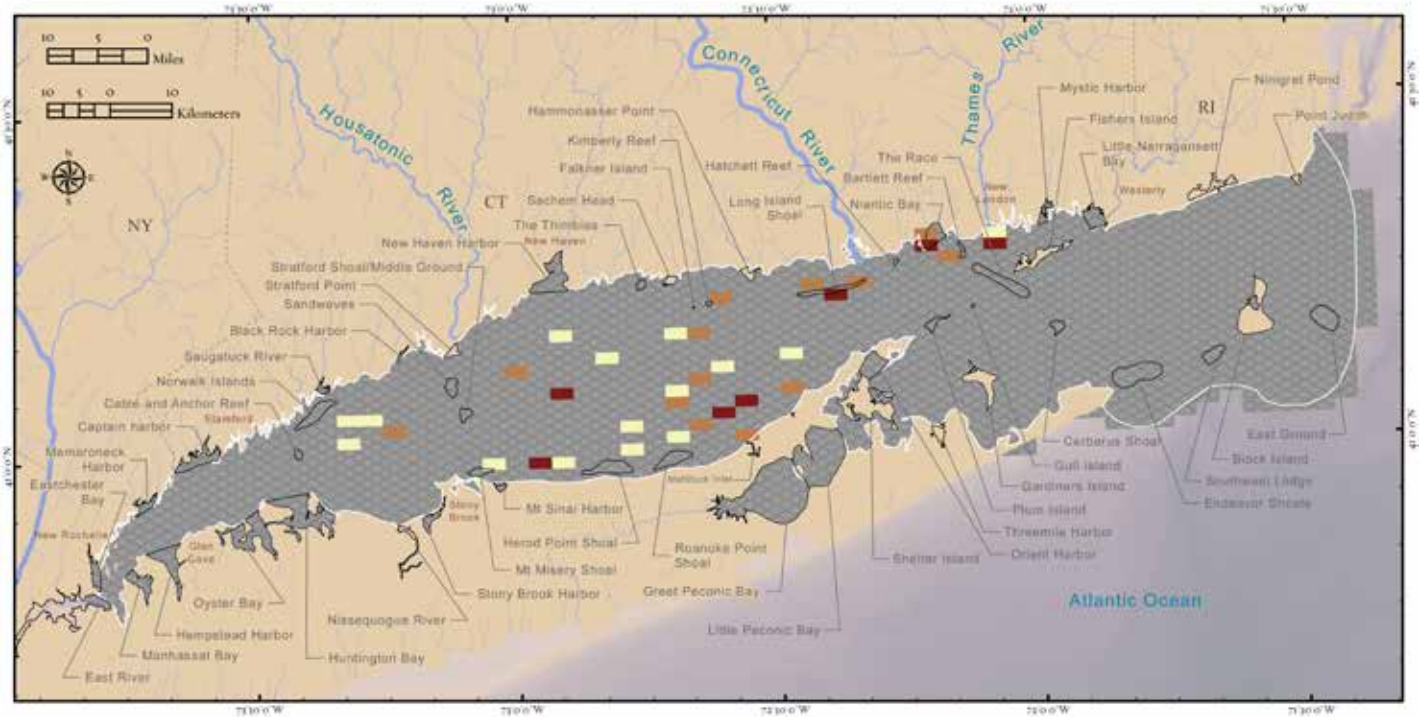


Long Island Sound Ecological Assessment

Bigeye Scad

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

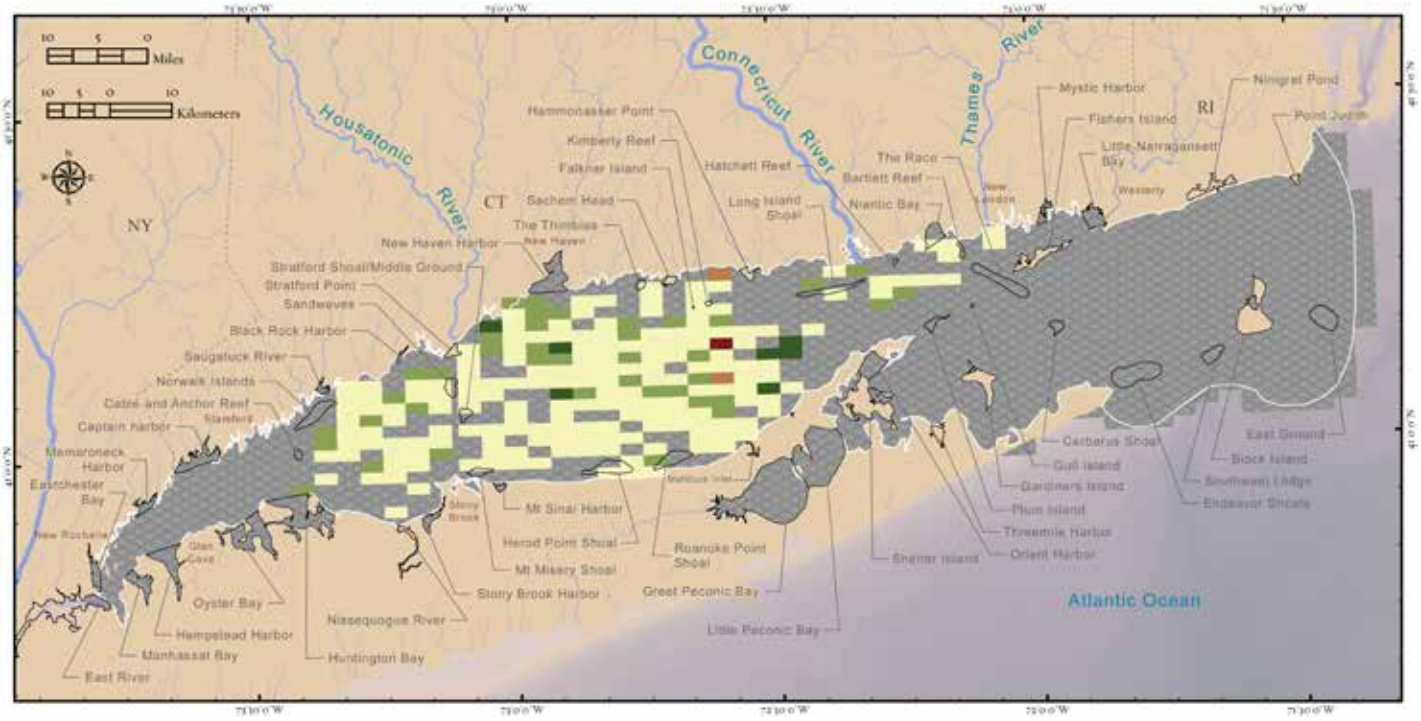


Long Island Sound Ecological Assessment

Black Sea Bass

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

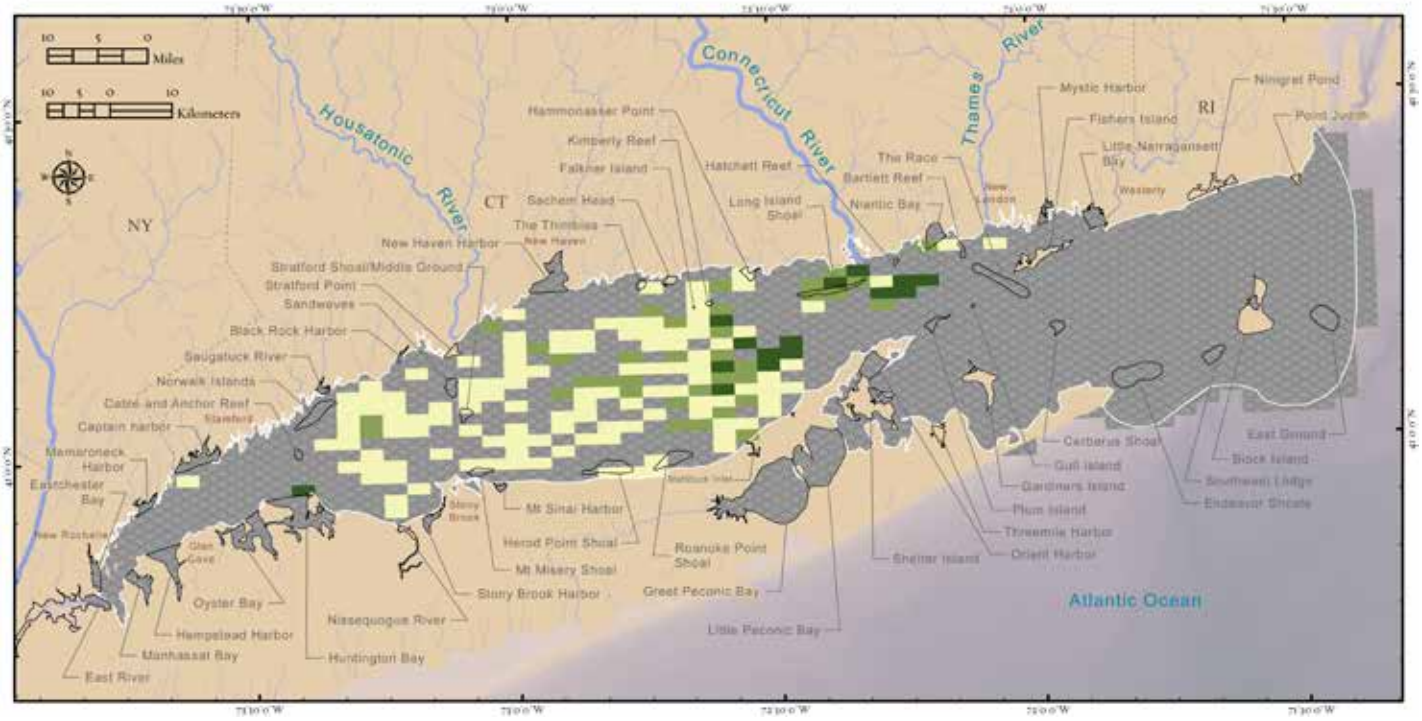


Long Island Sound Ecological Assessment

Bushy Bryozoan

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

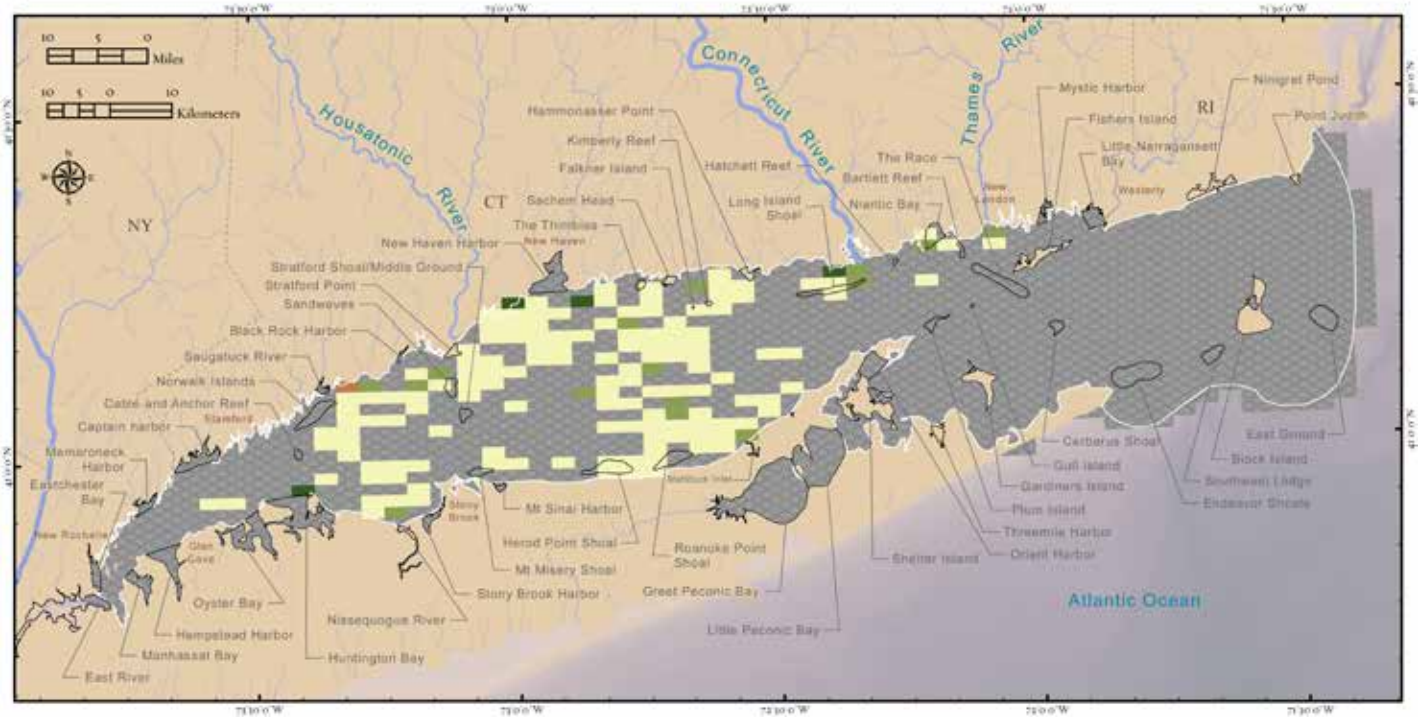


Long Island Sound Ecological Assessment

Blue Crab

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

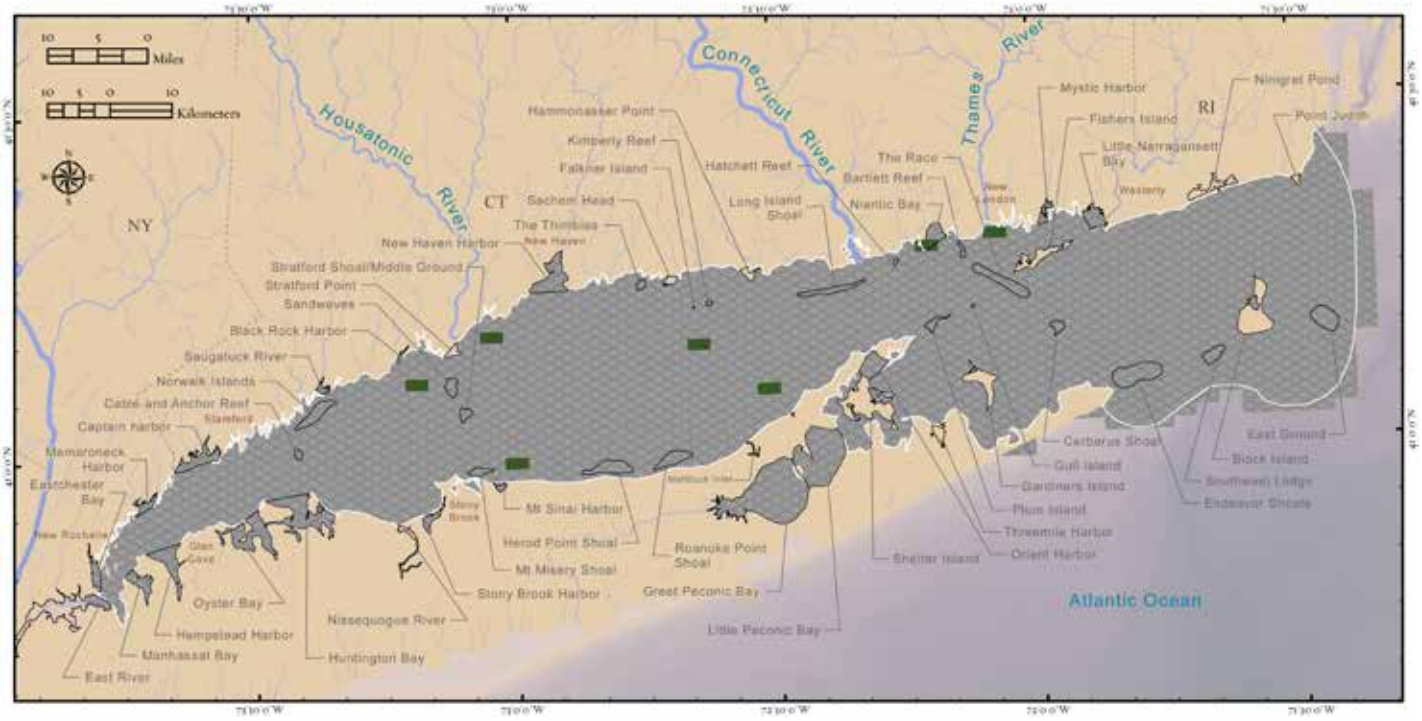


Long Island Sound Ecological Assessment

Blue Runner

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

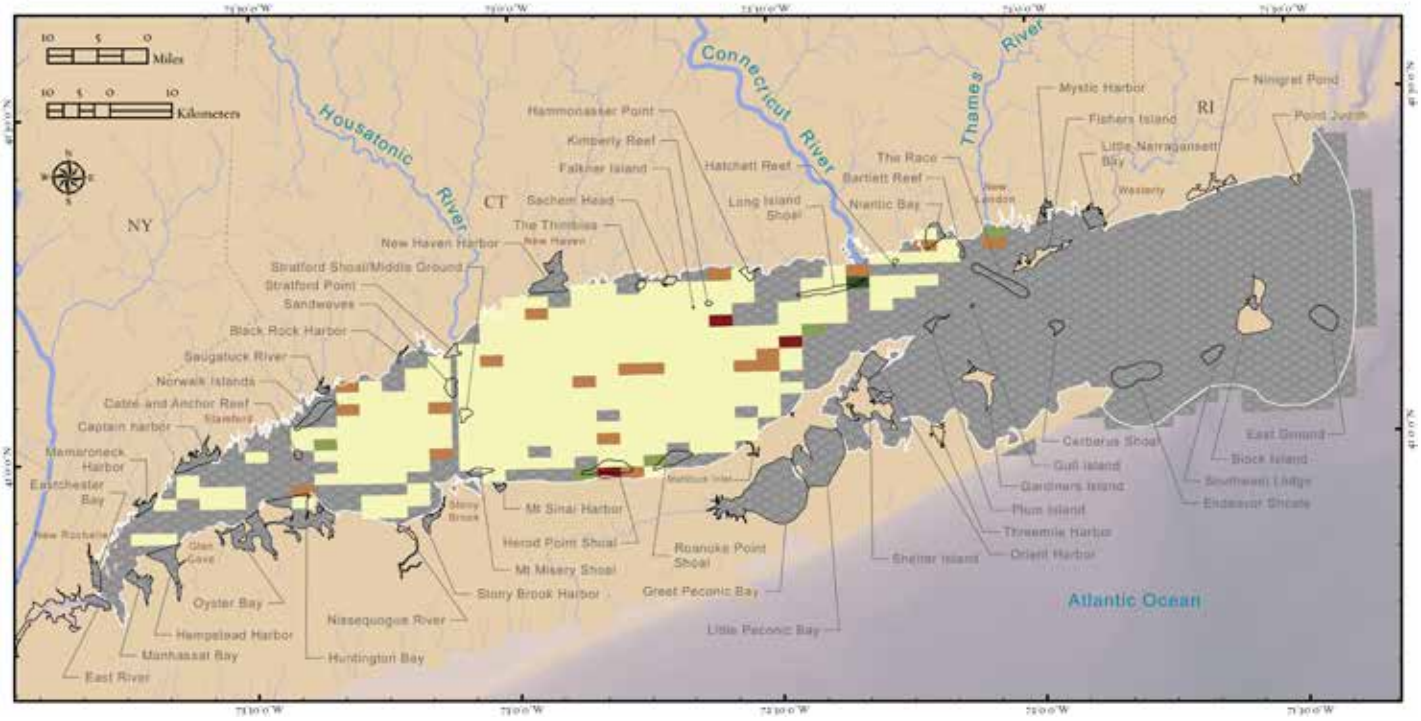


Long Island Sound Ecological Assessment

Butterfish

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

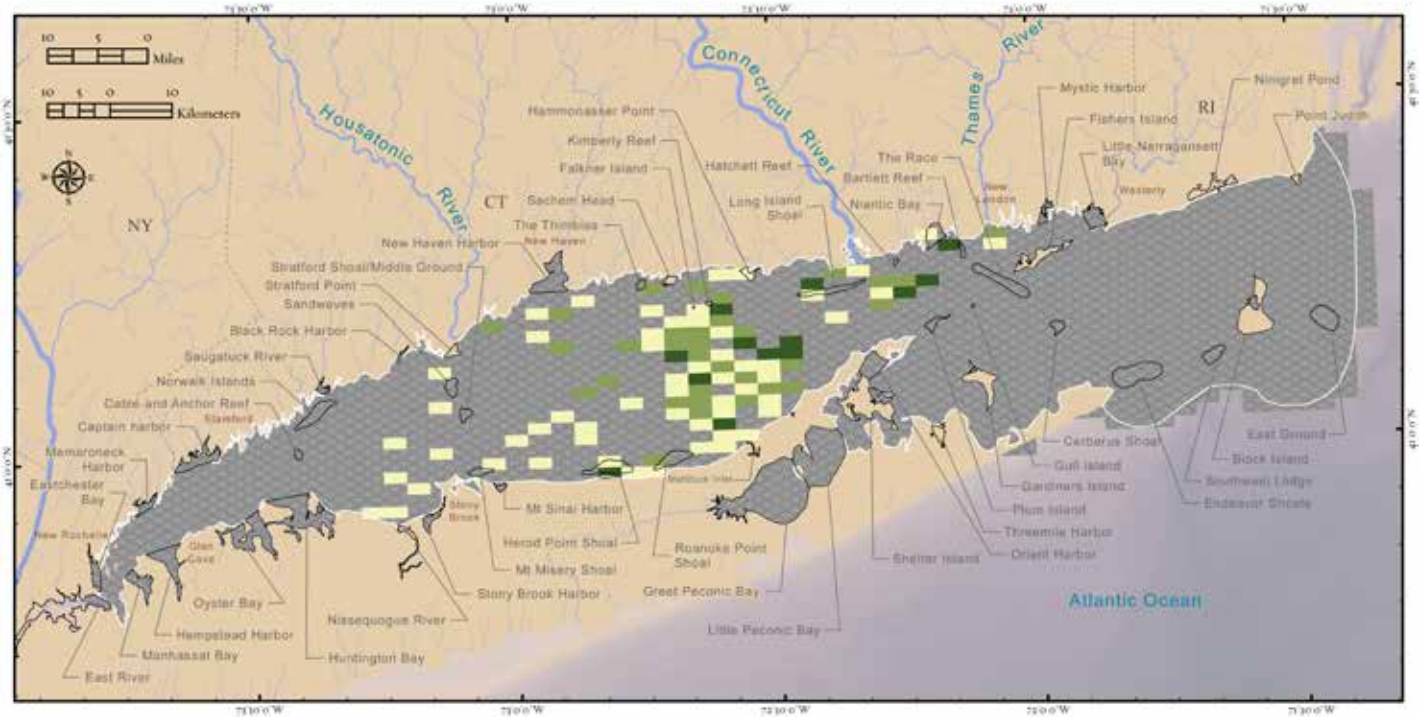


Long Island Sound Ecological Assessment

Clearnose Skate

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

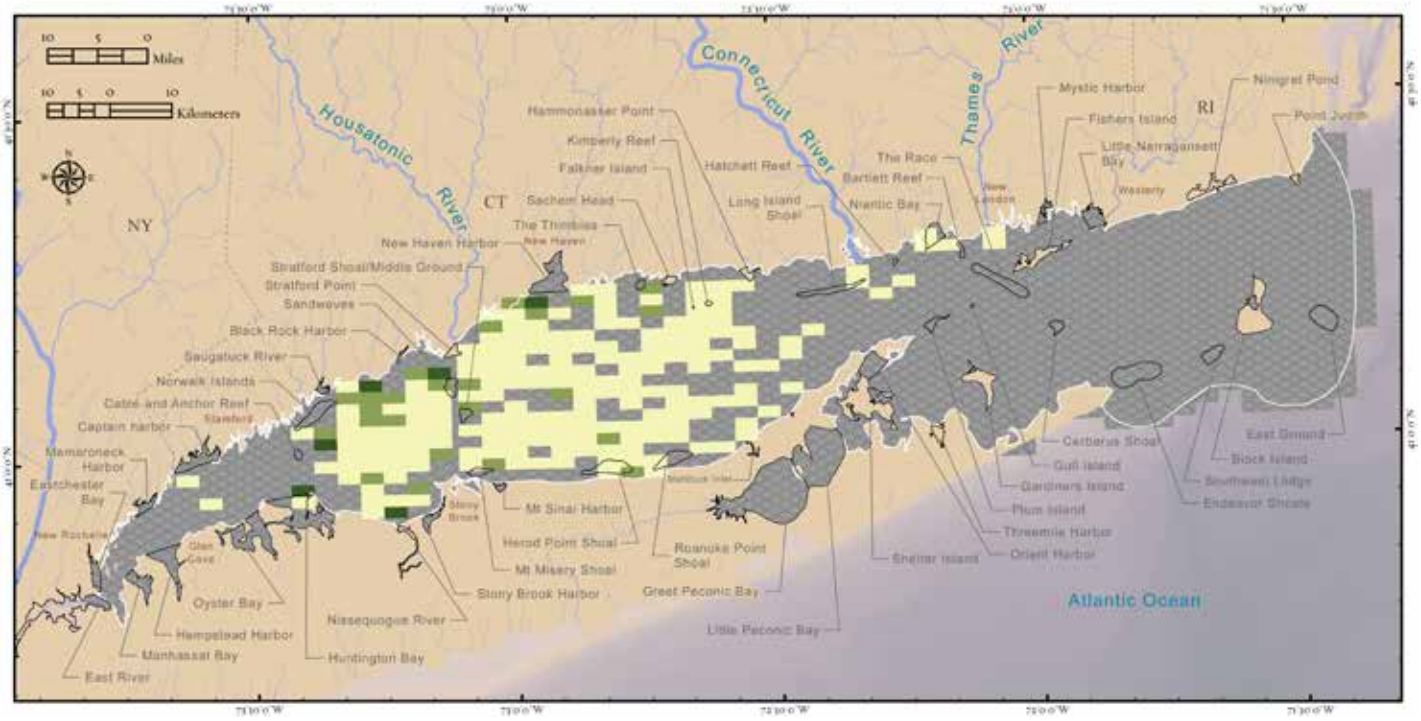


Long Island Sound Ecological Assessment

Horseshoe Crab

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

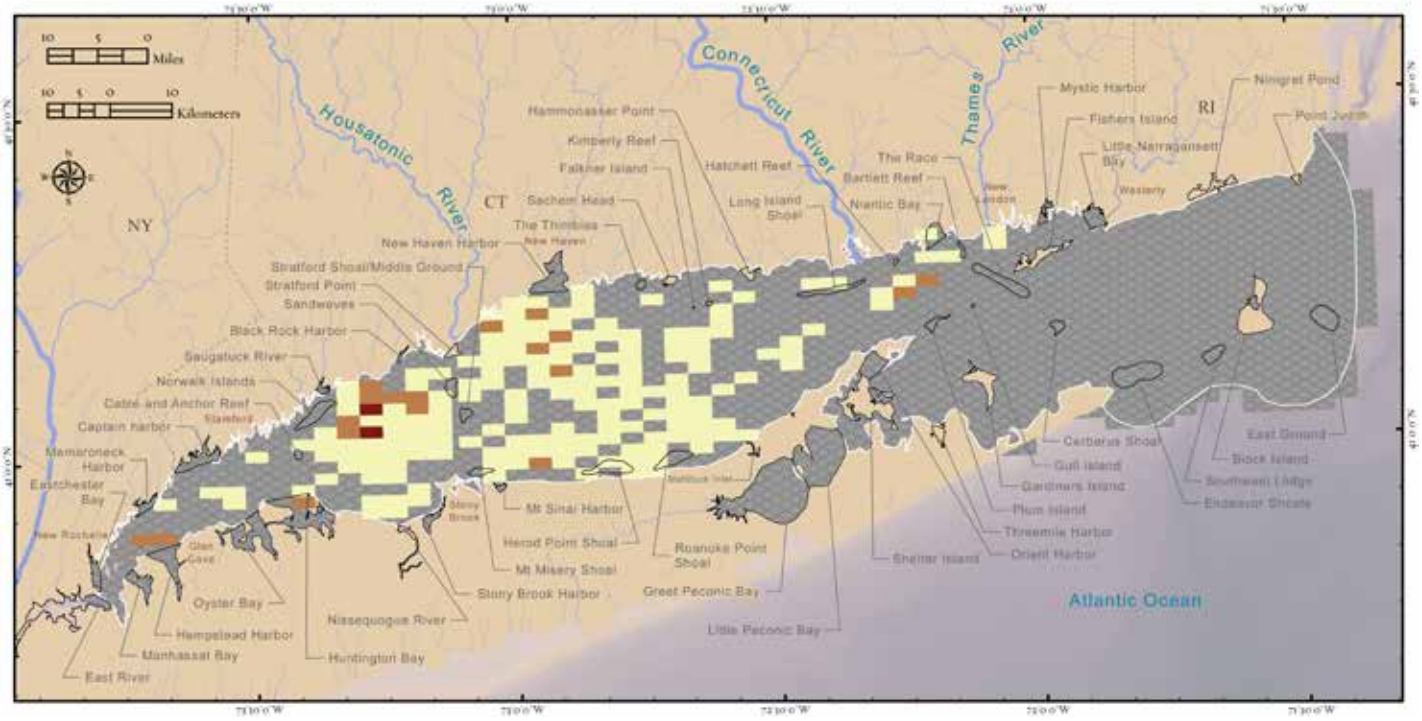


Long Island Sound Ecological Assessment

Cunner

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

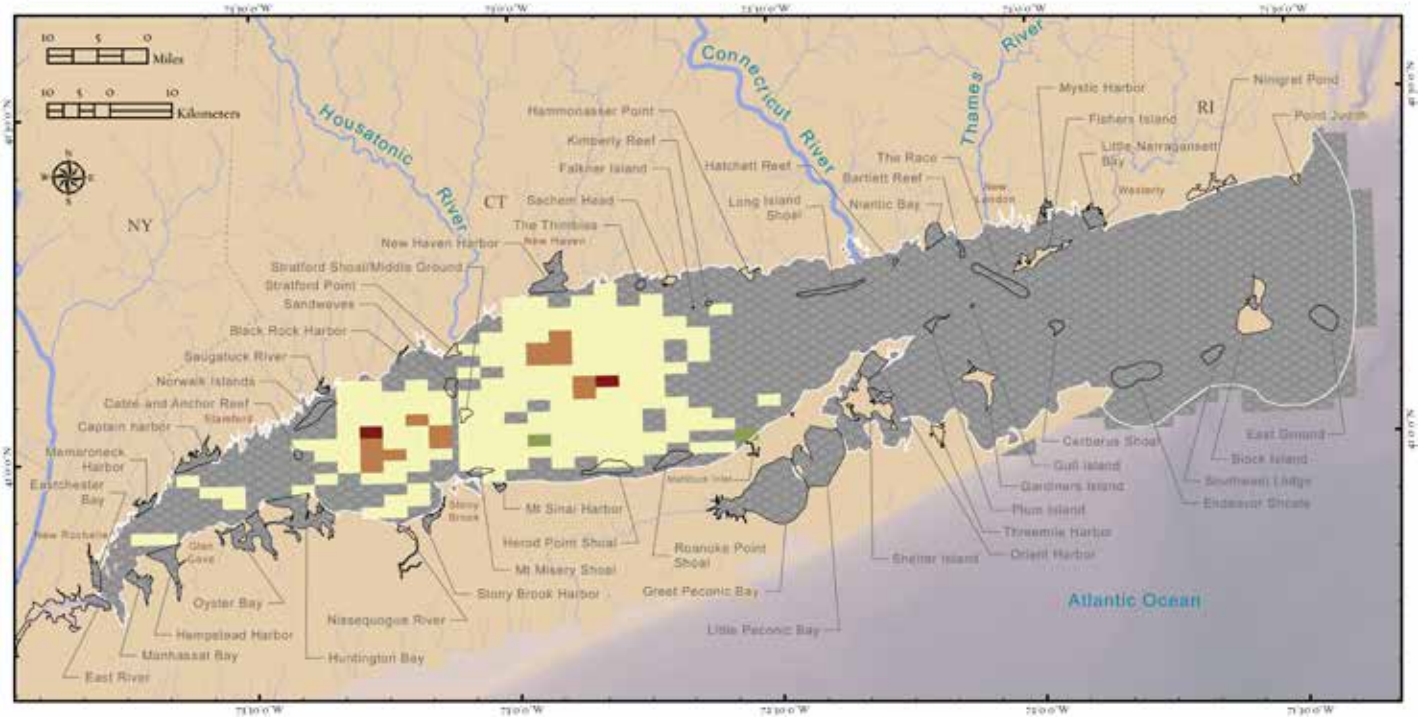


Long Island Sound Ecological Assessment

Fourbeard Rockling

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

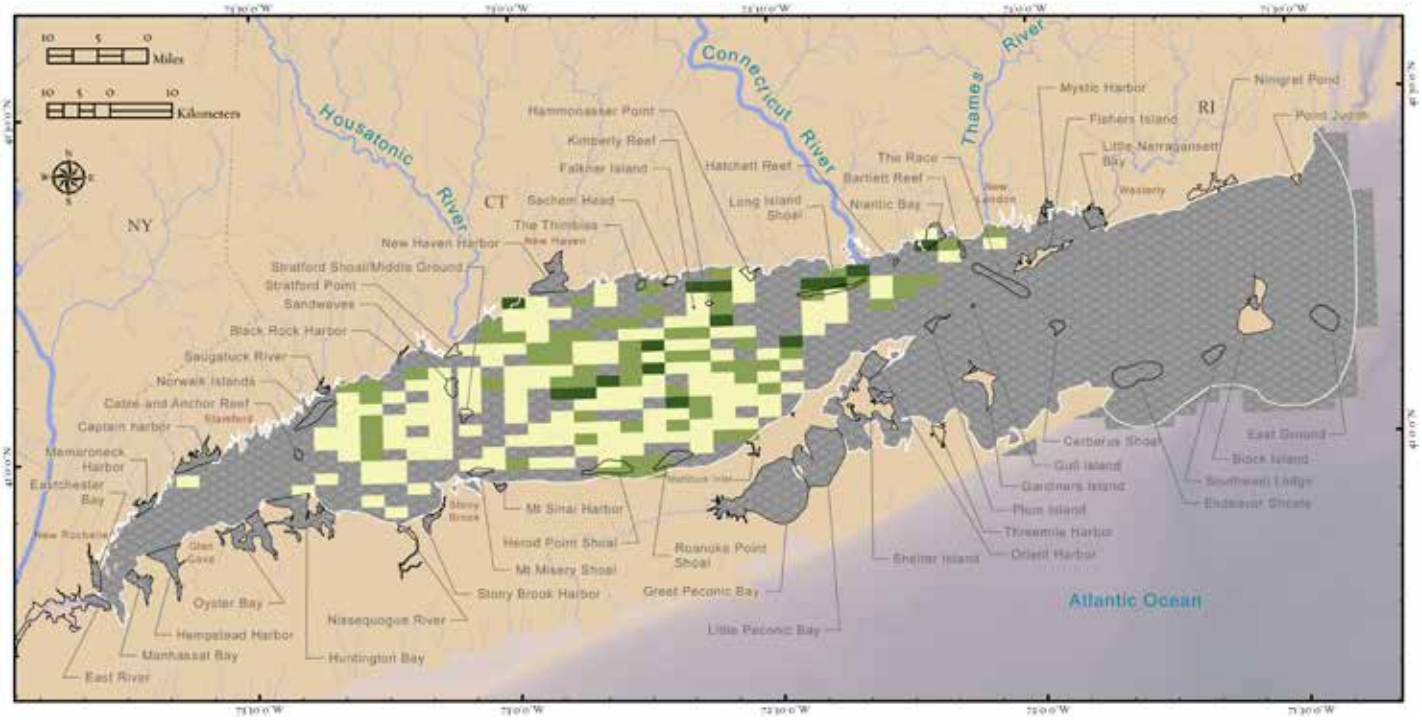


Long Island Sound Ecological Assessment

Lion´S Mane Jellyfish

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

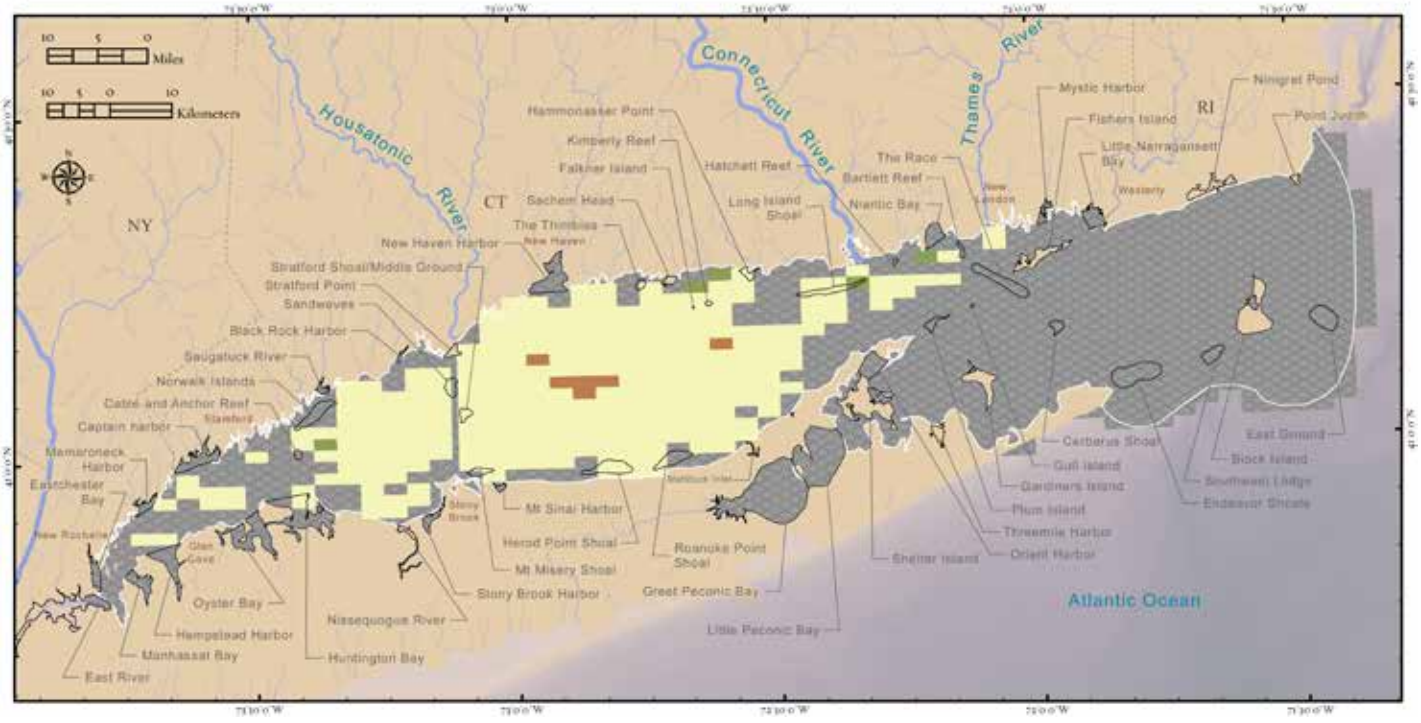


Long Island Sound Ecological Assessment

Fourspot Flounder

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

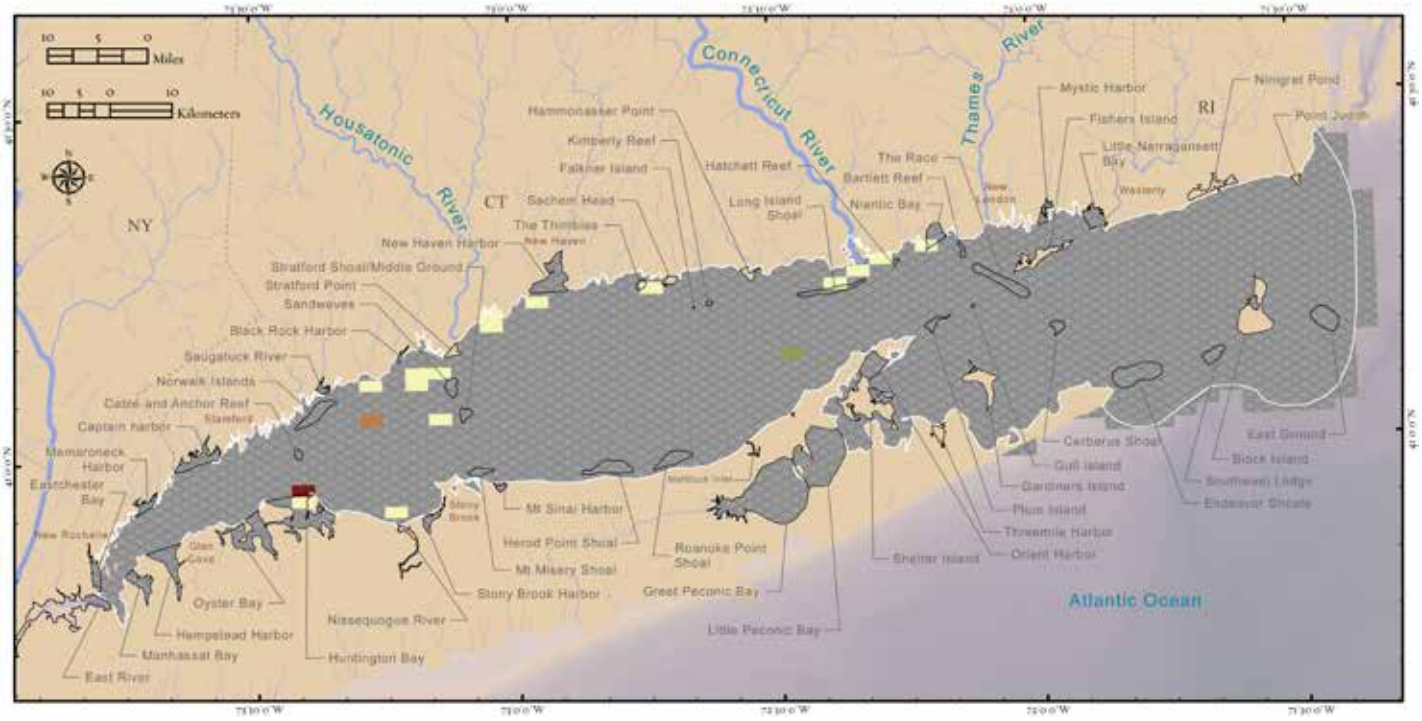


Long Island Sound Ecological Assessment

Grubby

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

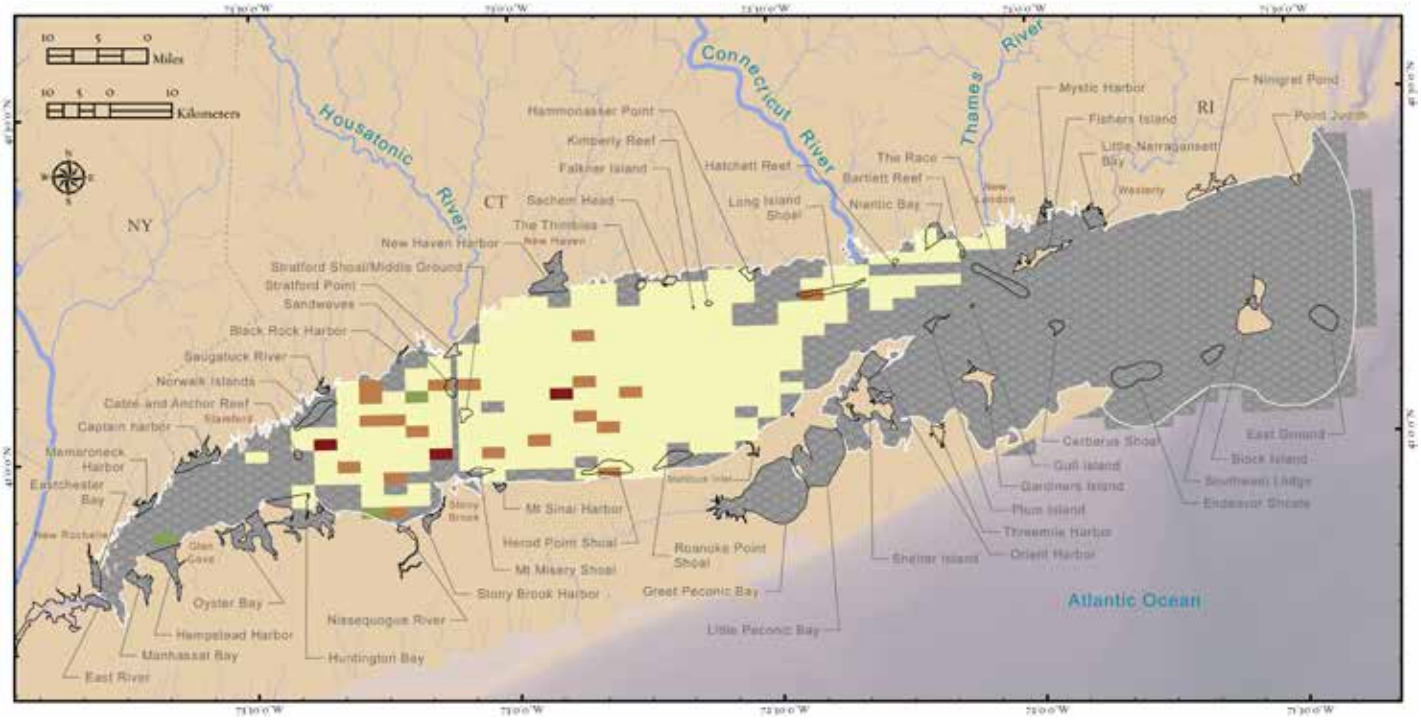


Long Island Sound Ecological Assessment

Little Skate

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

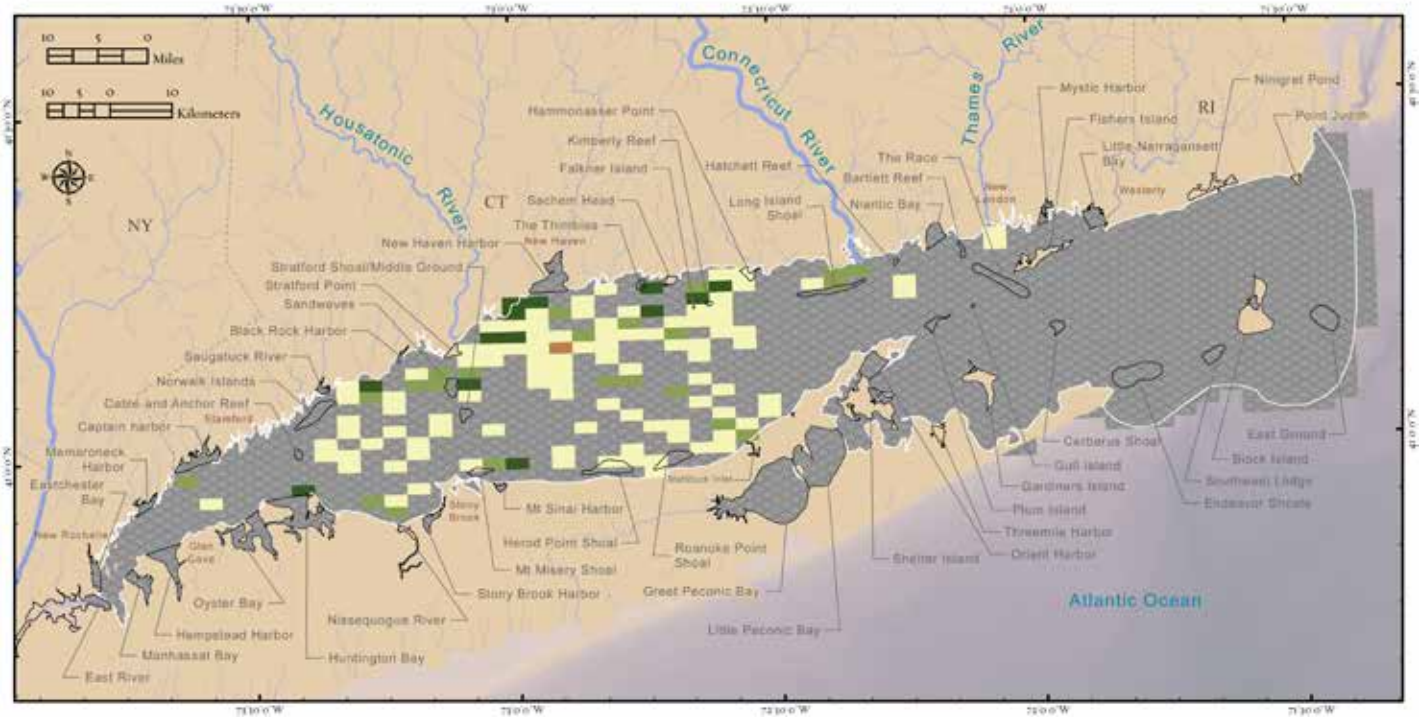


Long Island Sound Ecological Assessment

Hickory Shad

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

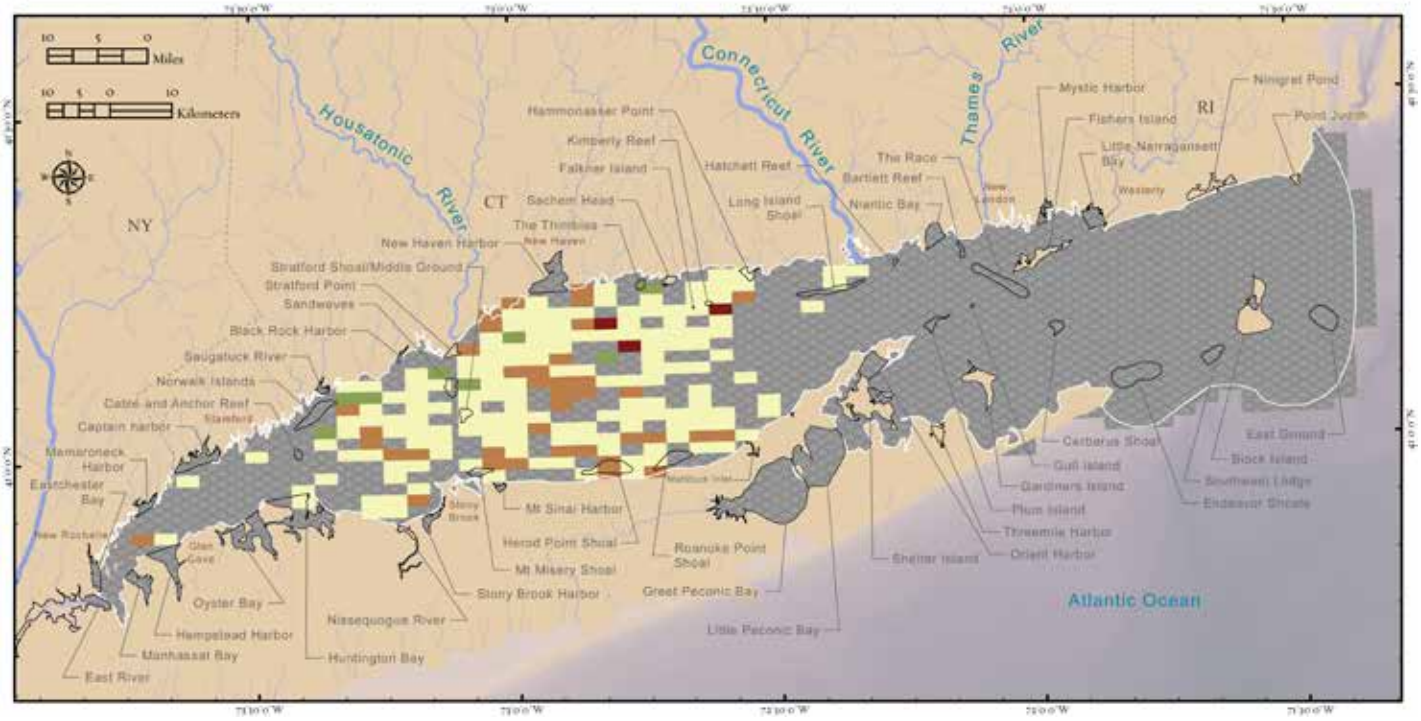


Long Island Sound Ecological Assessment

Hogchoker

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

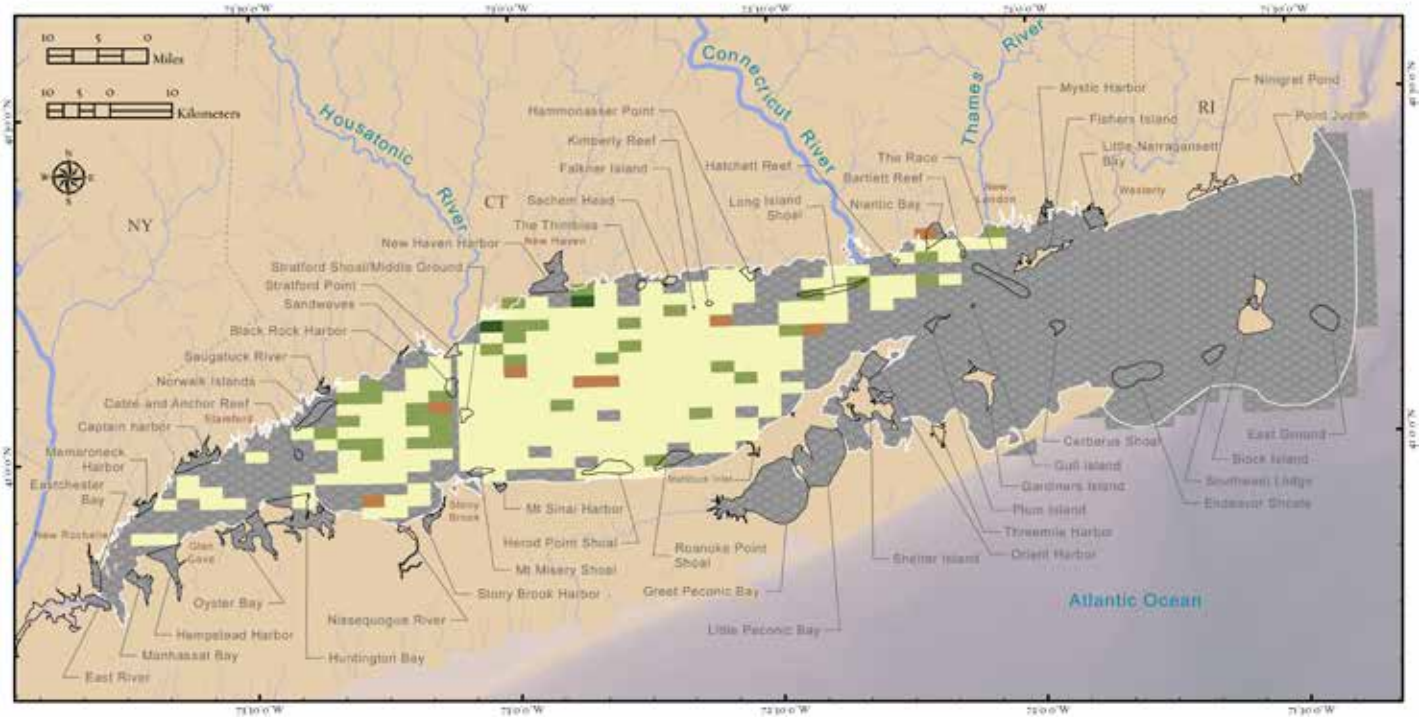


Long Island Sound Ecological Assessment

Long-Finned Squid

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

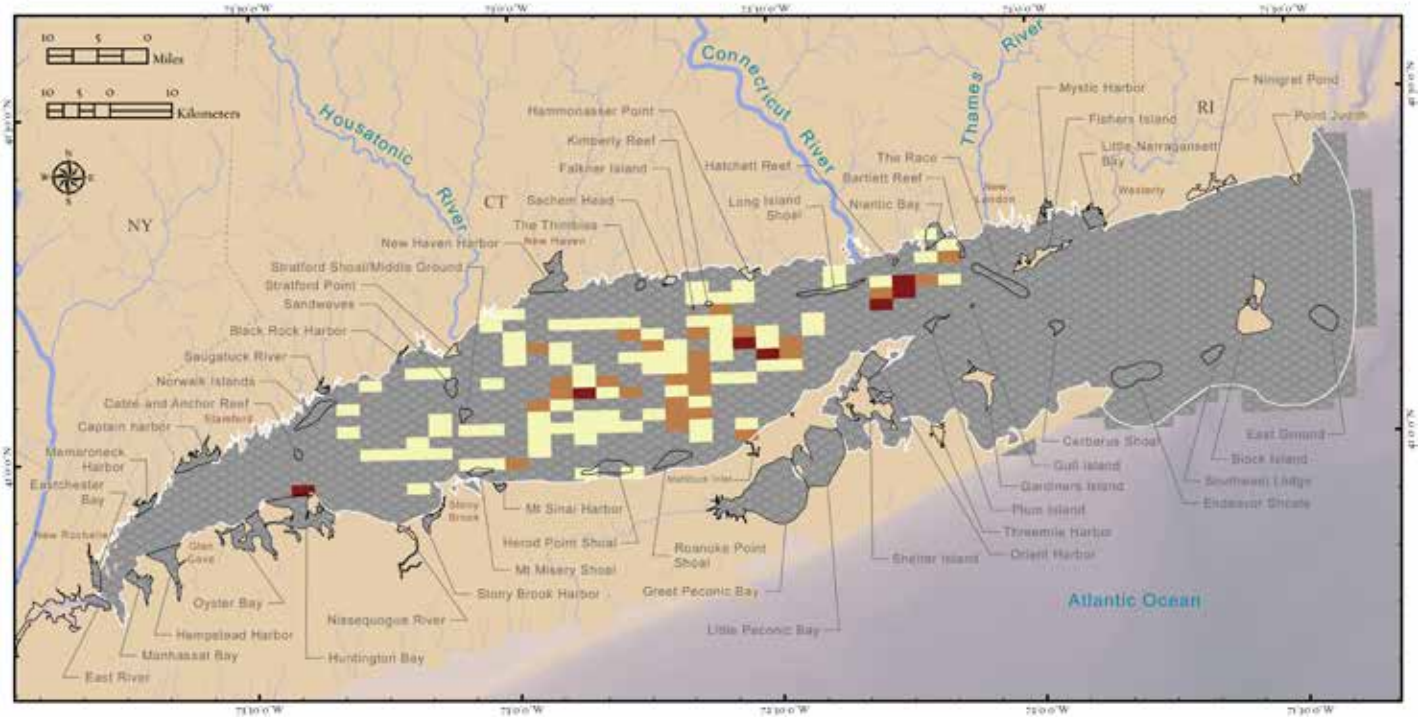


Long Island Sound Ecological Assessment

Longhorn Sculpin

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

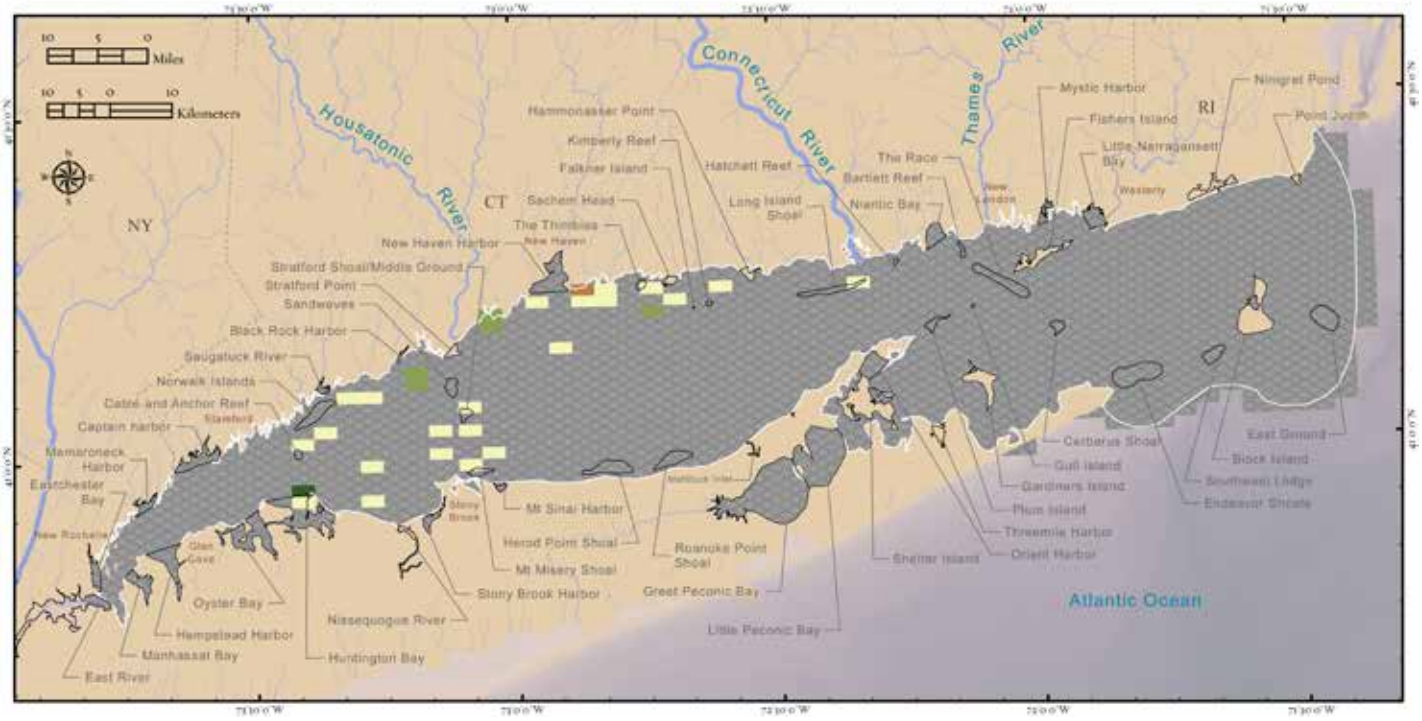


Long Island Sound Ecological Assessment

Oyster Toadfish

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

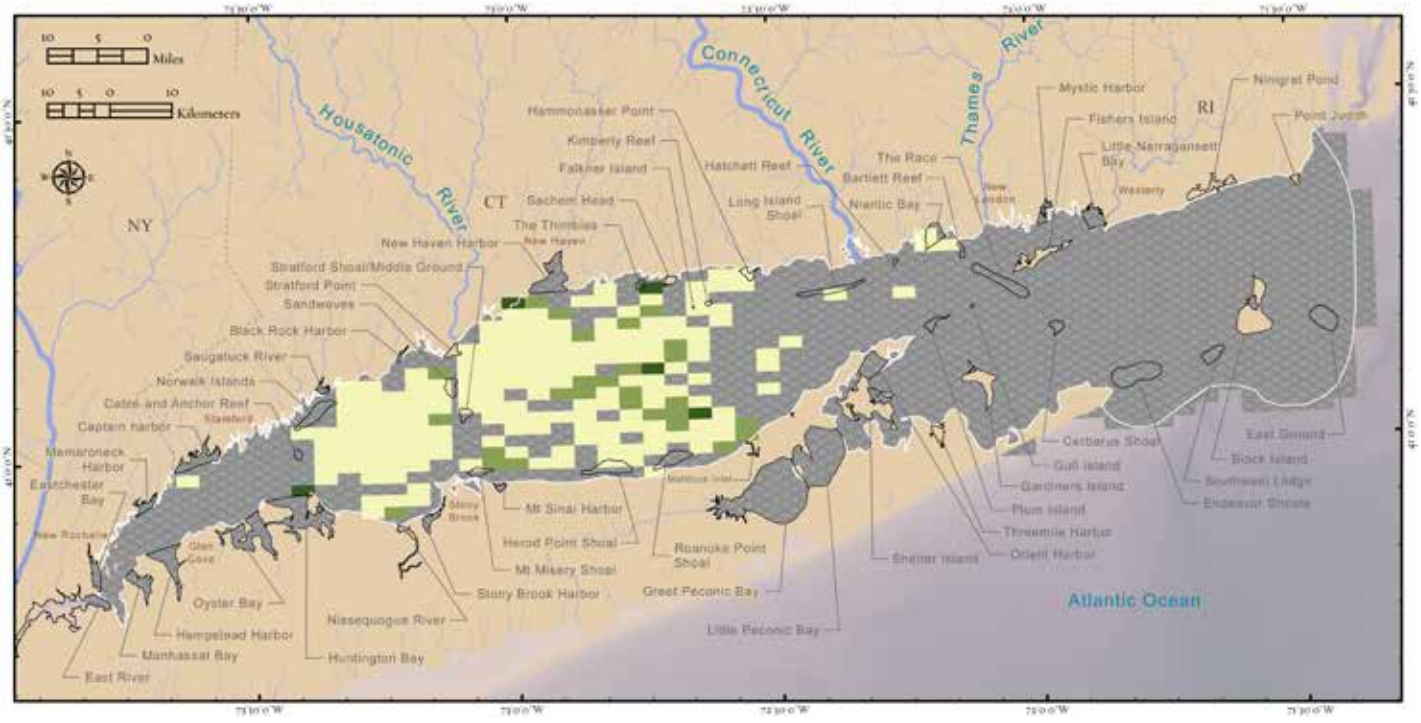


Long Island Sound Ecological Assessment

Mantis Shrimp

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

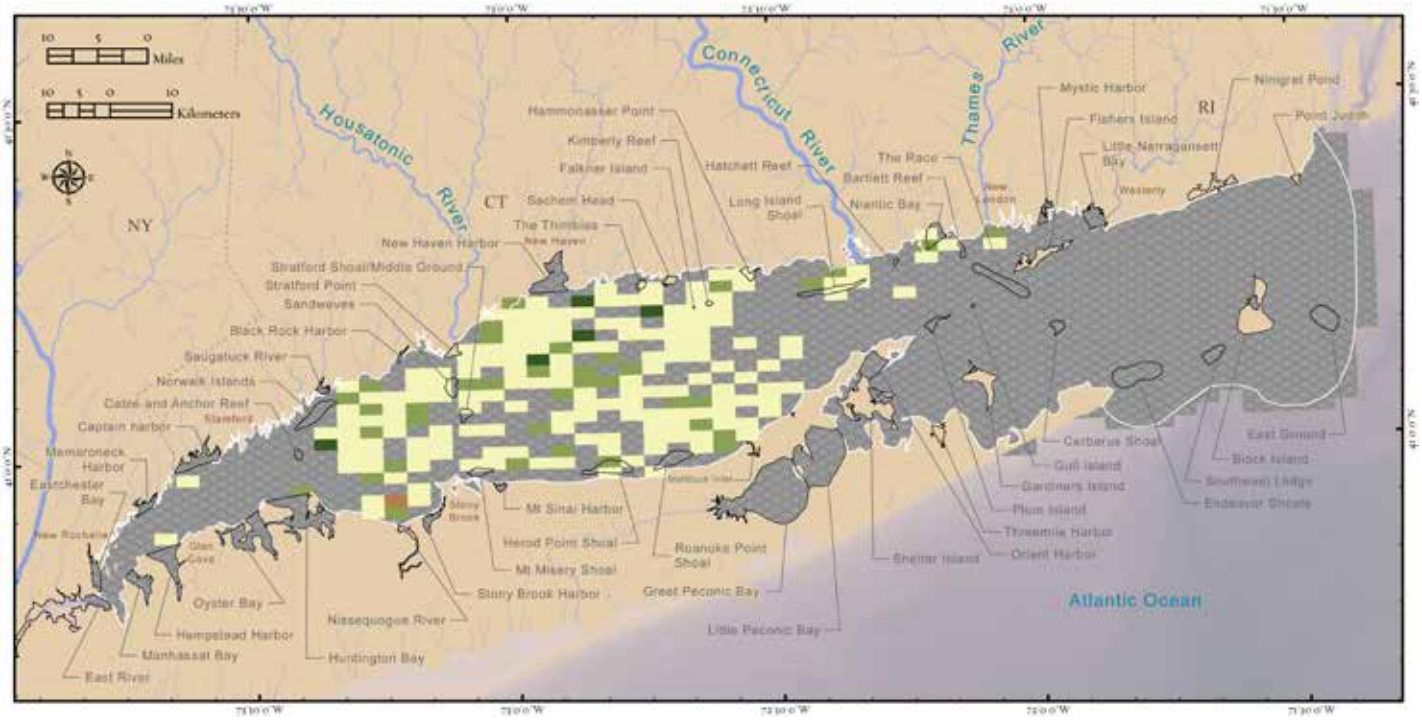


Long Island Sound Ecological Assessment

Moonfish

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

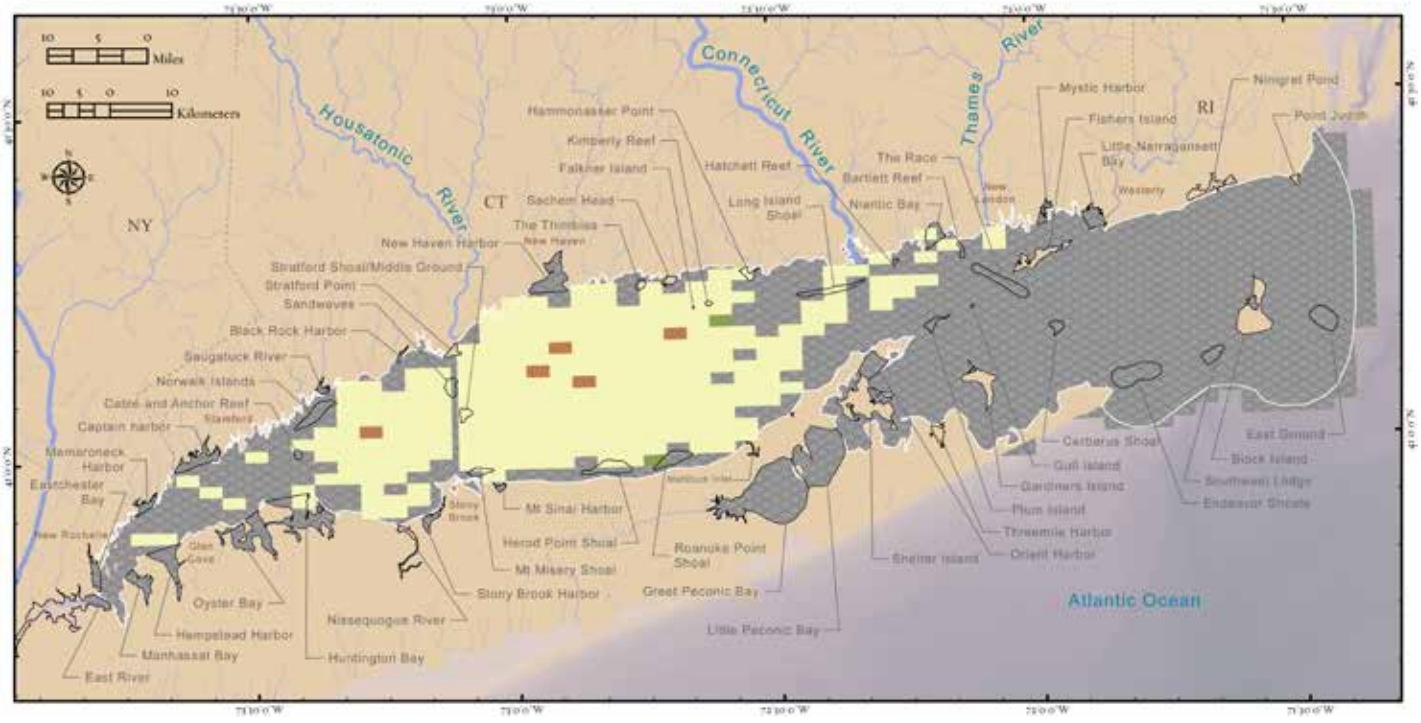


Long Island Sound Ecological Assessment

Red Hake

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

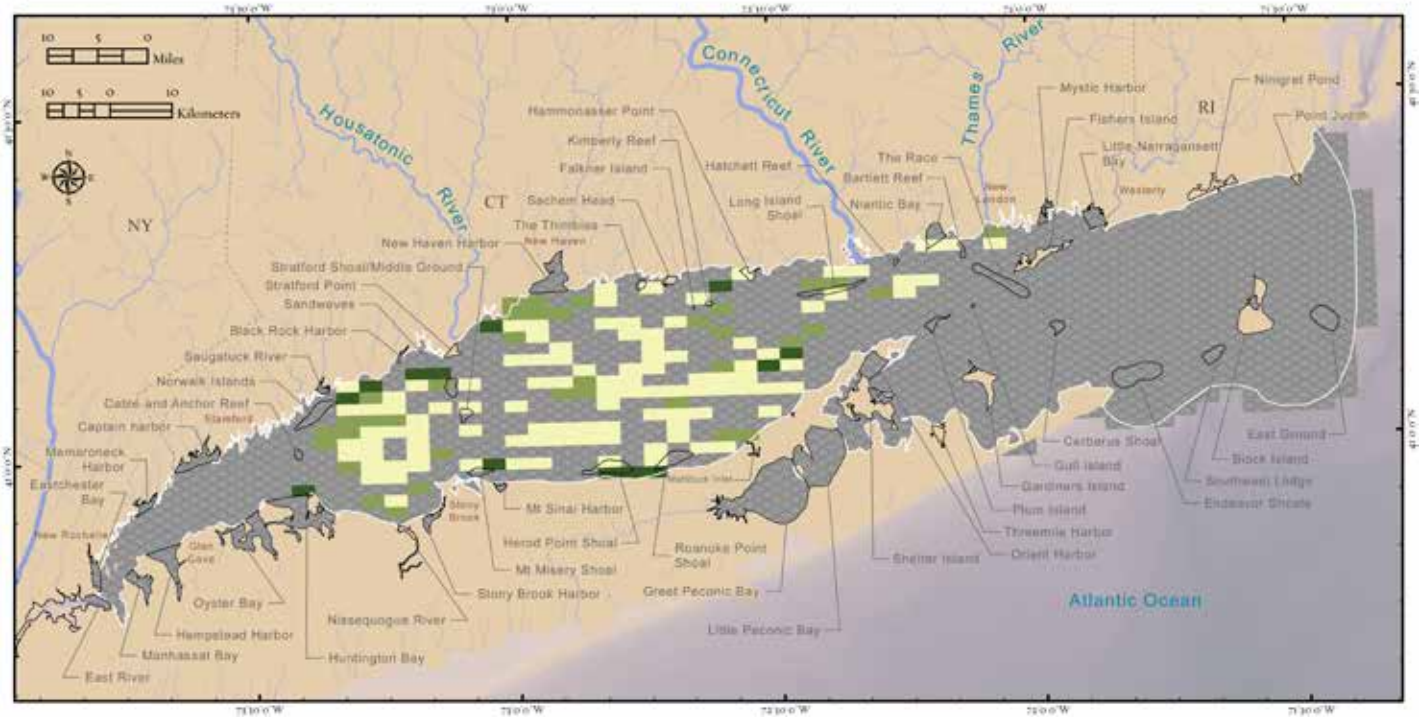


Long Island Sound Ecological Assessment

Mud Crabs

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

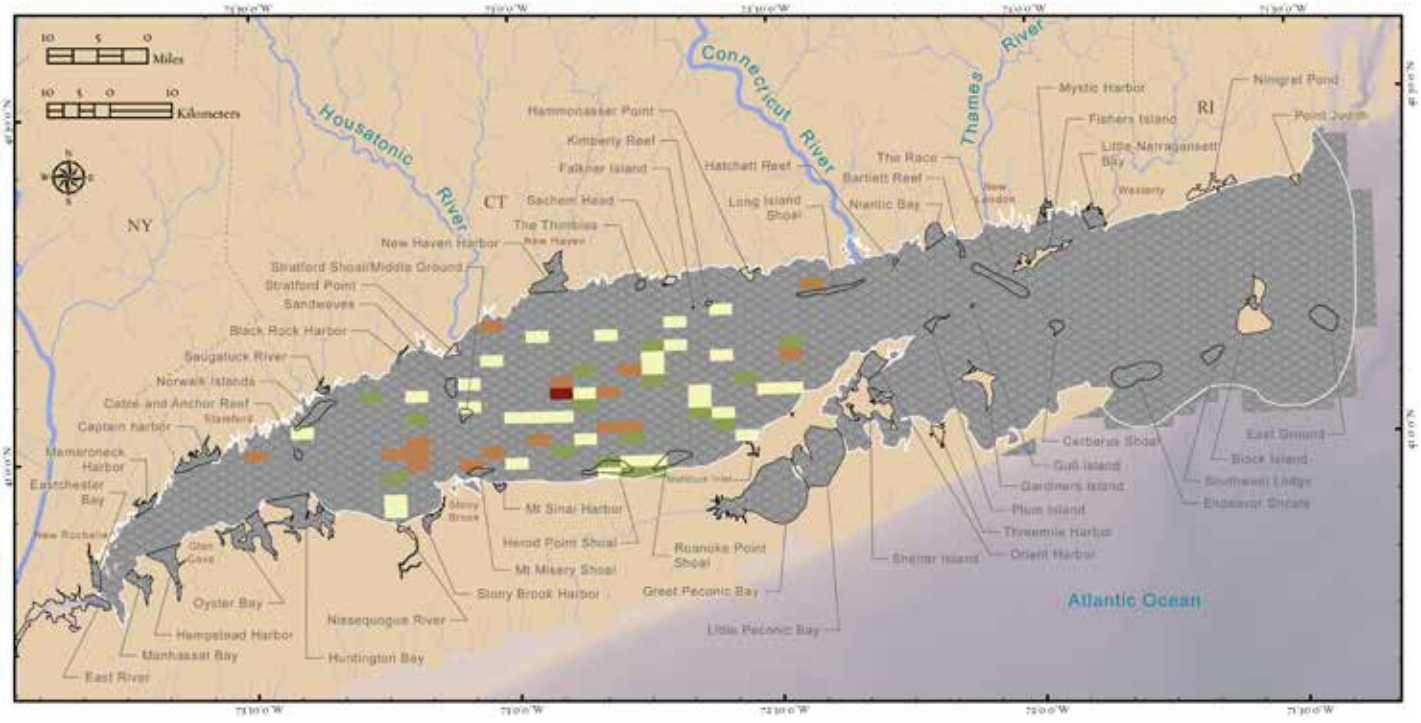


Long Island Sound Ecological Assessment

Northern Puffer

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

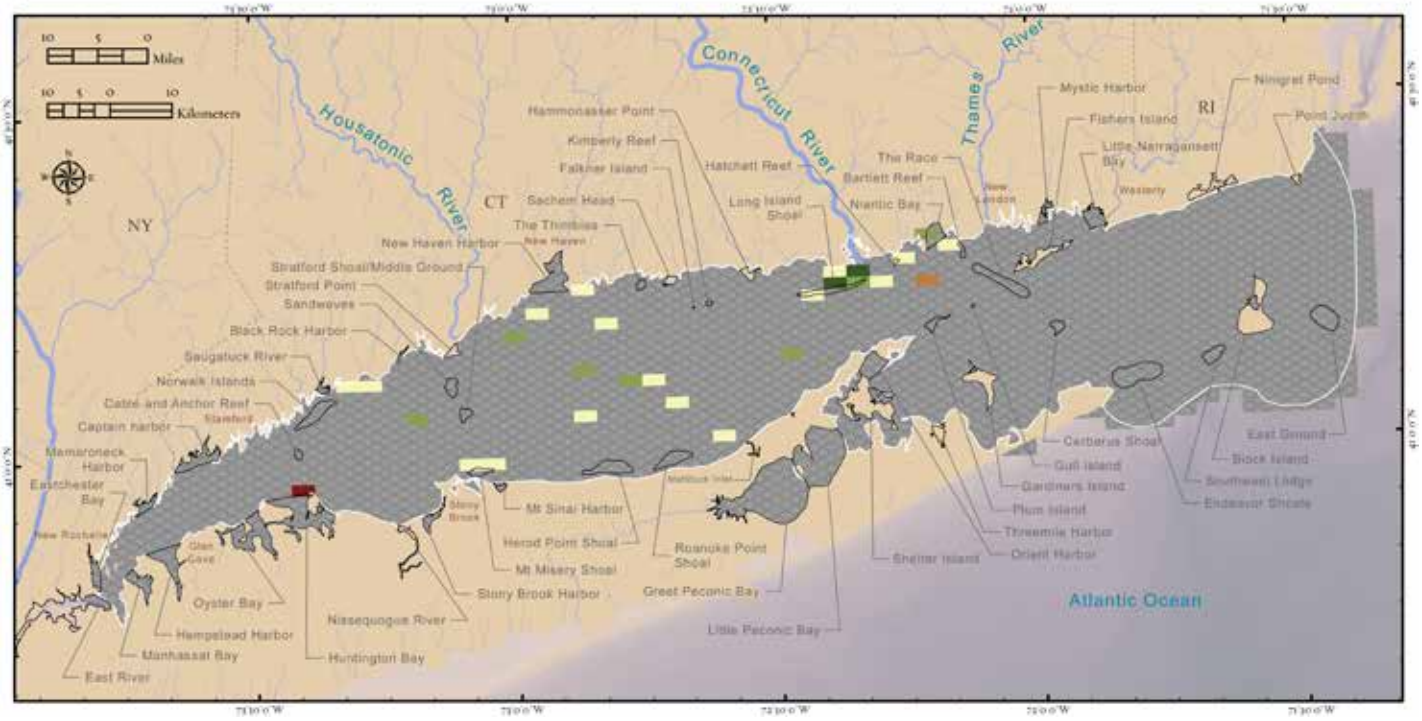


Long Island Sound Ecological Assessment

Rock Gunnel

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

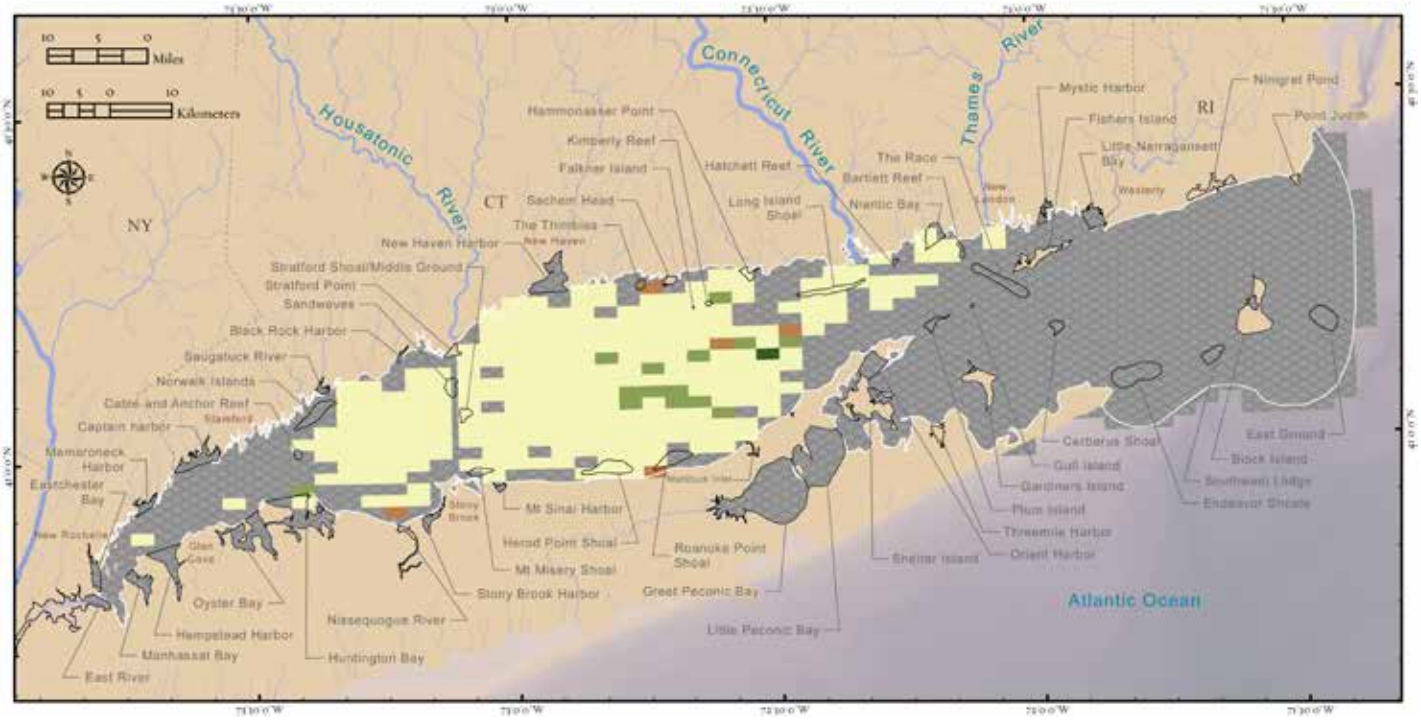


Long Island Sound Ecological Assessment

Northern Searobin

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

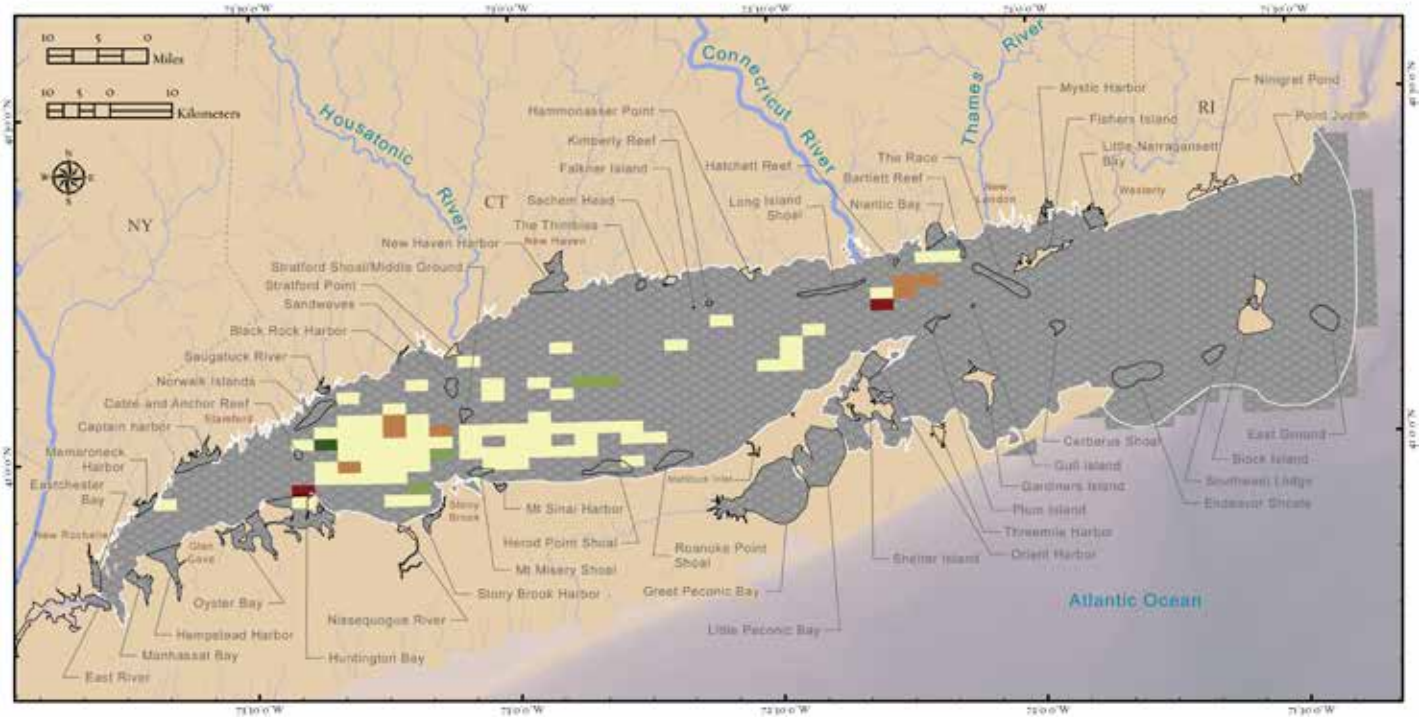


Long Island Sound Ecological Assessment

Ocean Pout

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

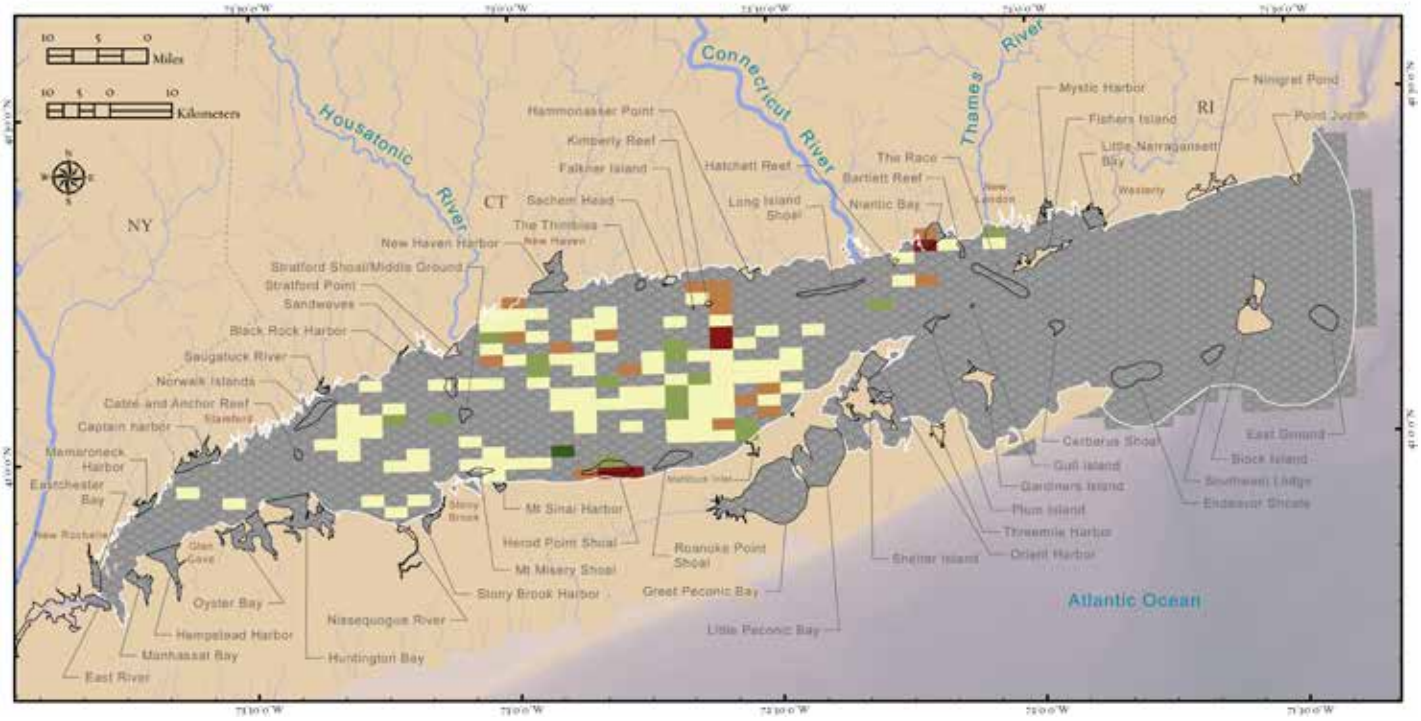


Long Island Sound Ecological Assessment

Rough Scad

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

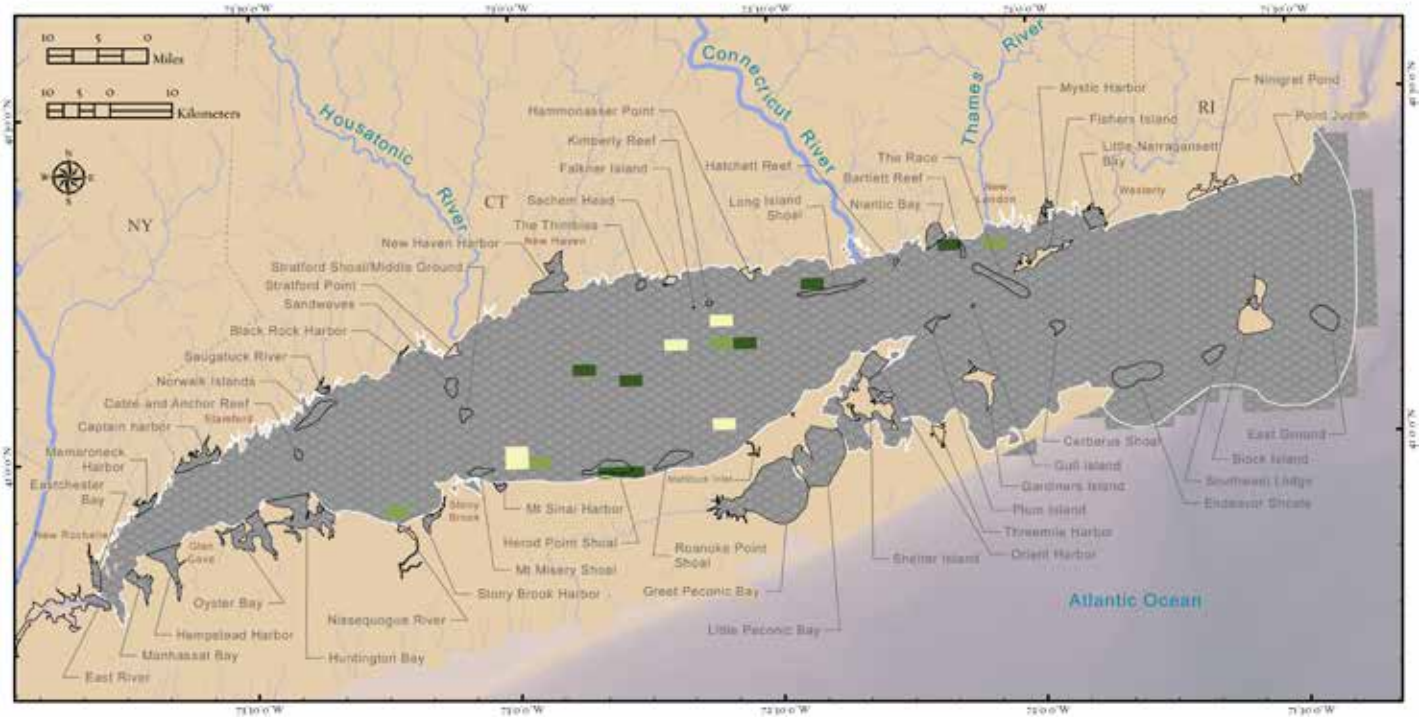


Long Island Sound Ecological Assessment

Round Scad

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

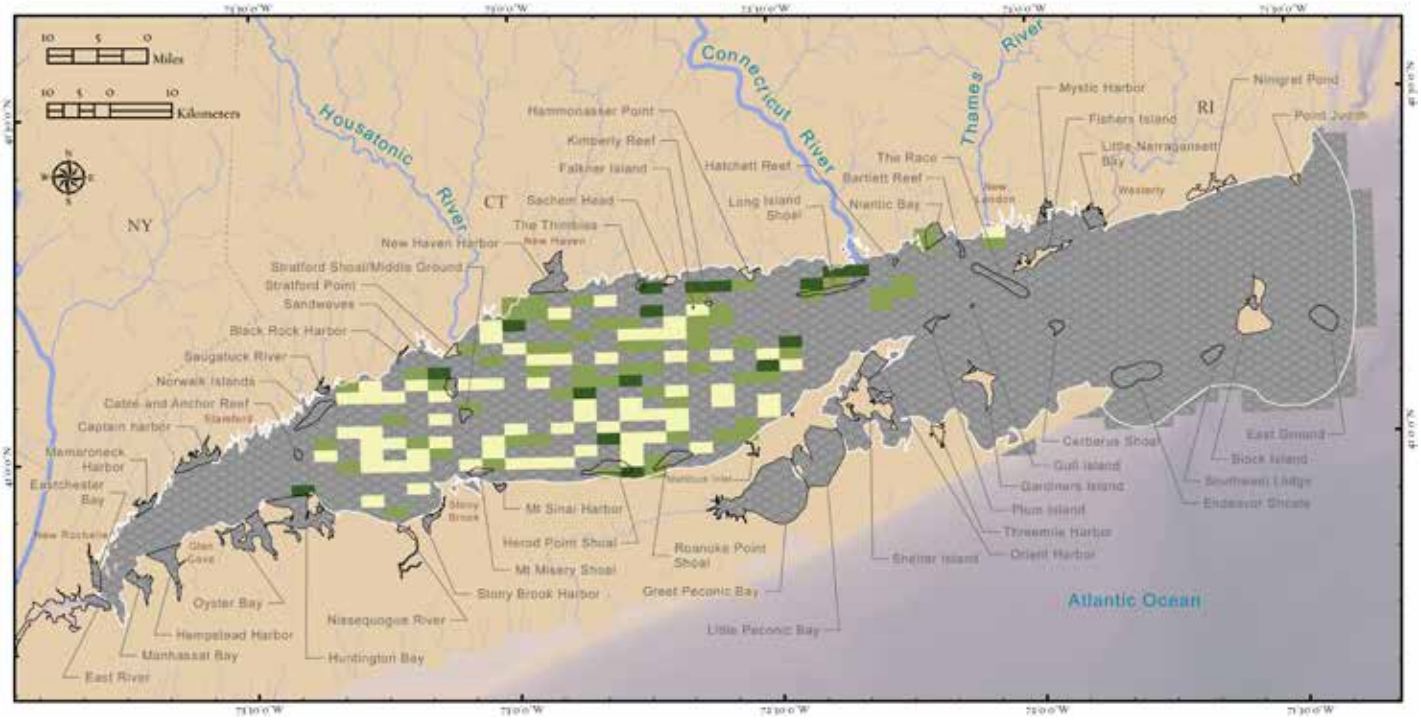


Long Island Sound Ecological Assessment

Sand Shrimp

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

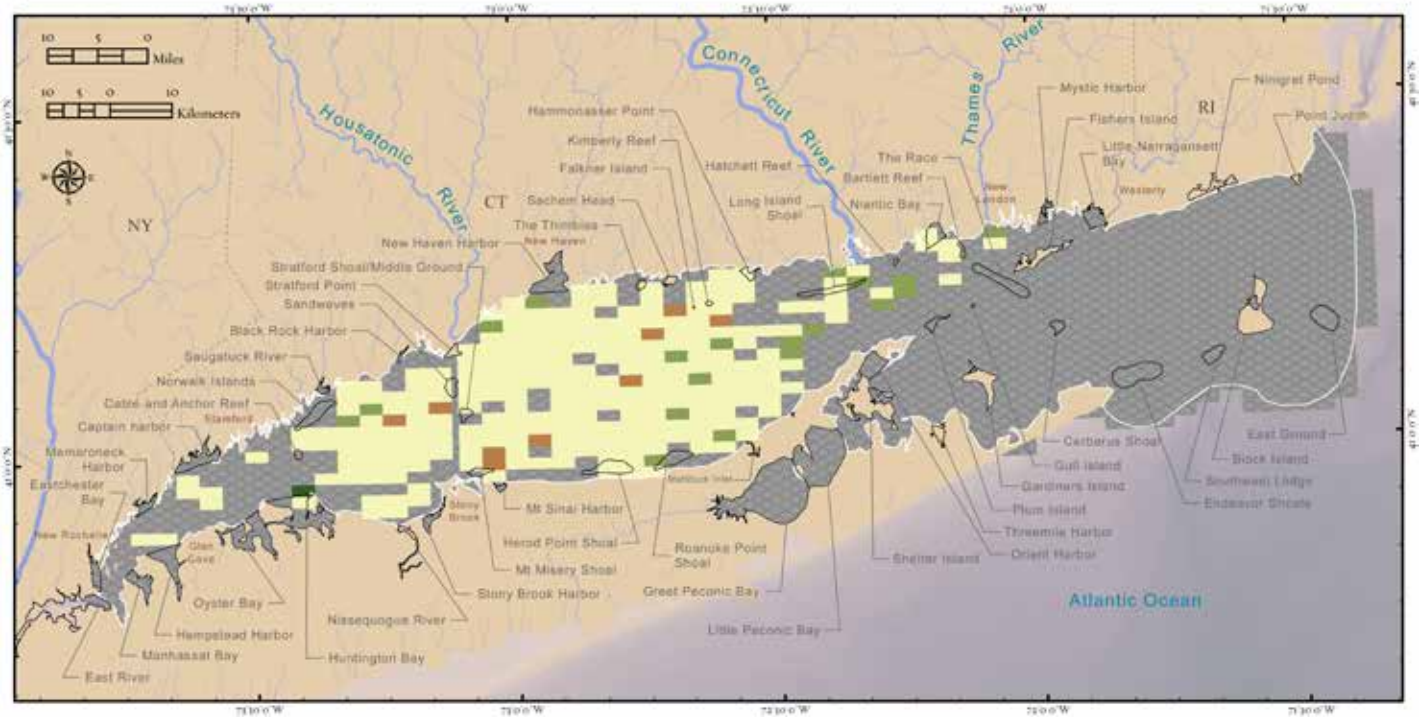


Long Island Sound Ecological Assessment

Weakfish

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

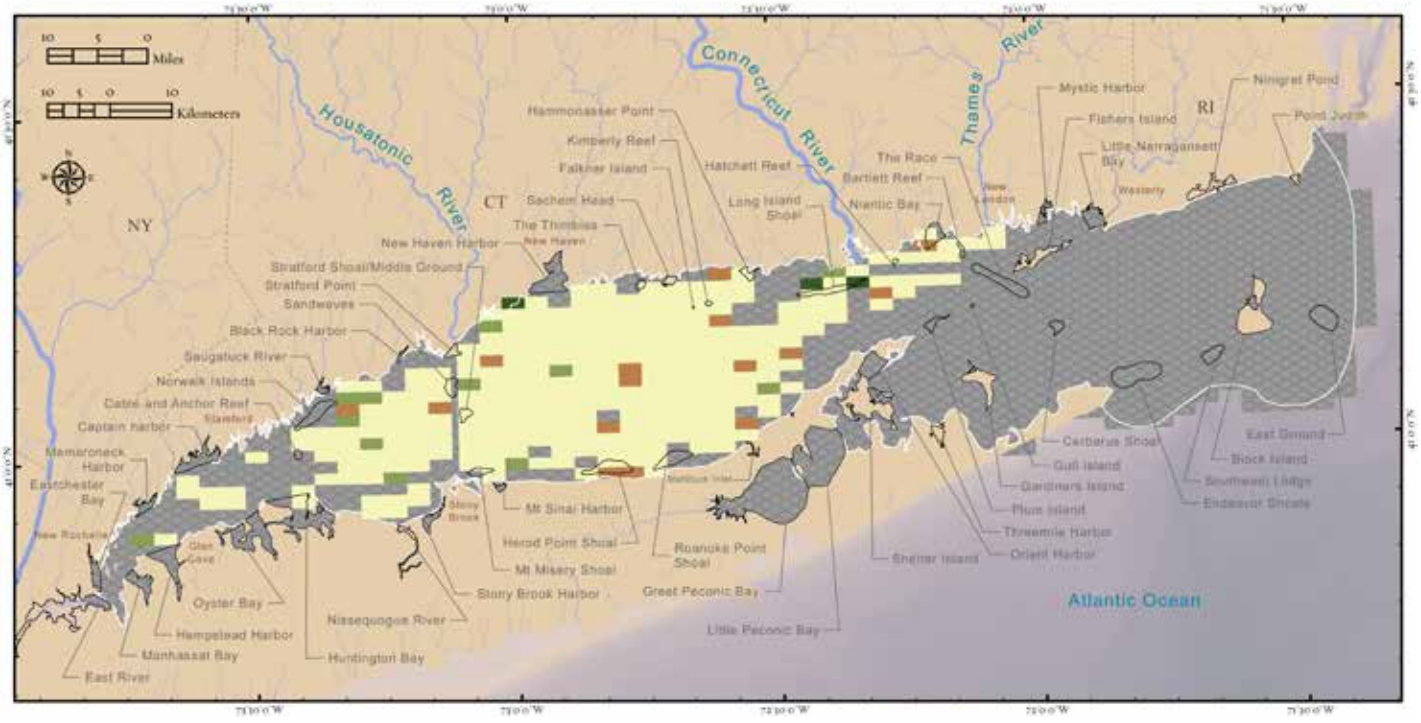


Long Island Sound Ecological Assessment

Scup

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

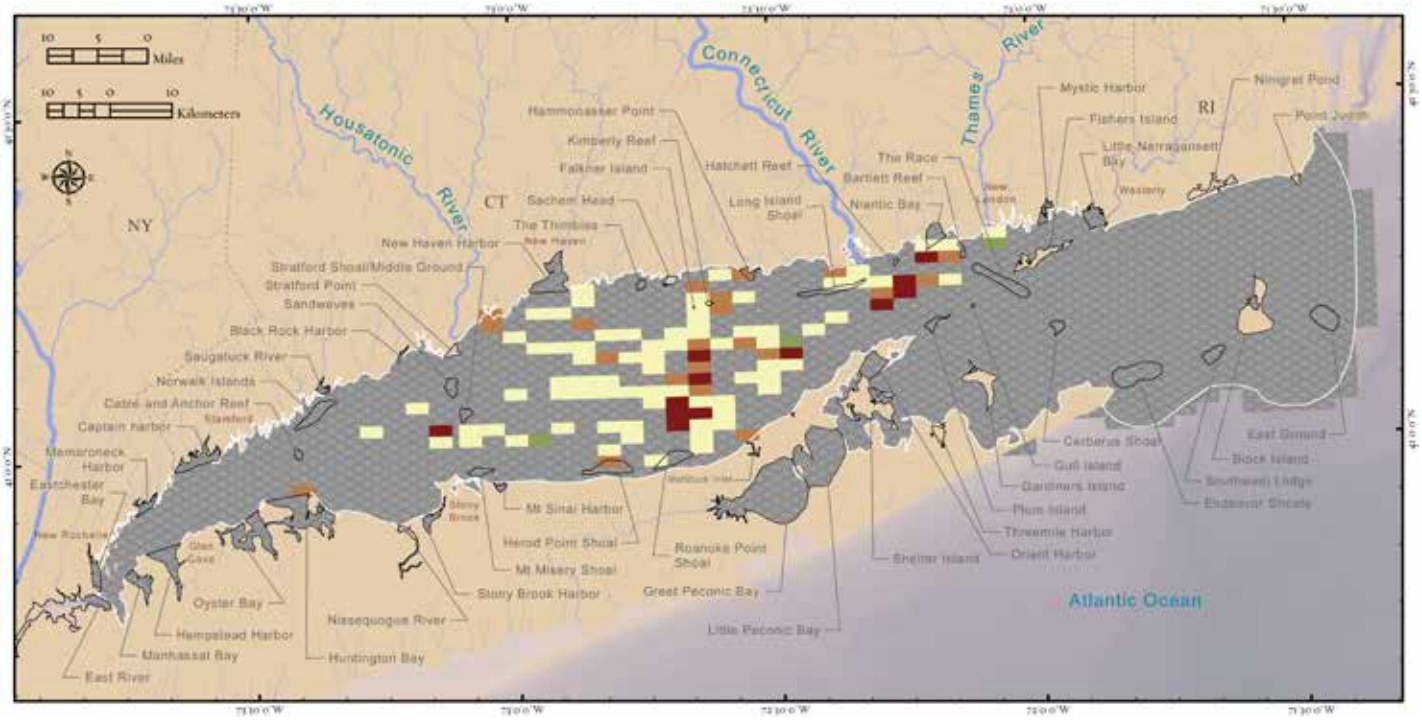


Long Island Sound Ecological Assessment

Sea Raven

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

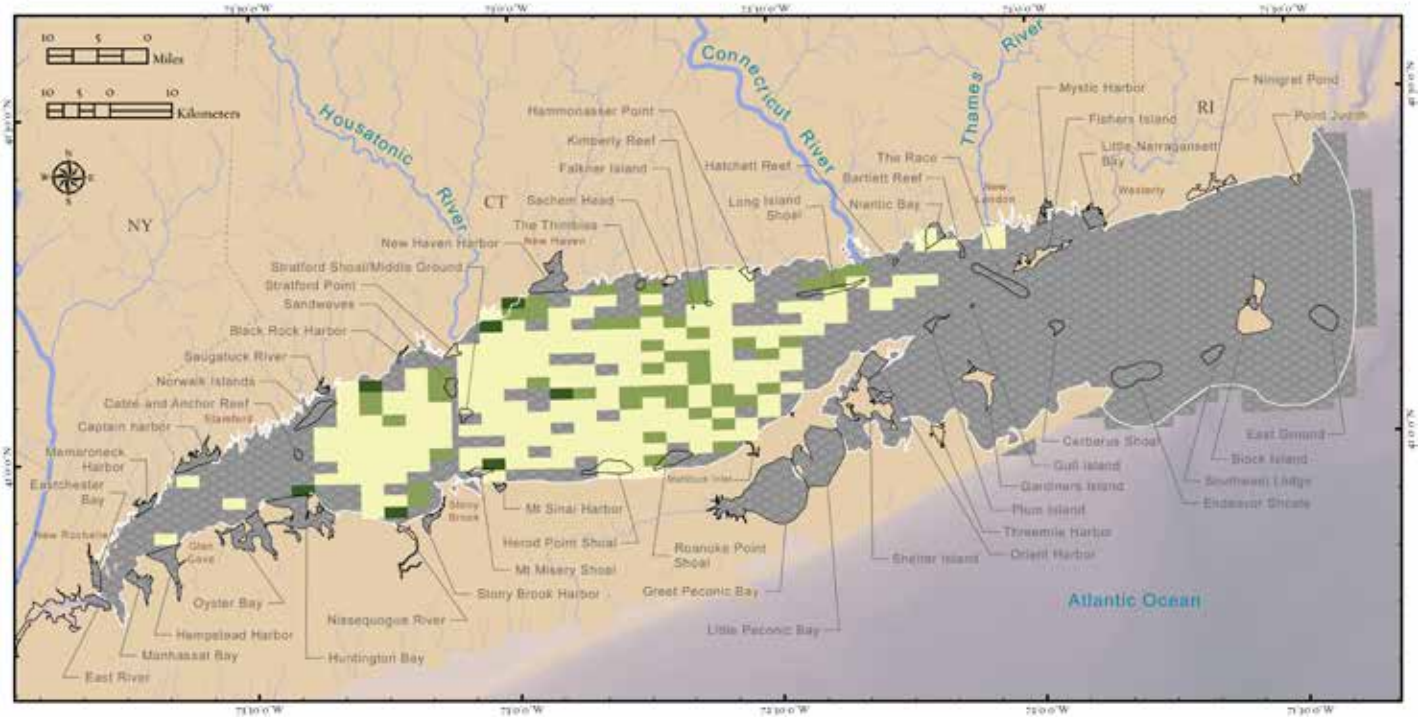


Long Island Sound Ecological Assessment

Spotted Hake

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

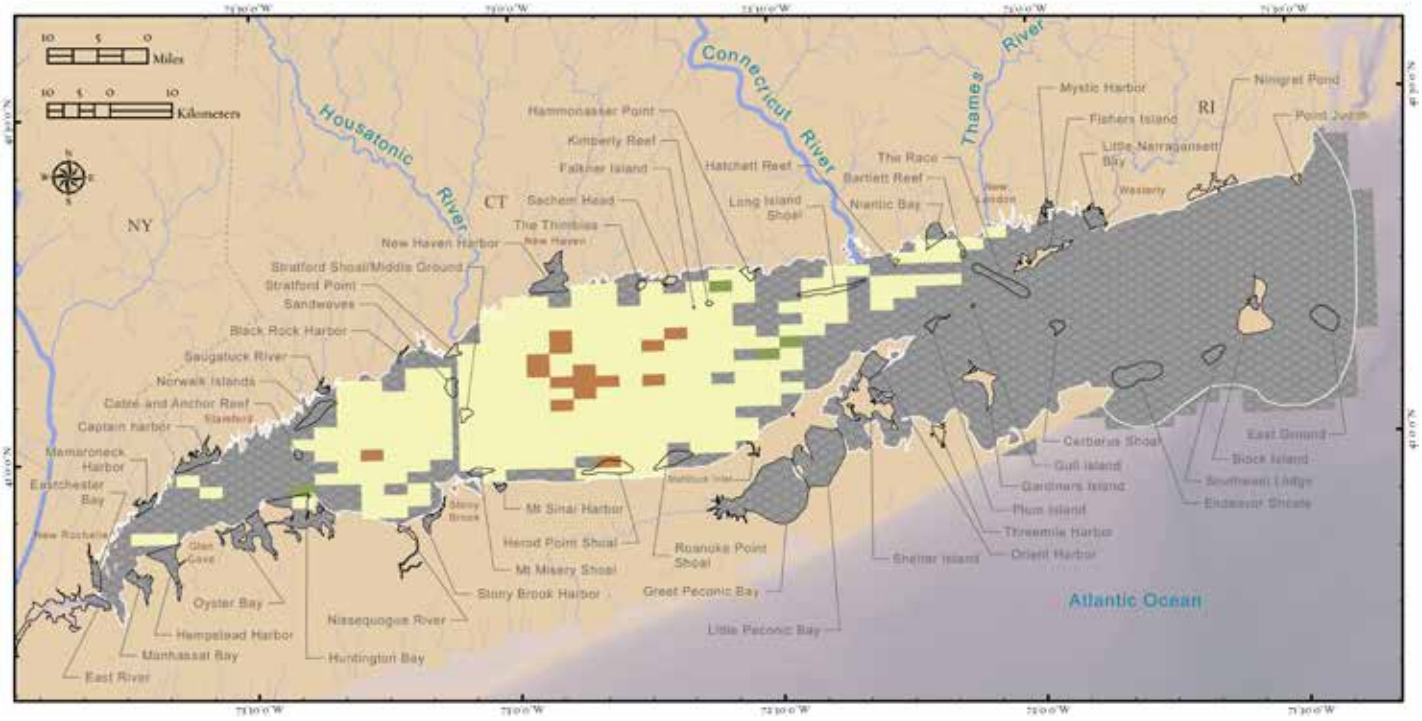


Long Island Sound Ecological Assessment

Silver Hake

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

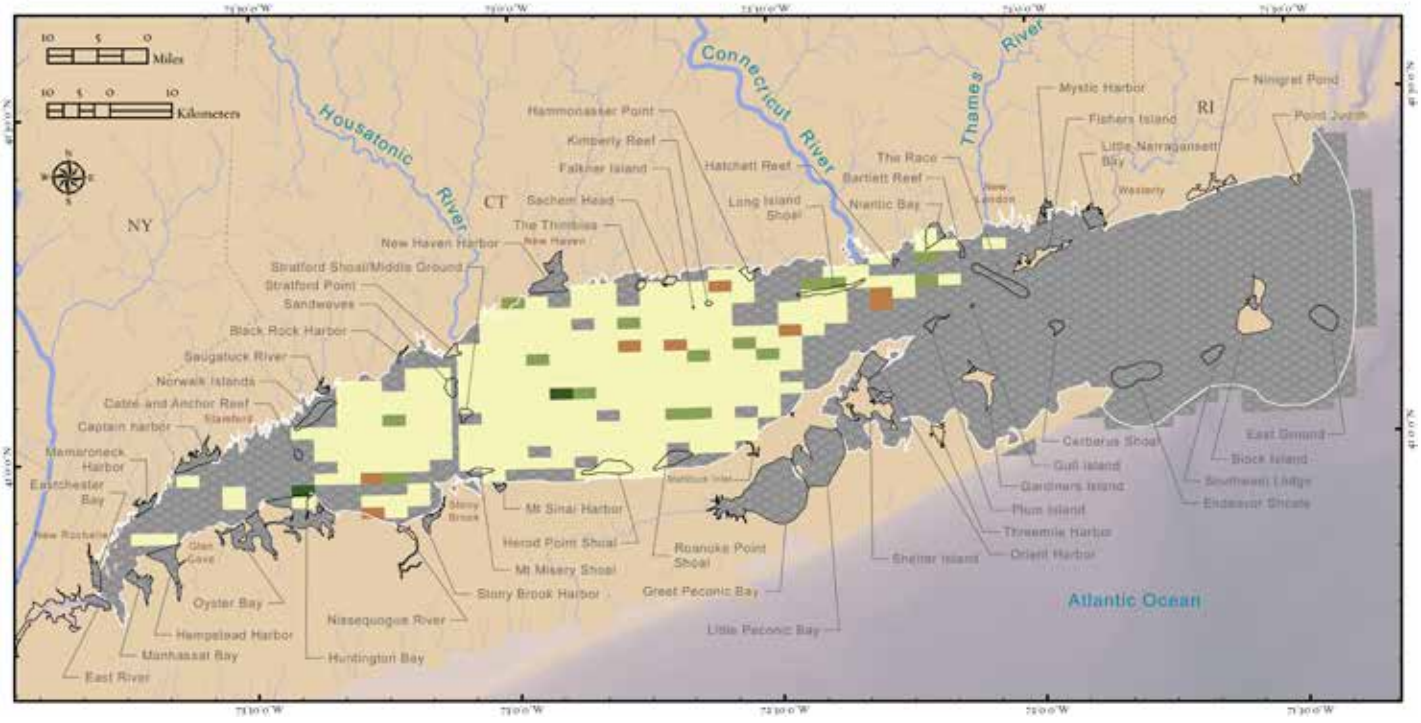


Long Island Sound Ecological Assessment

Smooth Dogfish

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

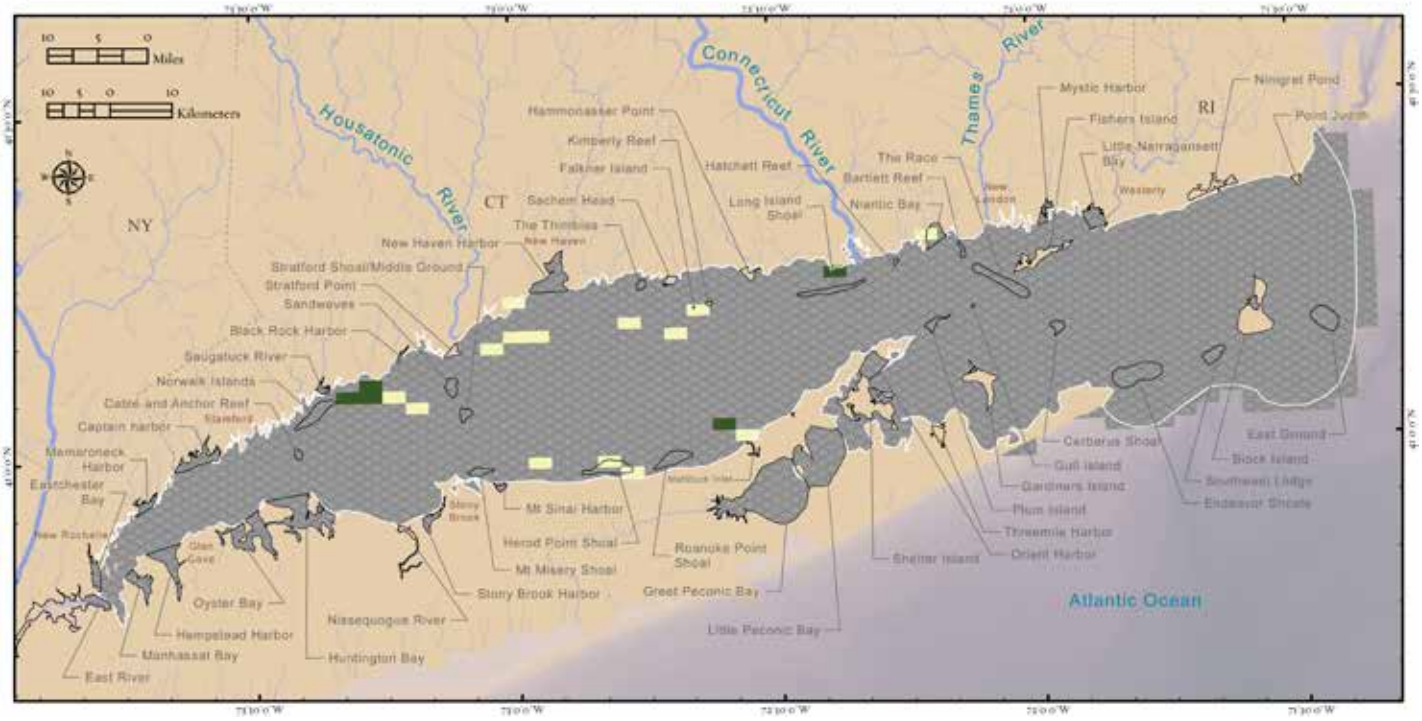


Long Island Sound Ecological Assessment

Striped Anchovy

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

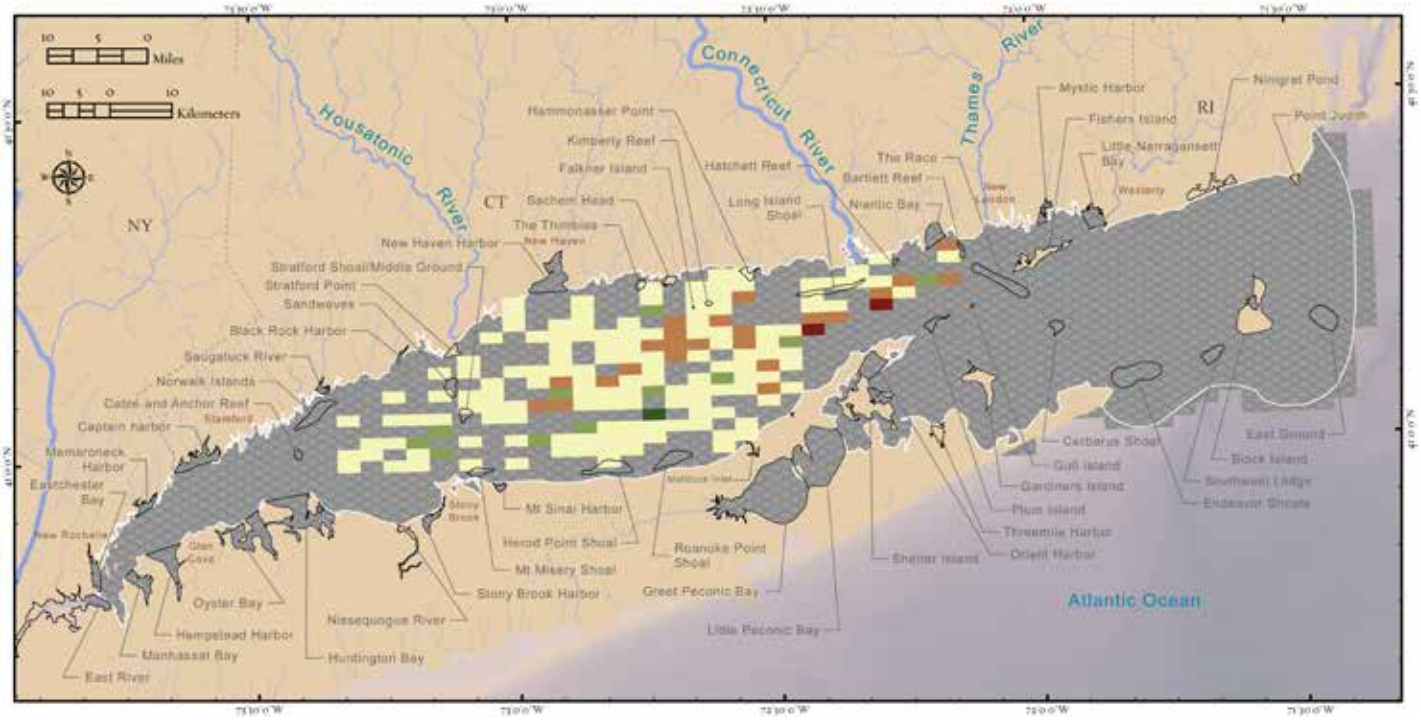


Long Island Sound Ecological Assessment

Spiny Dogfish

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

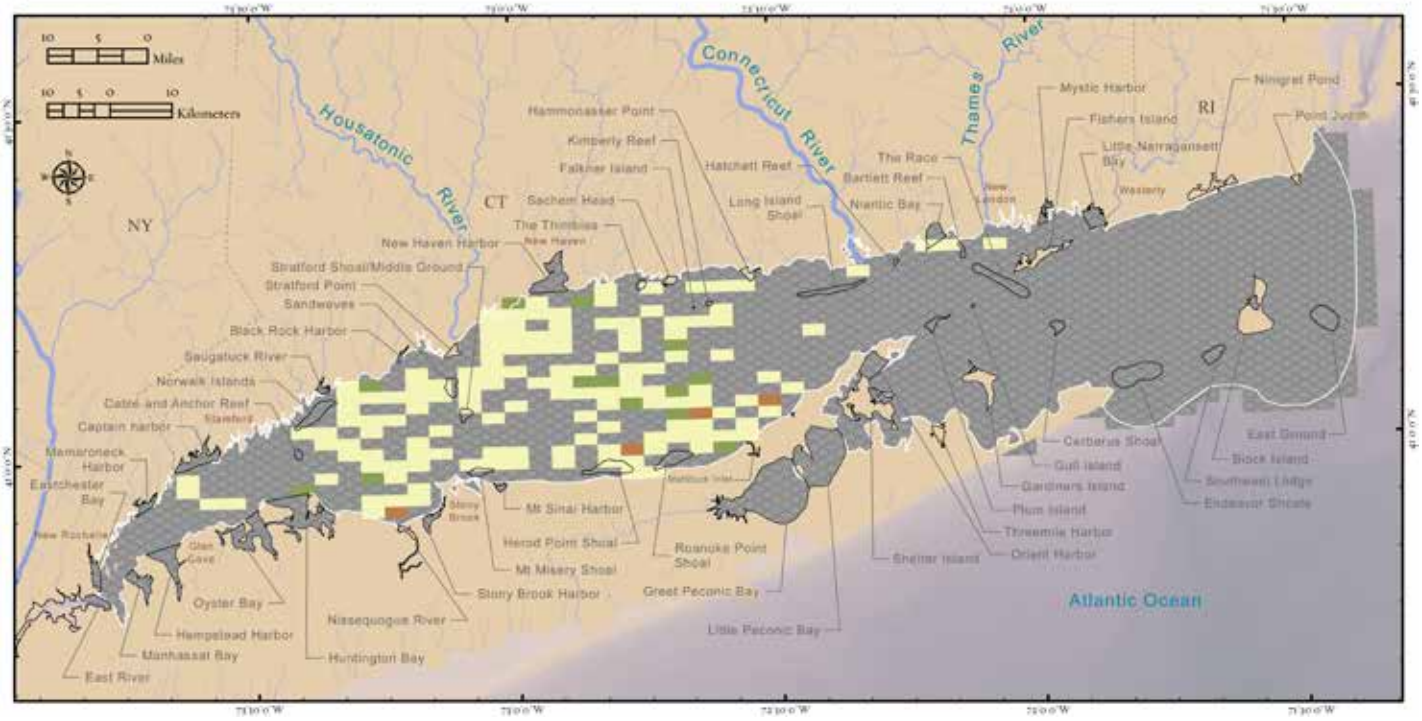


Long Island Sound Ecological Assessment

Spot

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

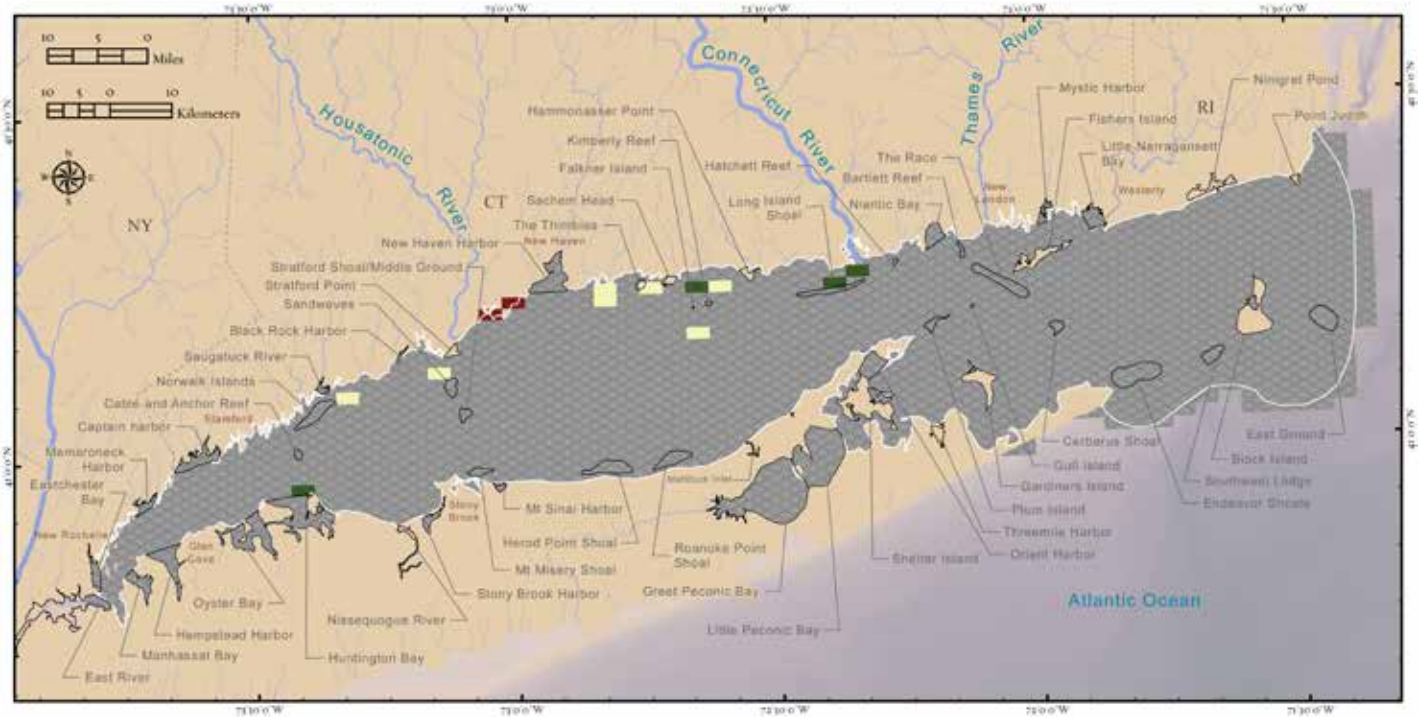


Long Island Sound Ecological Assessment

White Perch

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

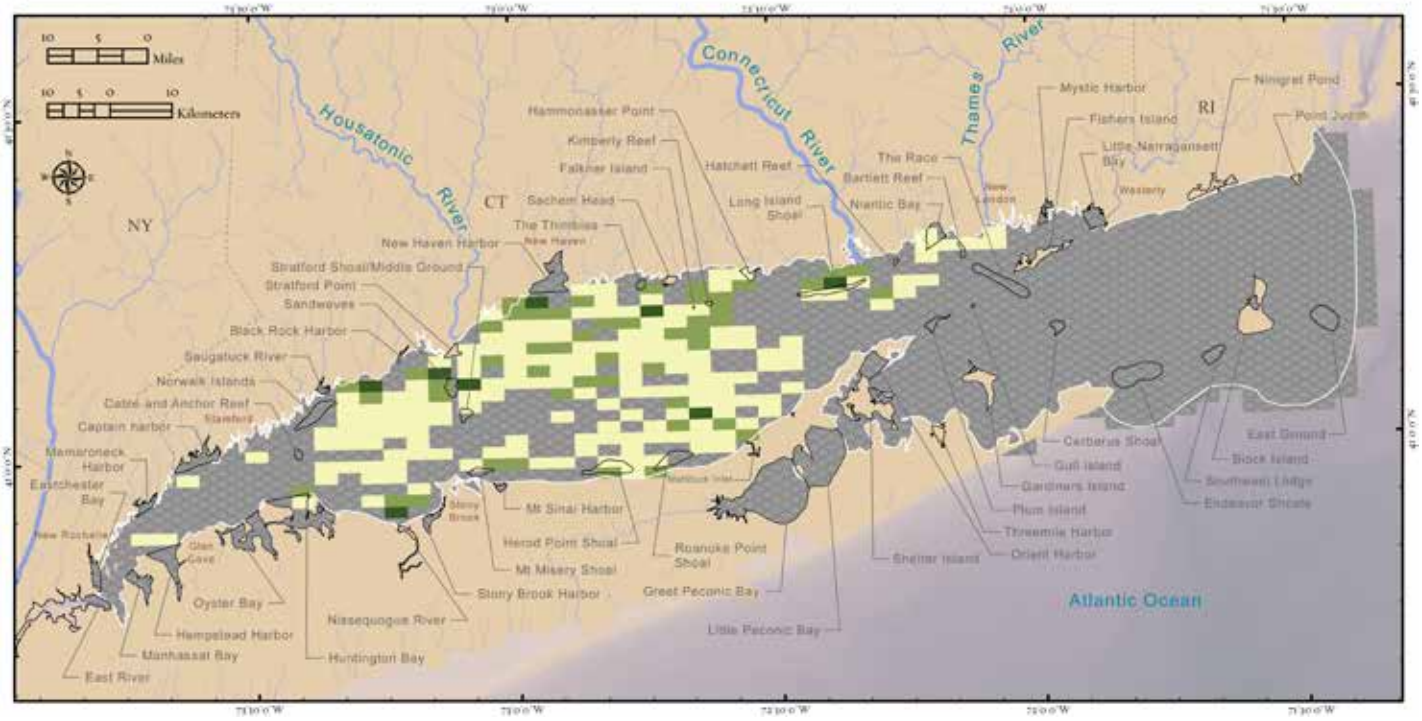


Long Island Sound Ecological Assessment

Striped Bass

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

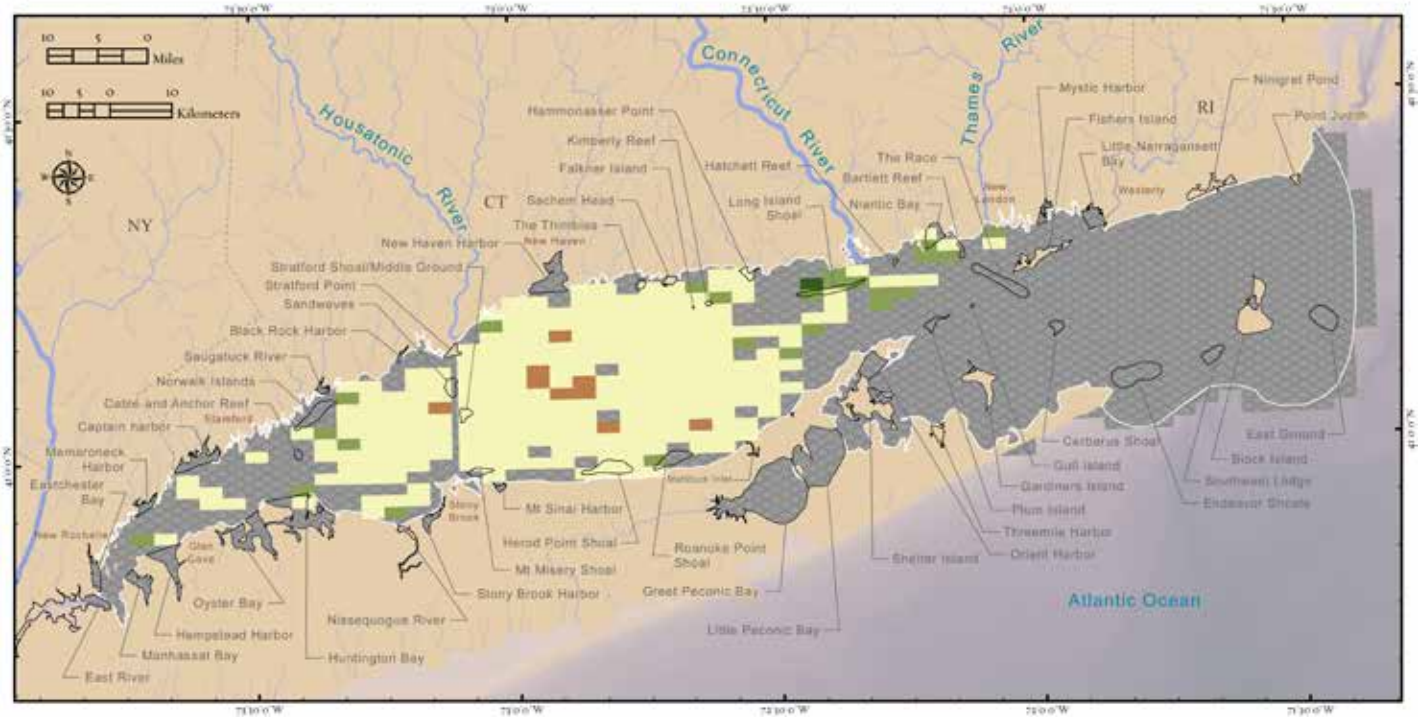


Long Island Sound Ecological Assessment

Striped Searobin

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

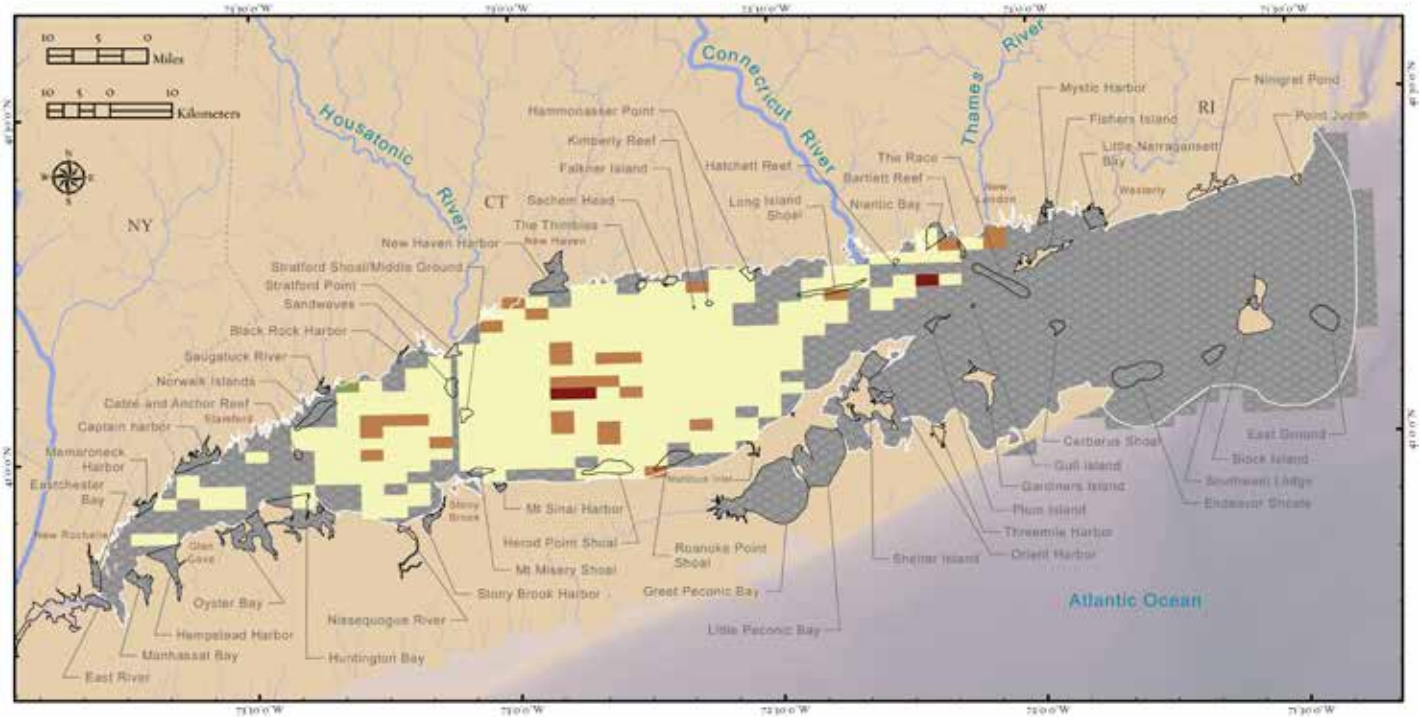


Long Island Sound Ecological Assessment

Windowpane Flounder

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

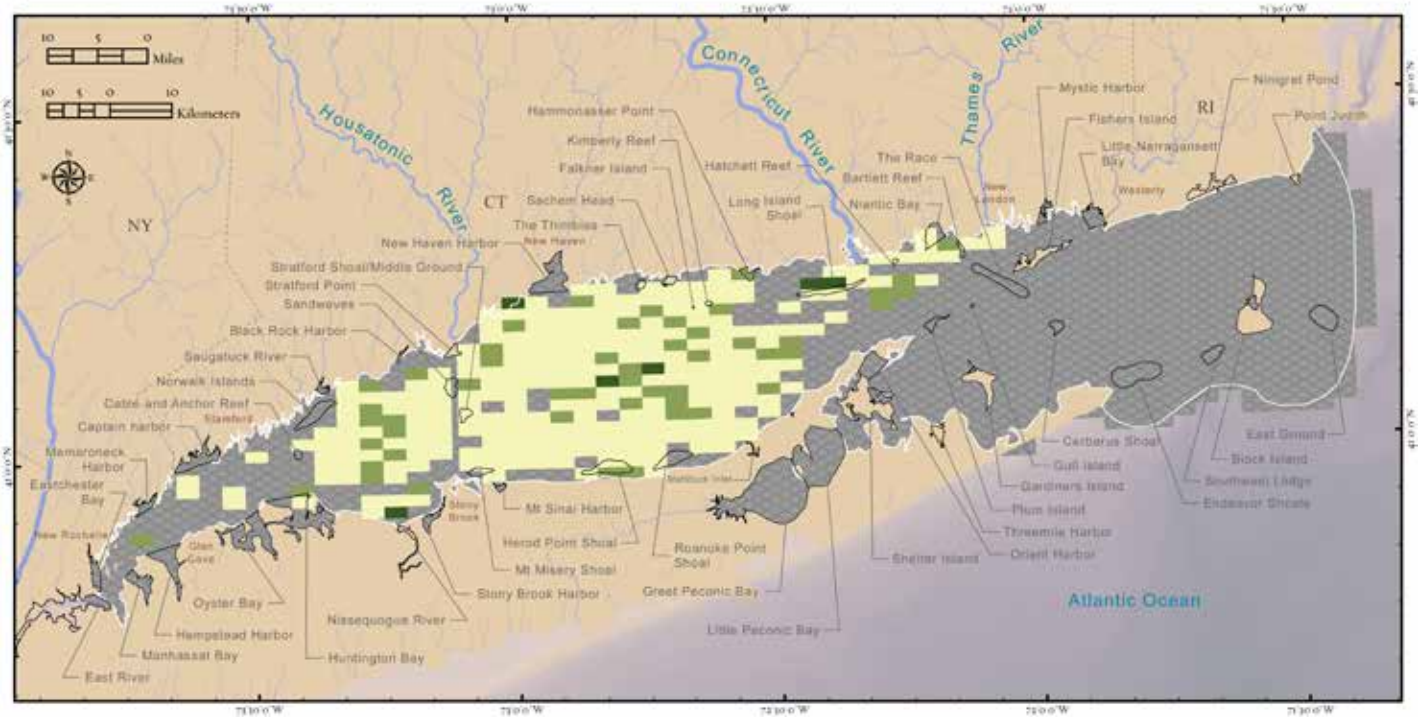


Long Island Sound Ecological Assessment

Summer Flounder

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

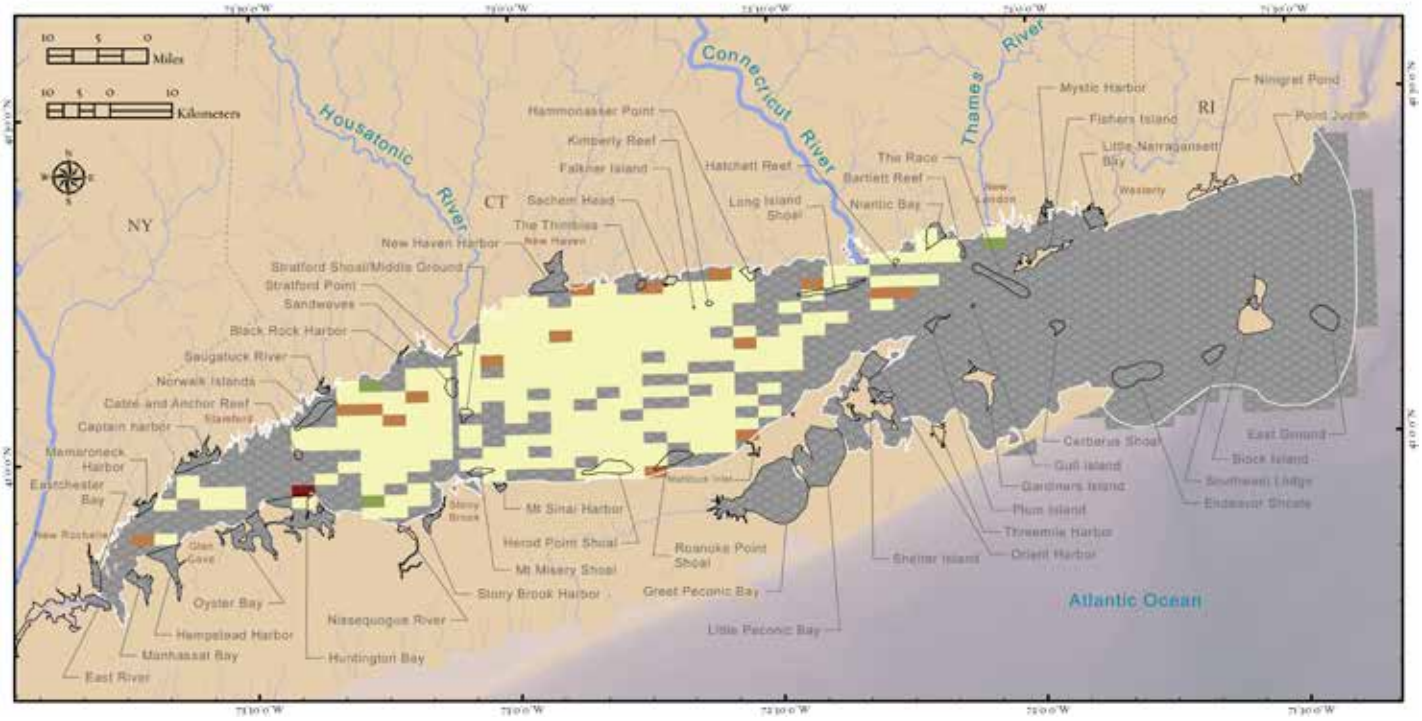


Long Island Sound Ecological Assessment

Tautog

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

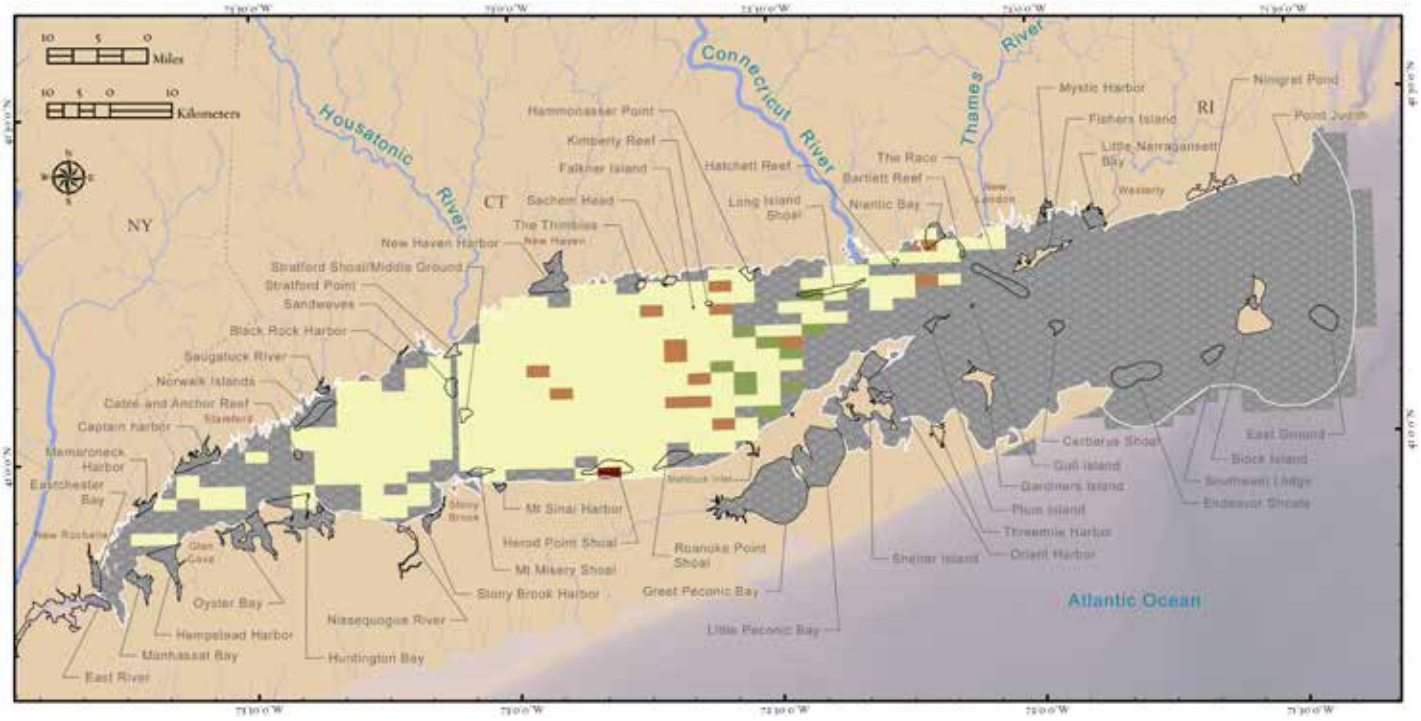


Long Island Sound Ecological Assessment

Winter Flounder

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

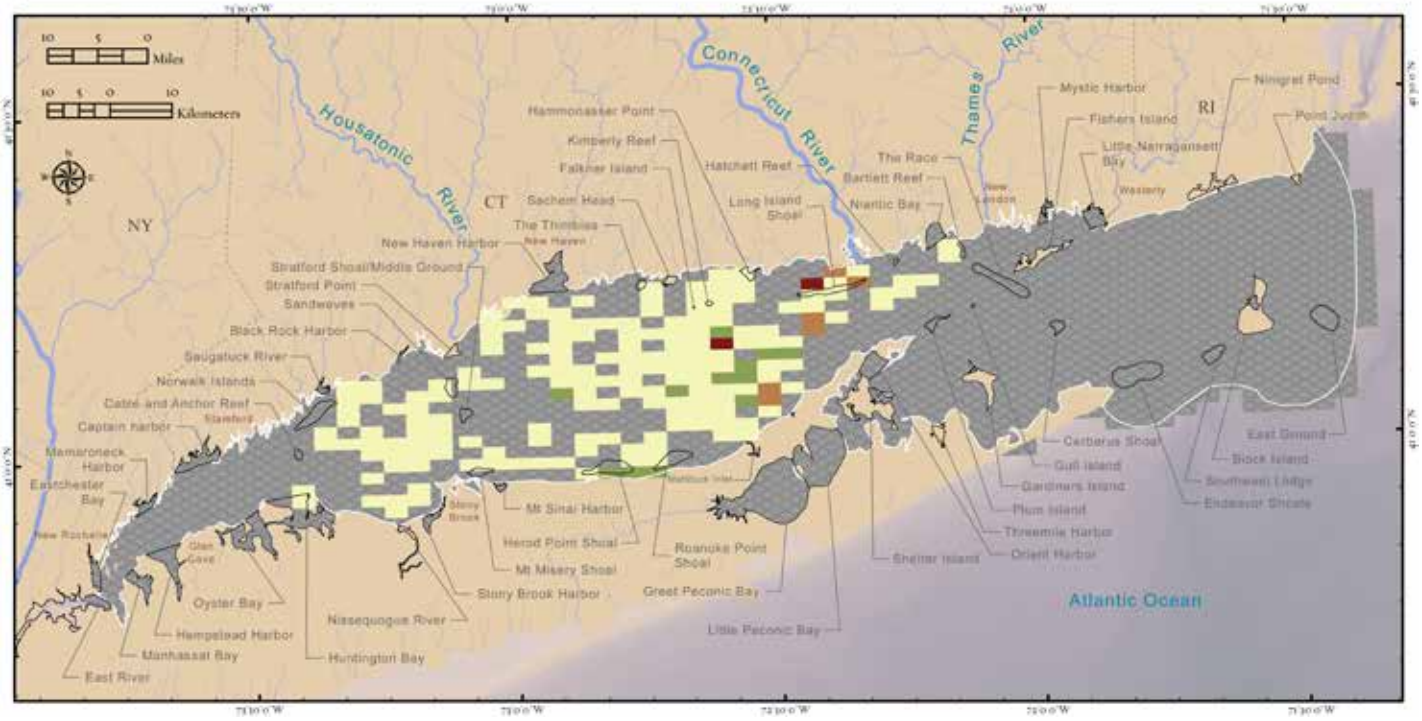


Long Island Sound Ecological Assessment

Winter Skate

Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2

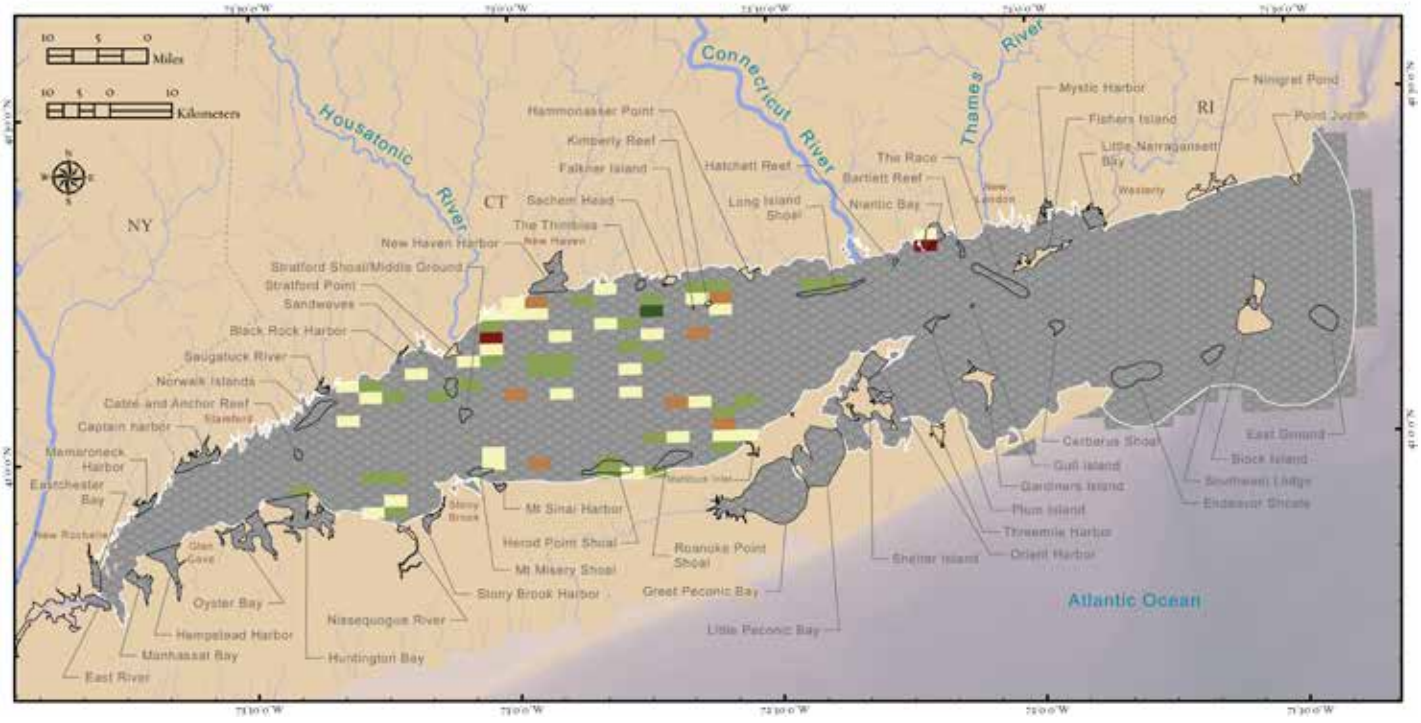


Long Island Sound Ecological Assessment

Yellow Jack

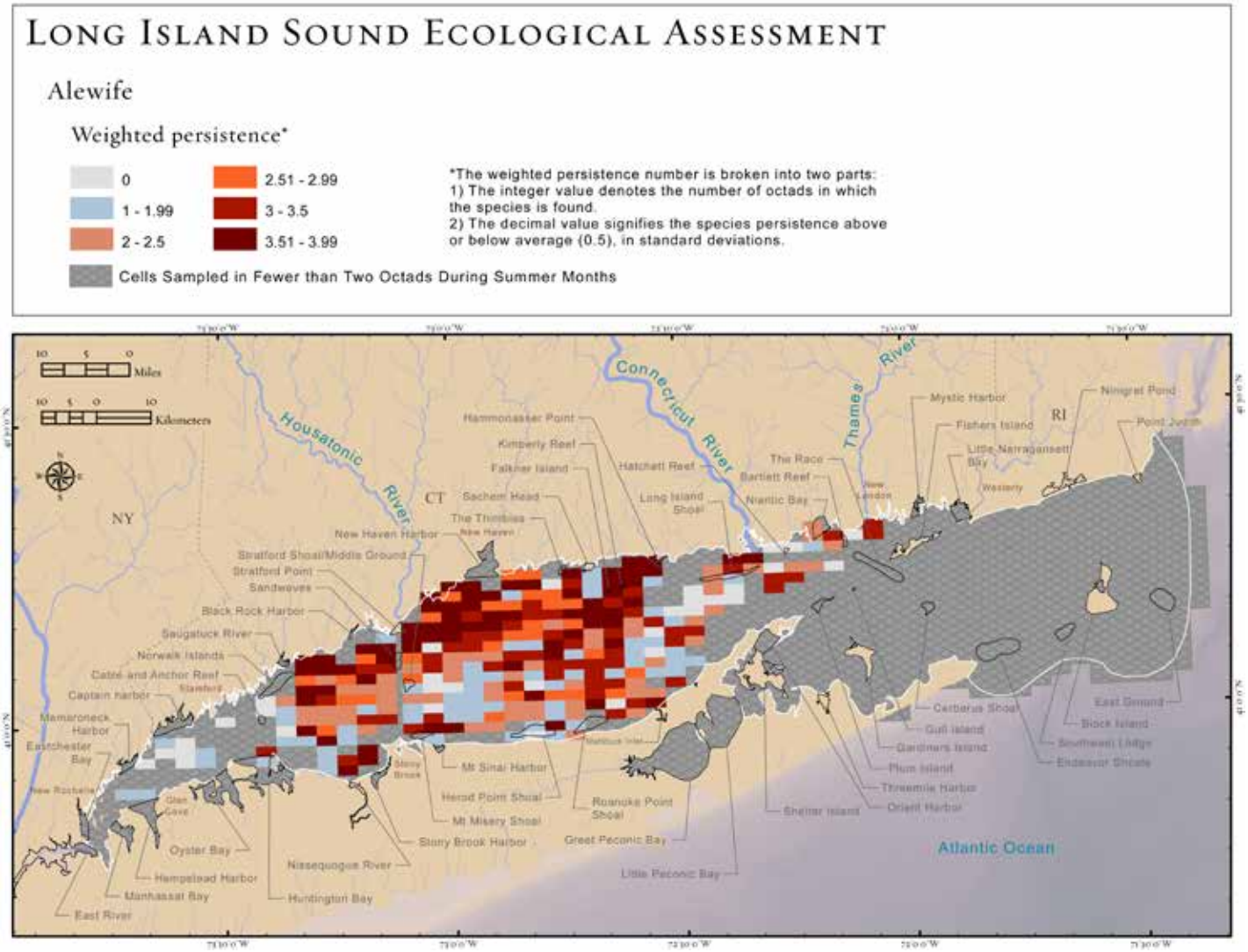
Species trend (slope of residuals across three octads)

- Steep negative slope: less than -2
- Negative slope: between -2 and -1
- Relatively flat: between -1 and 1
- Insufficient data to calculate trend
- Positive slope: between 1 and 2
- Steep positive slope: greater than 2



iii. Individual species weighted persistence figures

This appendix expands on the weighted persistence results (for 3 octads: 1984-1992, 1993-2001, and 2002-2009) from Chapter 6: Species Persistence Patters in Long Island Sound, with figures from all the individual species that make up the individual subgroups (demersal, diadromous, and pelagic fish, and macroinvertebrates) and combined outputs (114 species total).



Long Island Sound Ecological Assessment

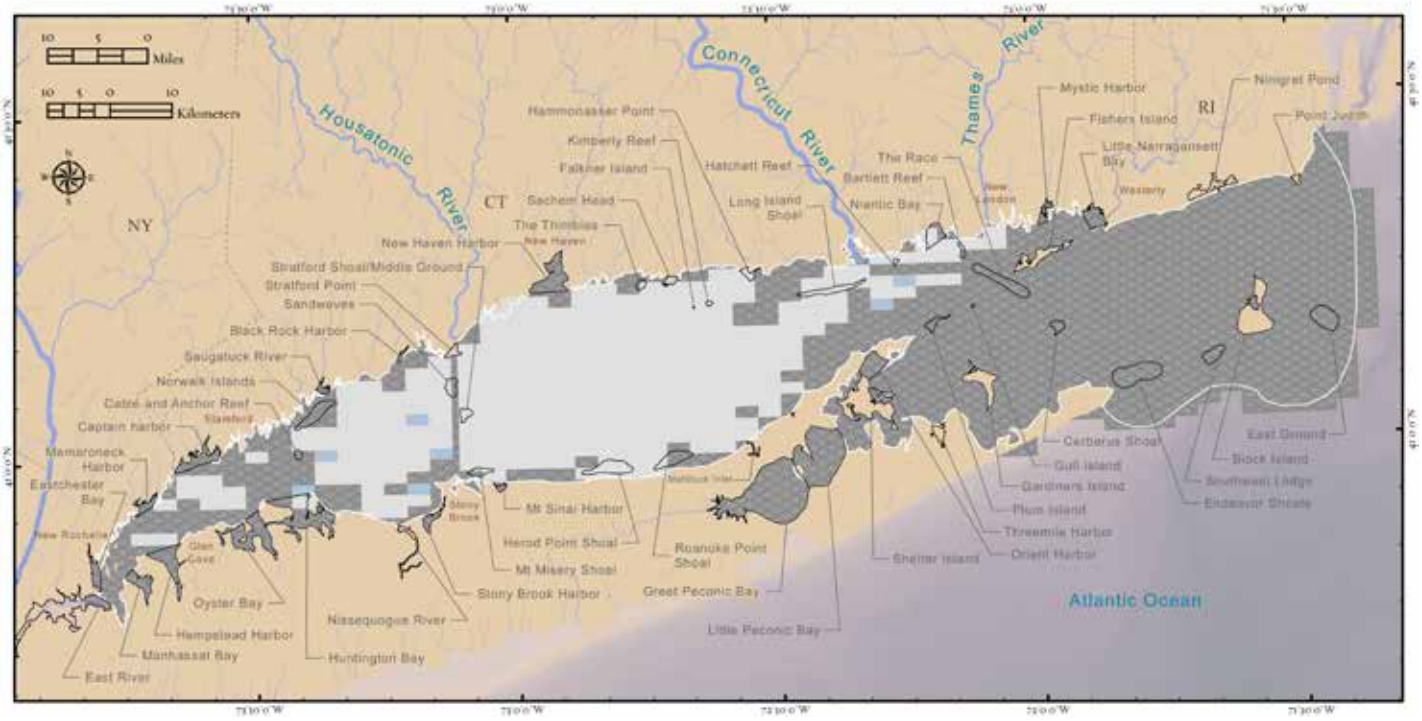
American Eel

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

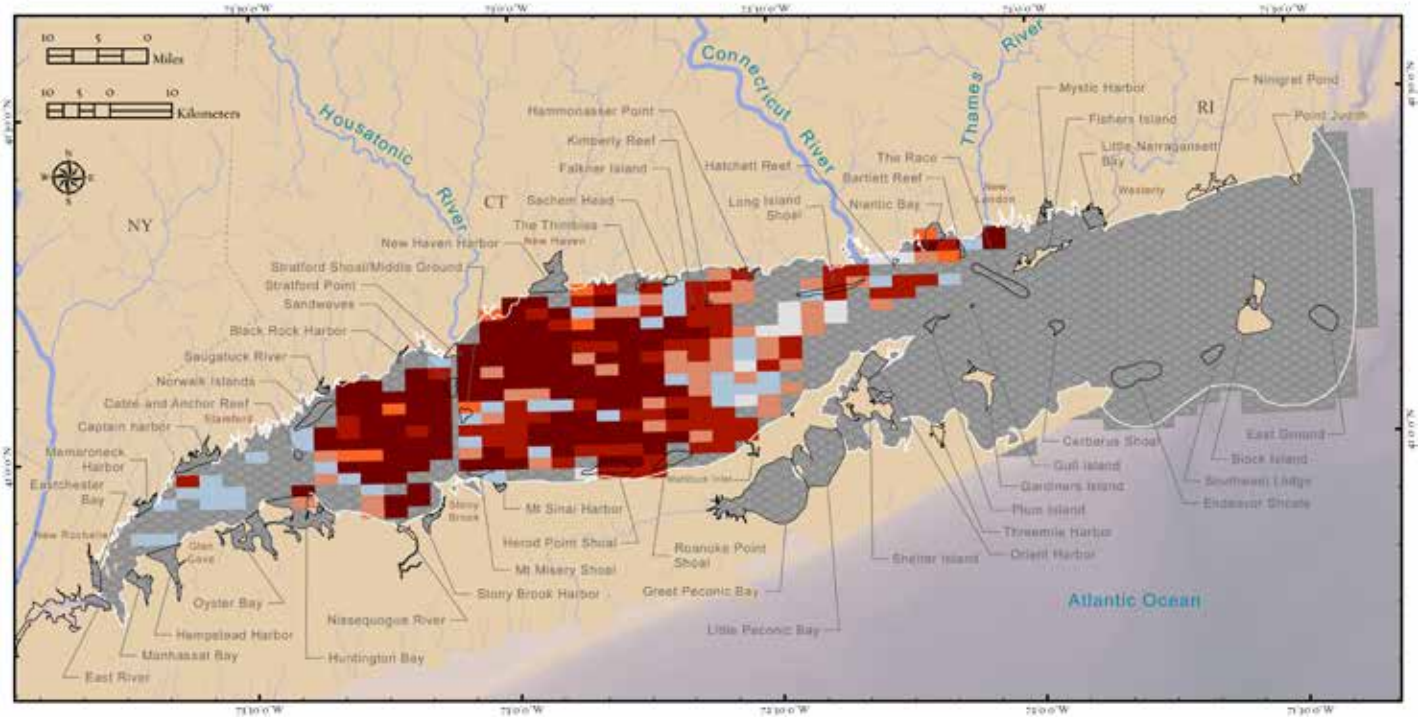
American Lobster

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

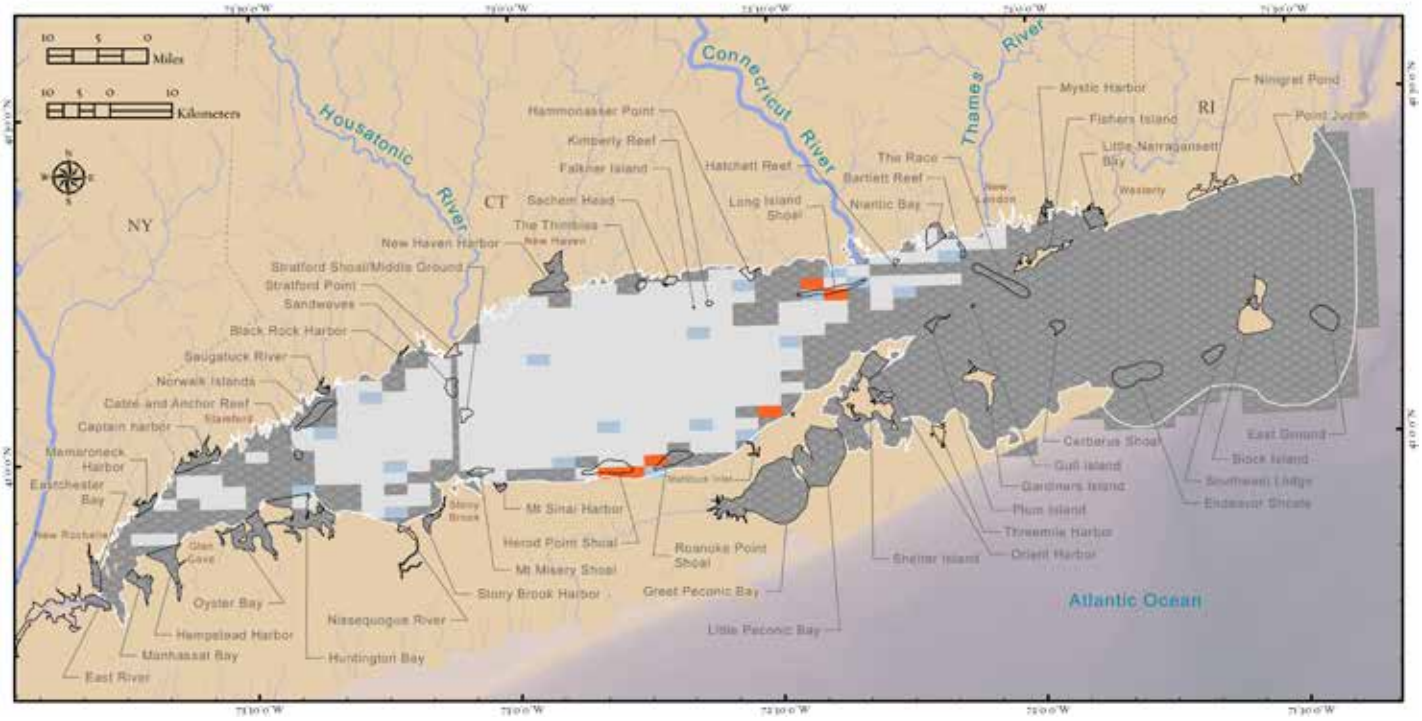
American Sand Lance

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

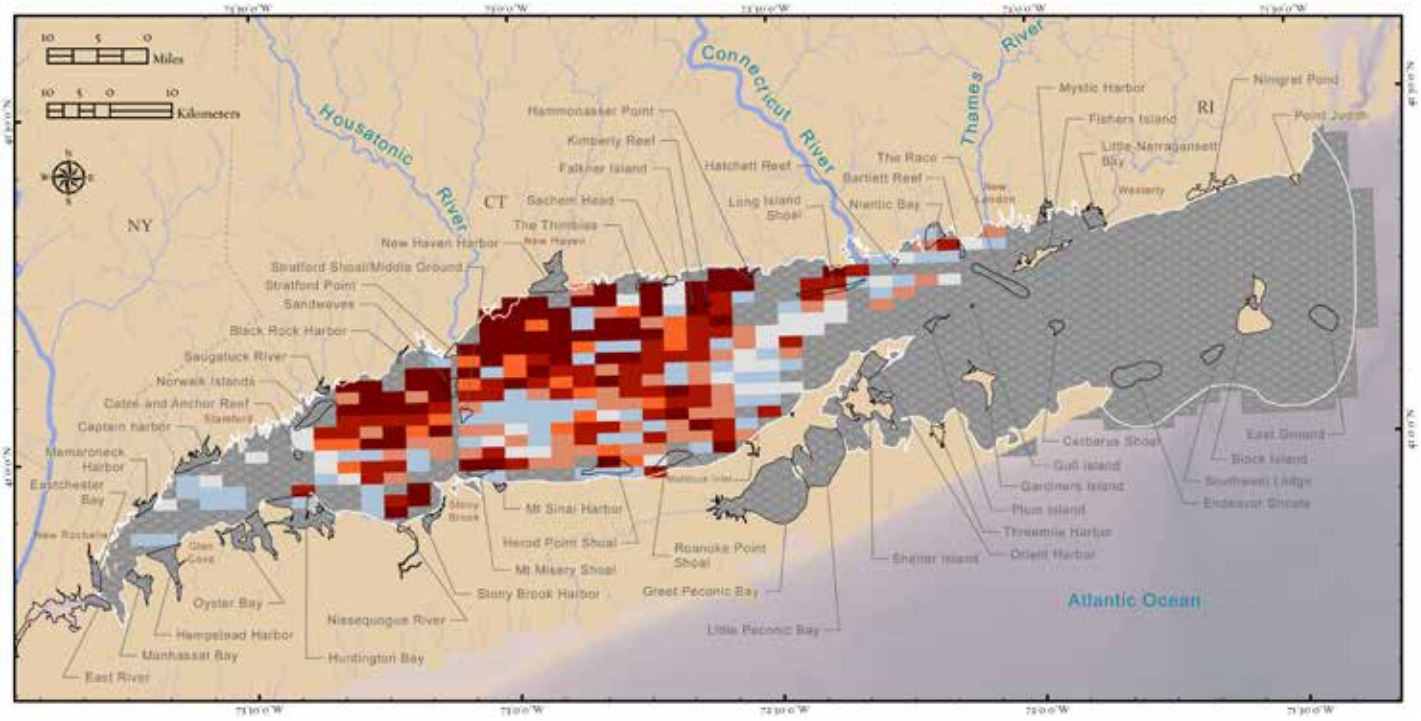
American Shad

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

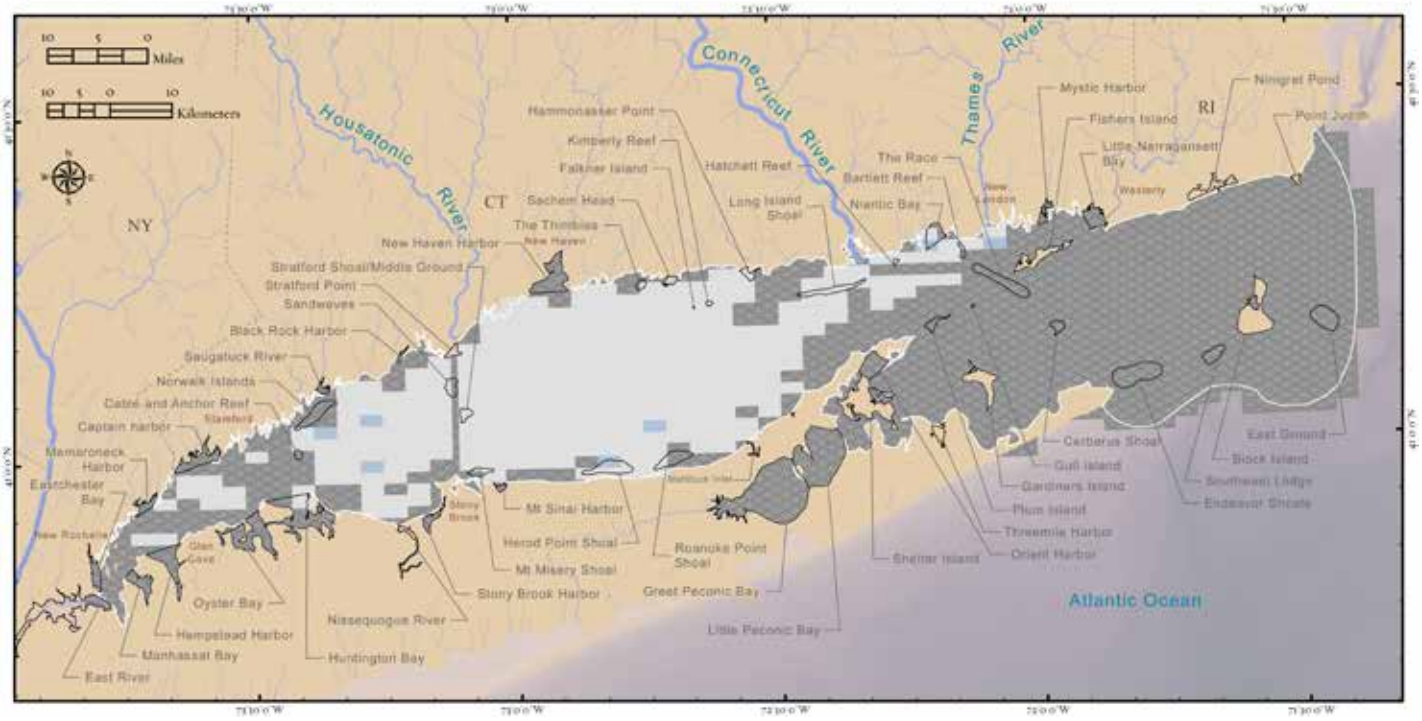
Atlantic Bonito

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

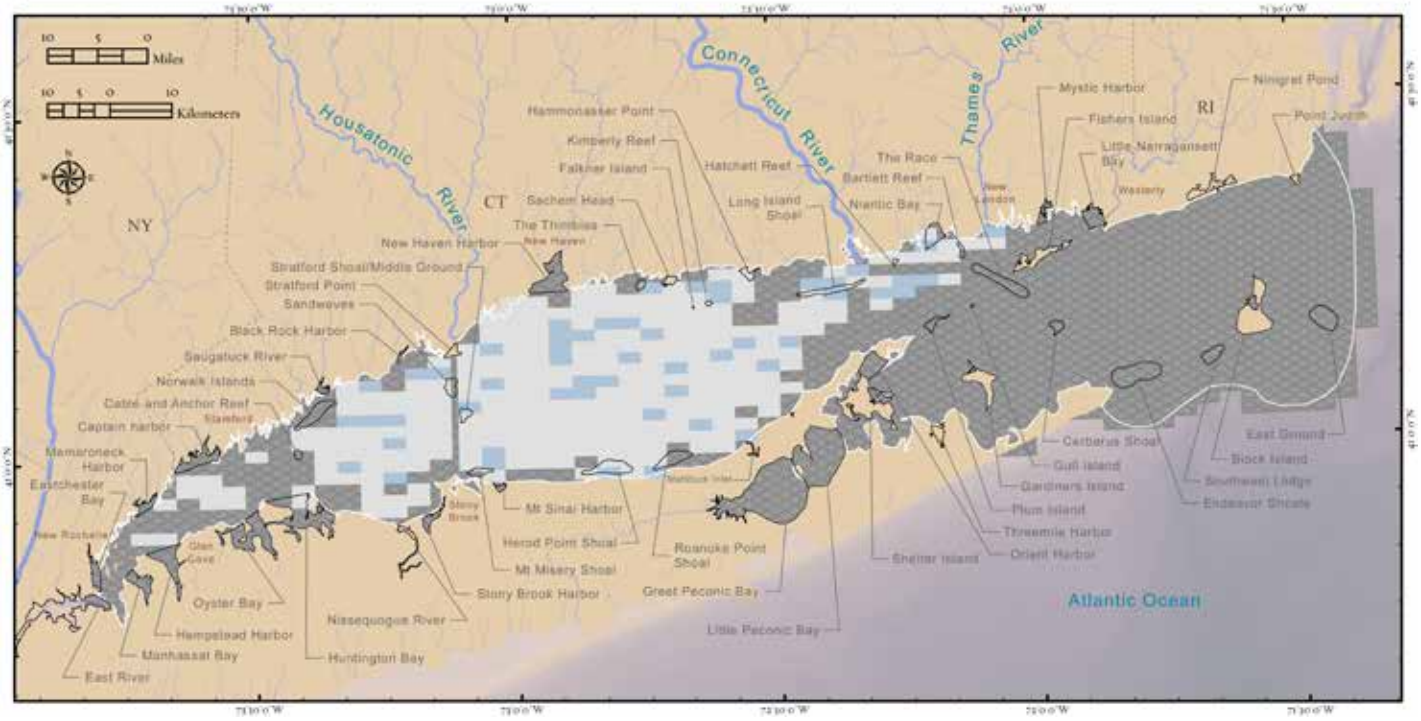
Atlantic Cod

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

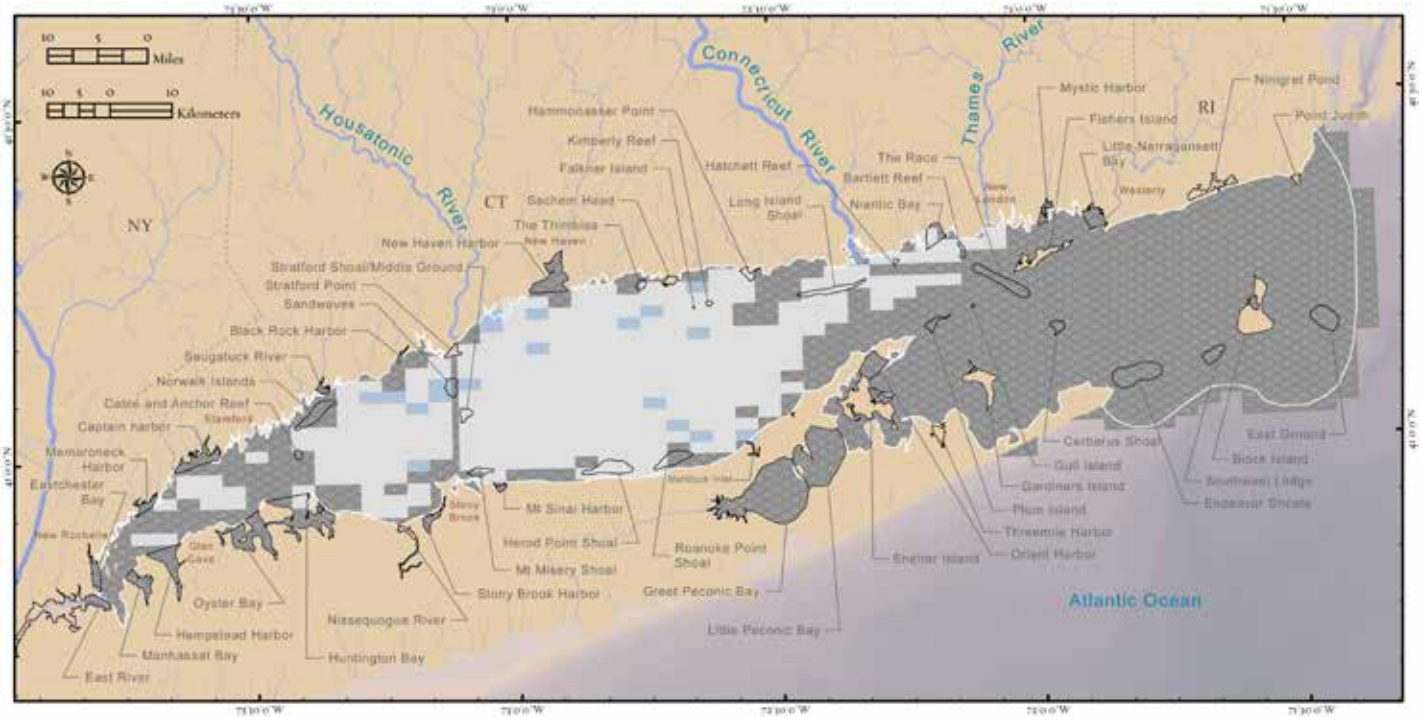
Atlantic Croaker

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

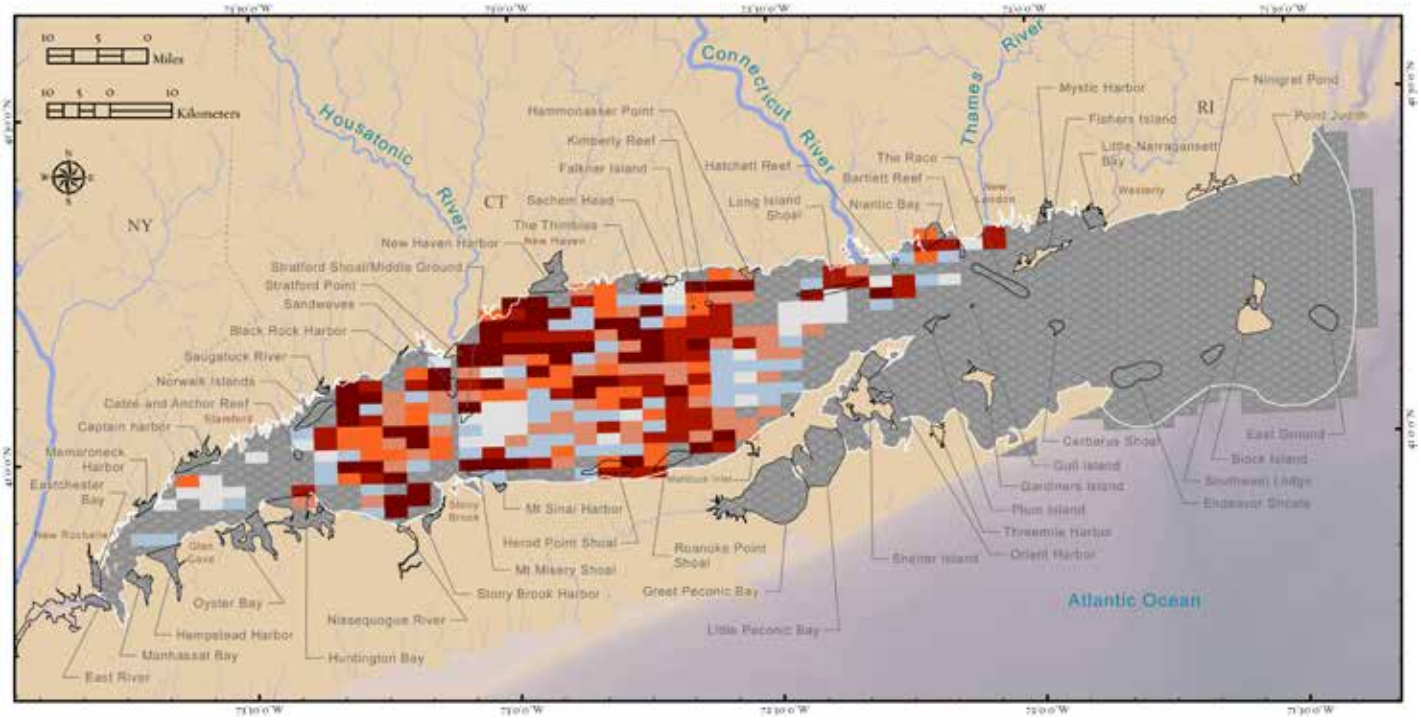
Atlantic Herring

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

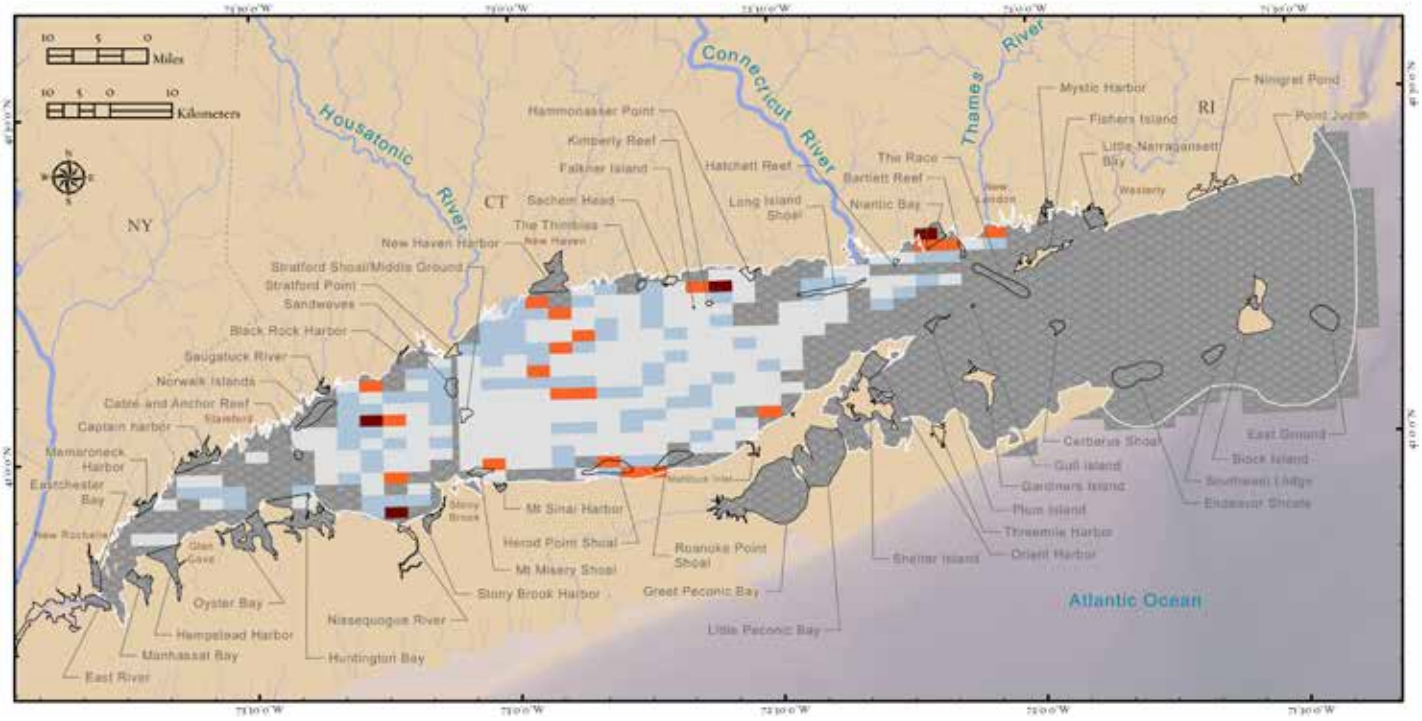
Atlantic Mackerel

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

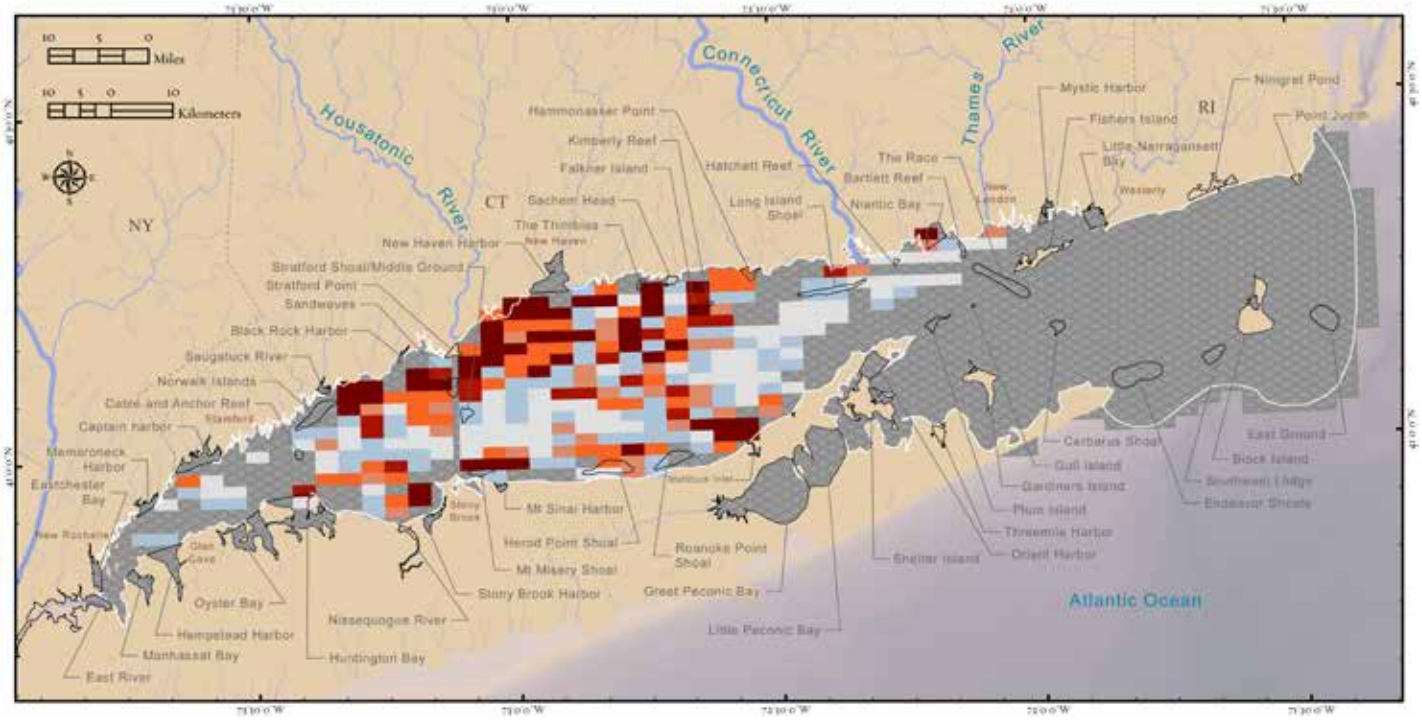
Atlantic Menhaden

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

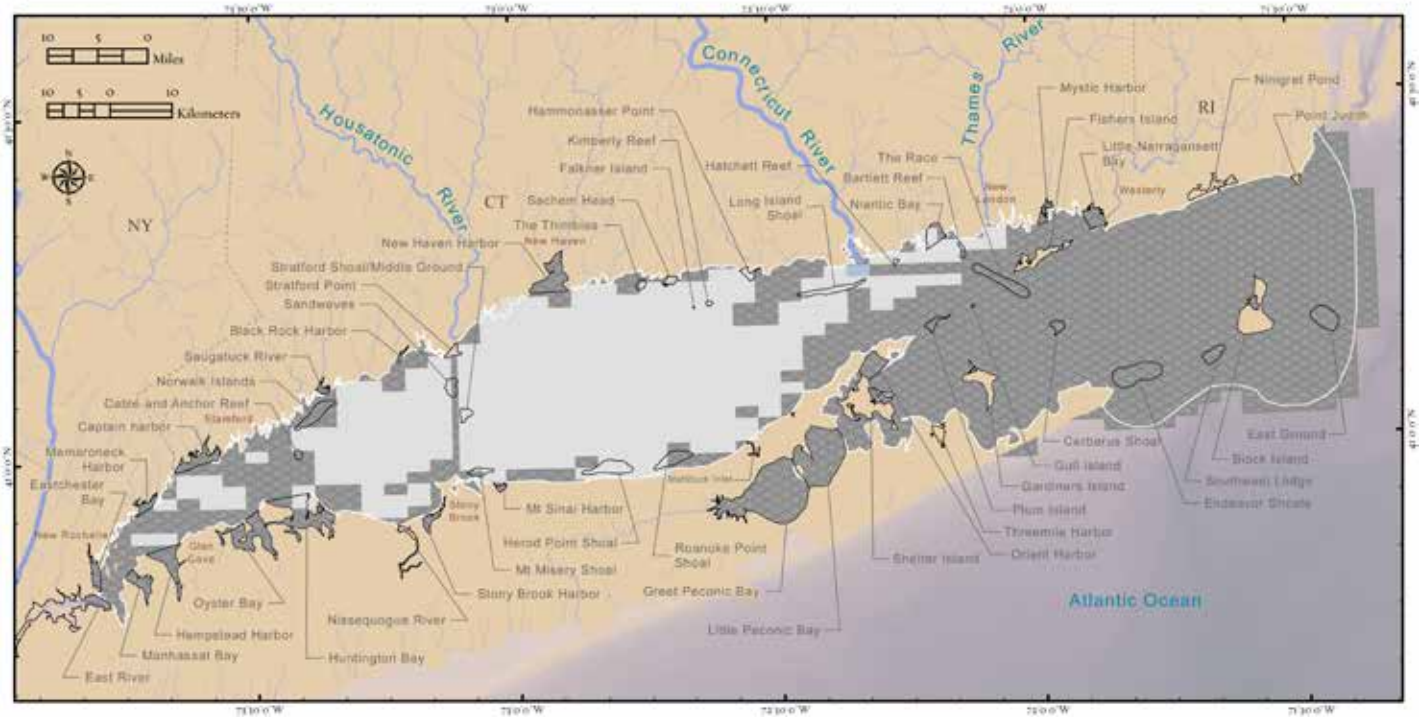
Atlantic Salmon

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

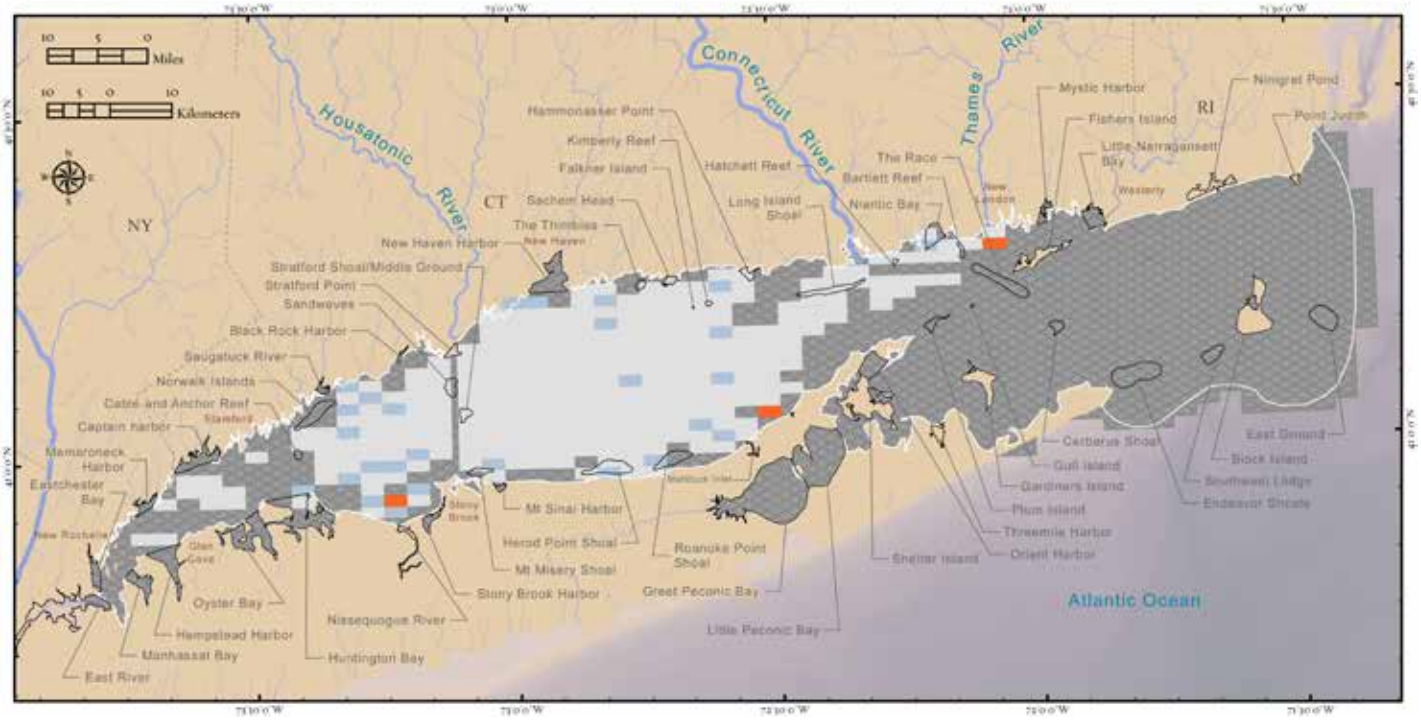
Atlantic Silverside

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

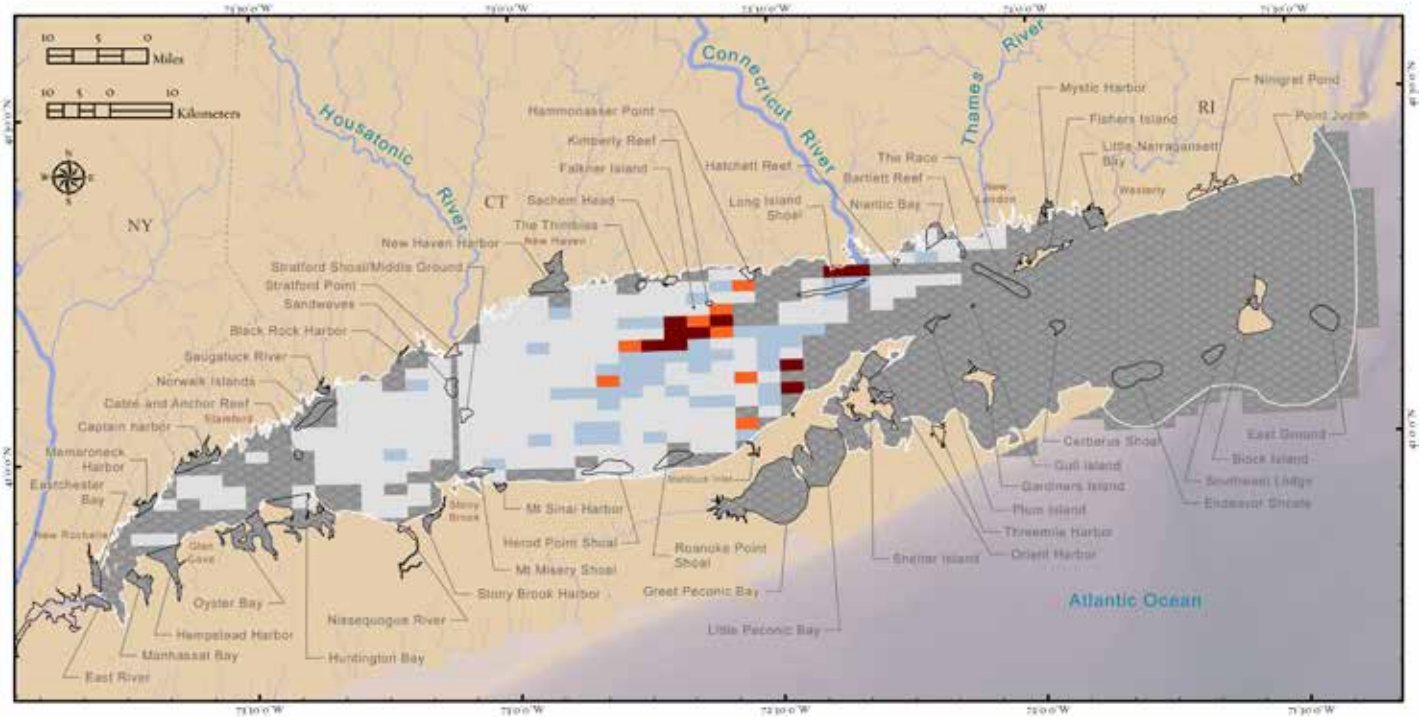
Atlantic Sturgeon

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

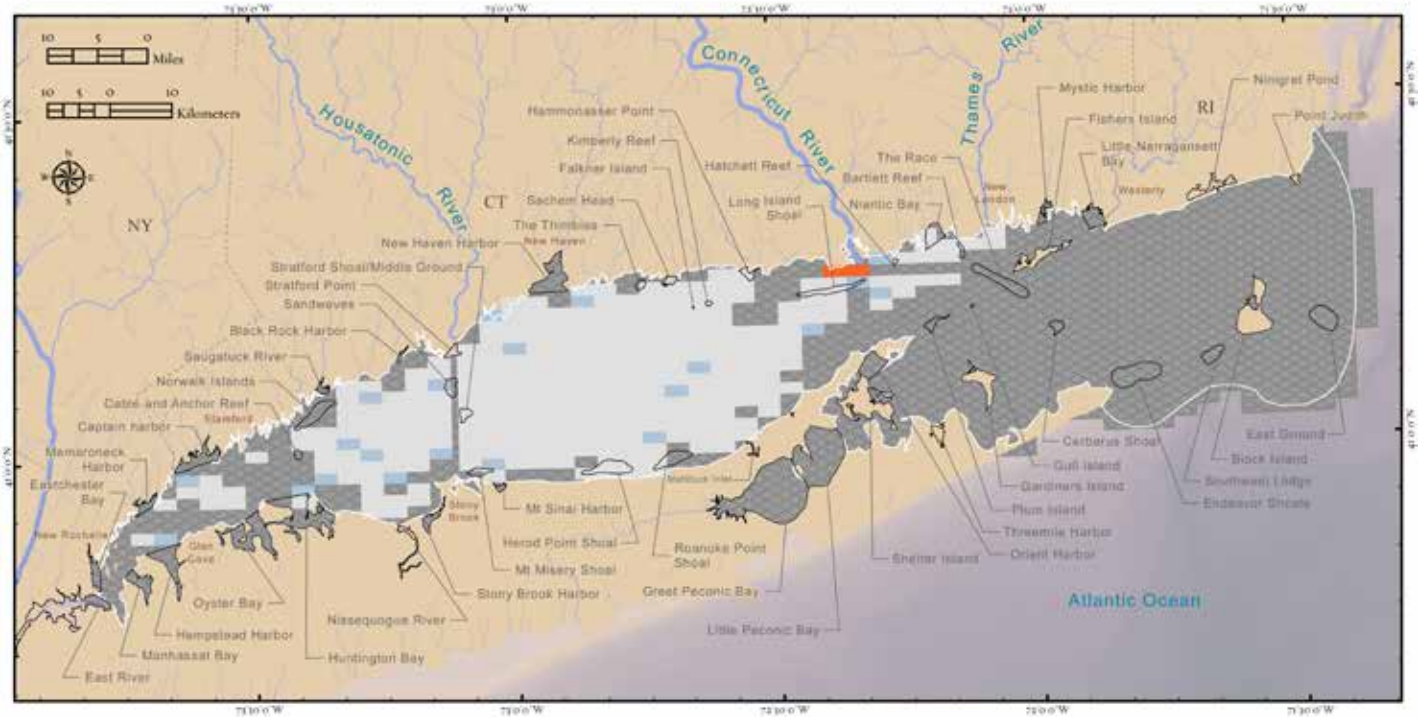
Atlantic Tomcod

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

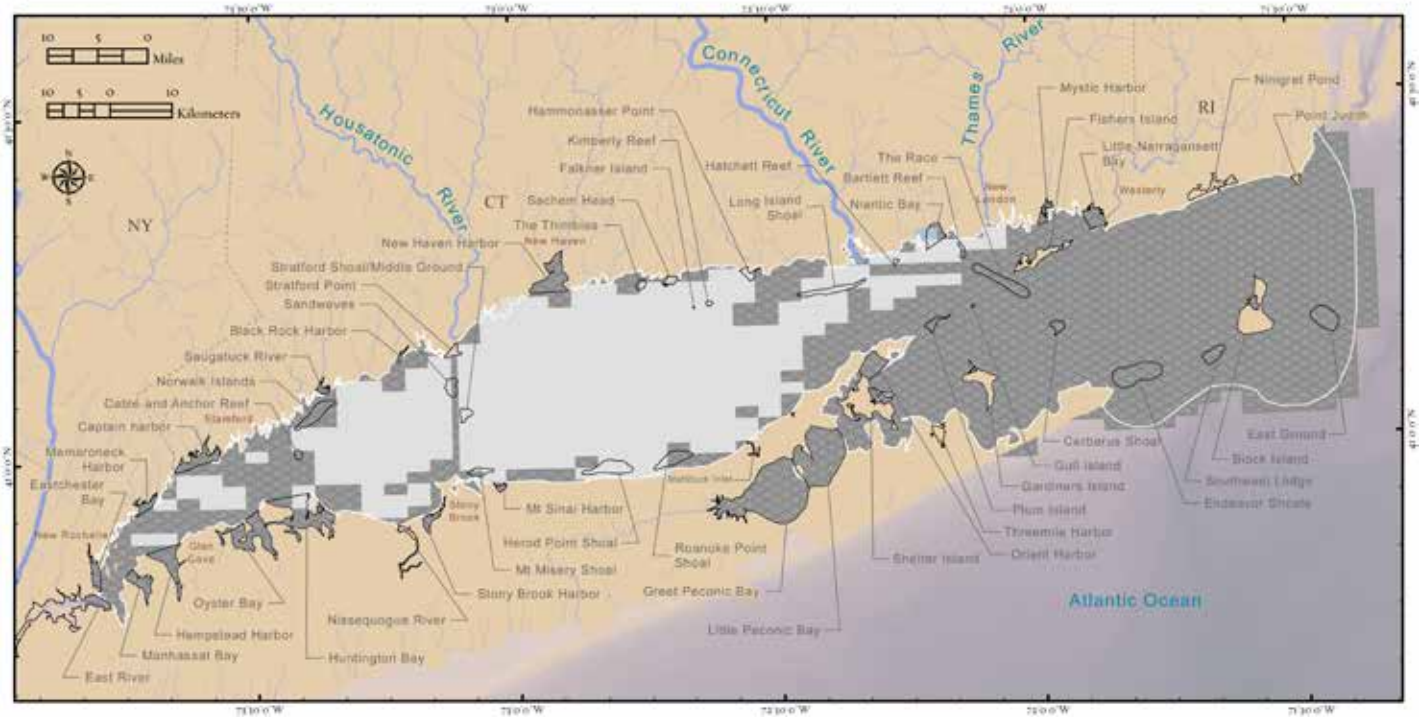
Banded Rudderfish

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

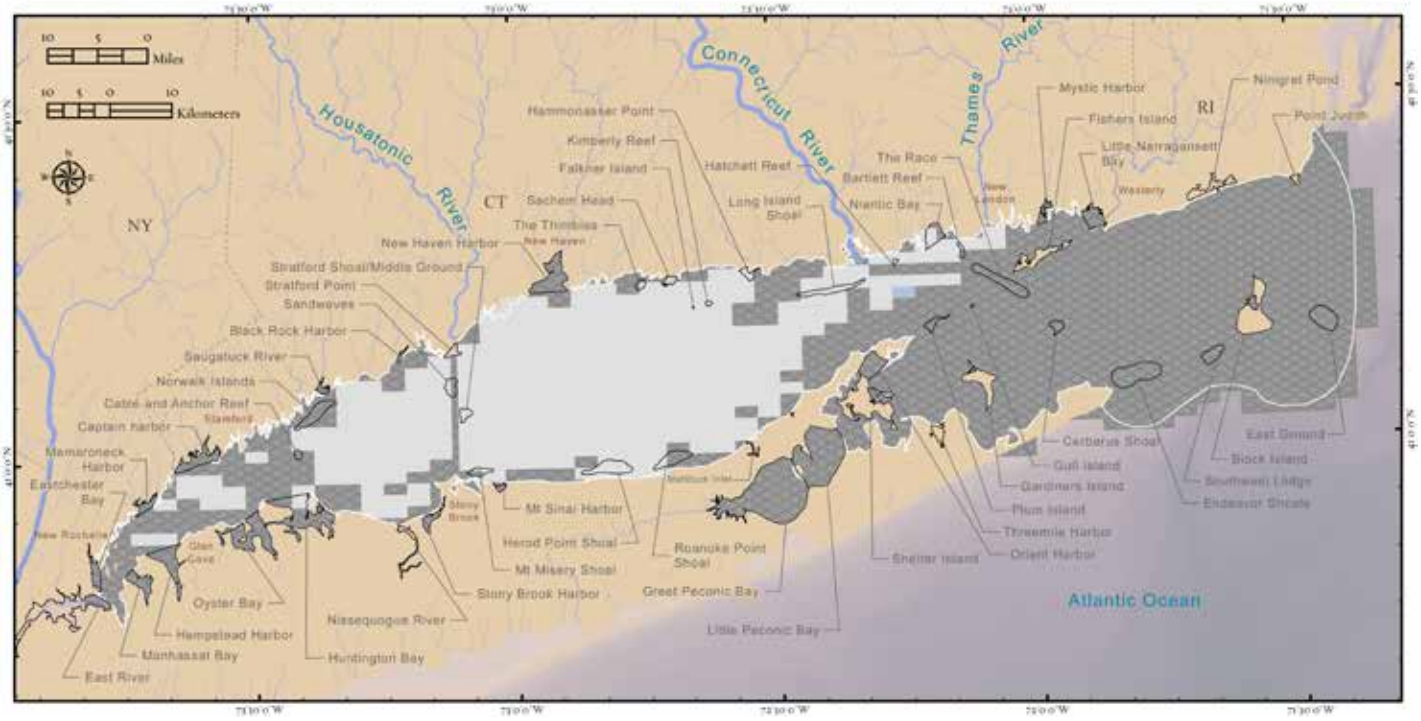
Barndoor Skate

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.

Cells Sampled in Fewer than Two Octads During Summer Months



Long Island Sound Ecological Assessment

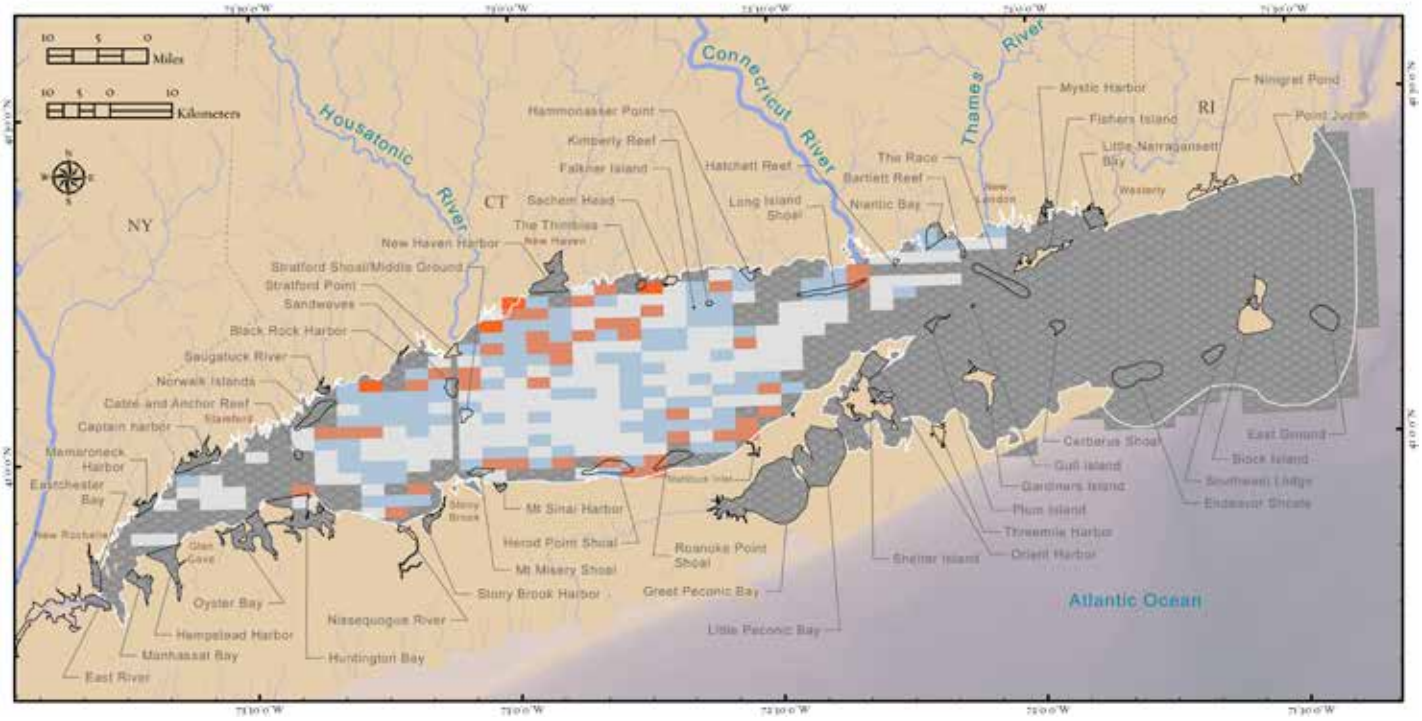
Bay Anchovy

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

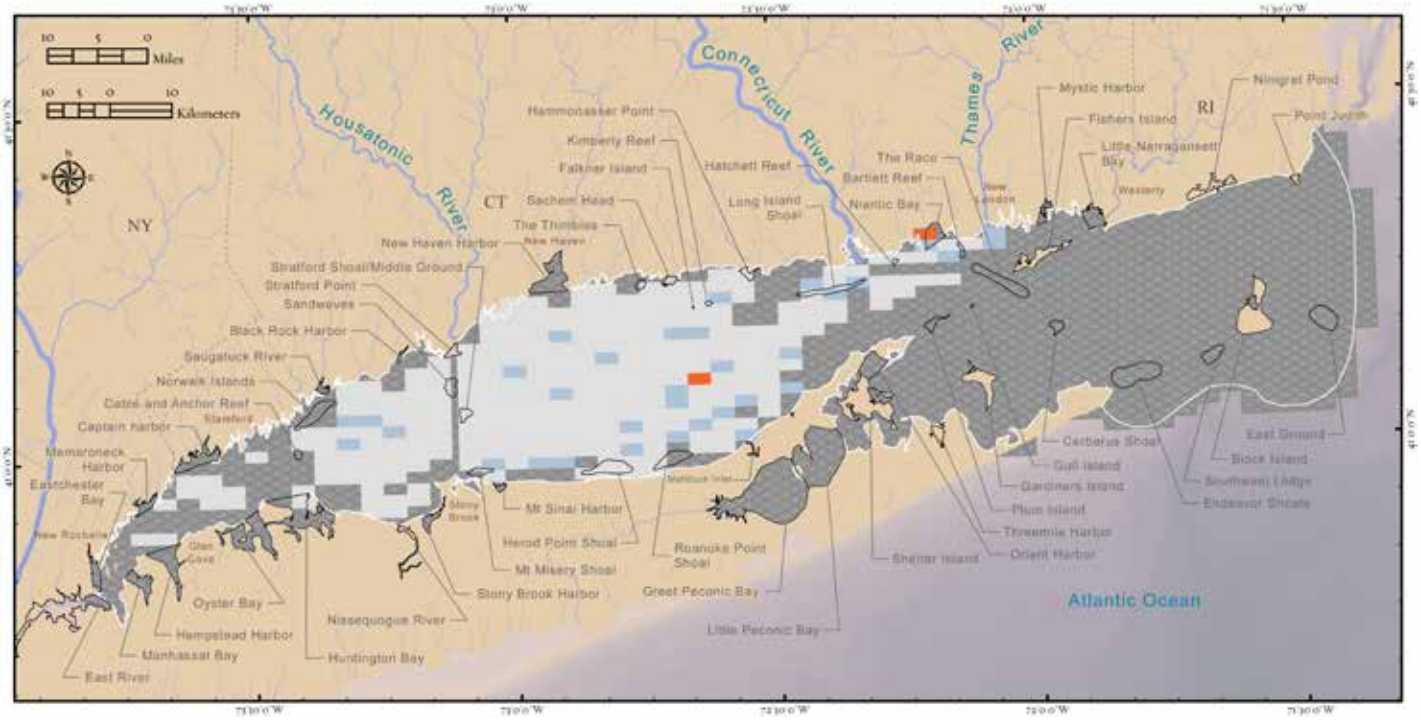
Bigeye Scad

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.

Cells Sampled in Fewer than Two Octads During Summer Months



Long Island Sound Ecological Assessment

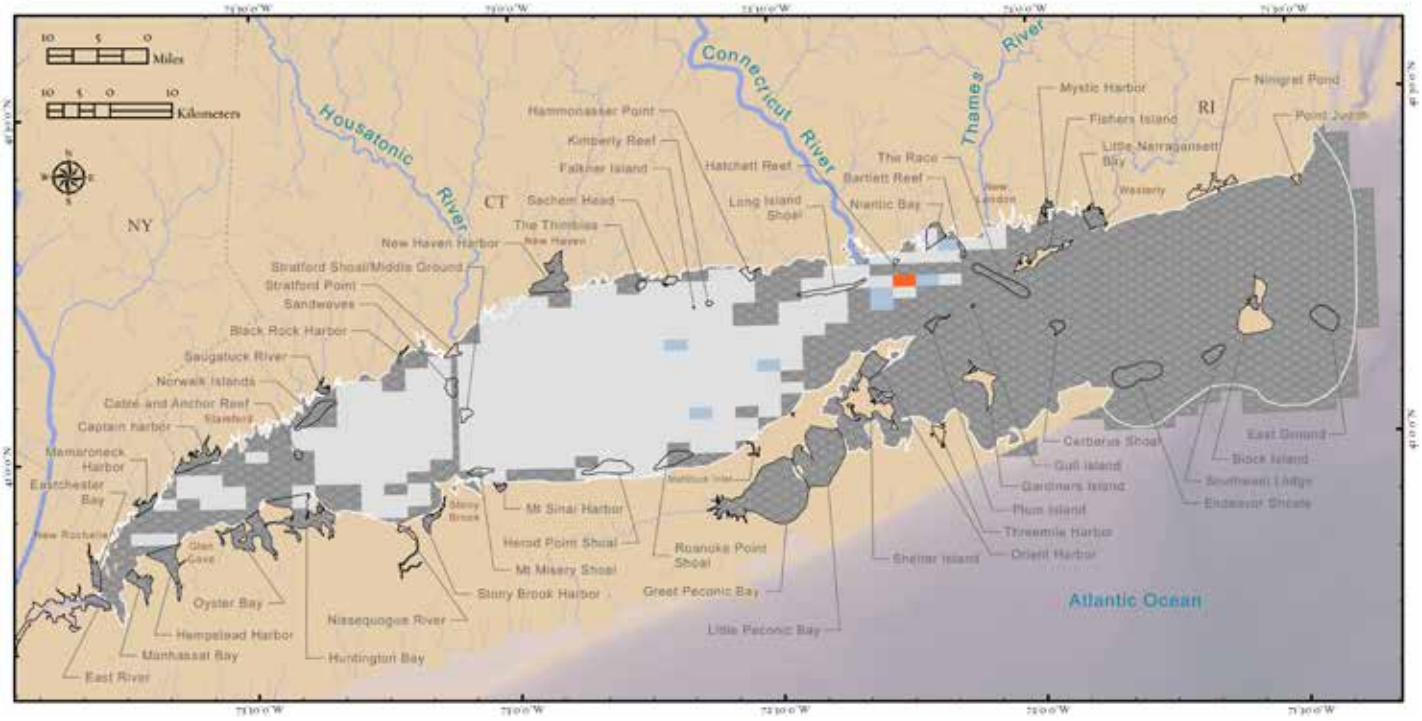
Bigeye

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

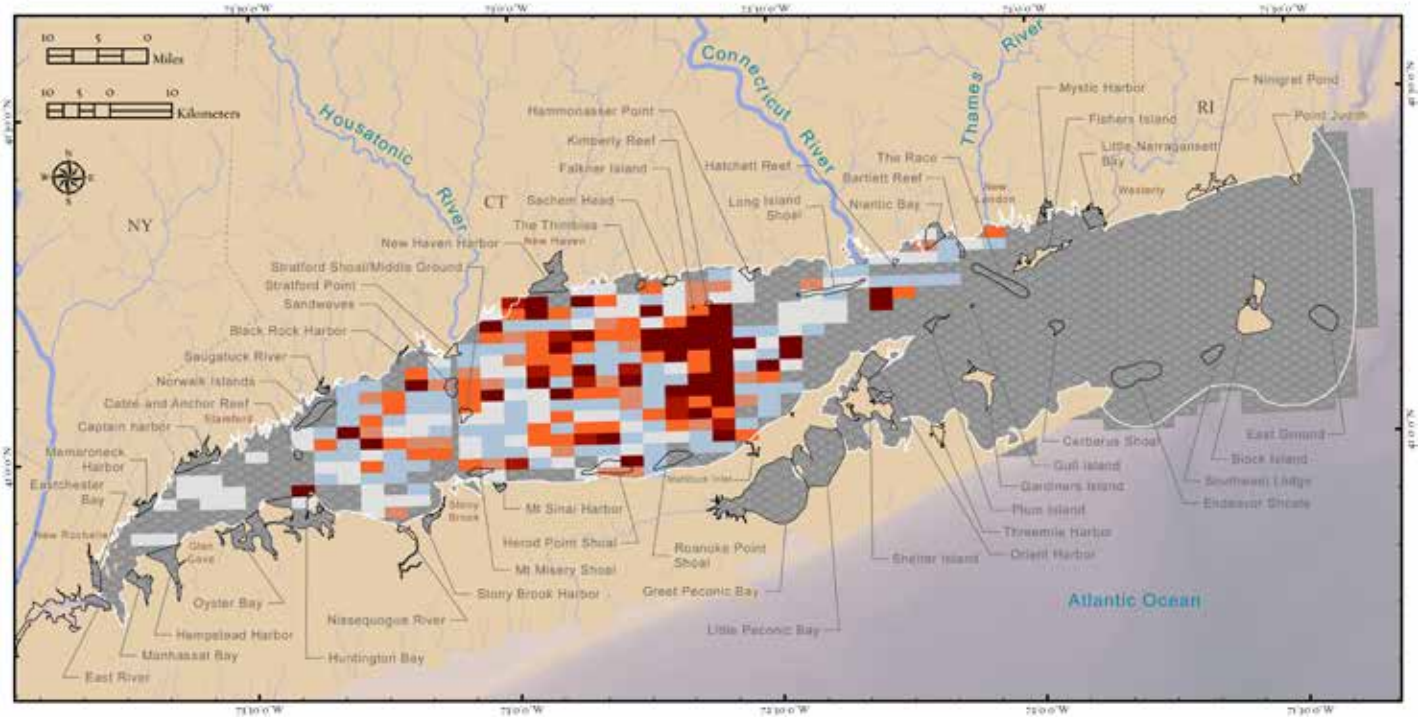
Black Sea Bass

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.

Cells Sampled in Fewer than Two Octads During Summer Months



Long Island Sound Ecological Assessment

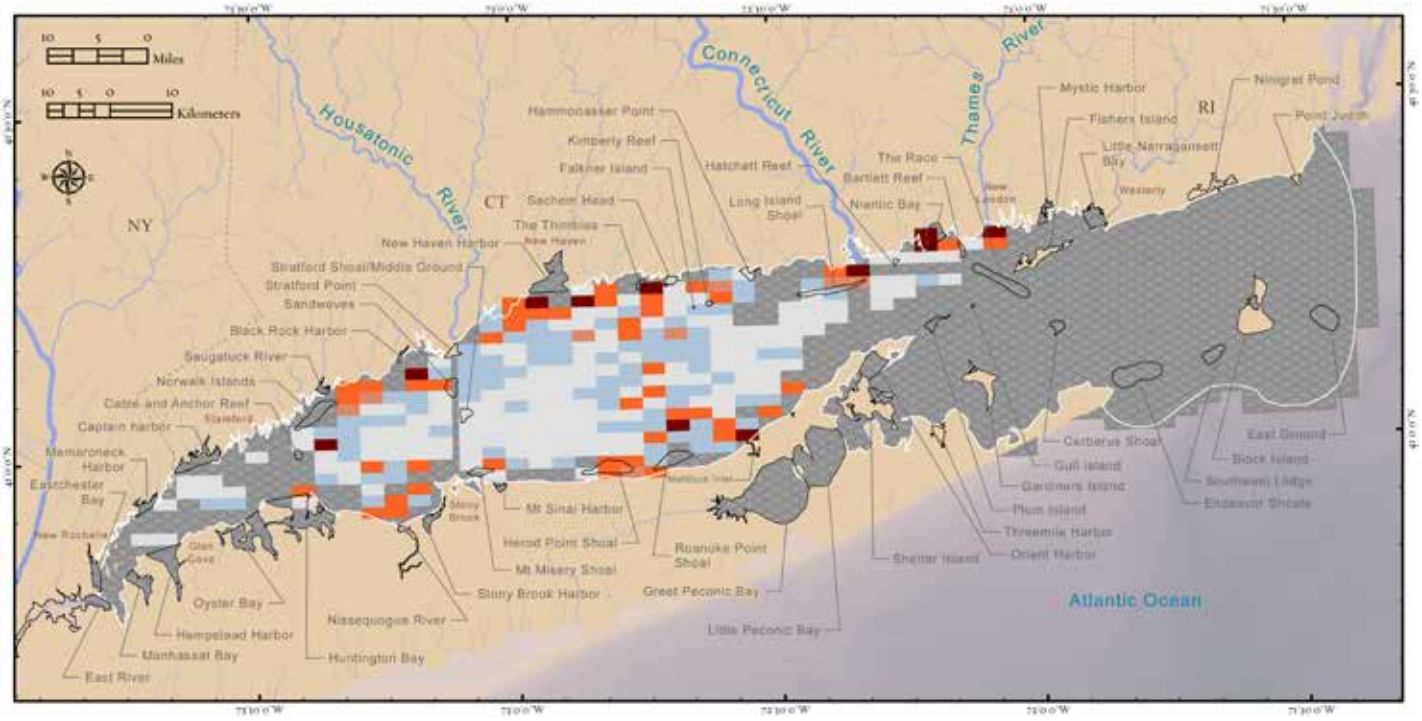
Blue Crab

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

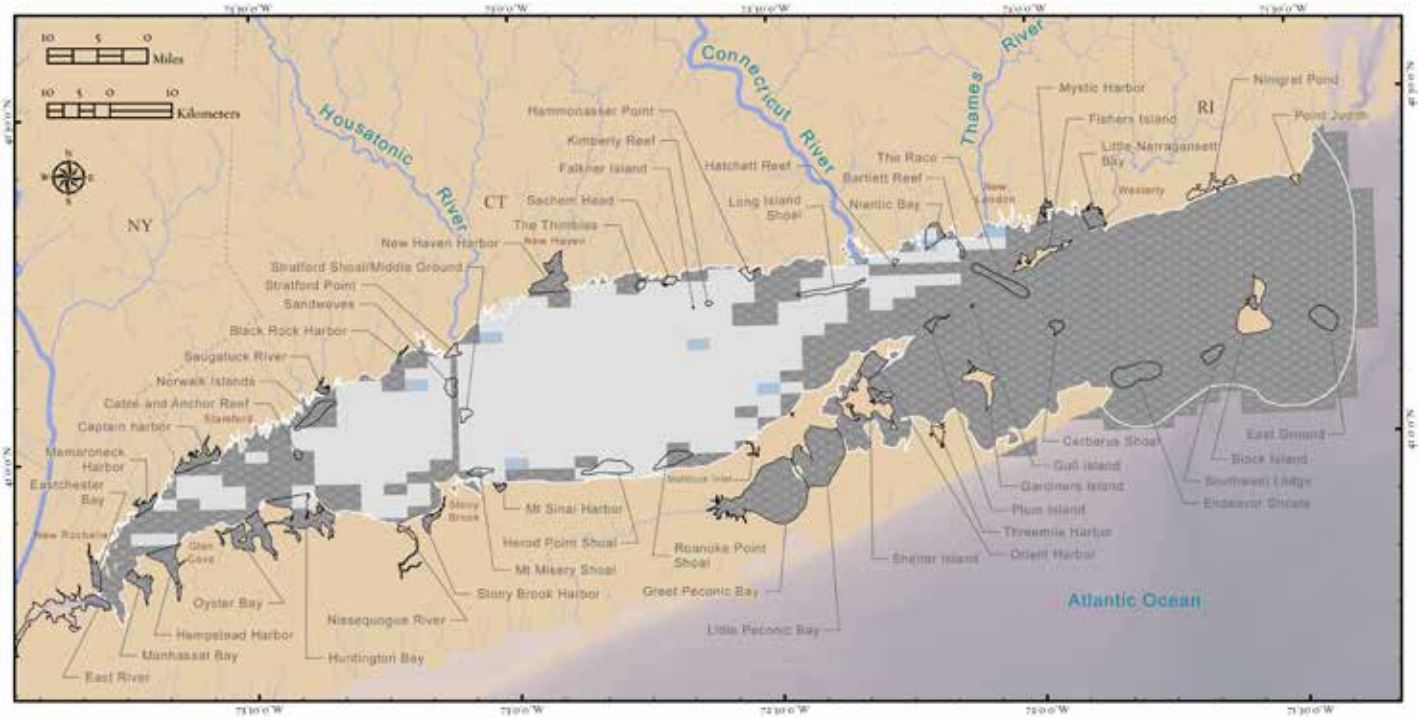
Blue Runner

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.

Cells Sampled in Fewer than Two Octads During Summer Months



Long Island Sound Ecological Assessment

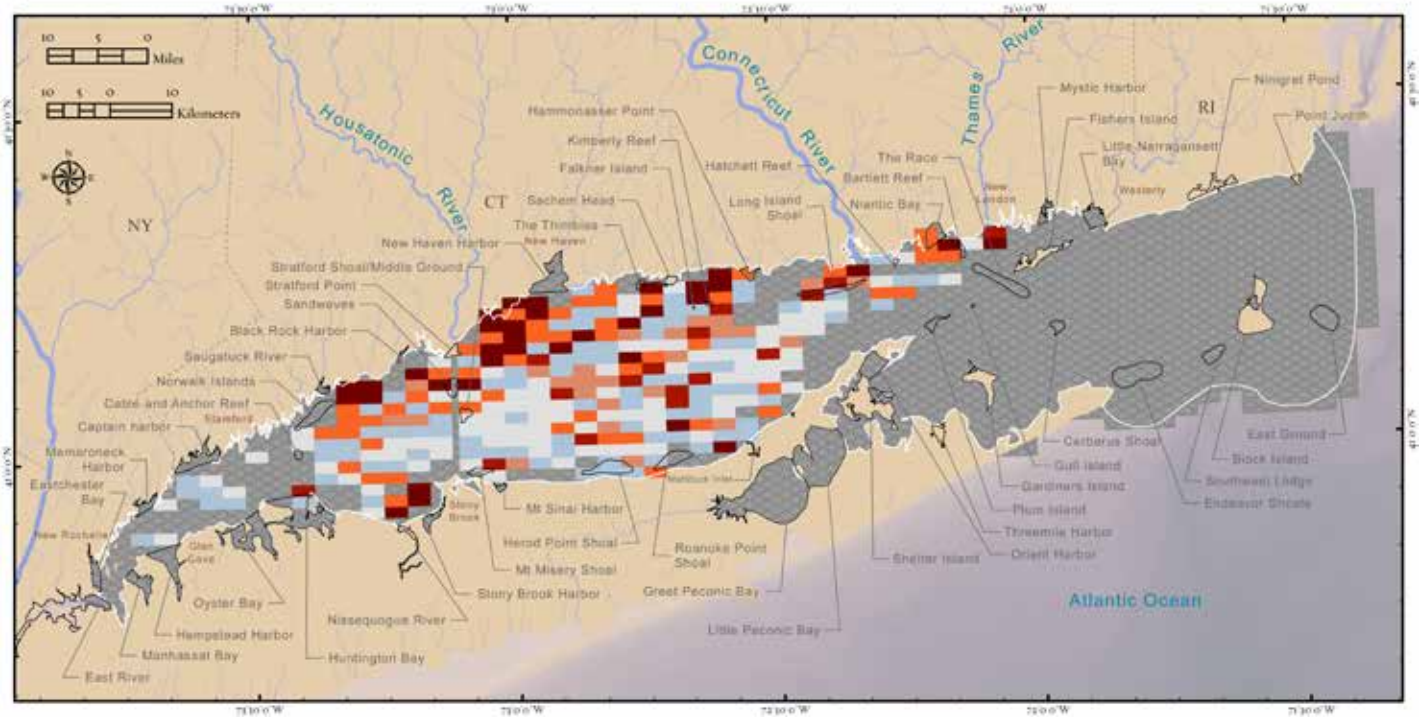
Blueback Herring

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

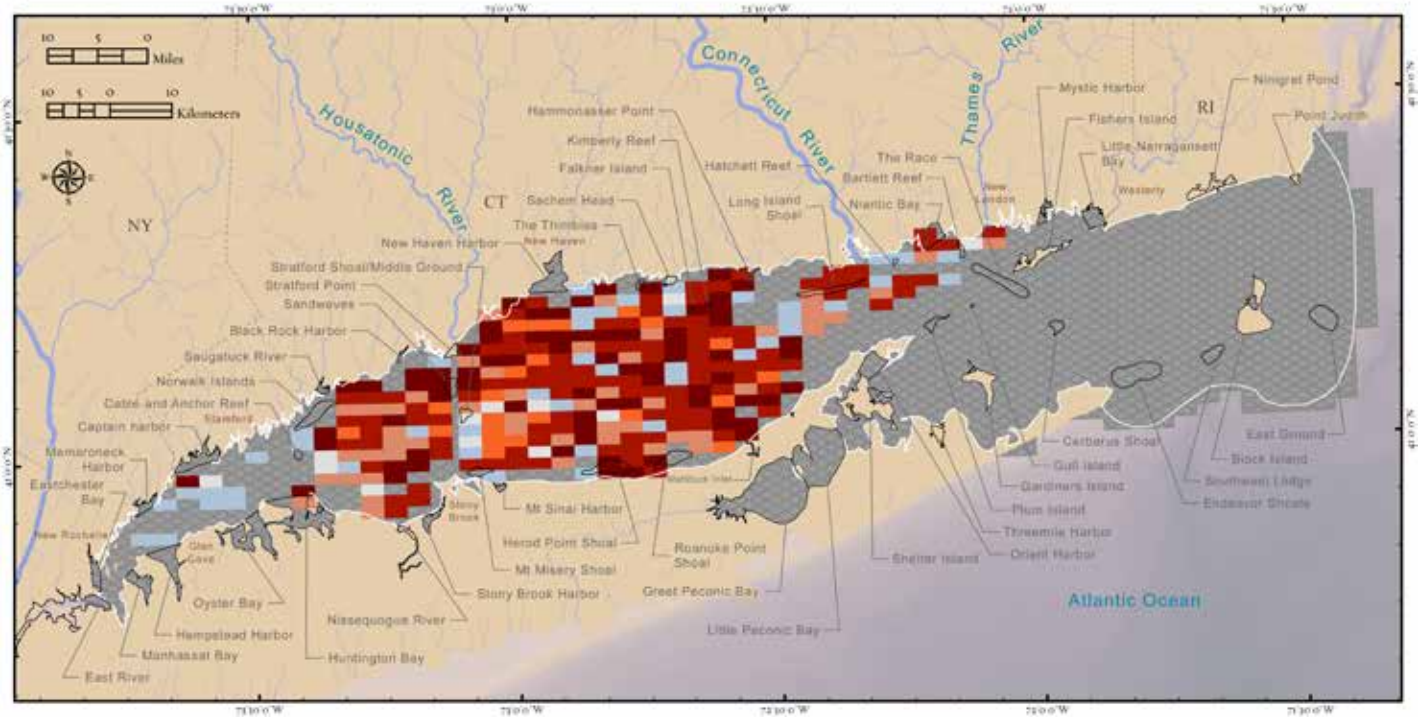
Bluefish

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

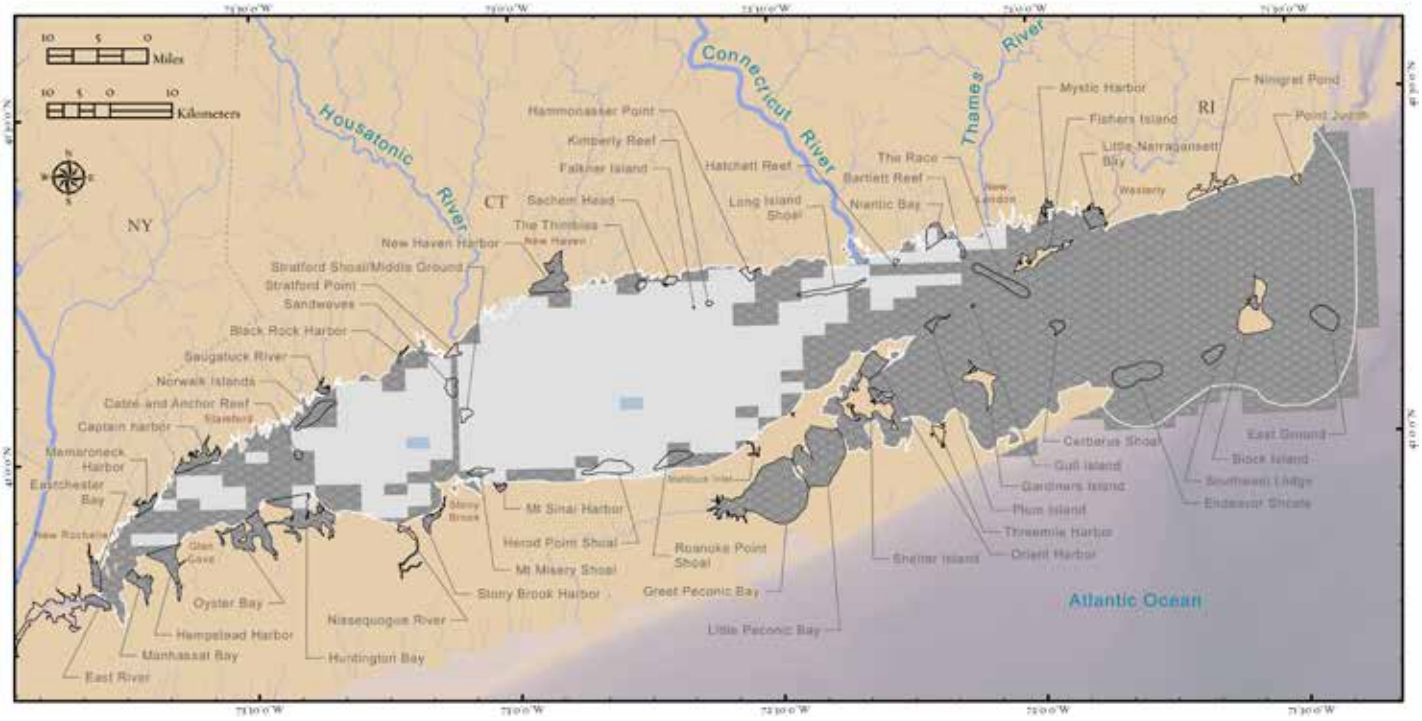
Bobtail Squid

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

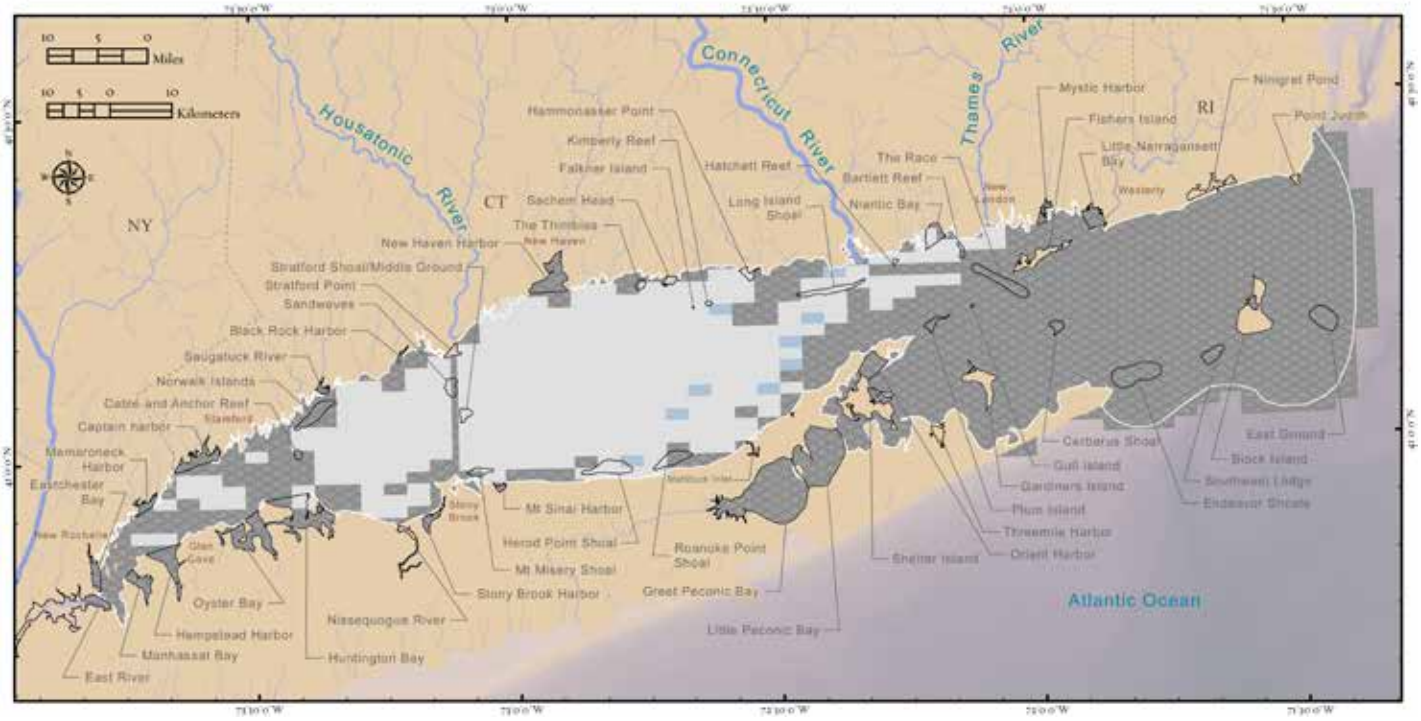
Boreal Squid

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.

Cells Sampled in Fewer than Two Octads During Summer Months



Long Island Sound Ecological Assessment

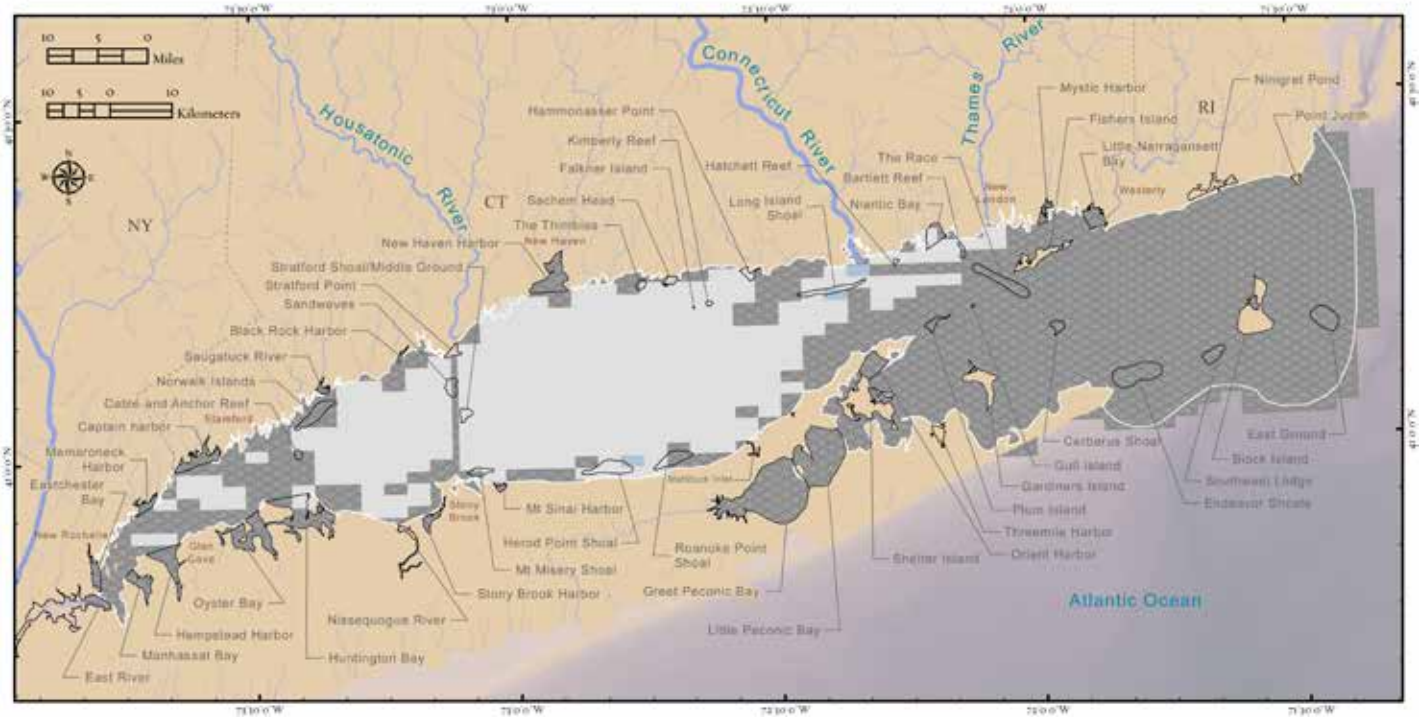
Brown Shrimp

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

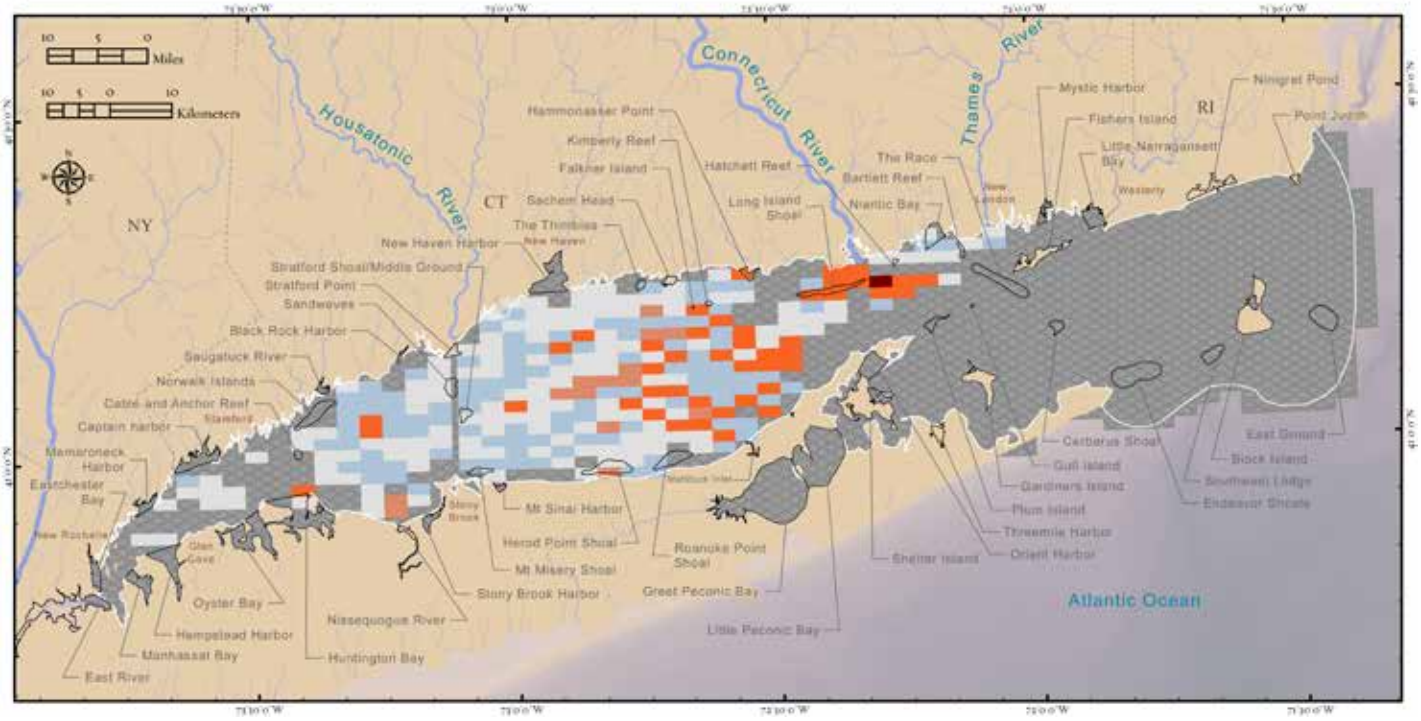
Bushy Bryozoan

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

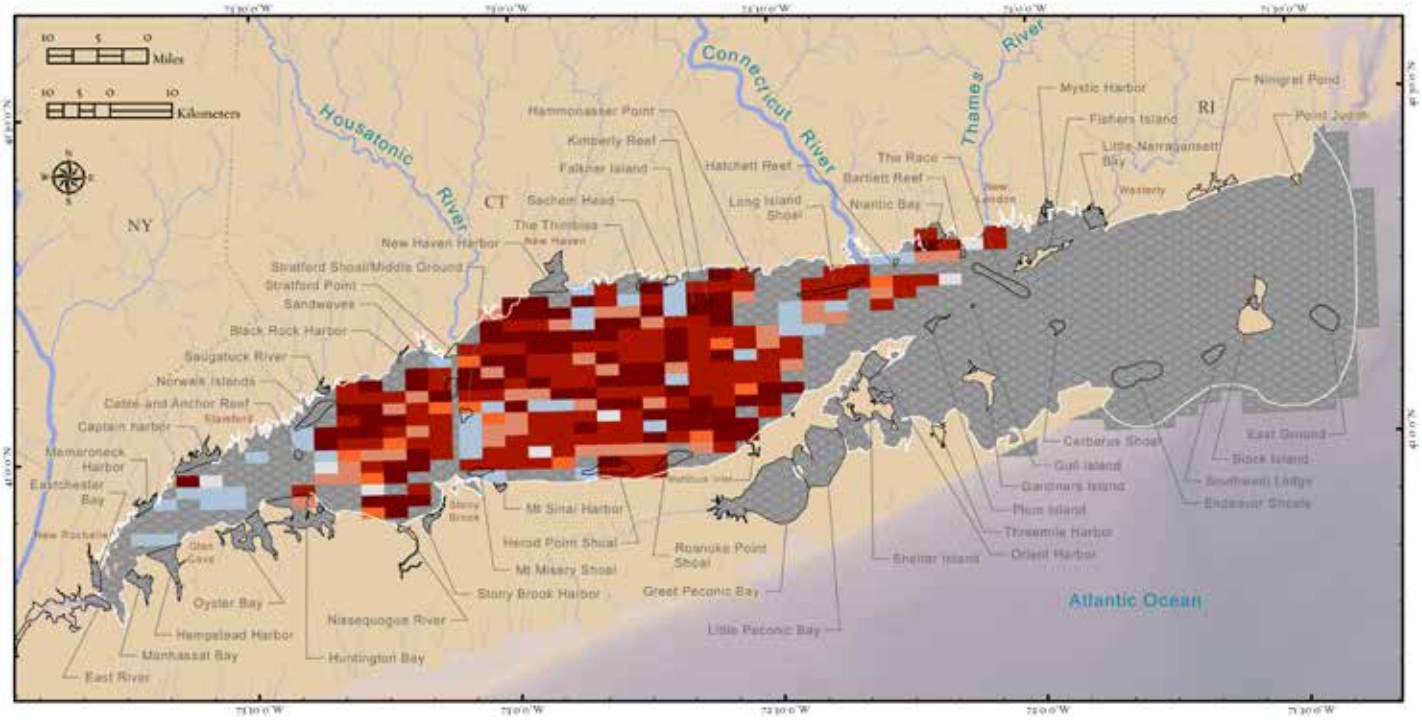
Butterfish

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

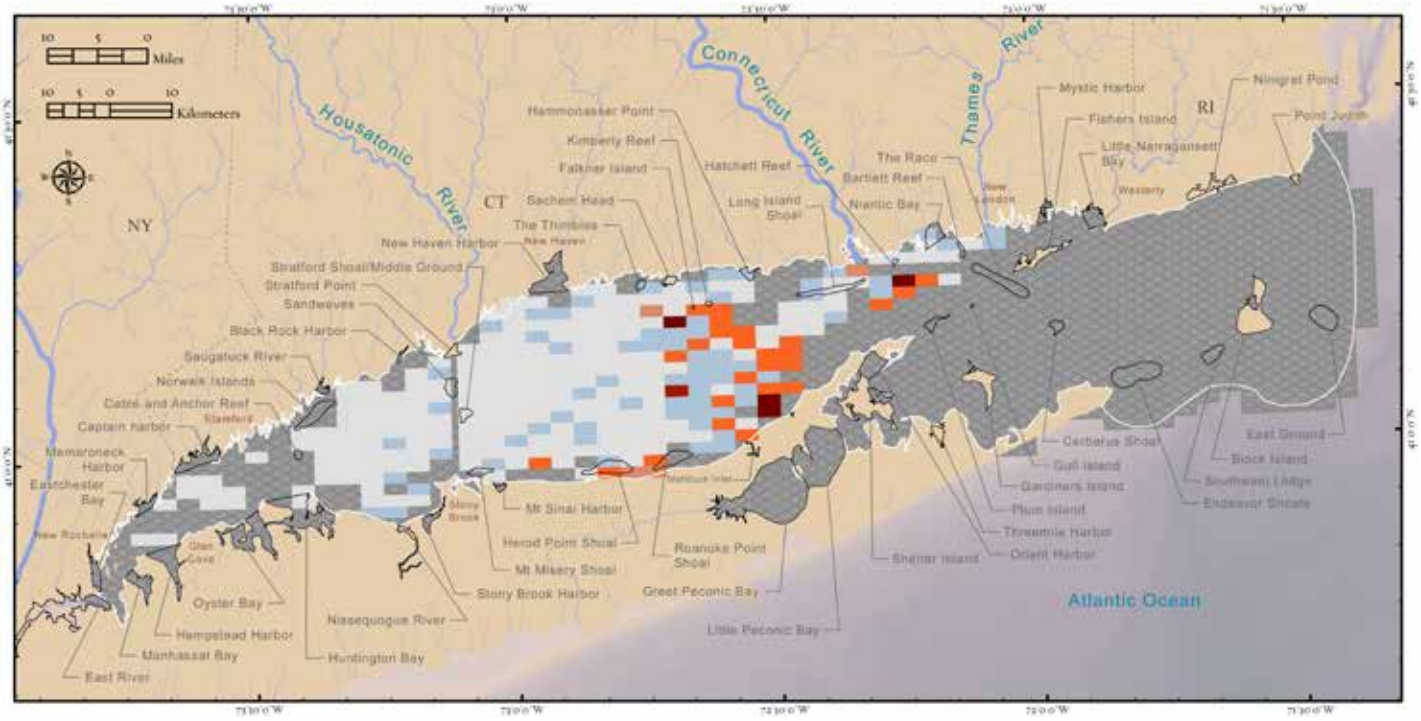
Clearnose Skate

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

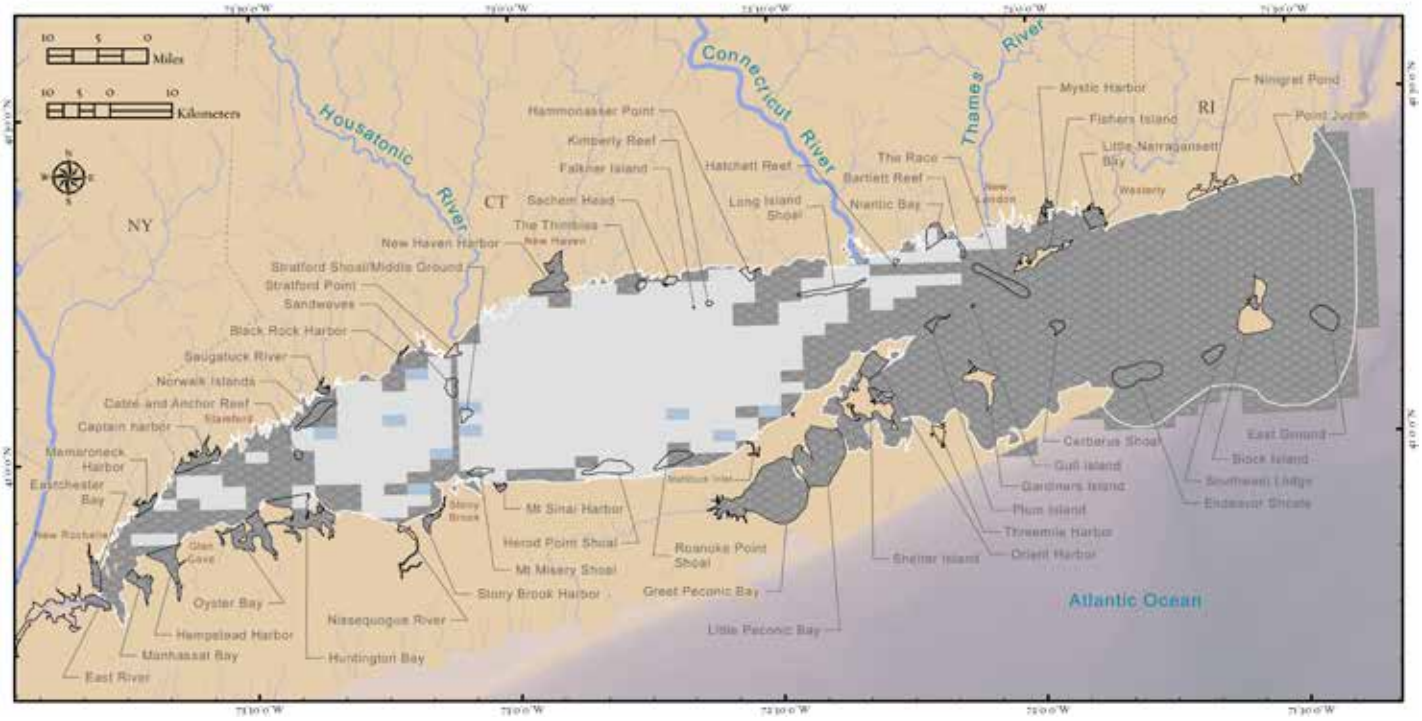
Coastal Mud Shrimp

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

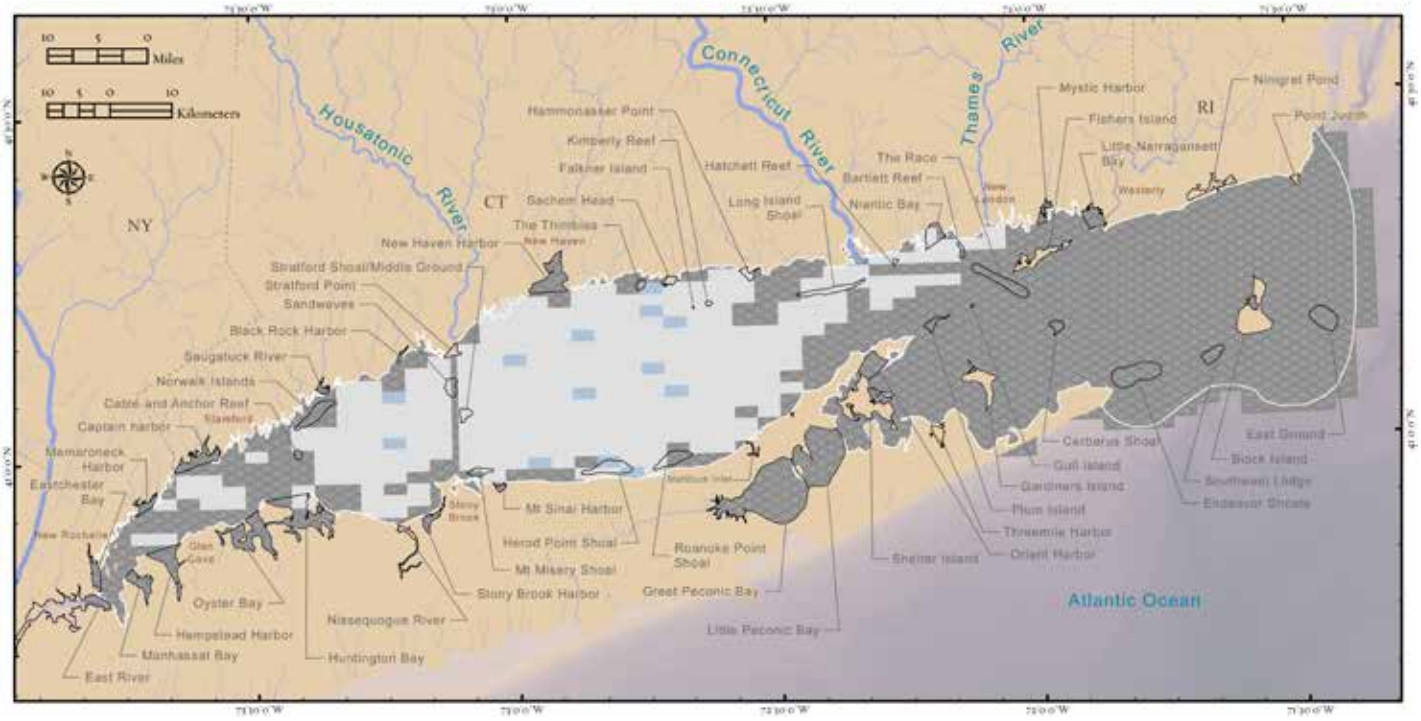
Conger Eel

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

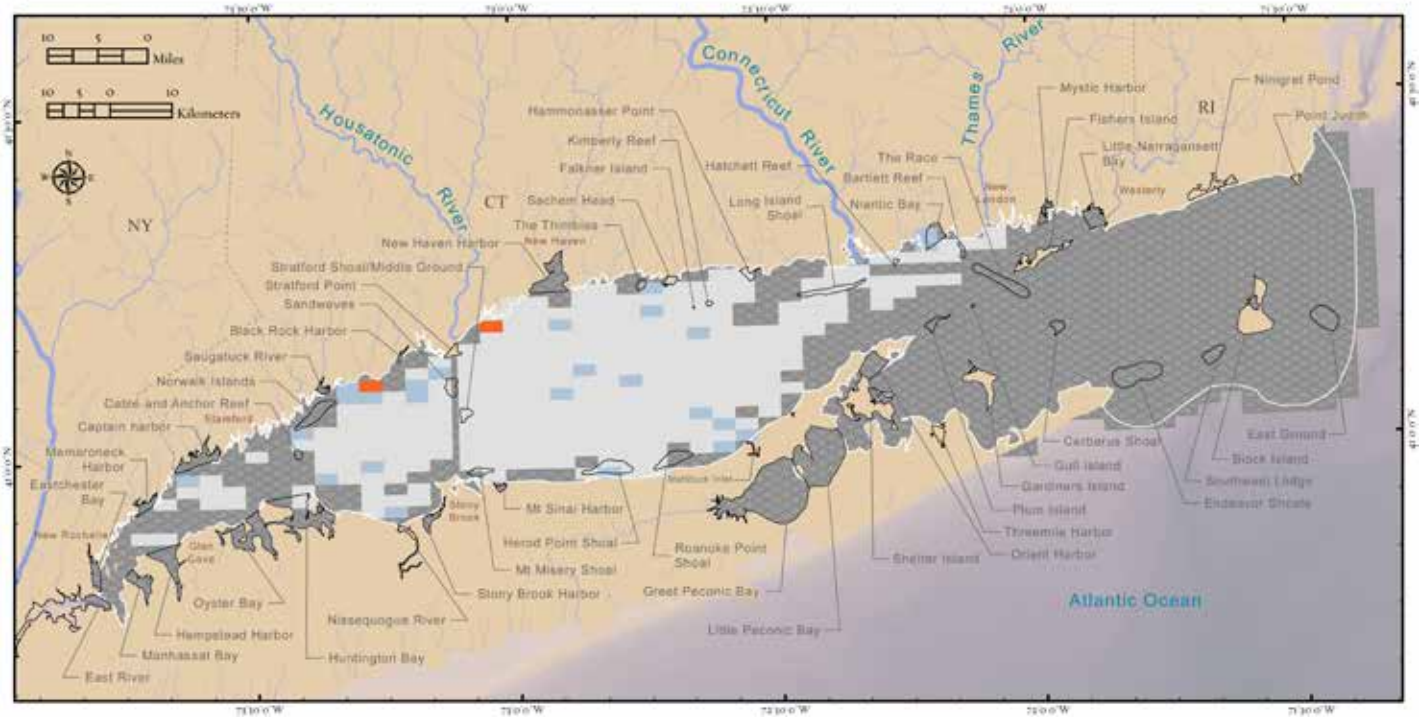
Crevalle Jack

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

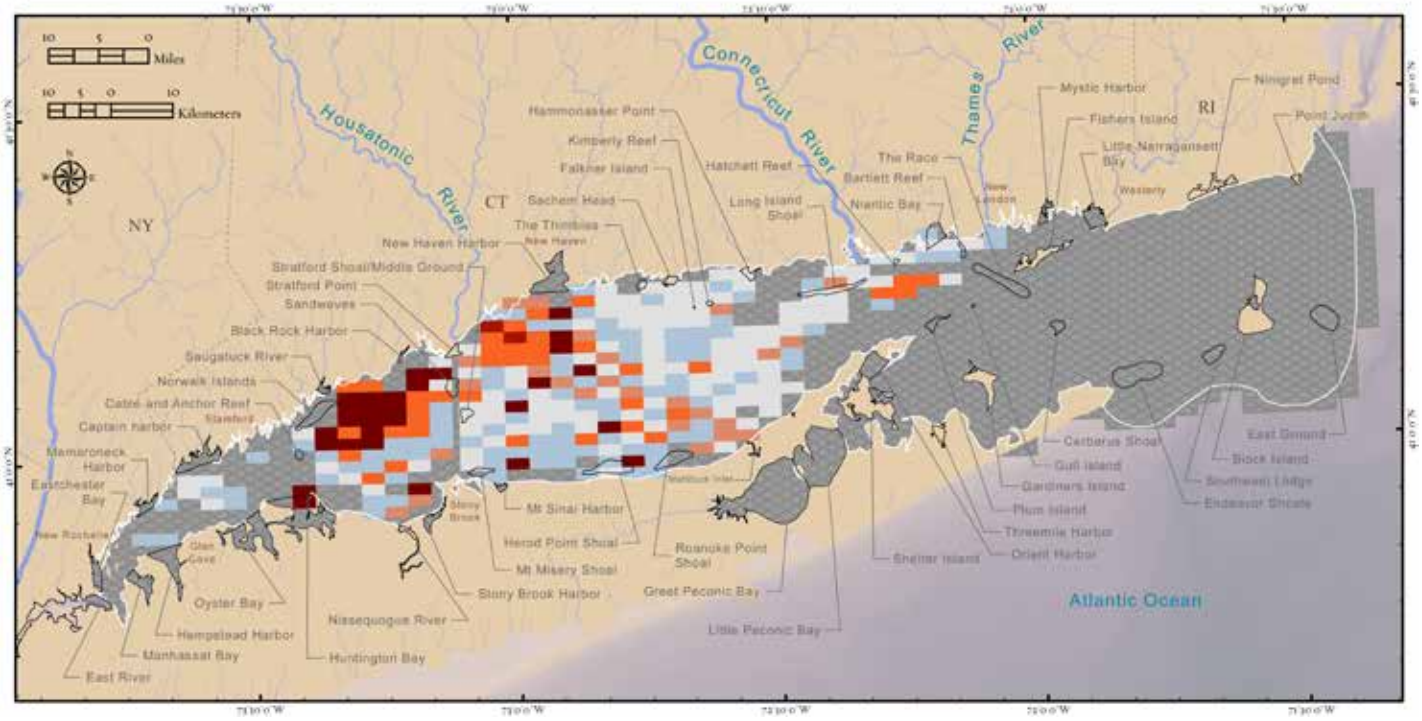
Cunner

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.

Cells Sampled in Fewer than Two Octads During Summer Months



Long Island Sound Ecological Assessment

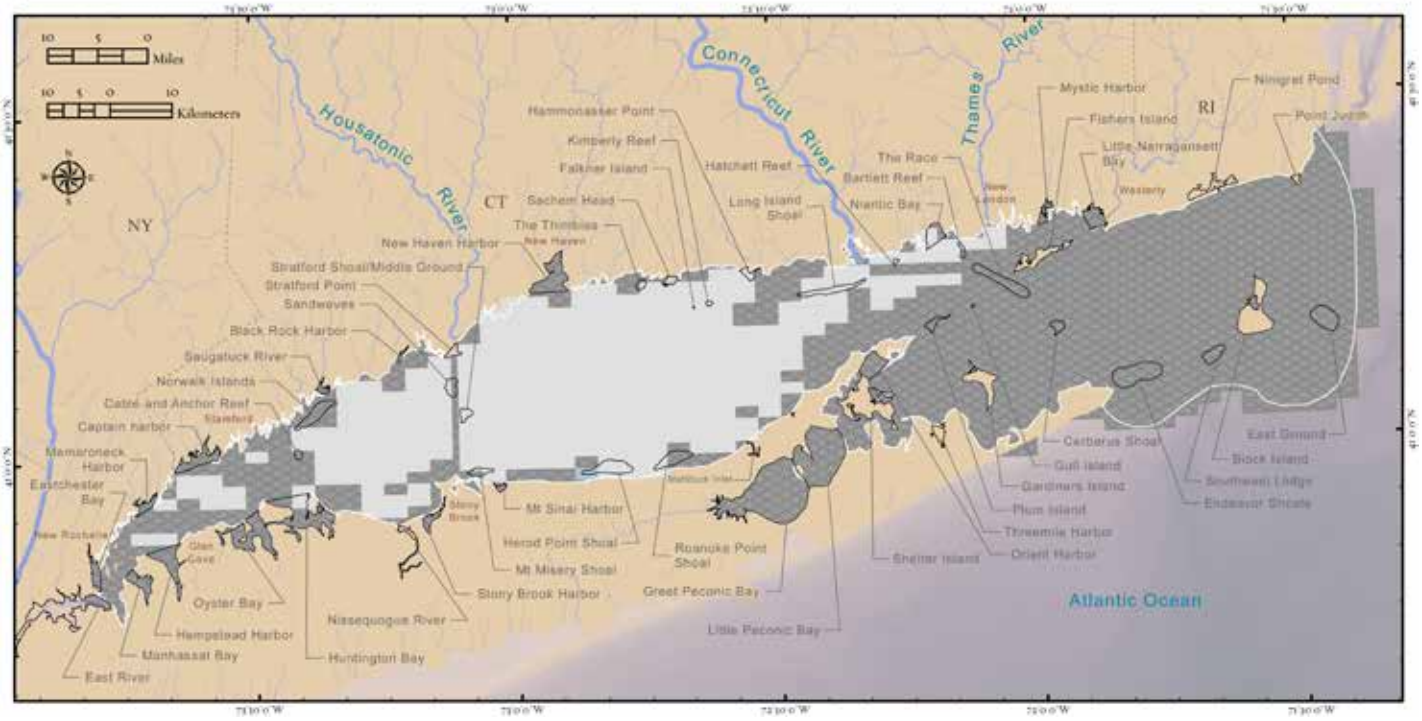
Dwarf Goatfish

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

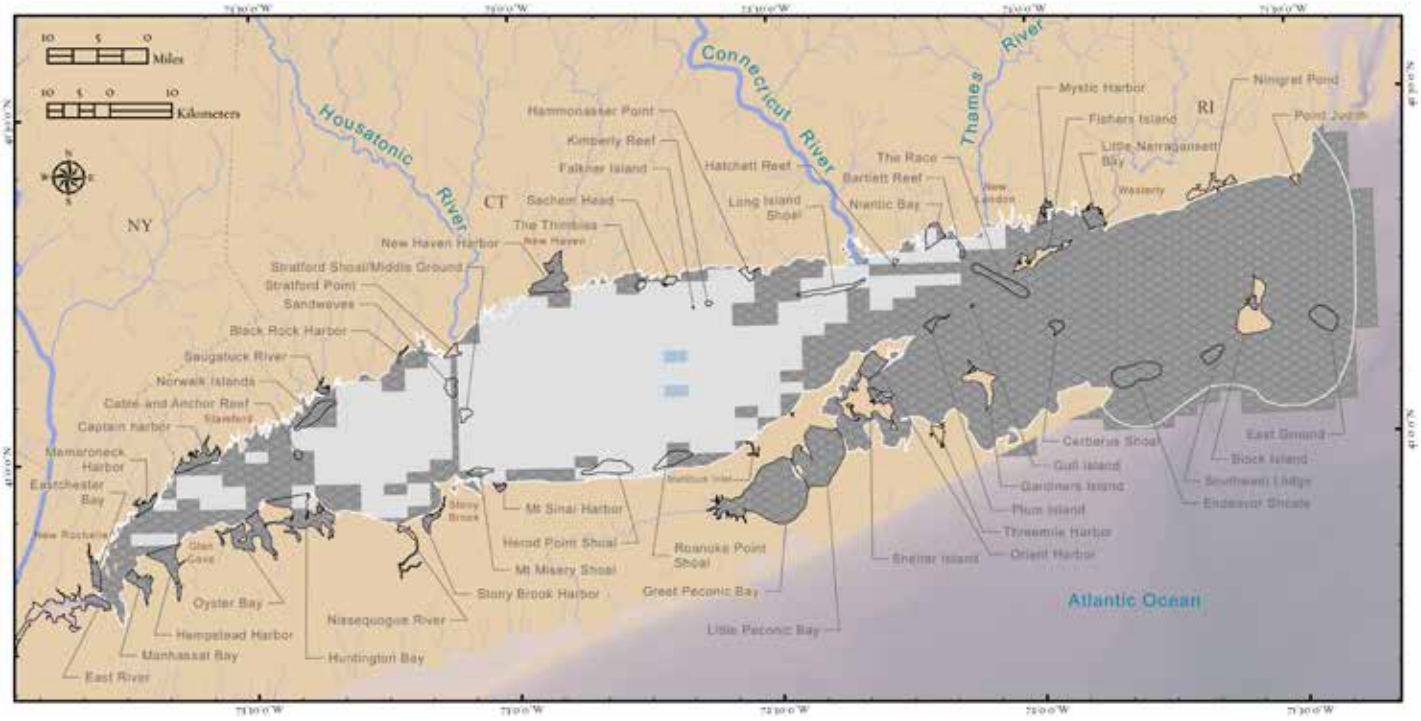
Fawn Cusk-Eel

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

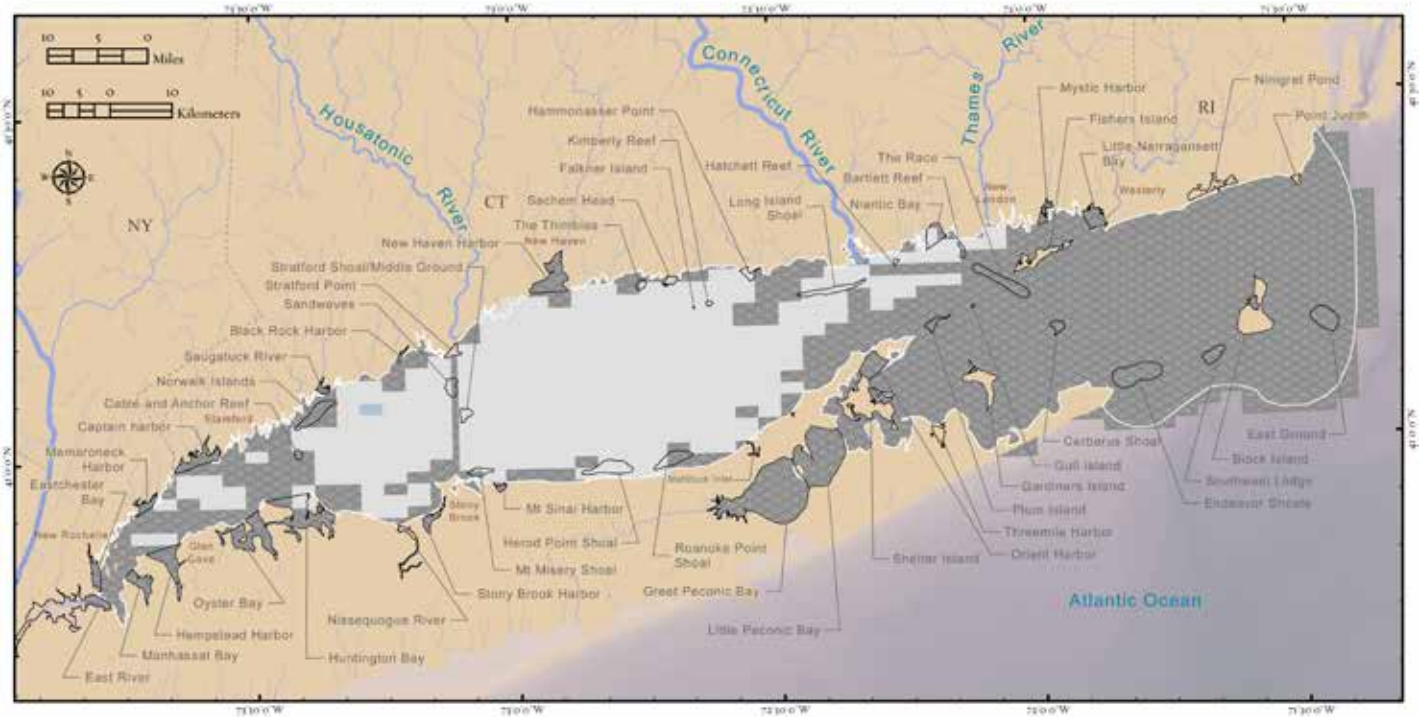
Feather Blenny

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

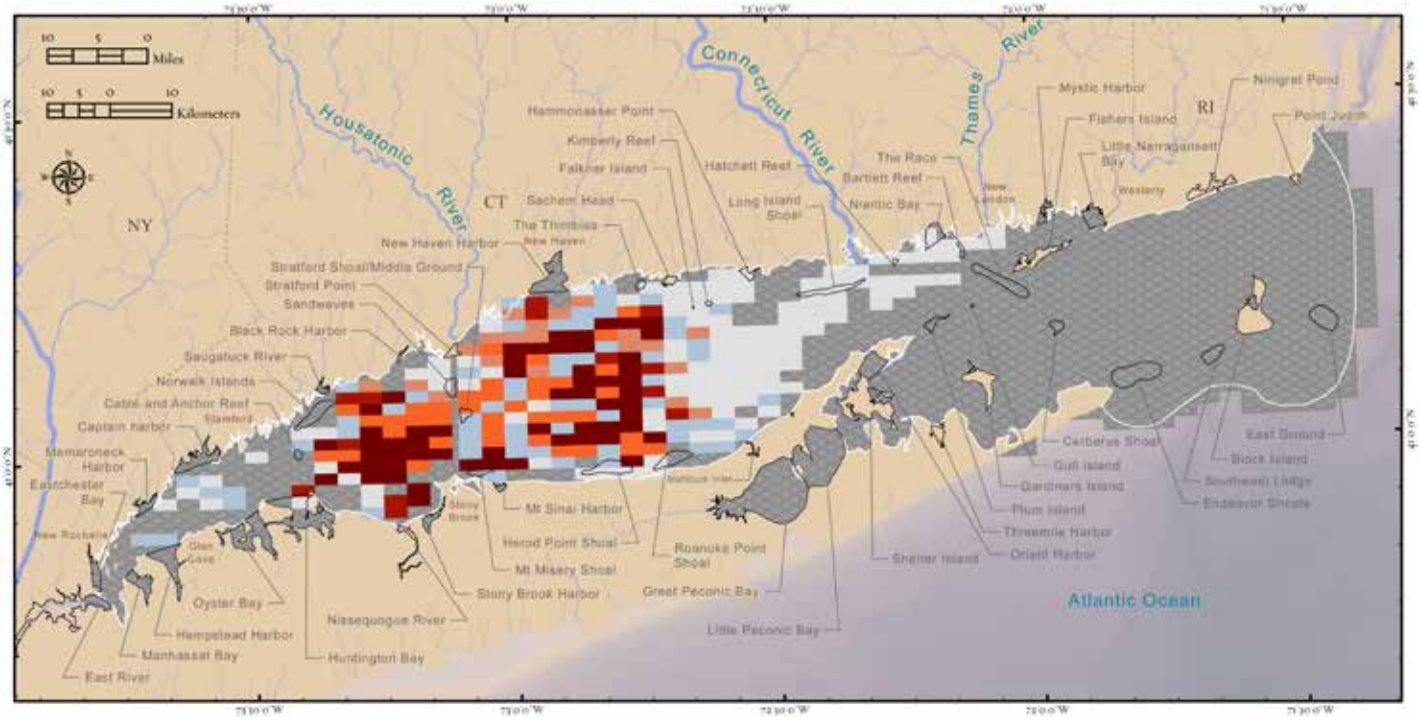
Fourbeard Rockling

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

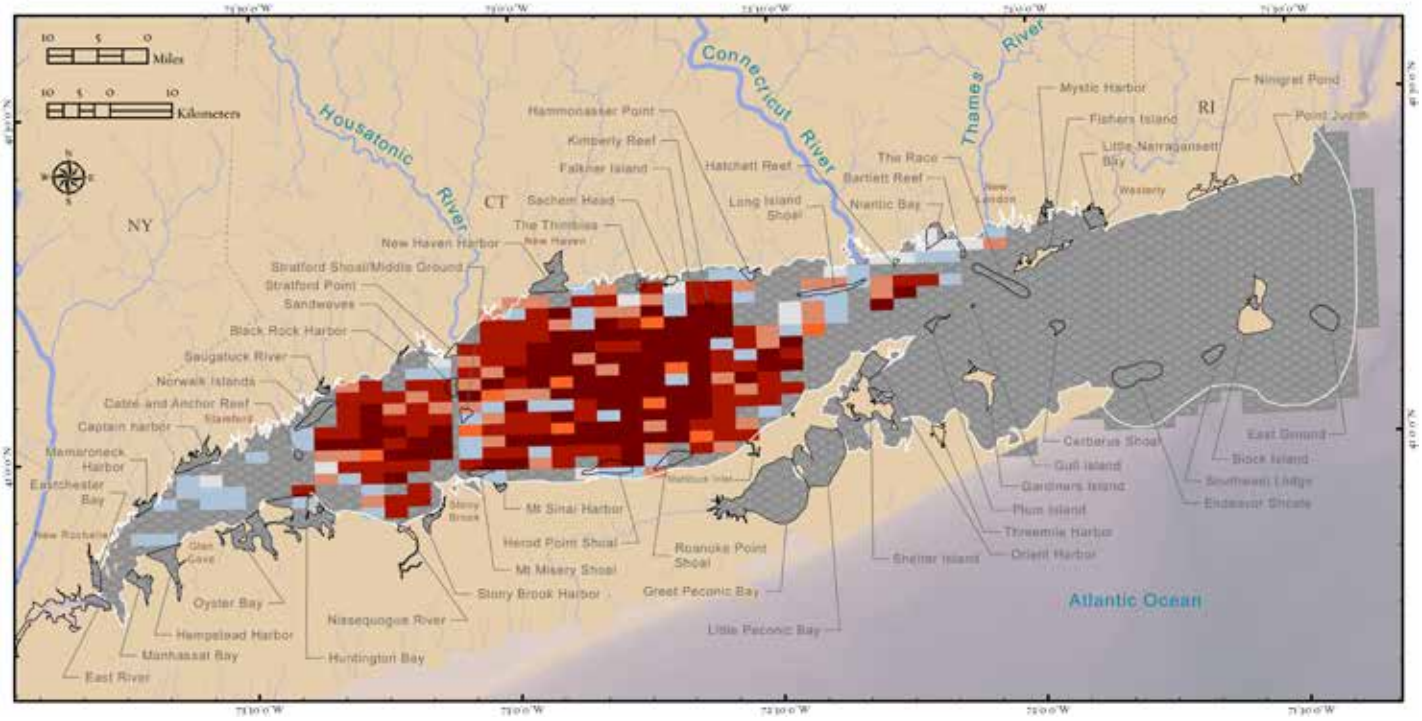
Fourspot Flounder

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

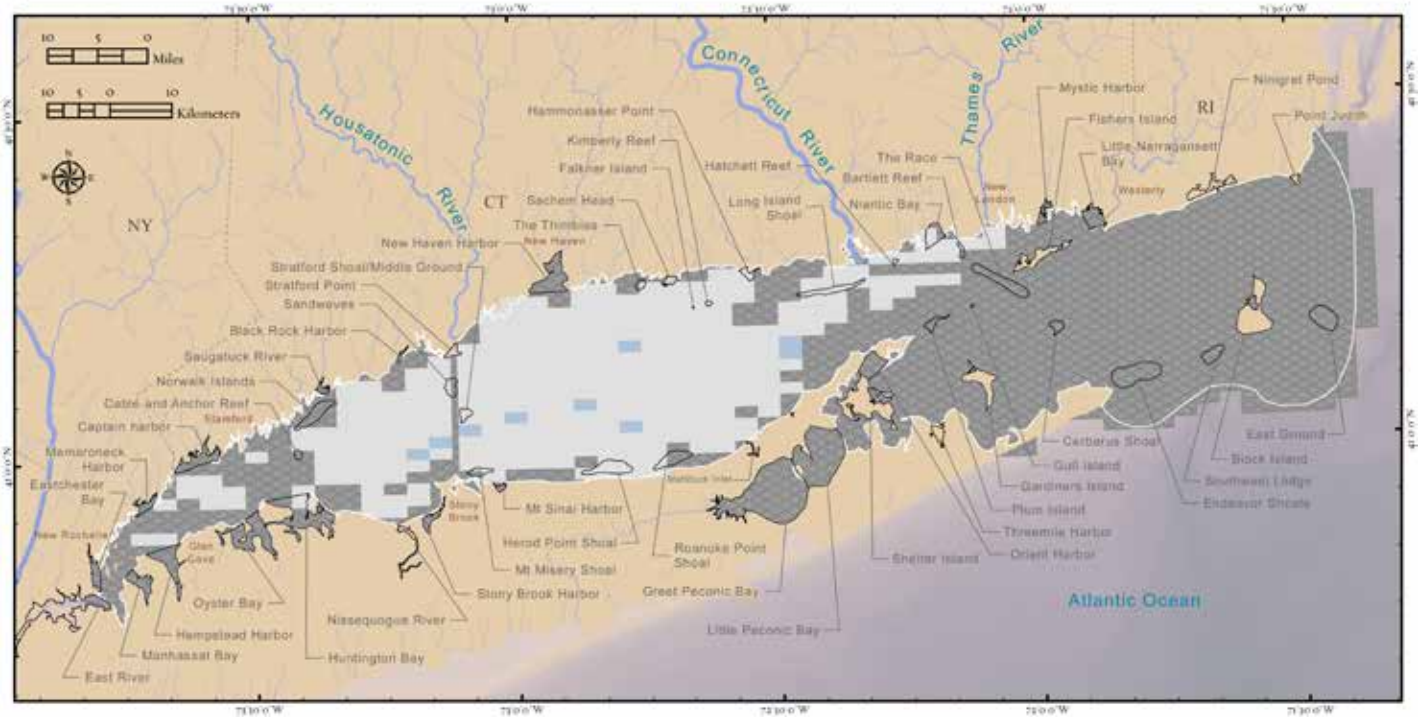
Ghost Shrimp

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.

Cells Sampled in Fewer than Two Octads During Summer Months



Long Island Sound Ecological Assessment

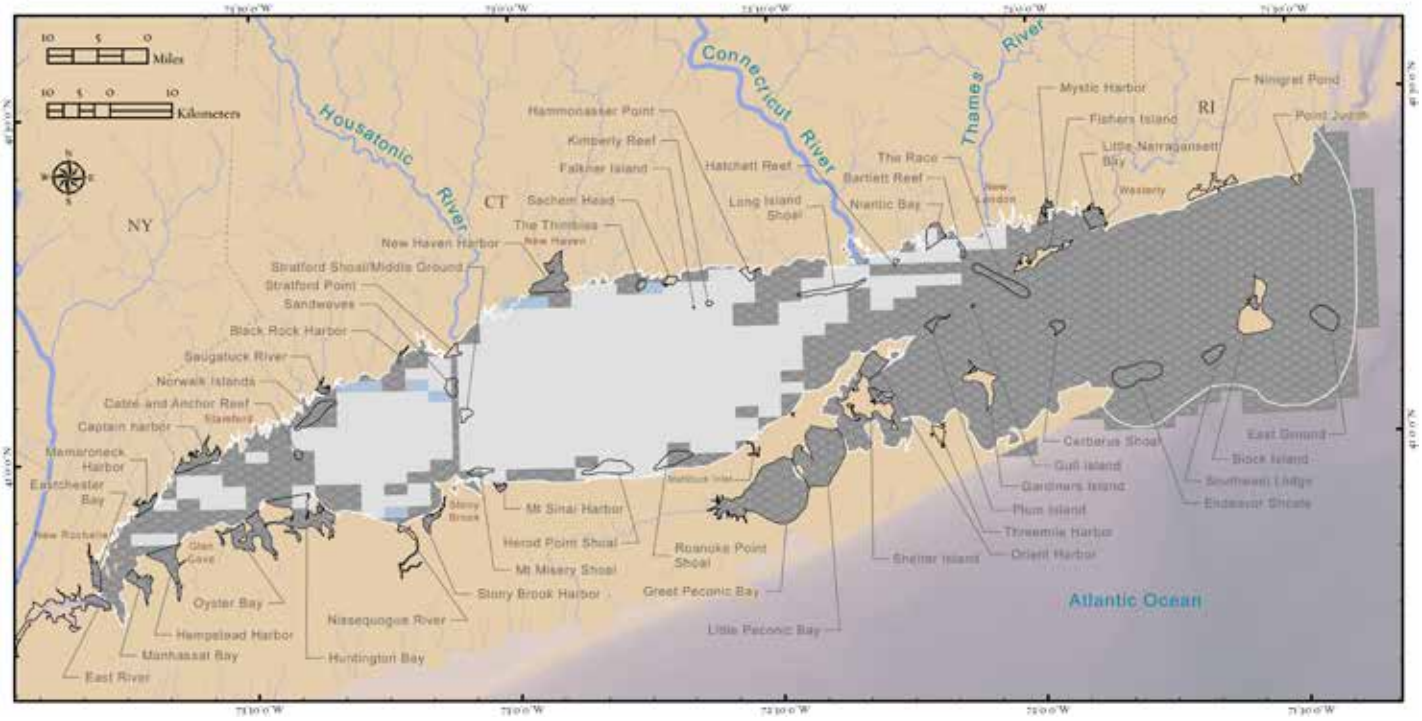
Gizzard Shad

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

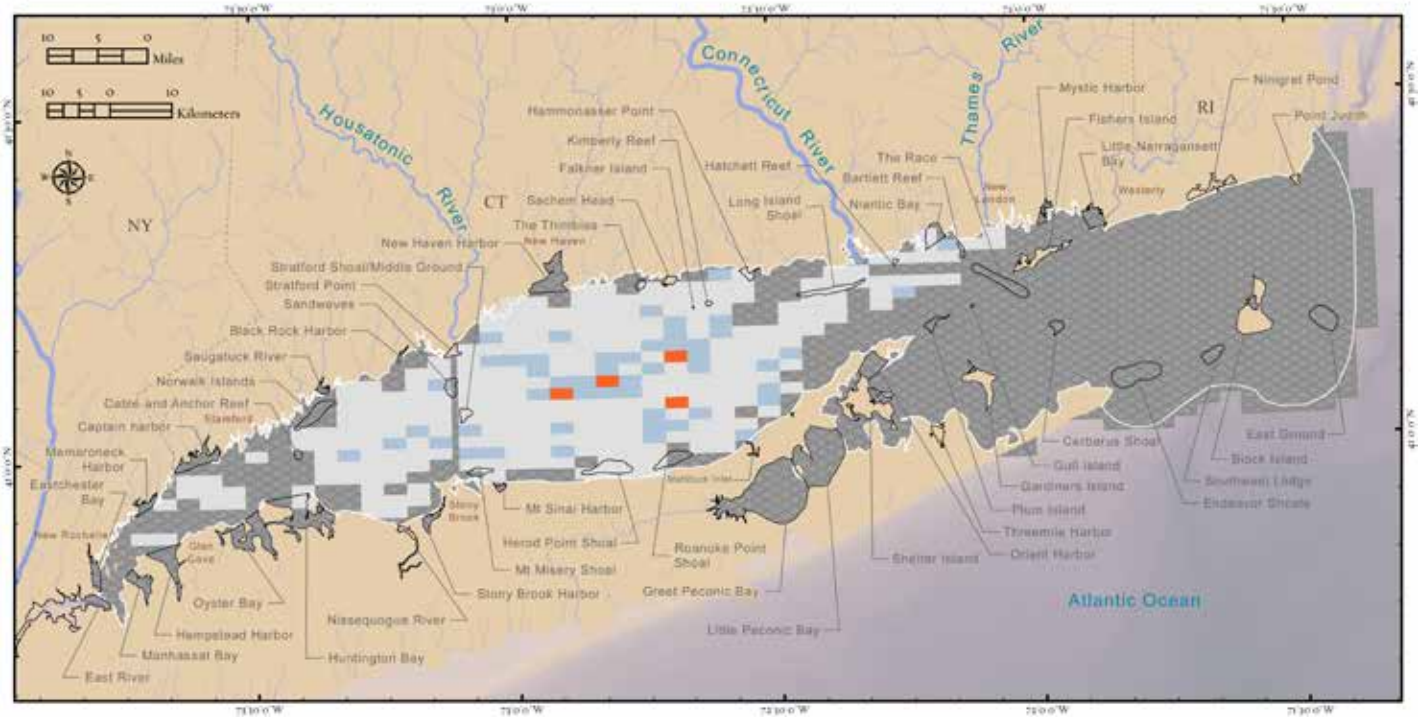
Goosefish

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

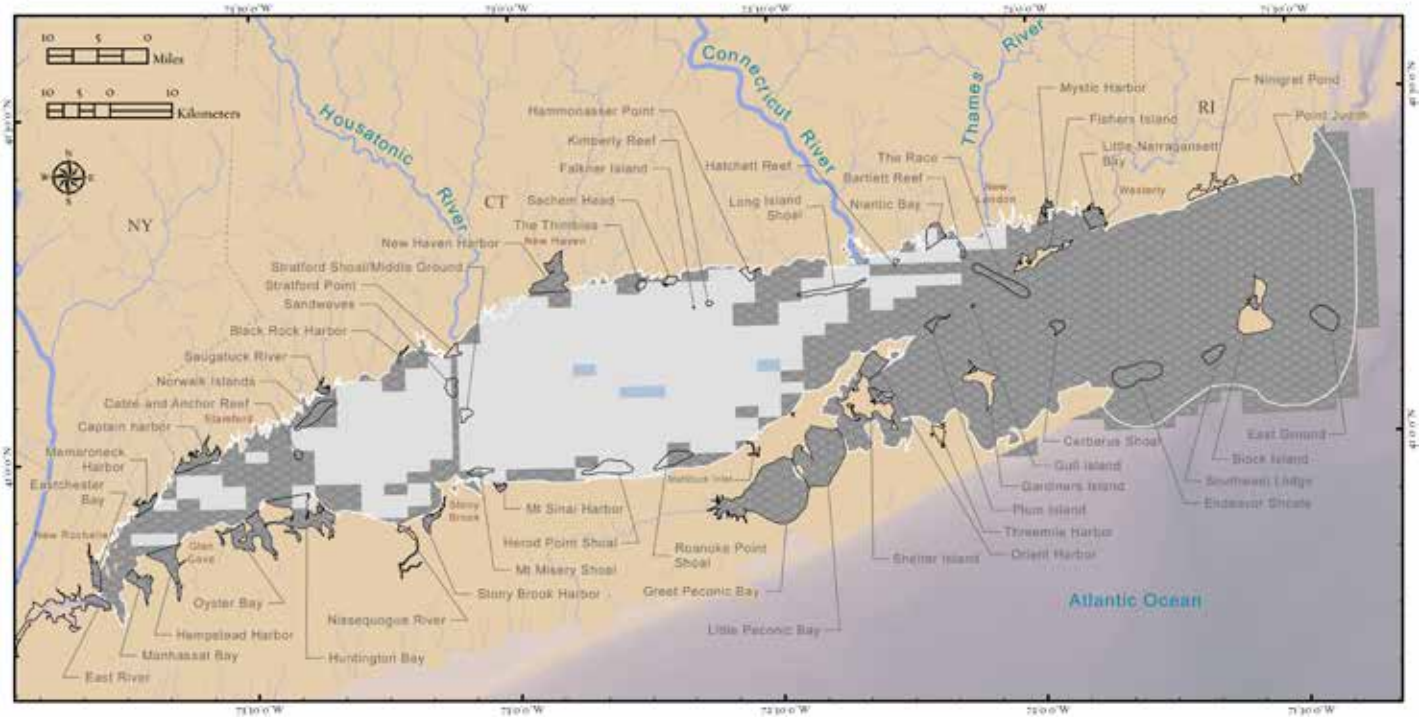
Gray Triggerfish

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

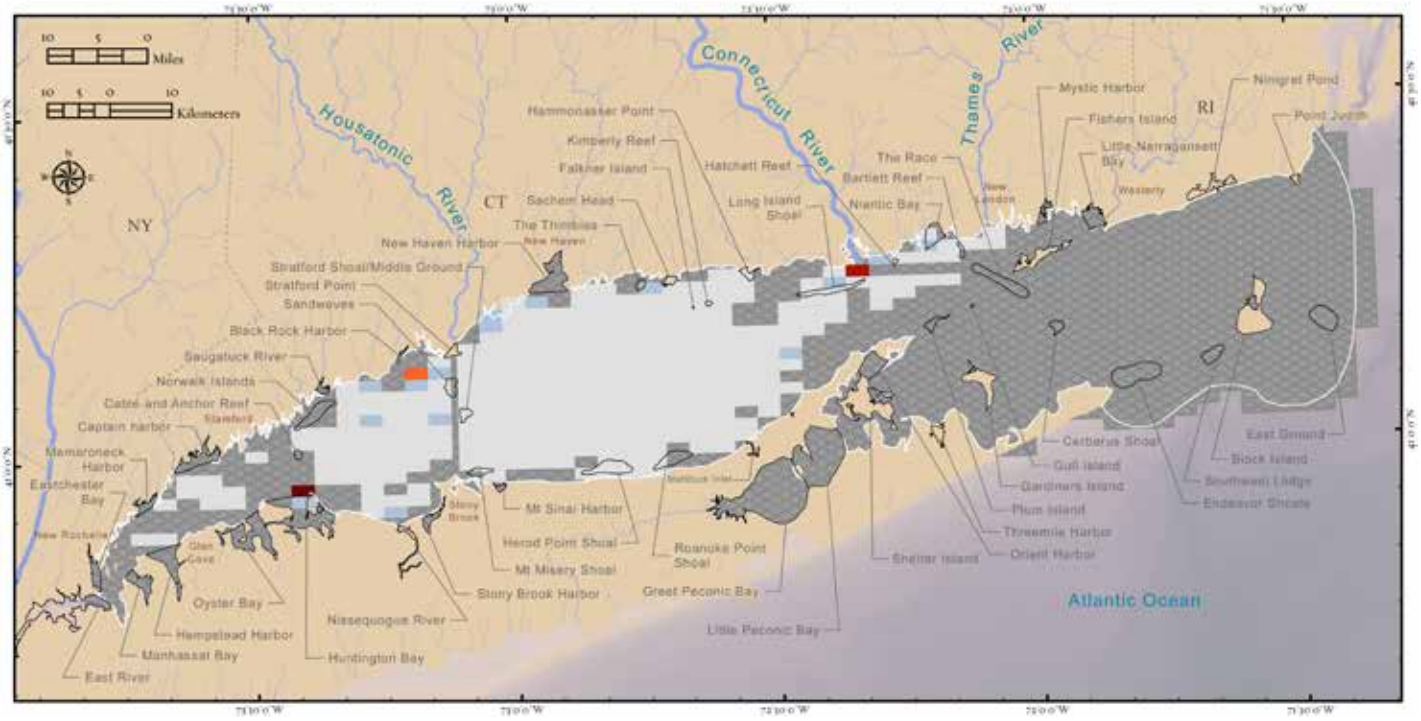
Grubby

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

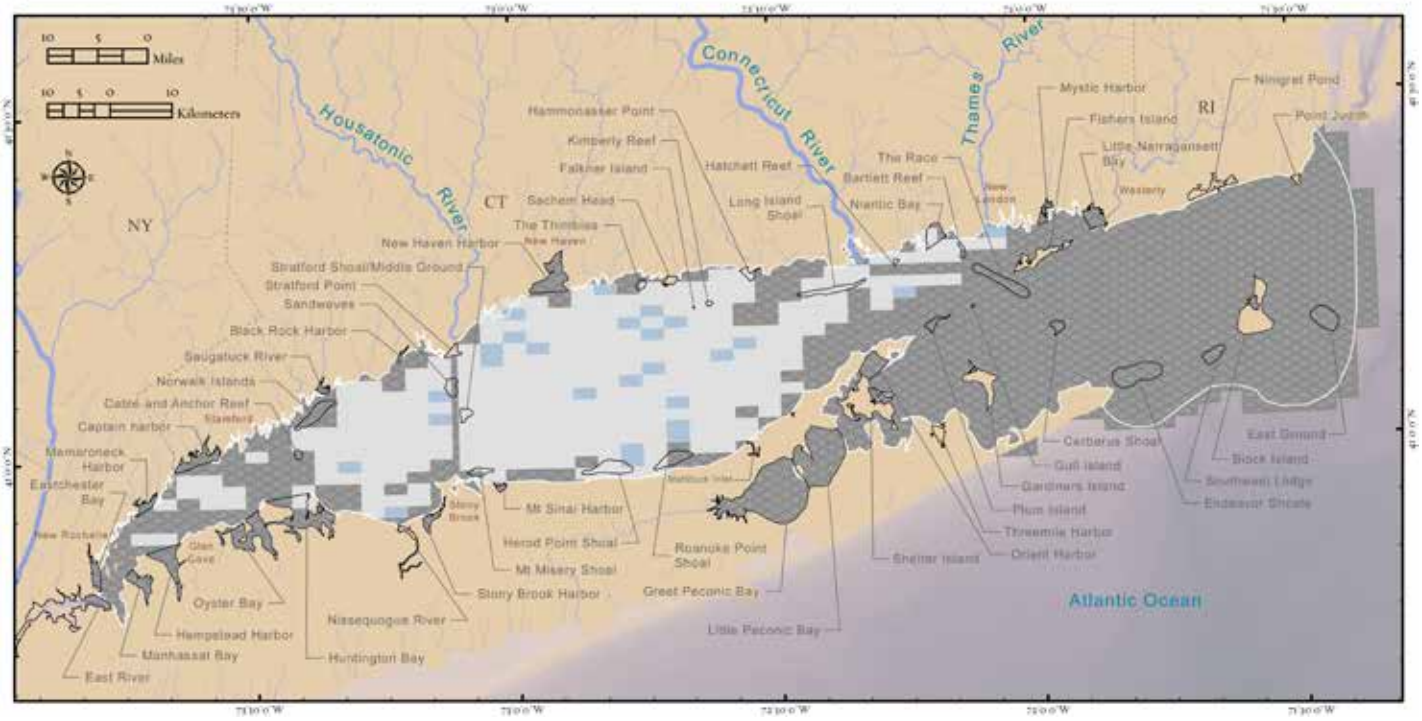
Haddock

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

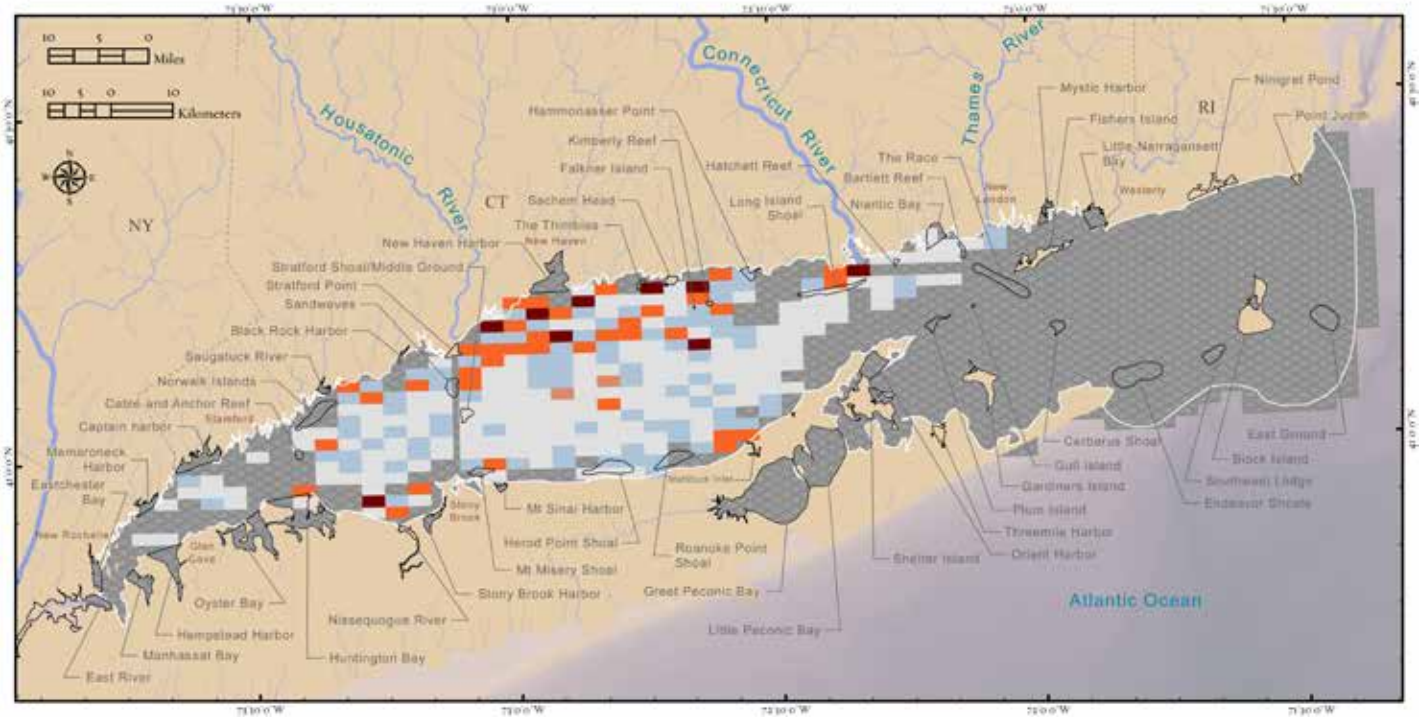
Hickory Shad

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

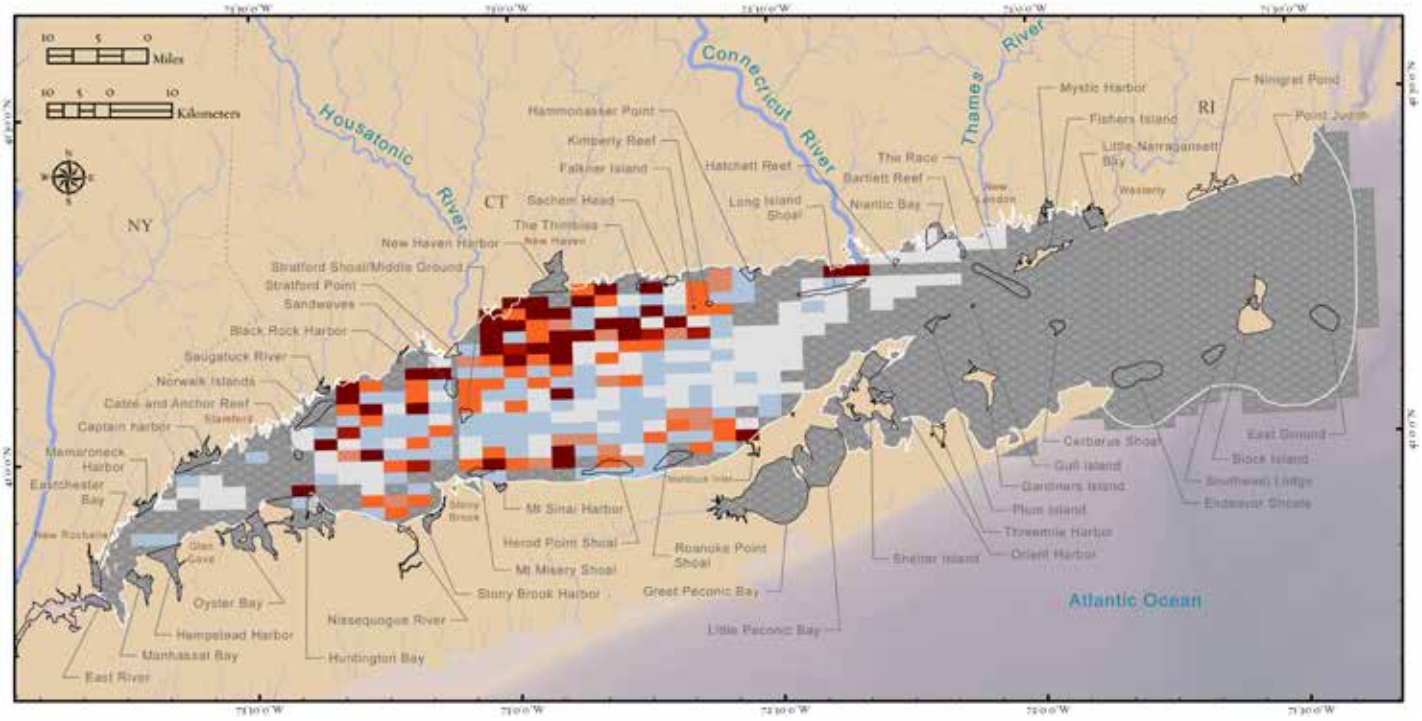
Hogchoker

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

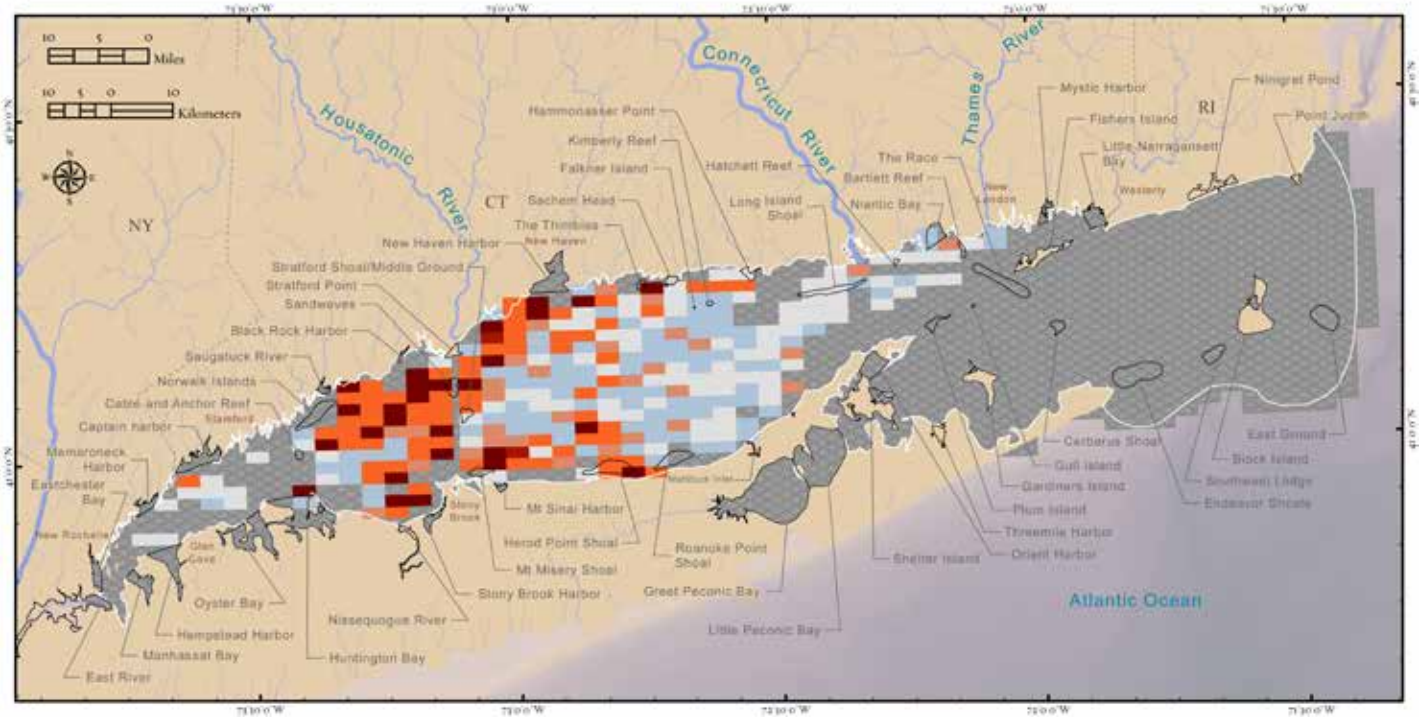
Horseshoe Crab

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

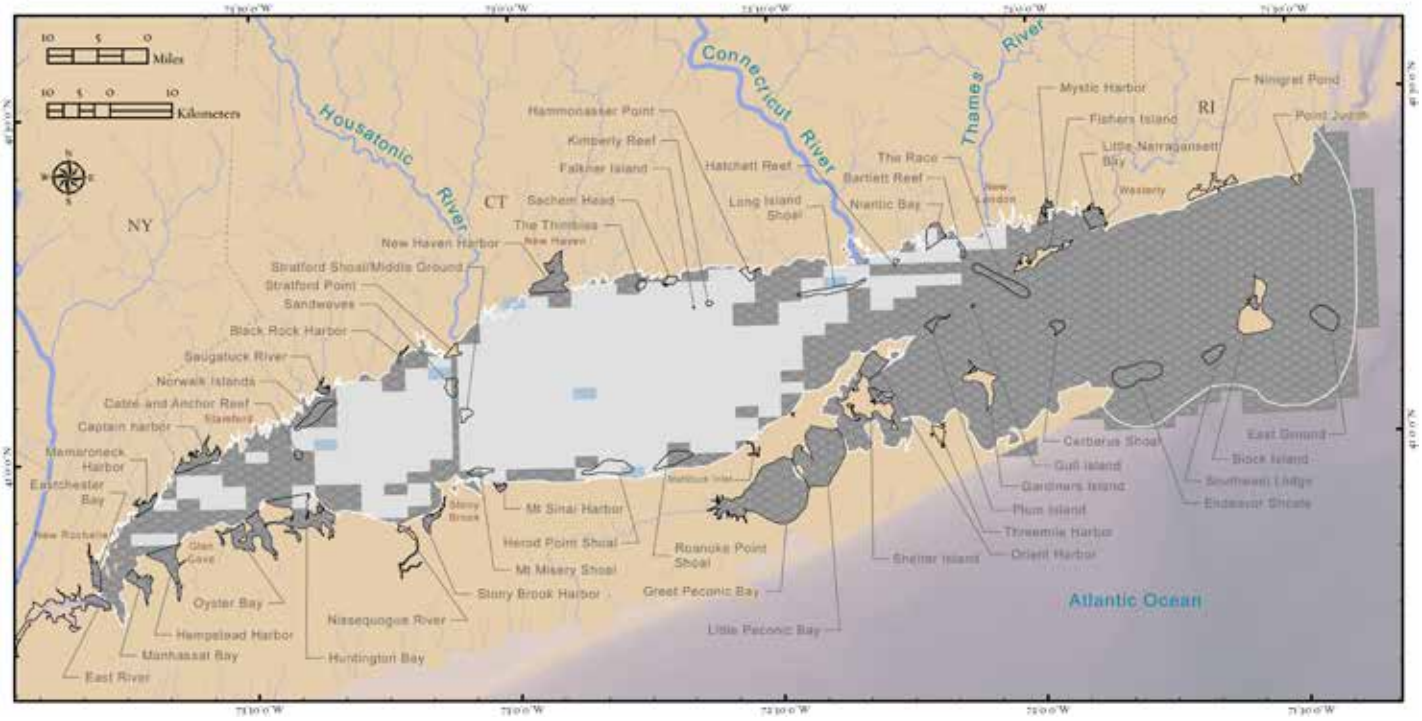
Japanese Shore Crab

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

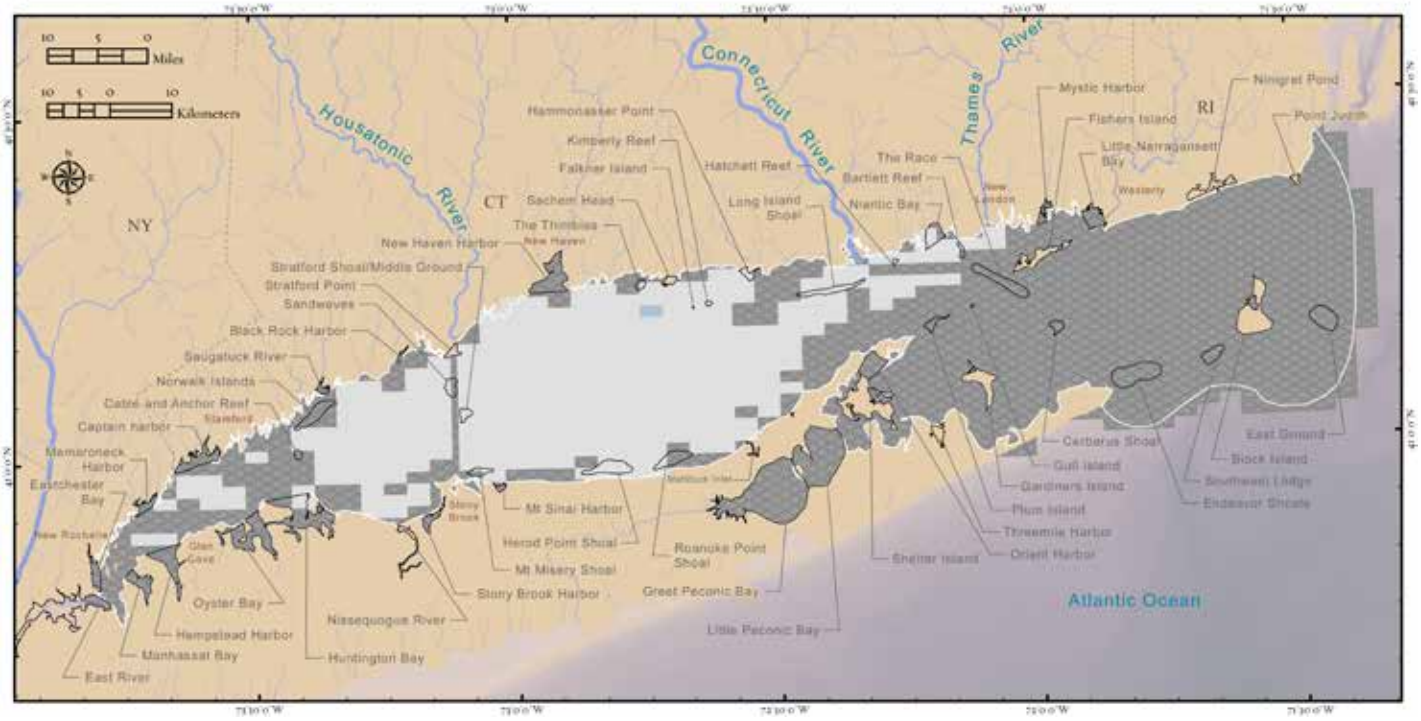
Lined Seahorse

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

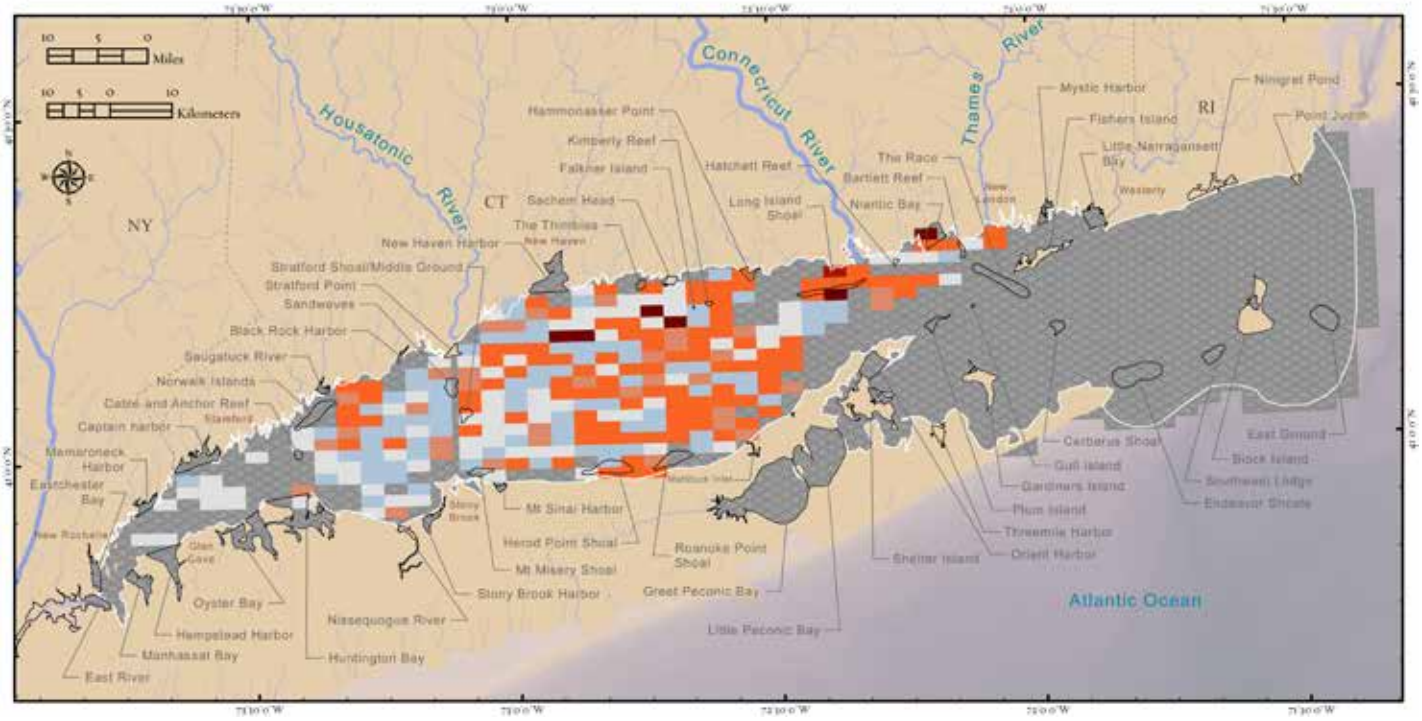
Lion'S Mane Jellyfish

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

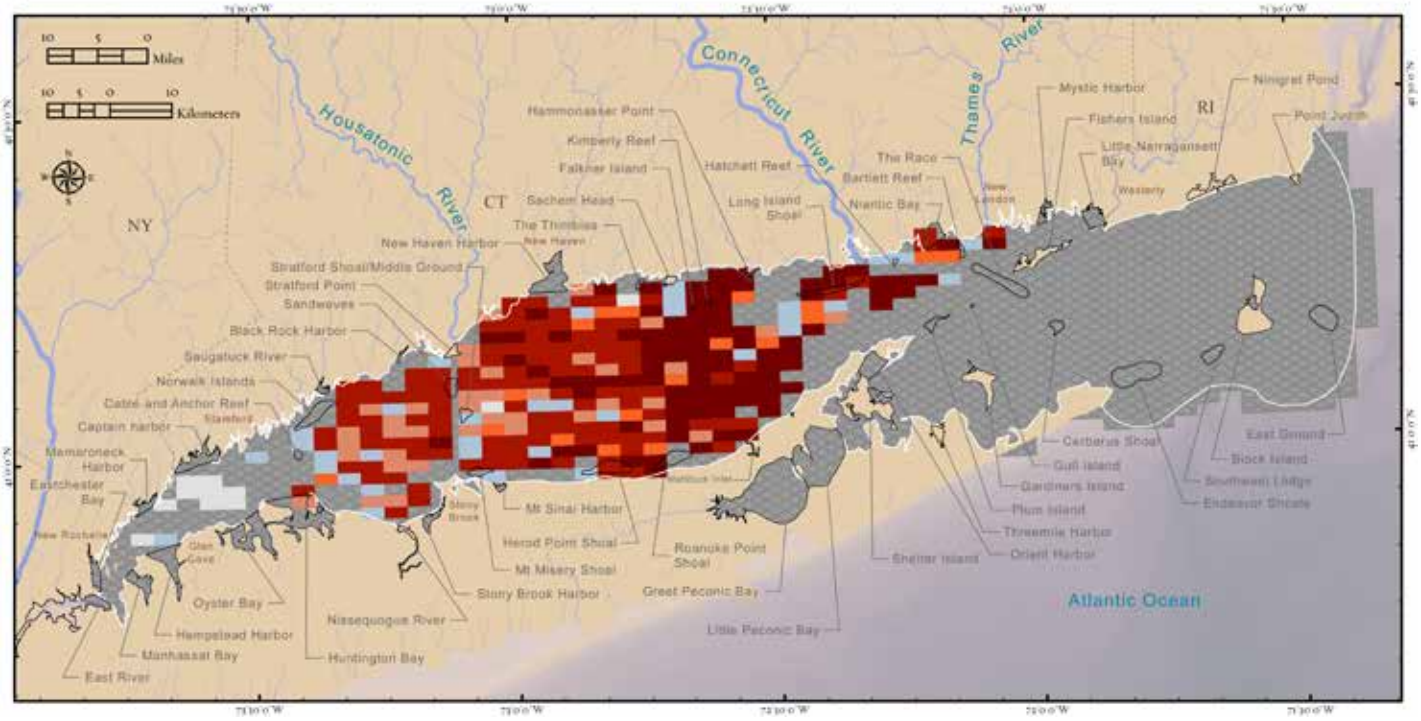
Little Skate

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

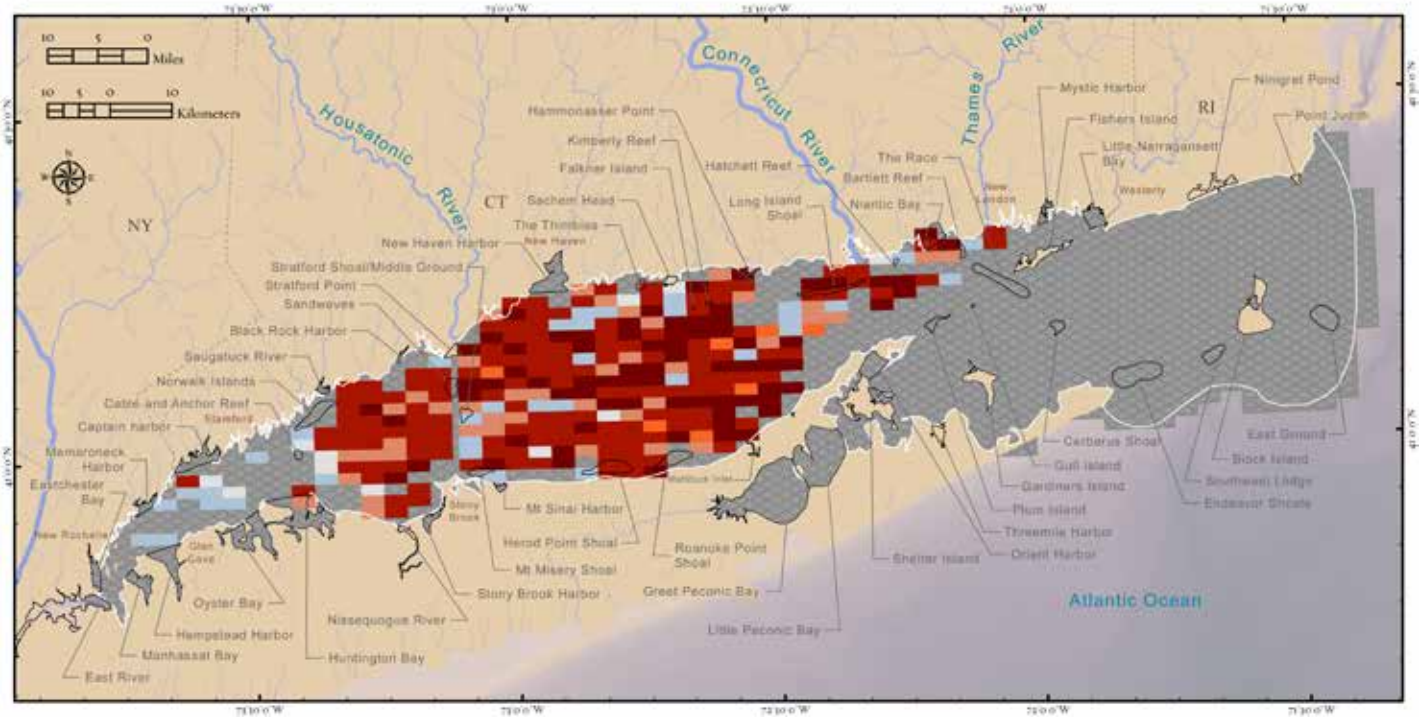
Long-Finned Squid

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

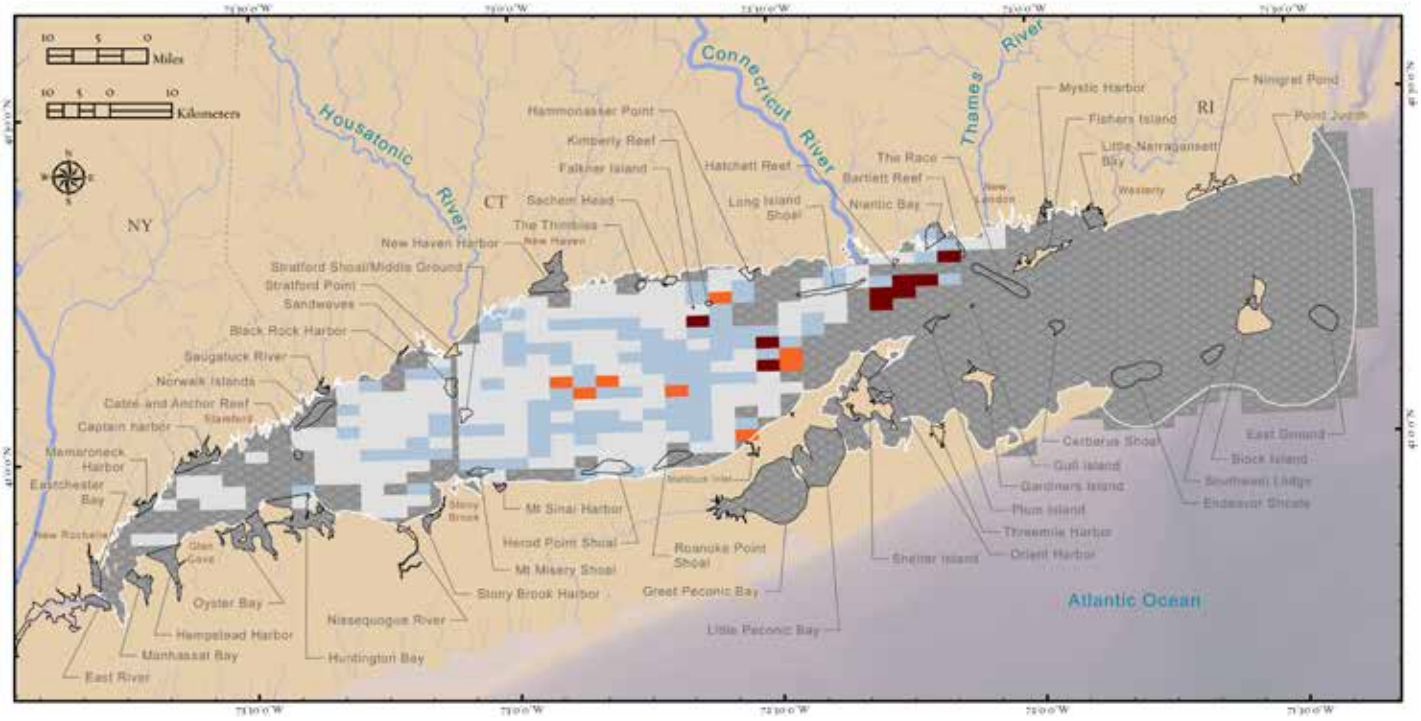
Longhorn Sculpin

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

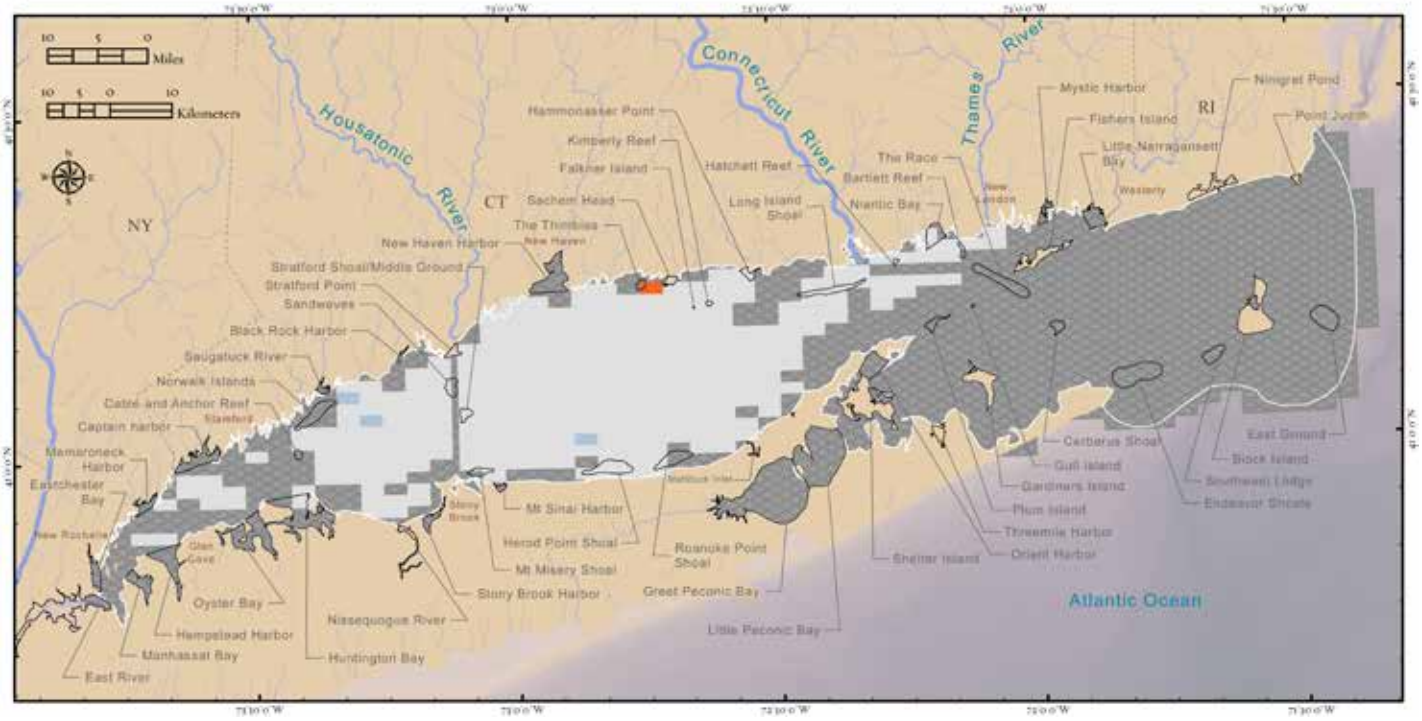
Lookdown

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

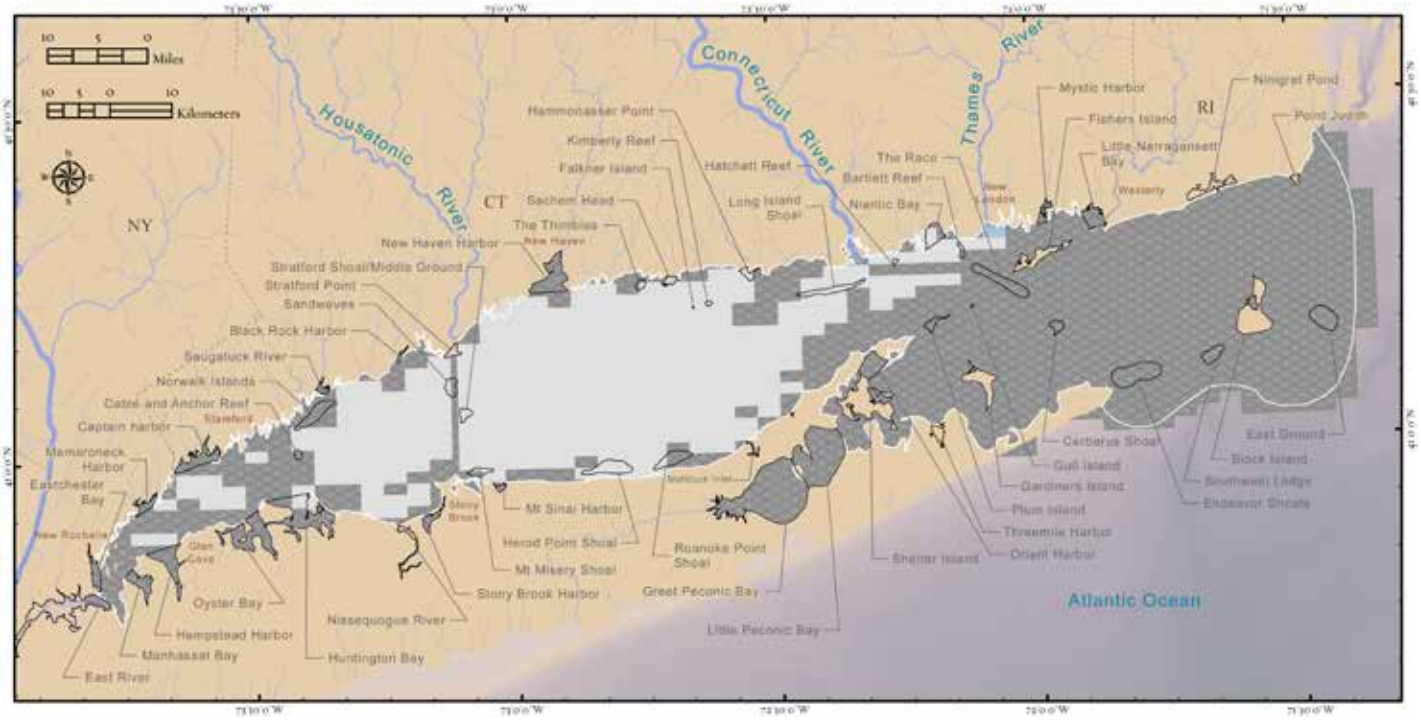
Lumpfish

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.

Cells Sampled in Fewer than Two Octads During Summer Months



Long Island Sound Ecological Assessment

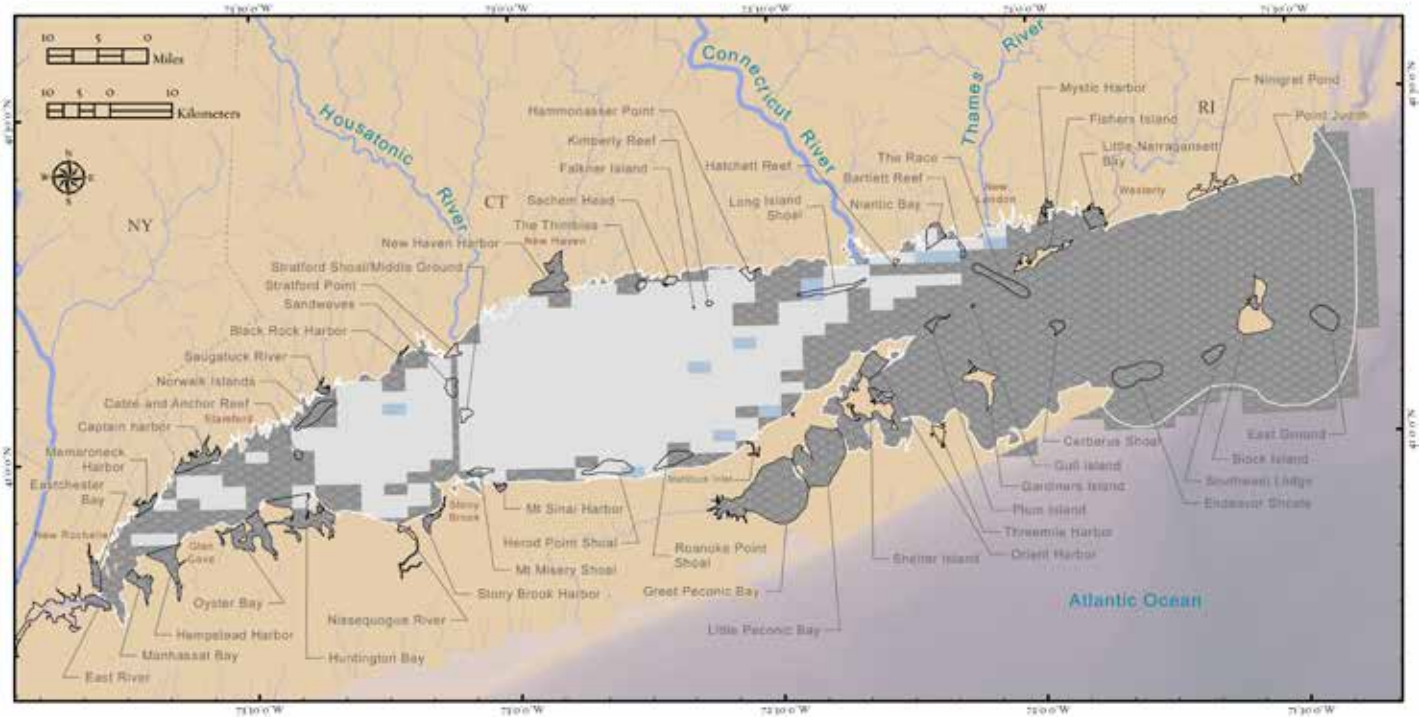
Mackerel Scad

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

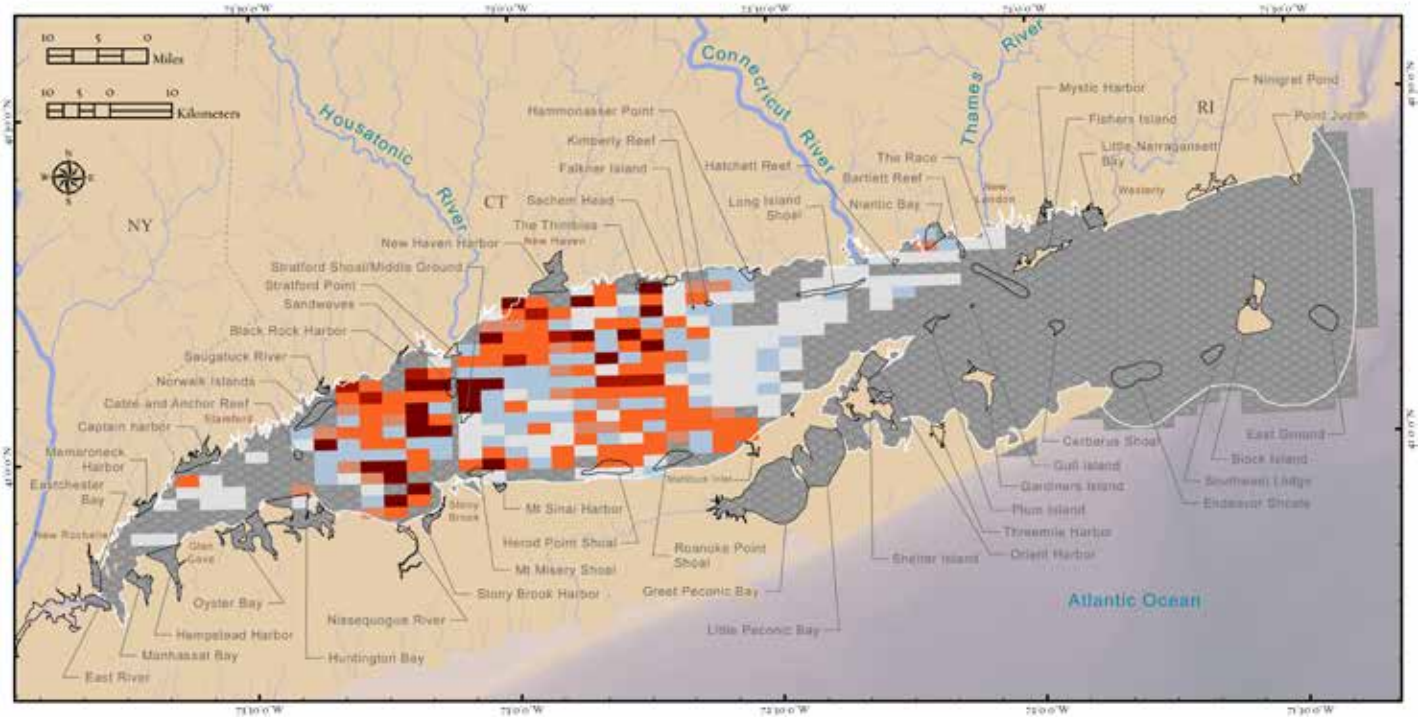
Mantis Shrimp

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

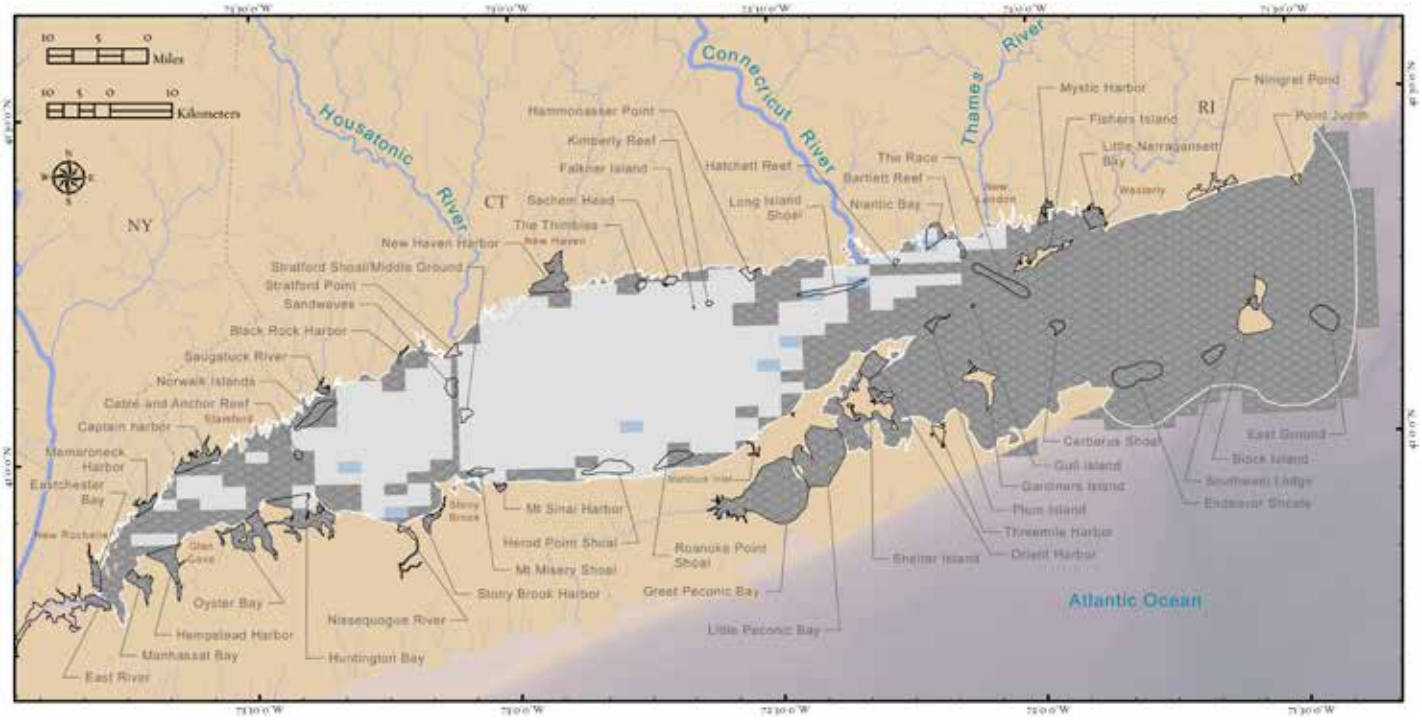
Moon Jelly

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

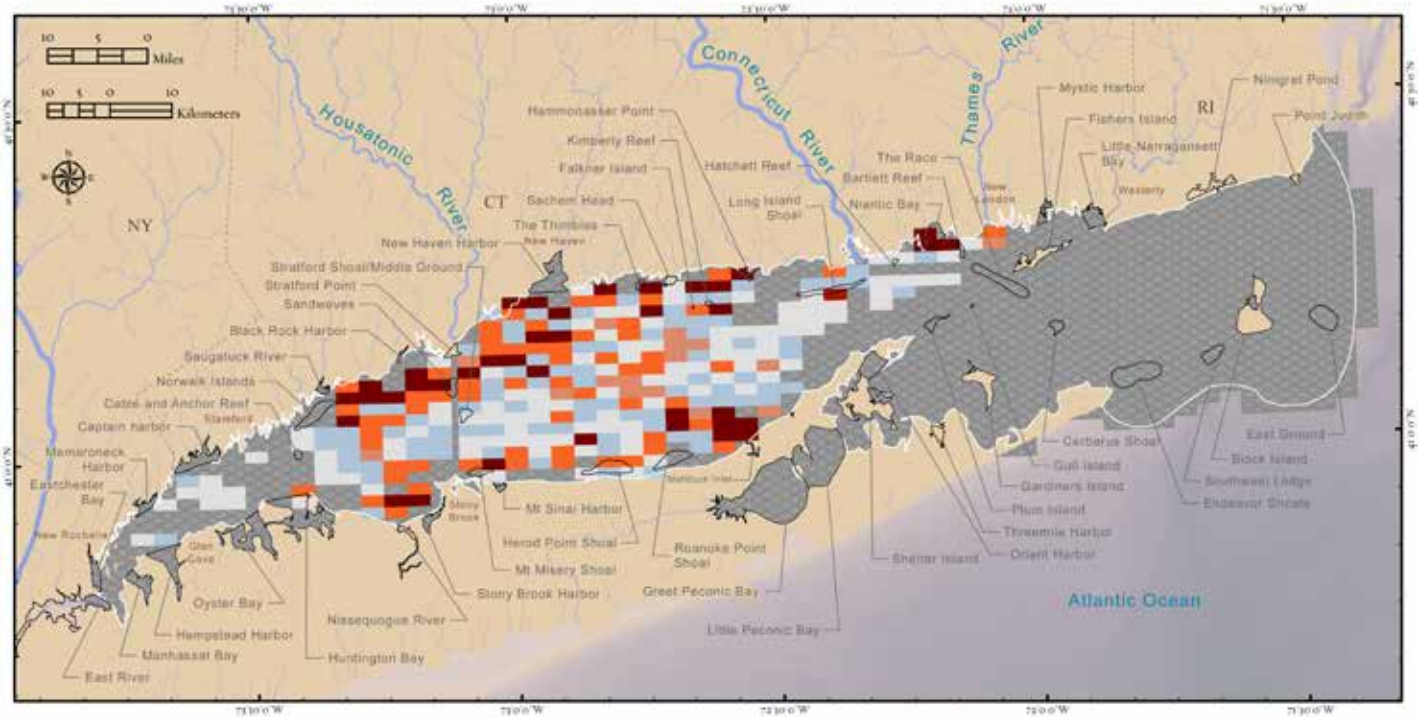
Moonfish

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

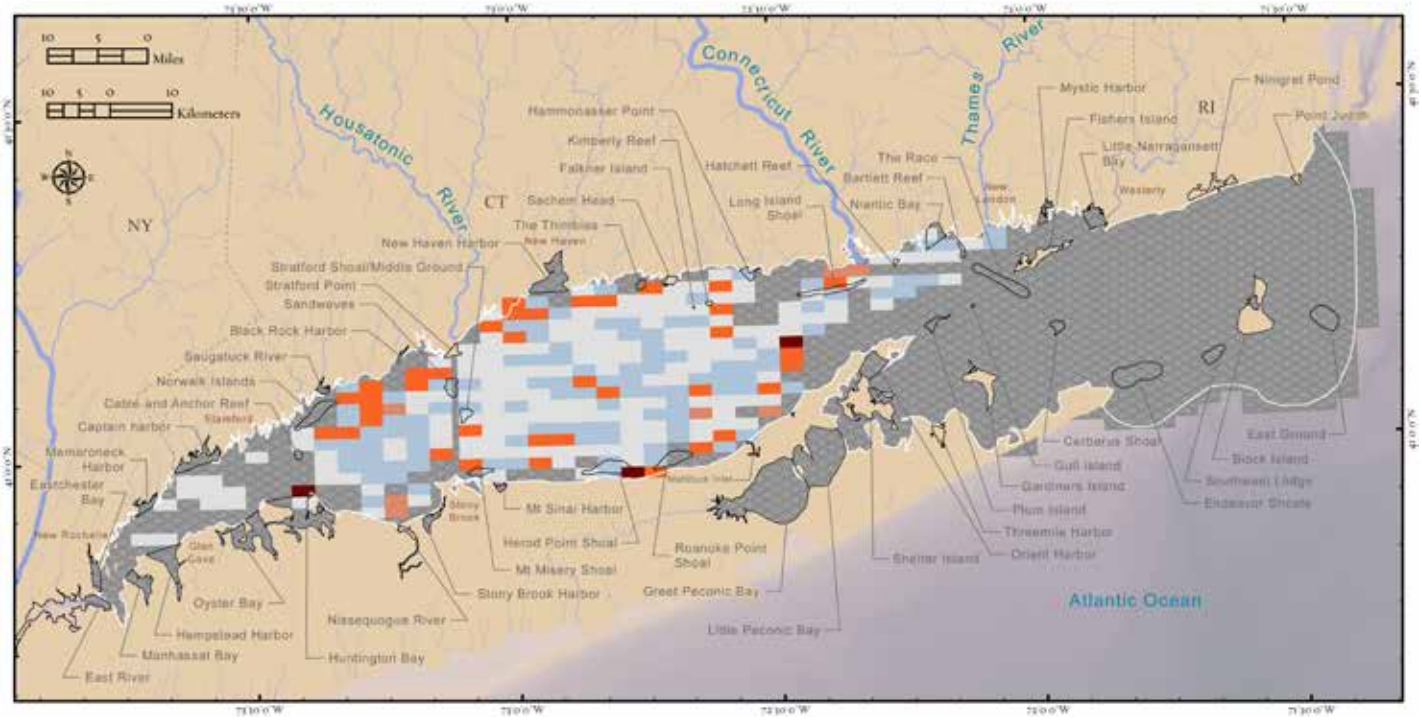
Mud Crabs

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

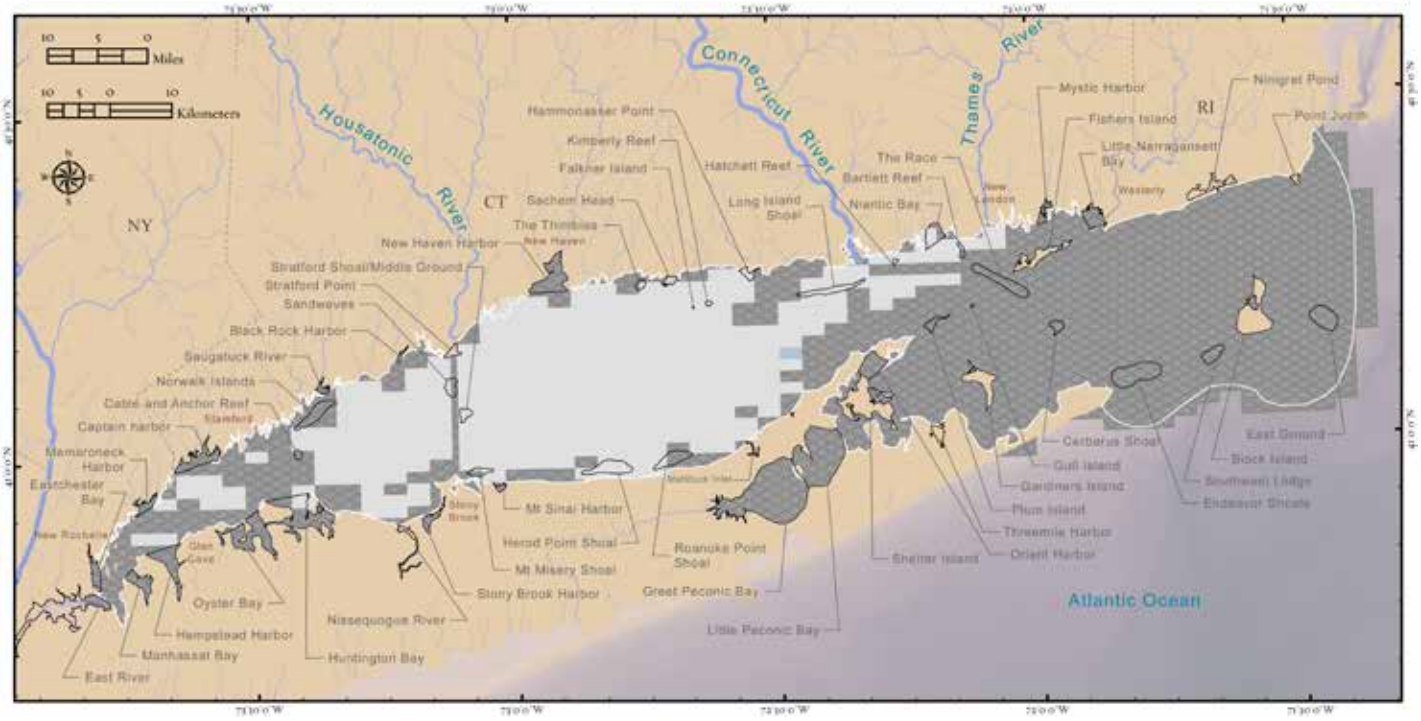
Naked Goby

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.

Cells Sampled in Fewer than Two Octads During Summer Months



Long Island Sound Ecological Assessment

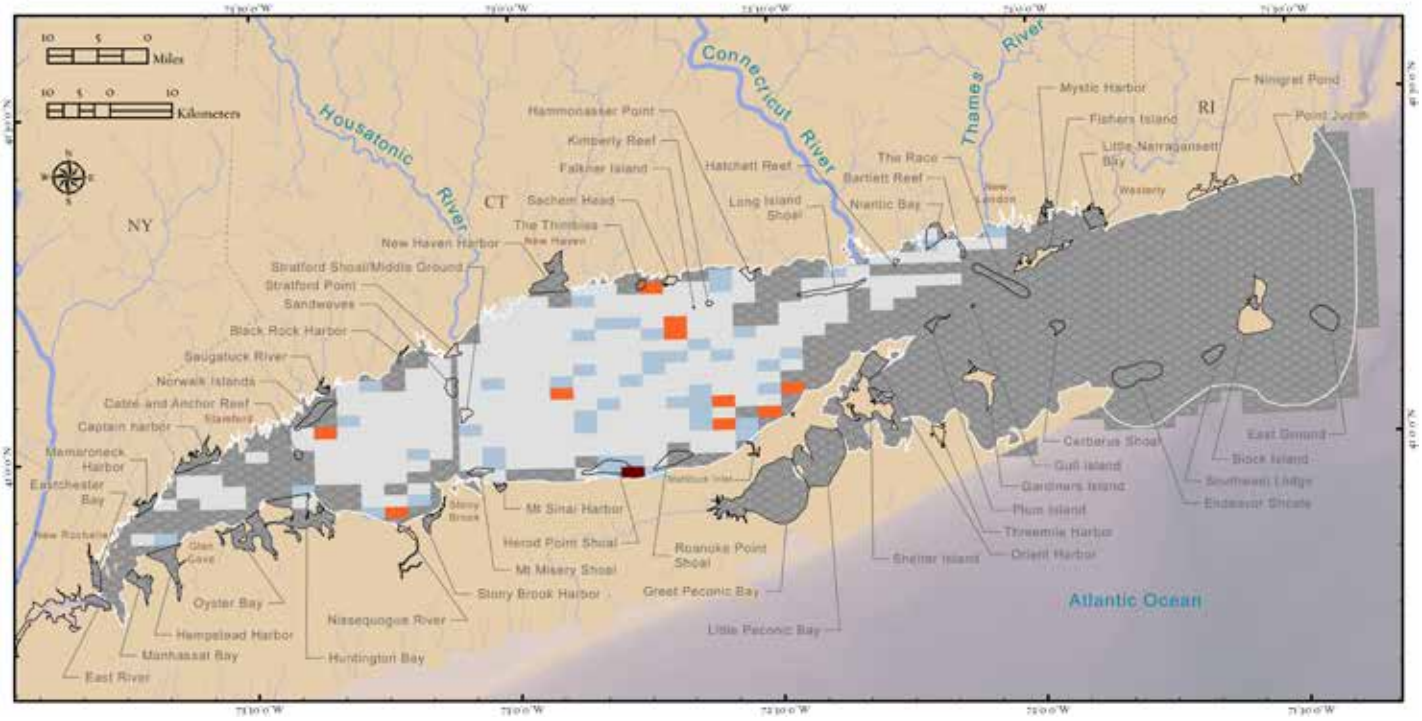
Northern Kingfish

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

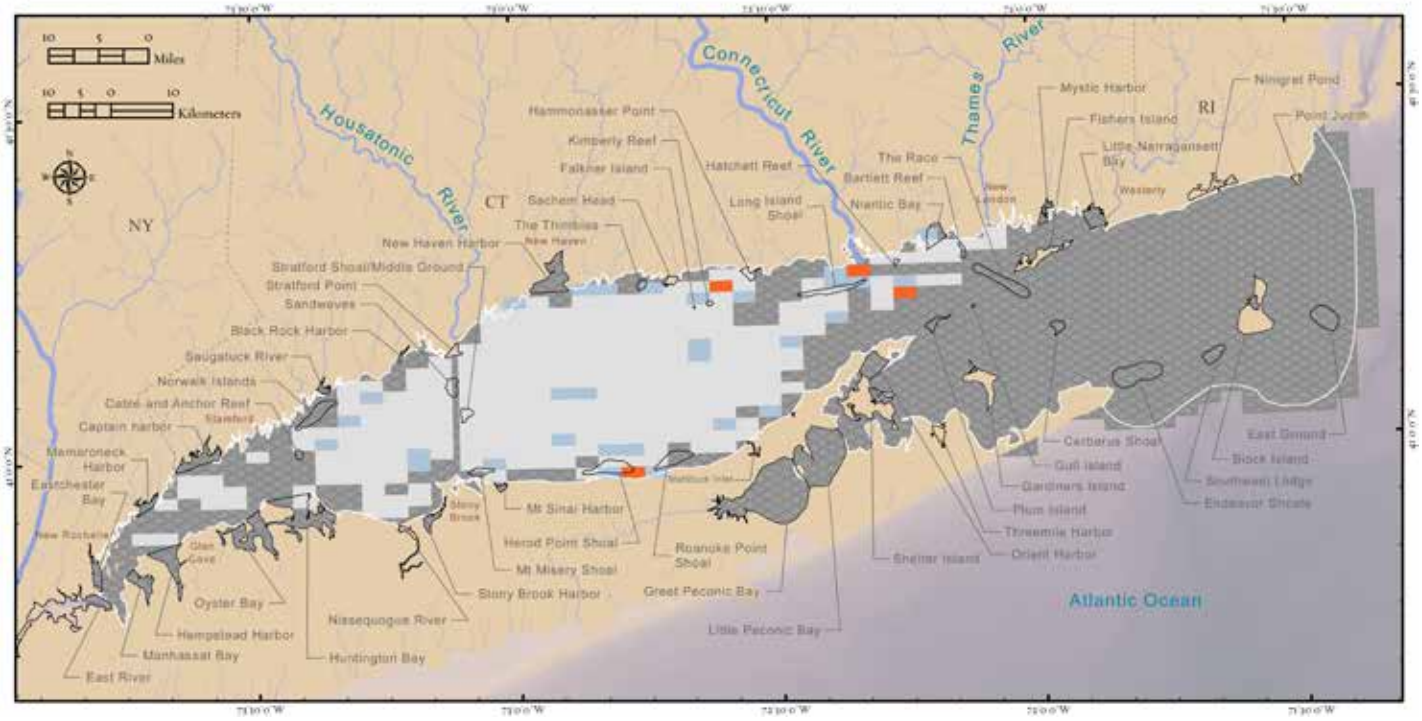
Northern Pipefish

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

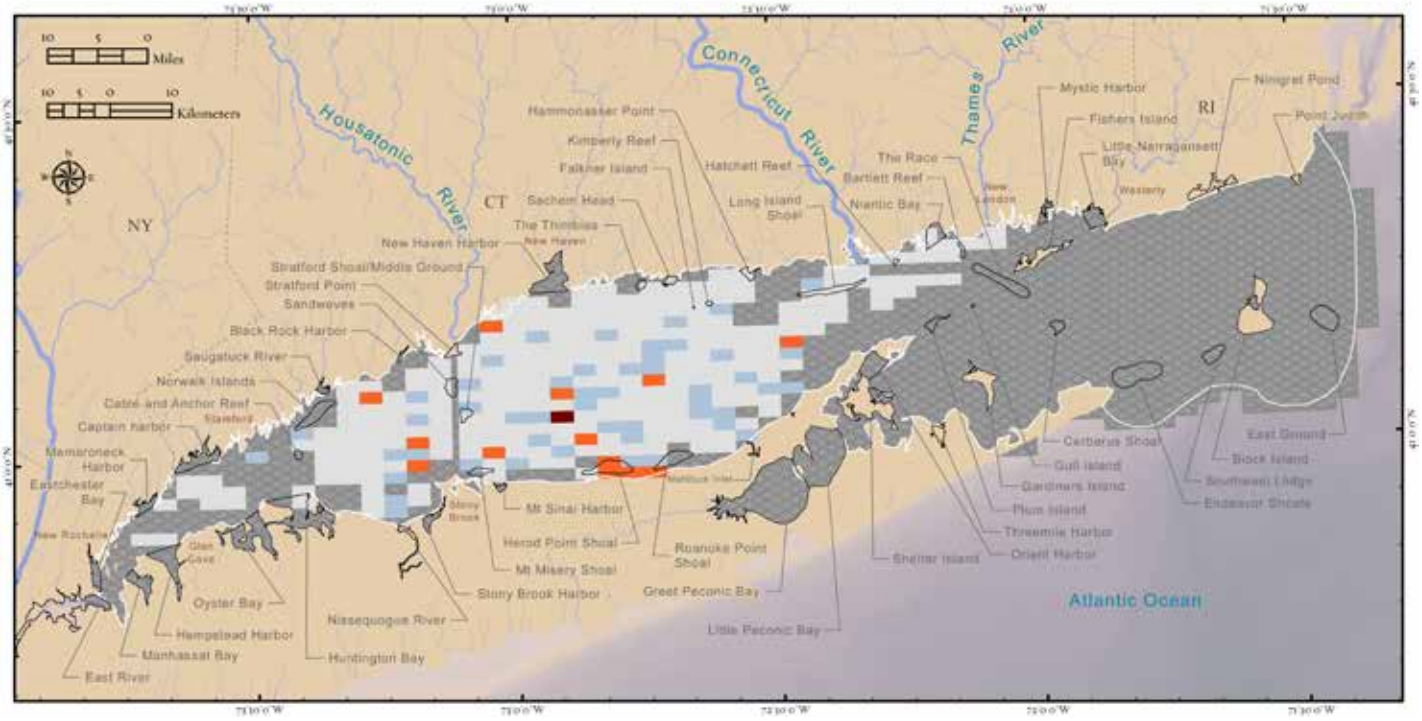
Northern Puffer

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

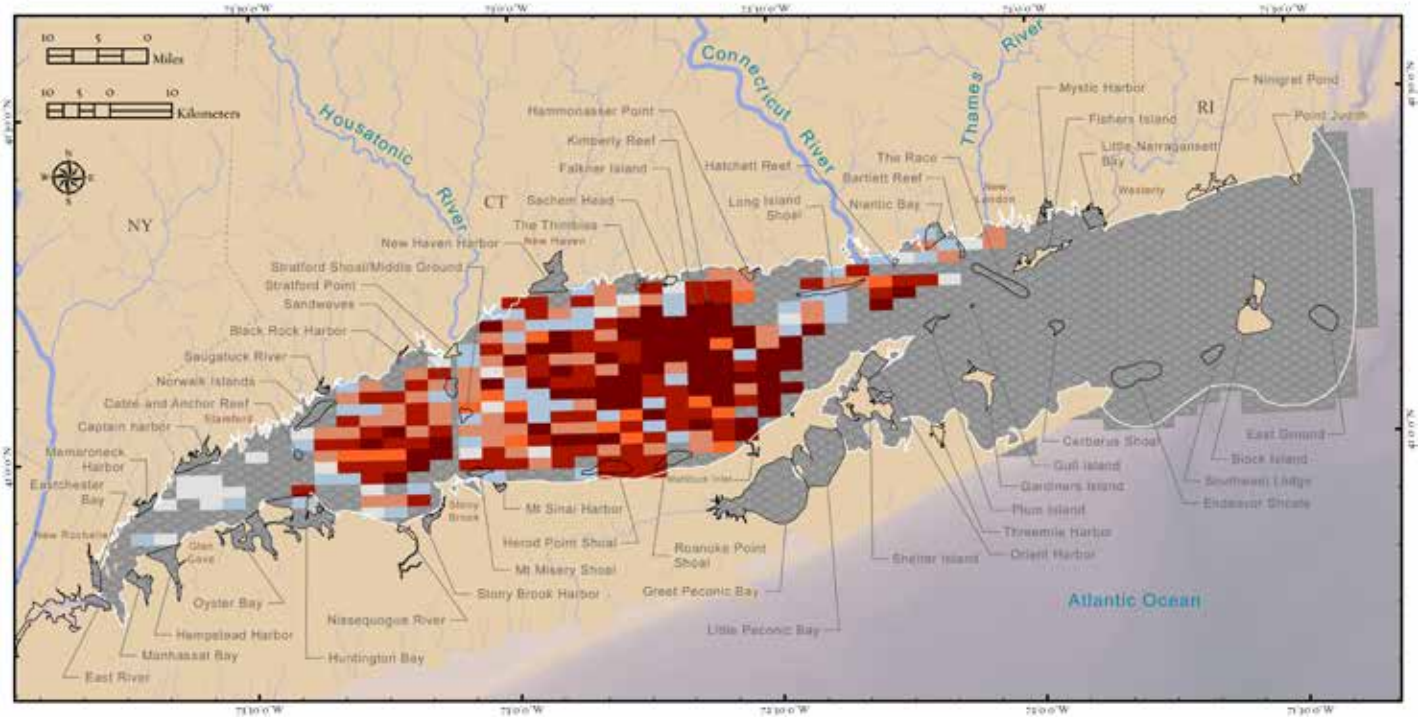
Northern Searobin

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

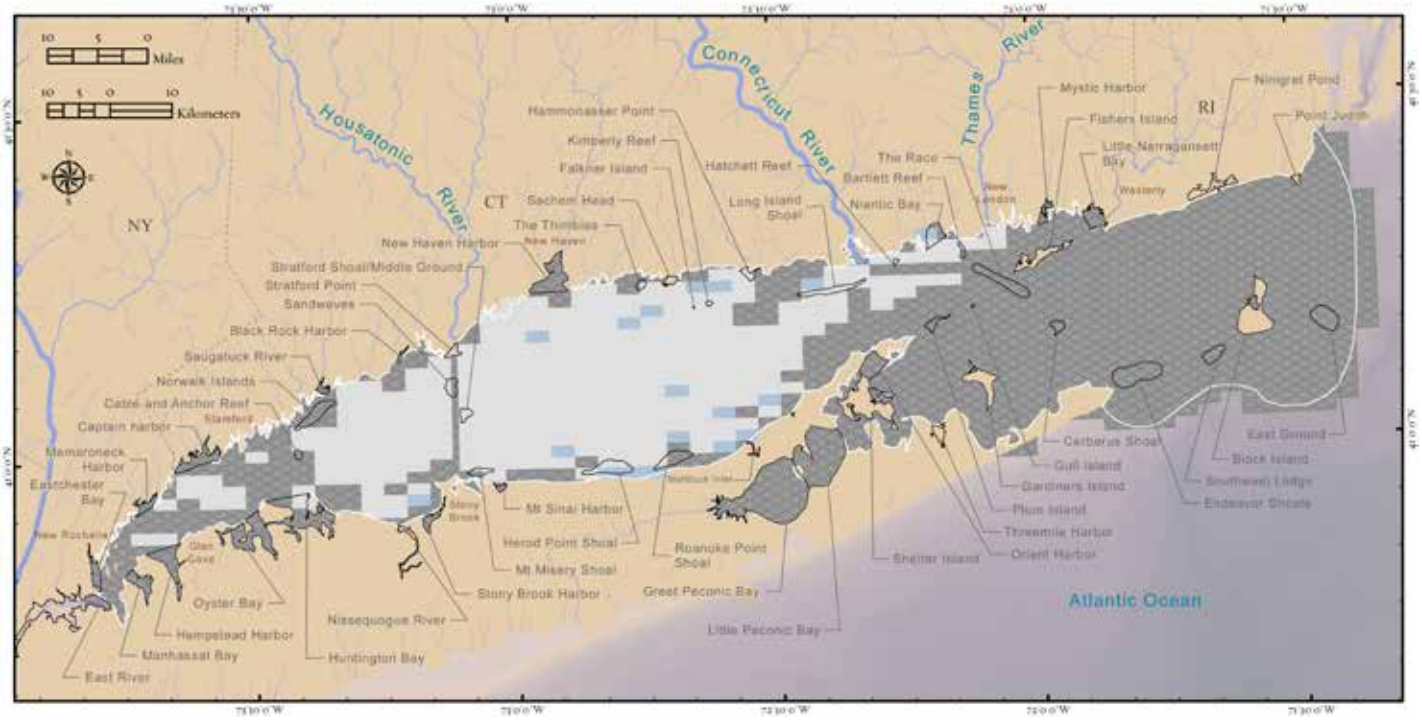
Northern Sennet

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

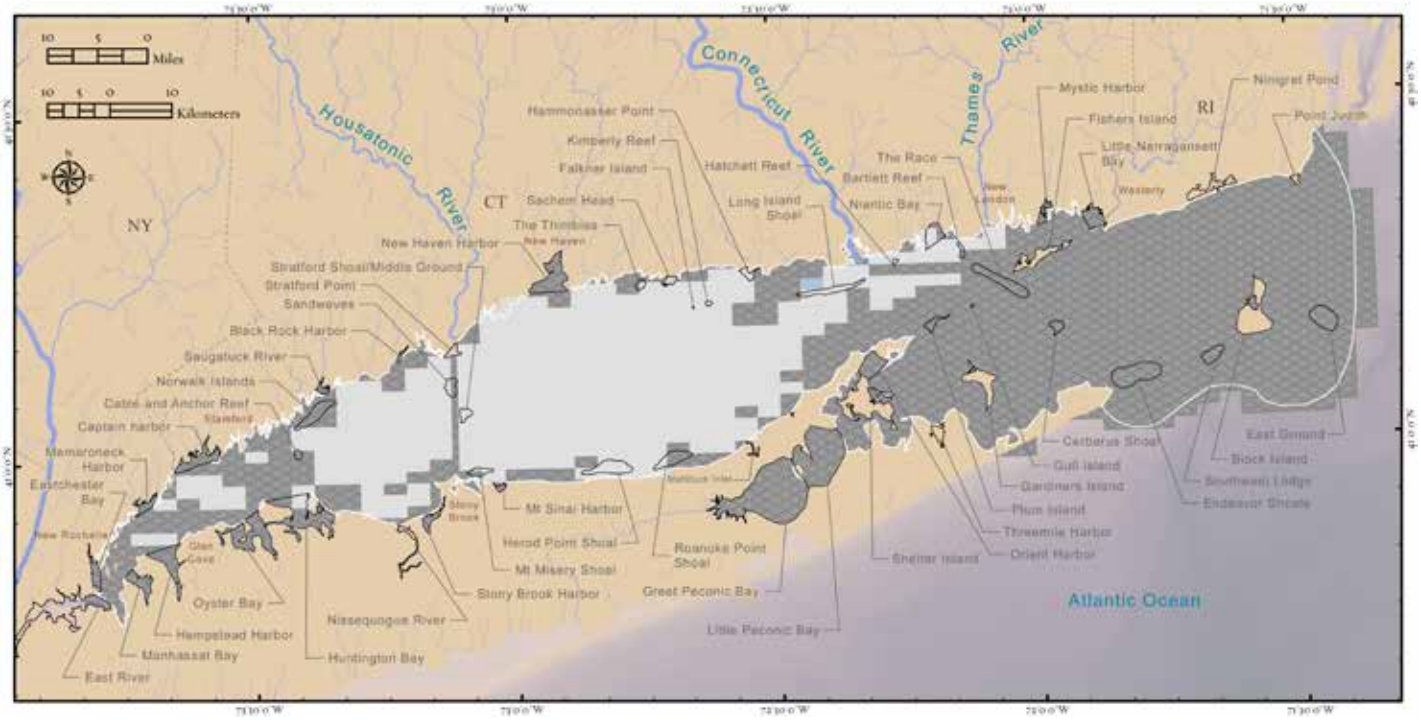
Northern Stargazer

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.

Cells Sampled in Fewer than Two Octads During Summer Months



Long Island Sound Ecological Assessment

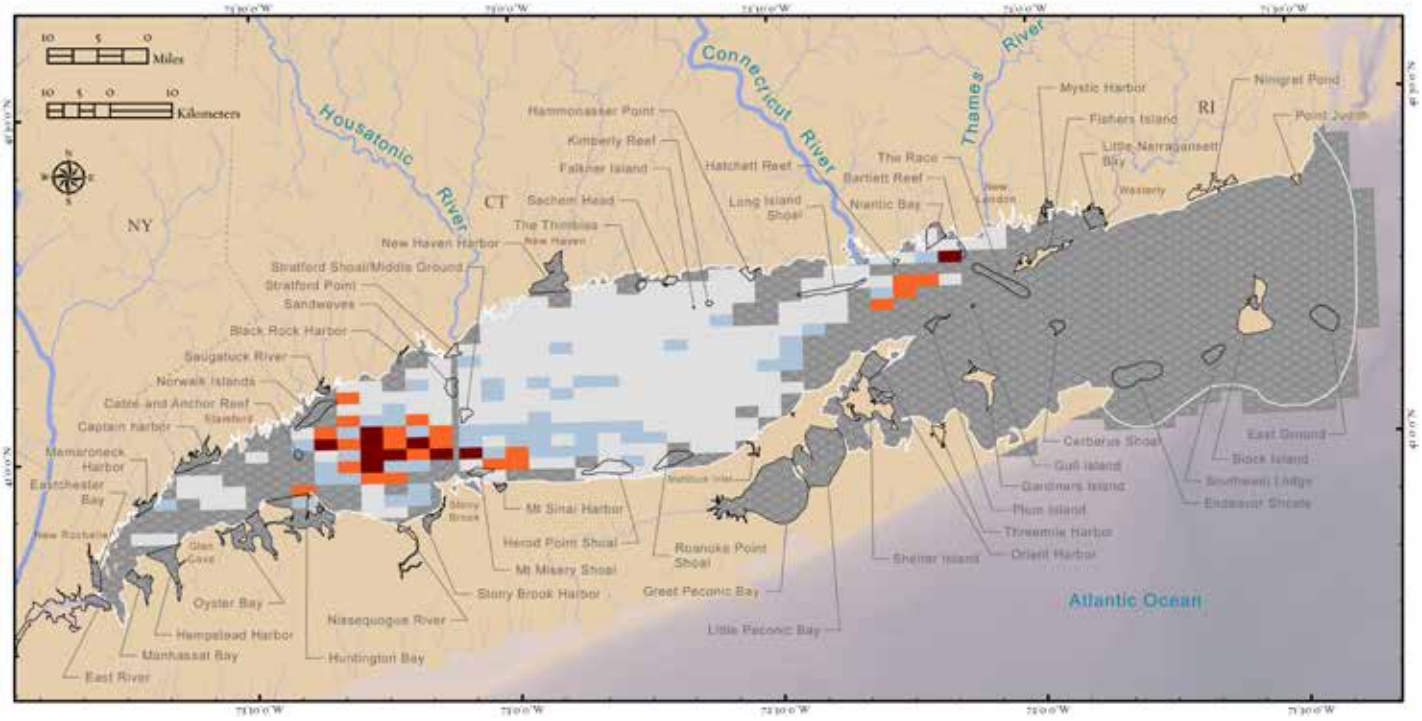
Ocean Pout

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

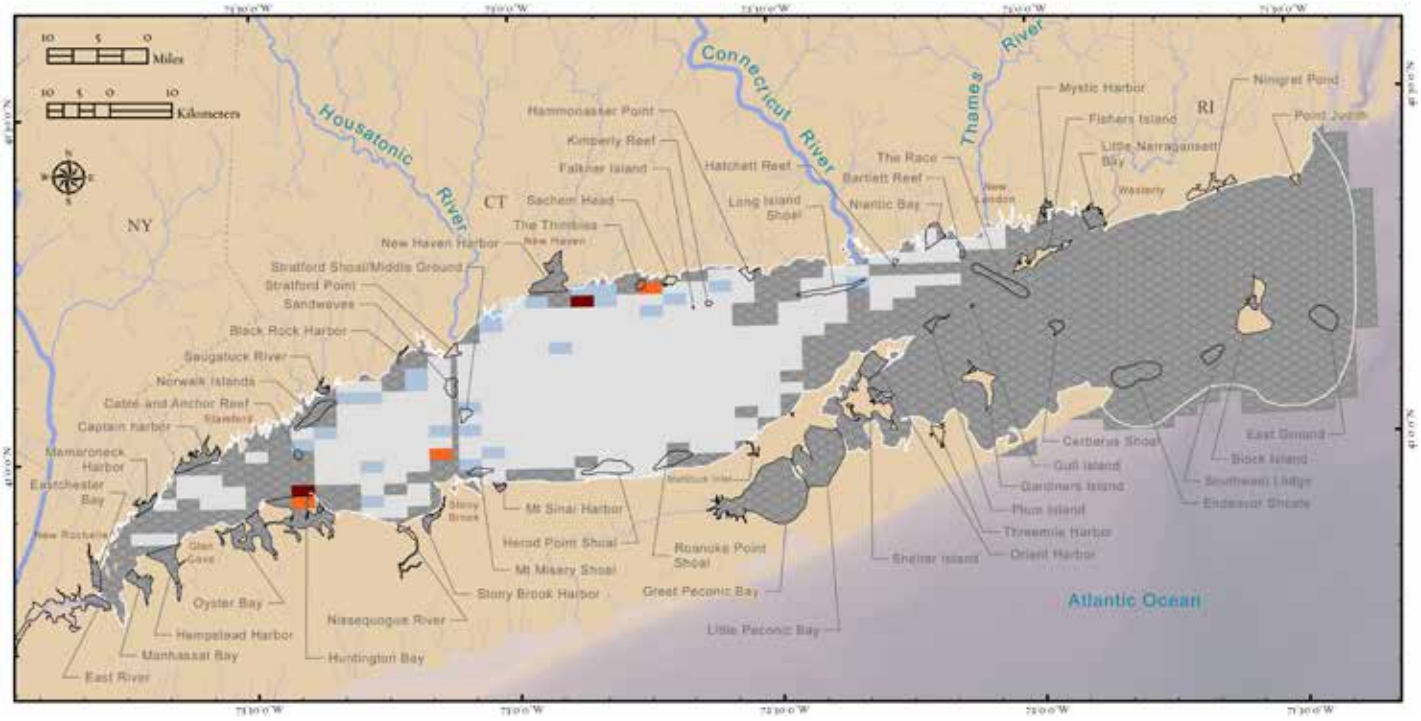
Oyster Toadfish

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

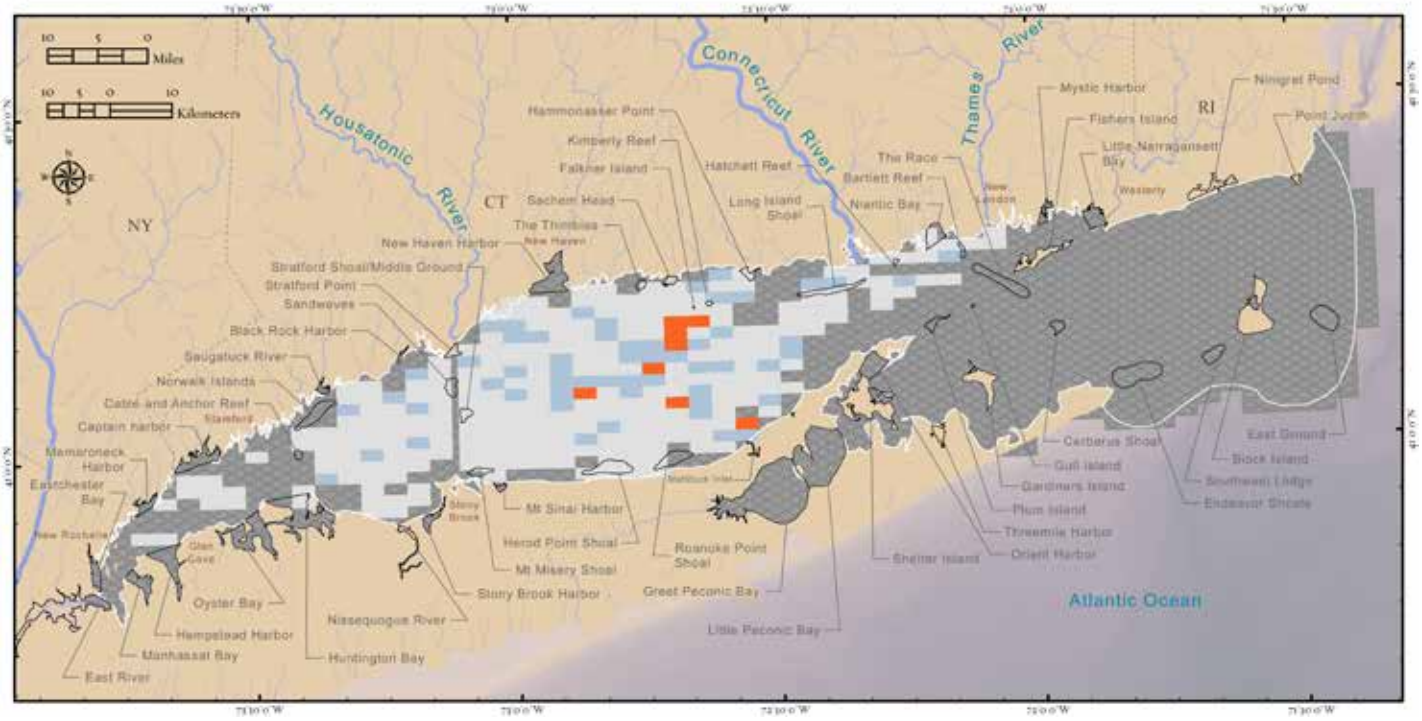
Planehead Filefish

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

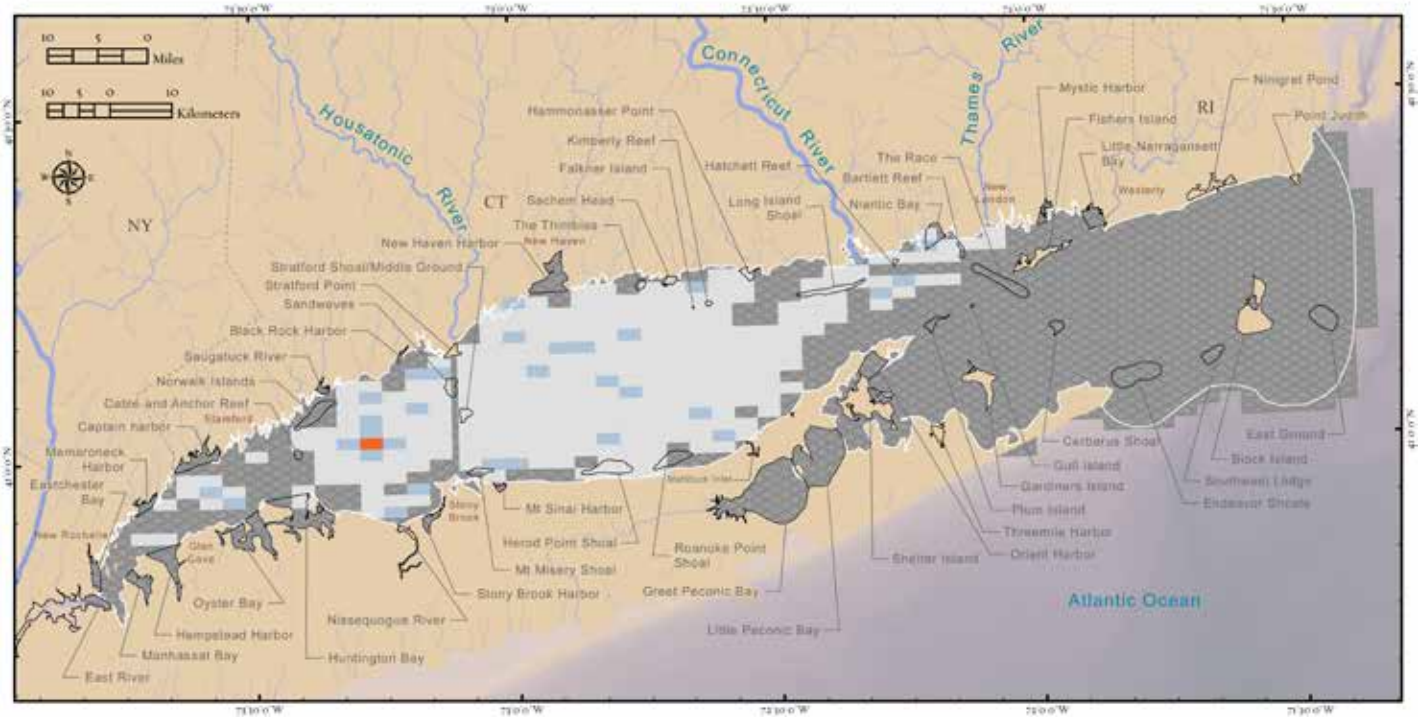
Pollock

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

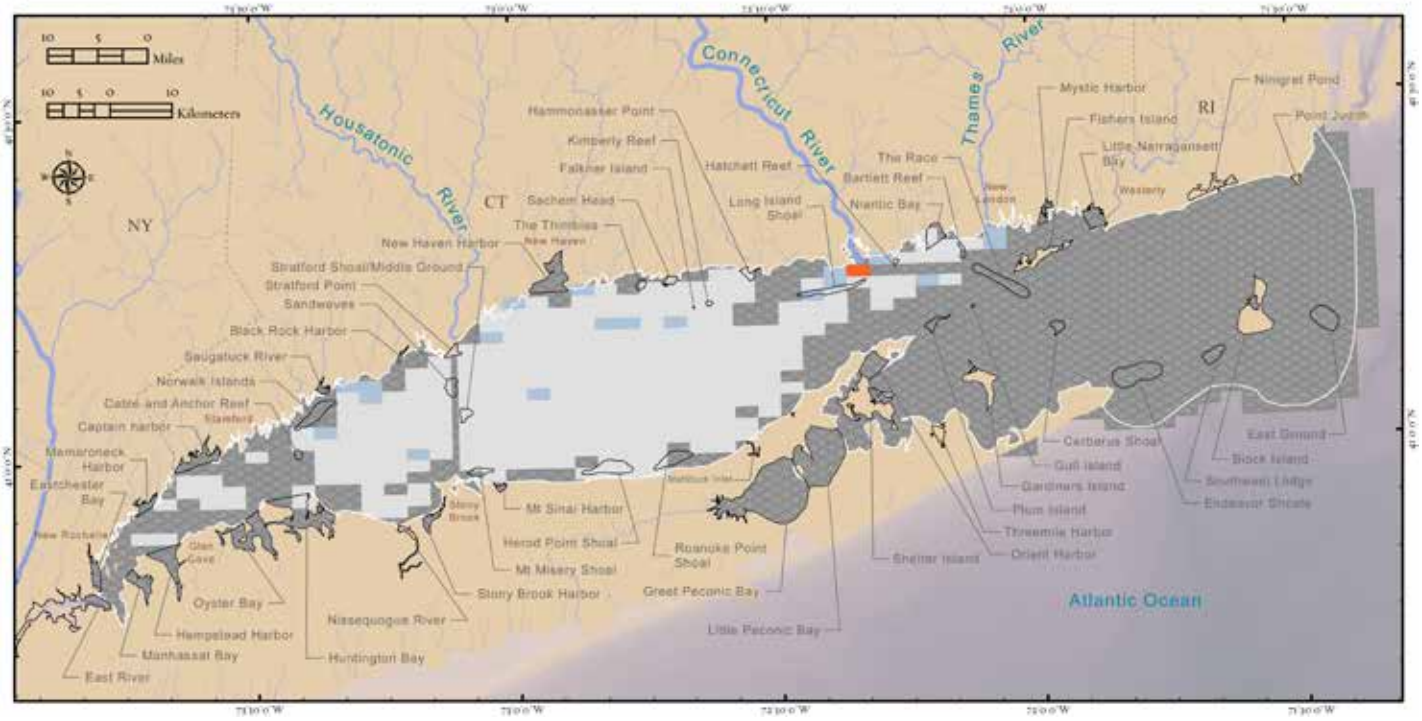
Rainbow Smelt

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

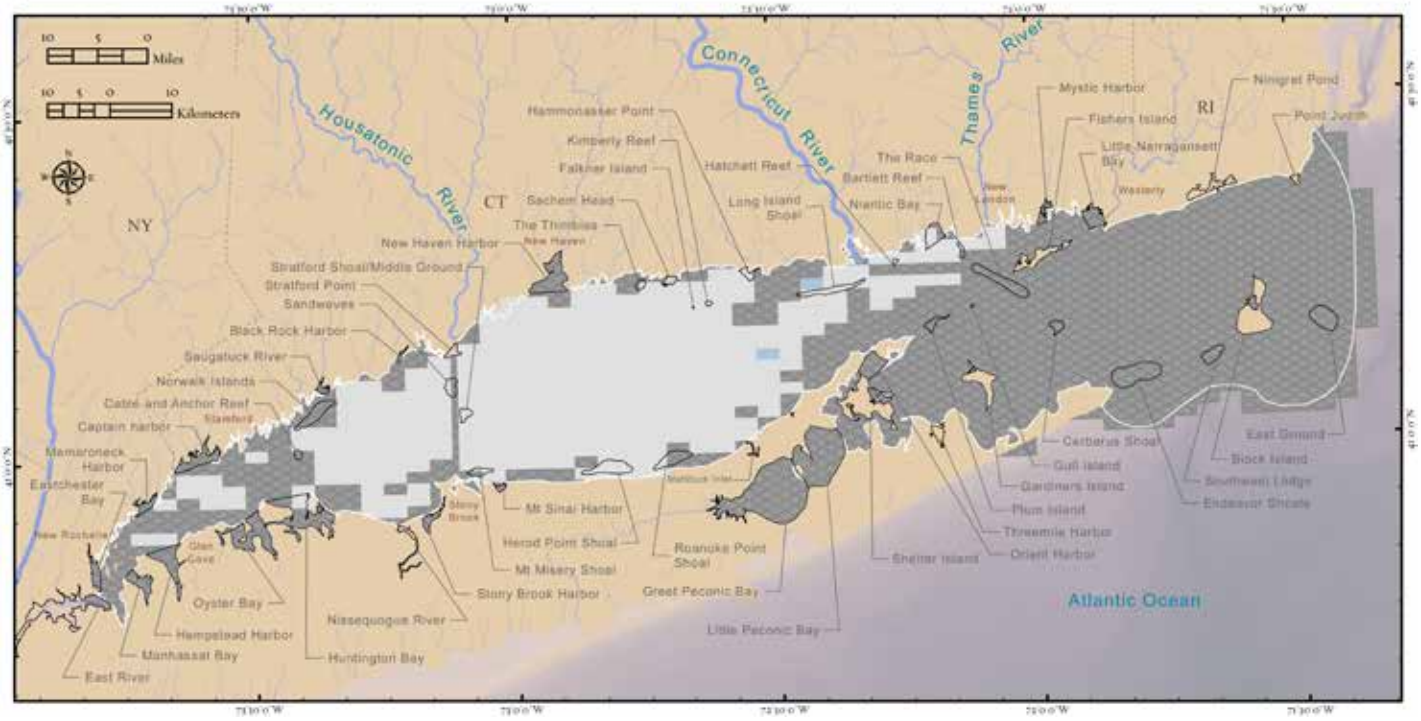
Red Cornetfish

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

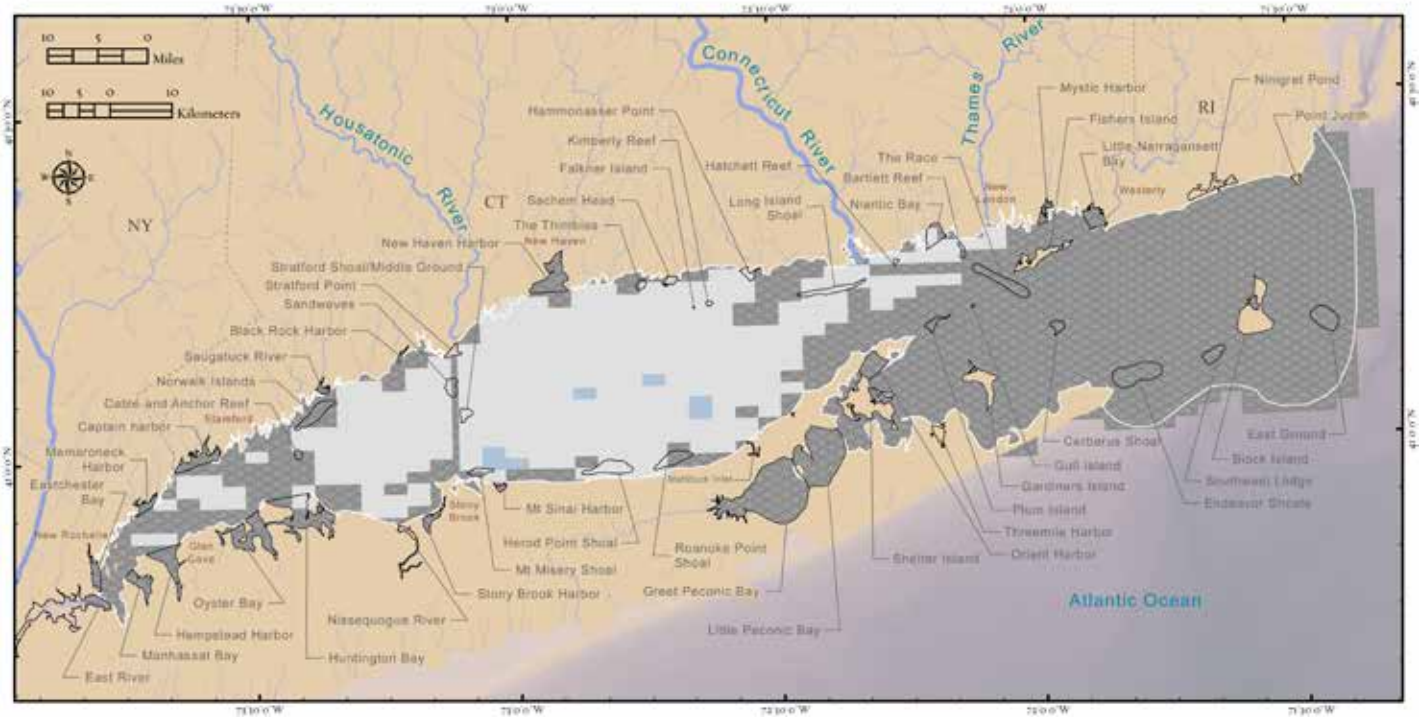
Red Goatfish

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

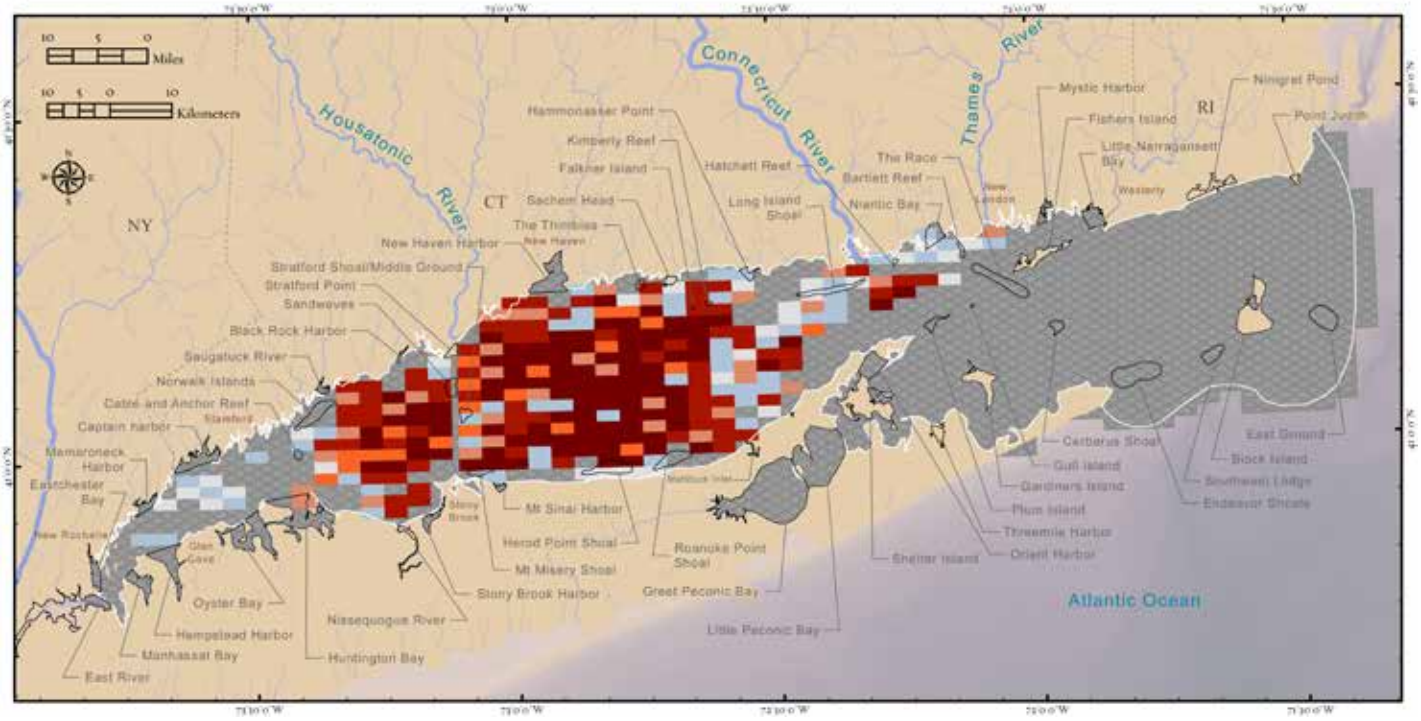
Red Hake

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

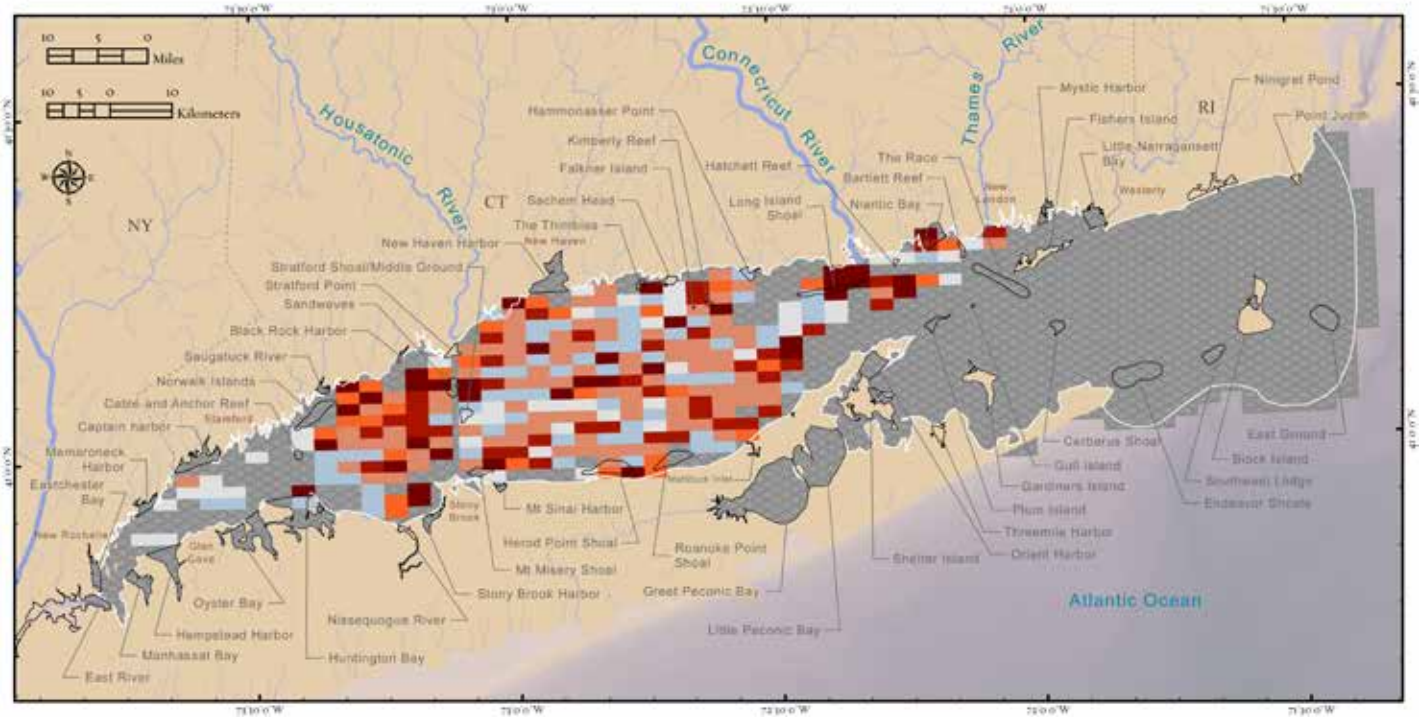
Rock Crab

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

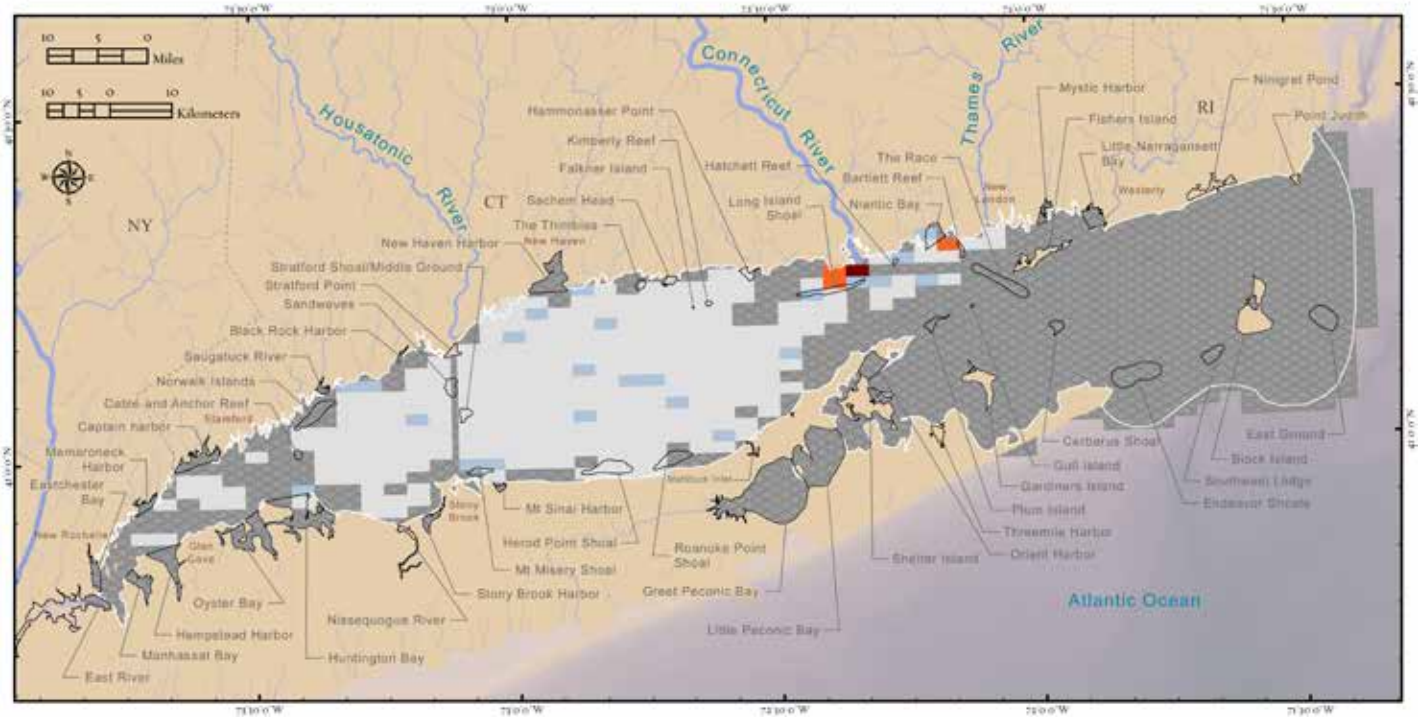
Rock Gunnel

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.

Cells Sampled in Fewer than Two Octads During Summer Months



Long Island Sound Ecological Assessment

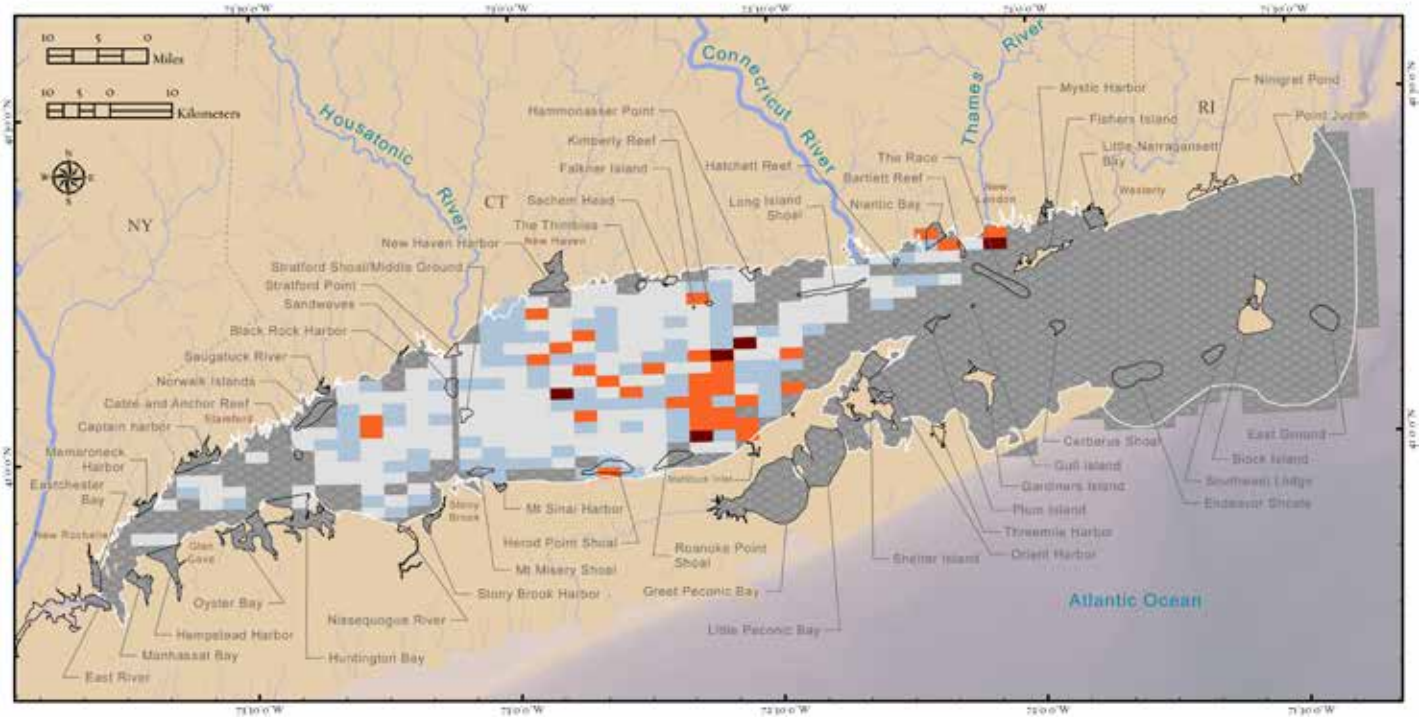
Rough Scad

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

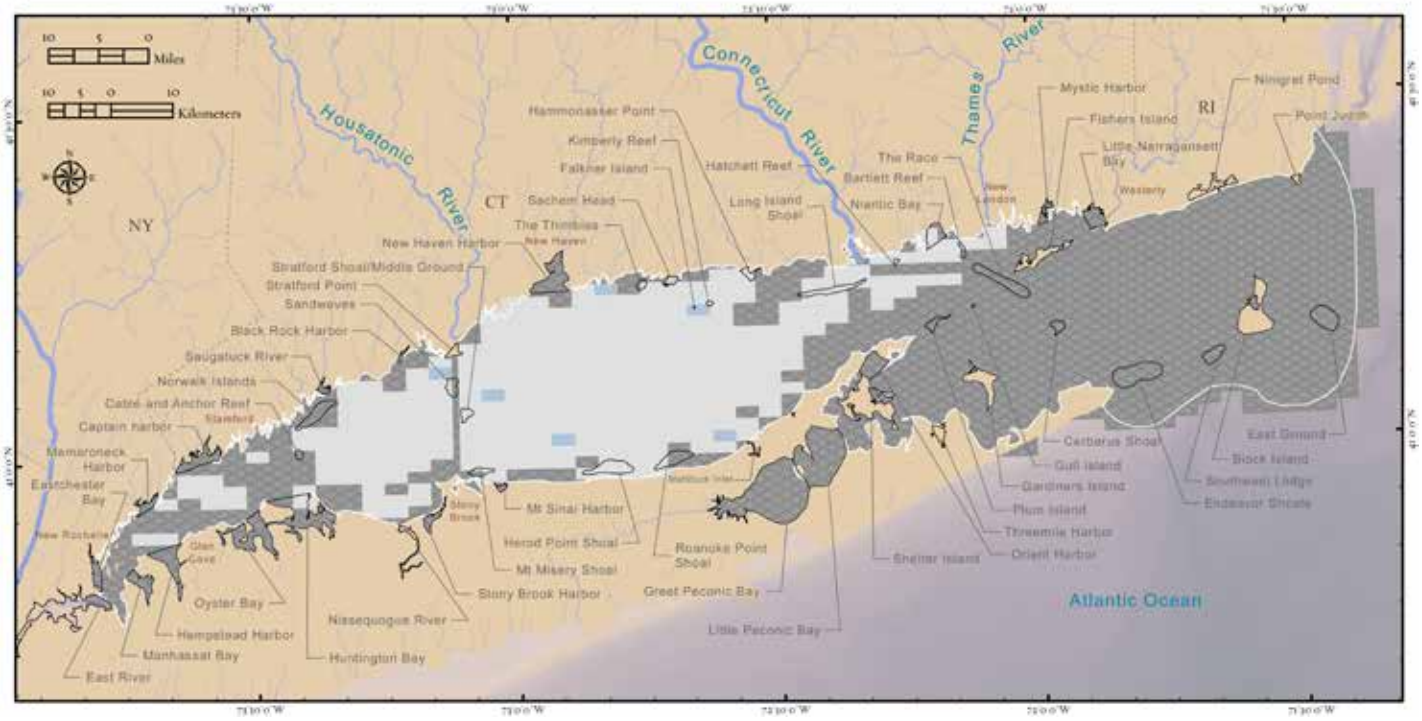
Roughtail Stingray

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

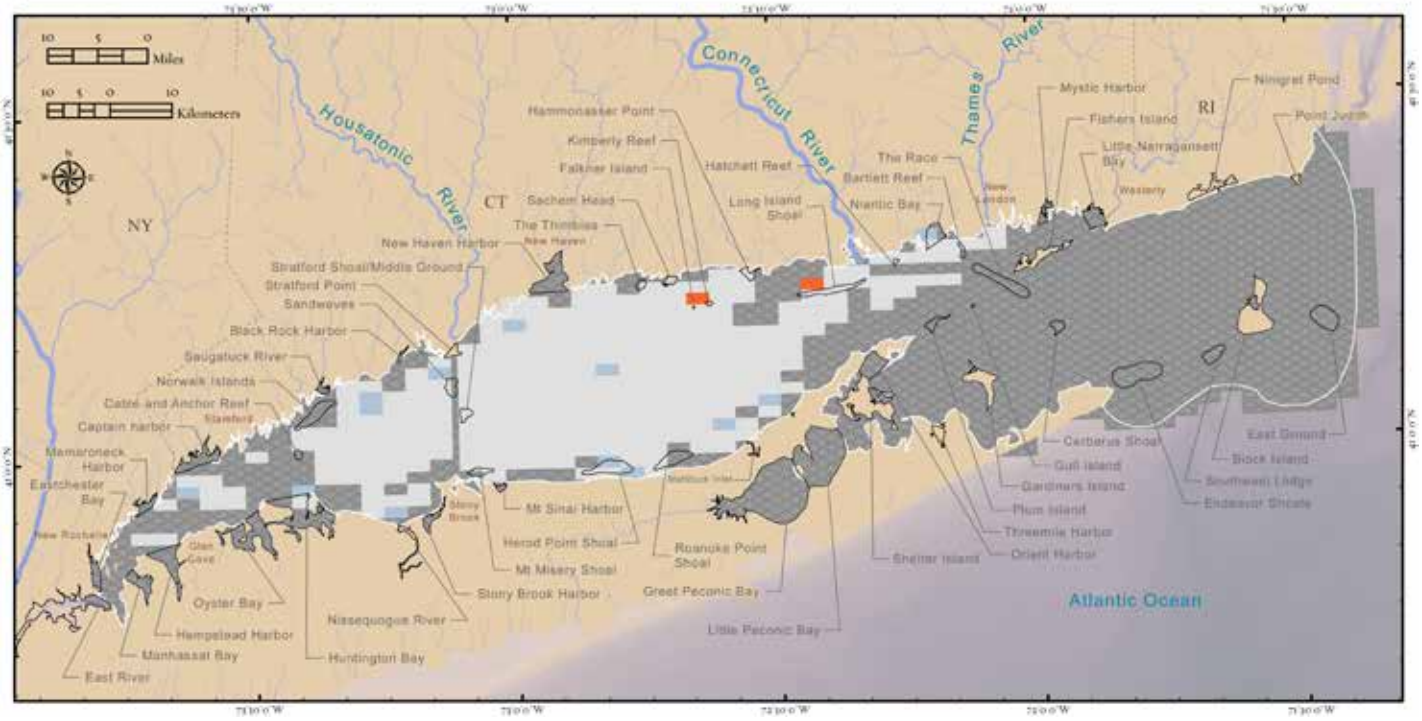
Round Herring

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

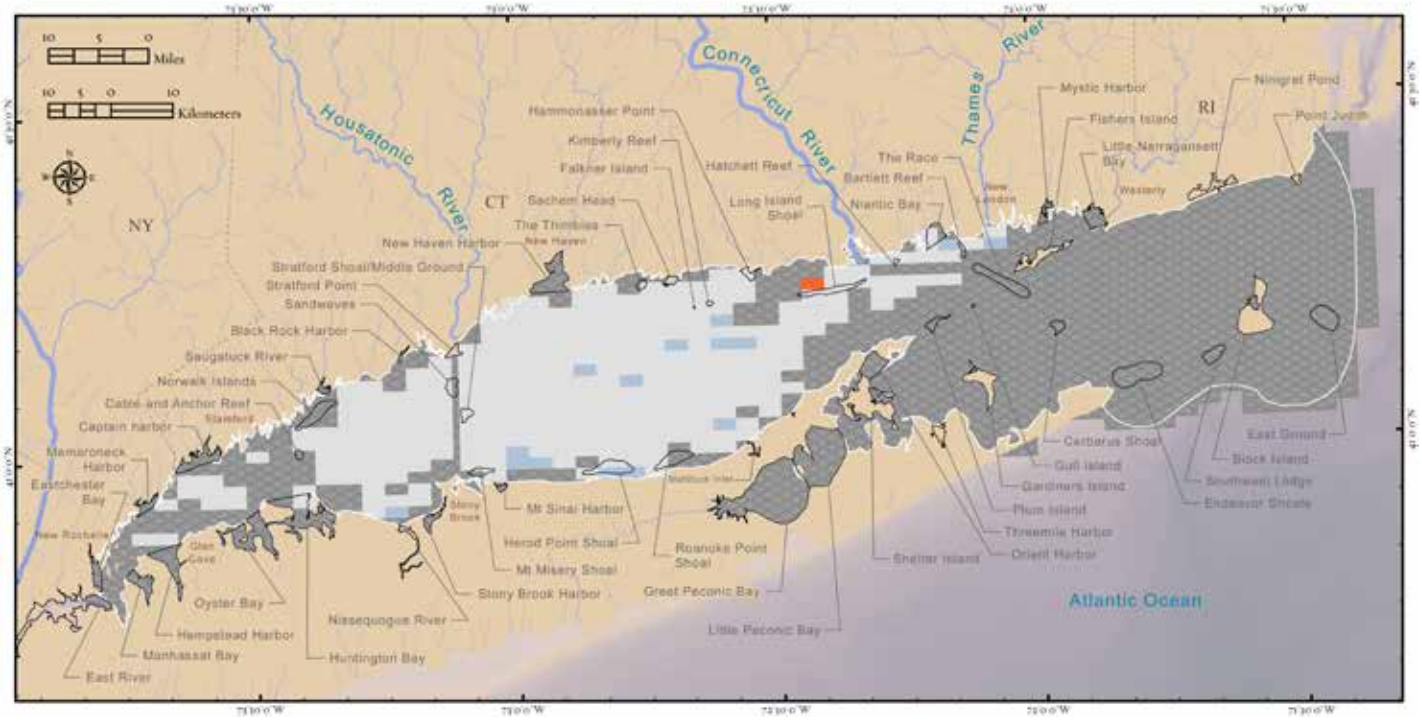
Round Scad

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.

Cells Sampled in Fewer than Two Octads During Summer Months



Long Island Sound Ecological Assessment

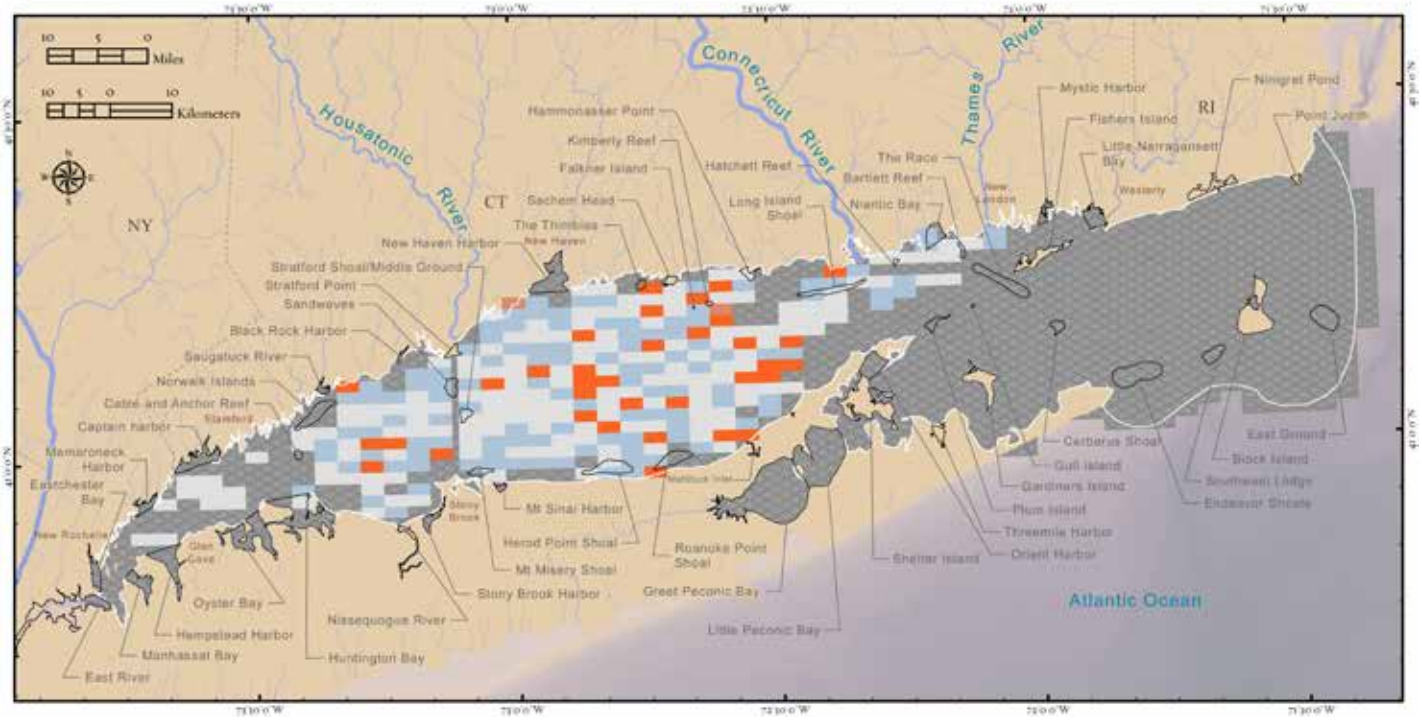
Sand Shrimp

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

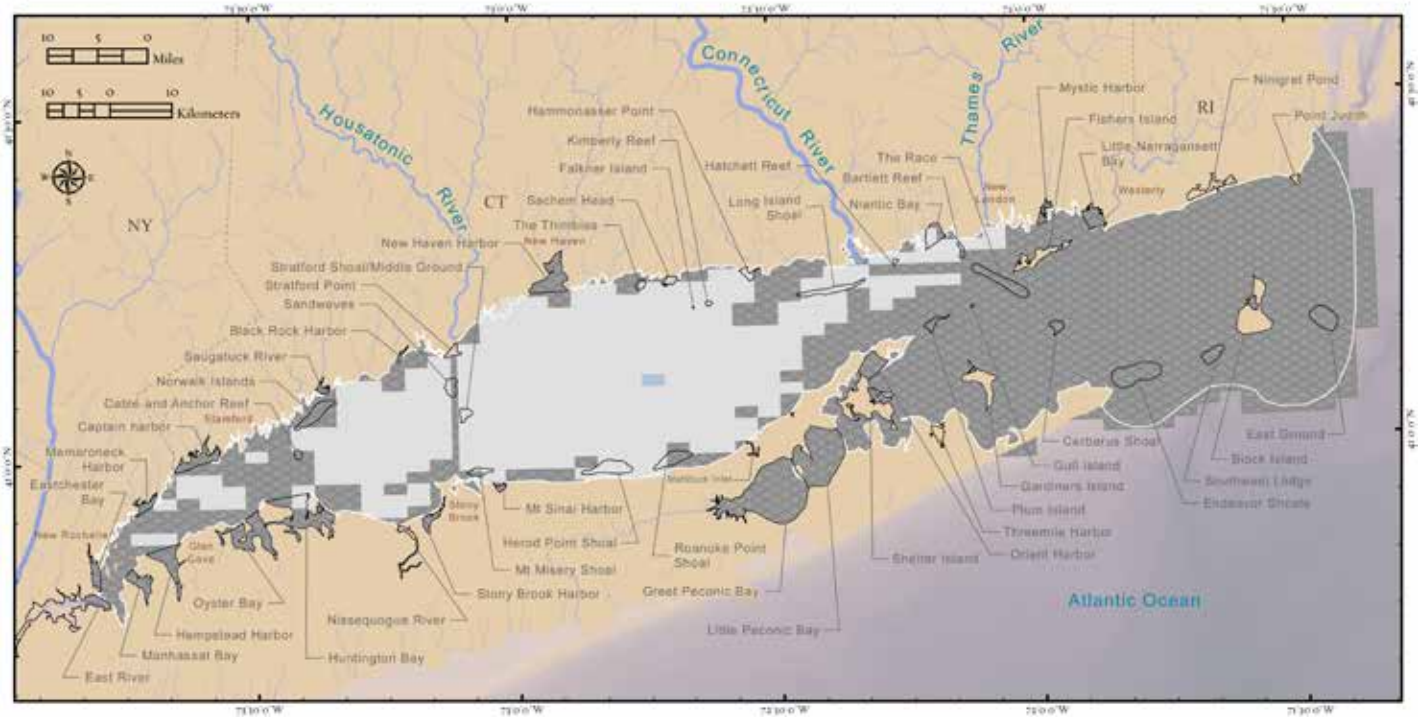
Sandbar Shark

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.

Cells Sampled in Fewer than Two Octads During Summer Months



Long Island Sound Ecological Assessment

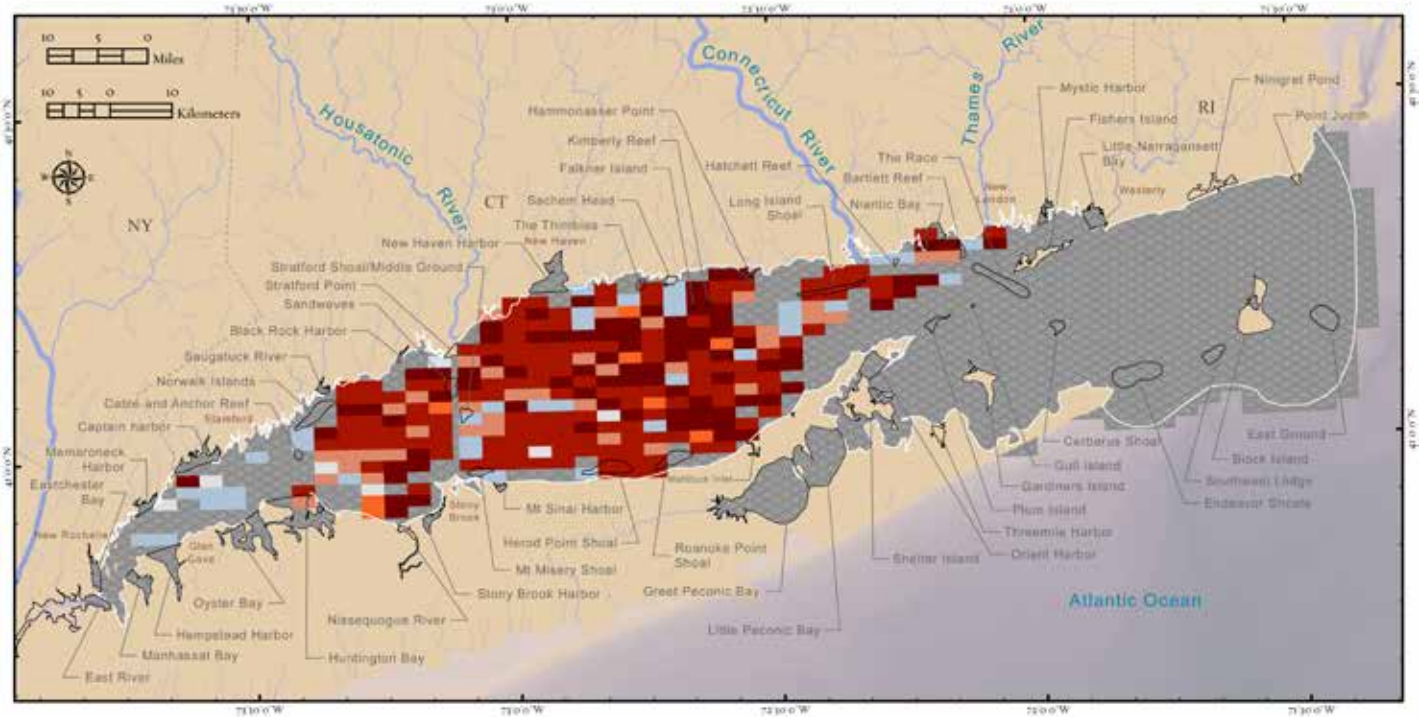
Scup

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

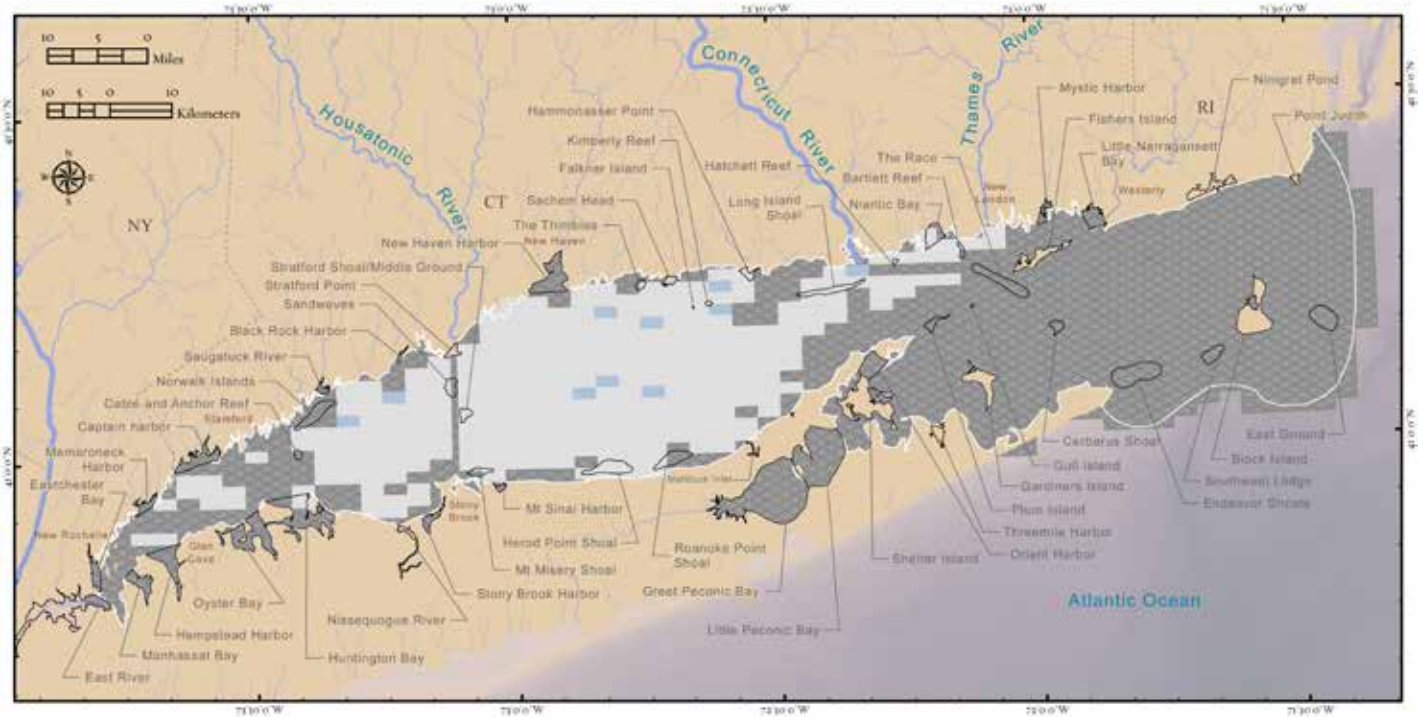
Sea Lamprey

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.

Cells Sampled in Fewer than Two Octads During Summer Months



Long Island Sound Ecological Assessment

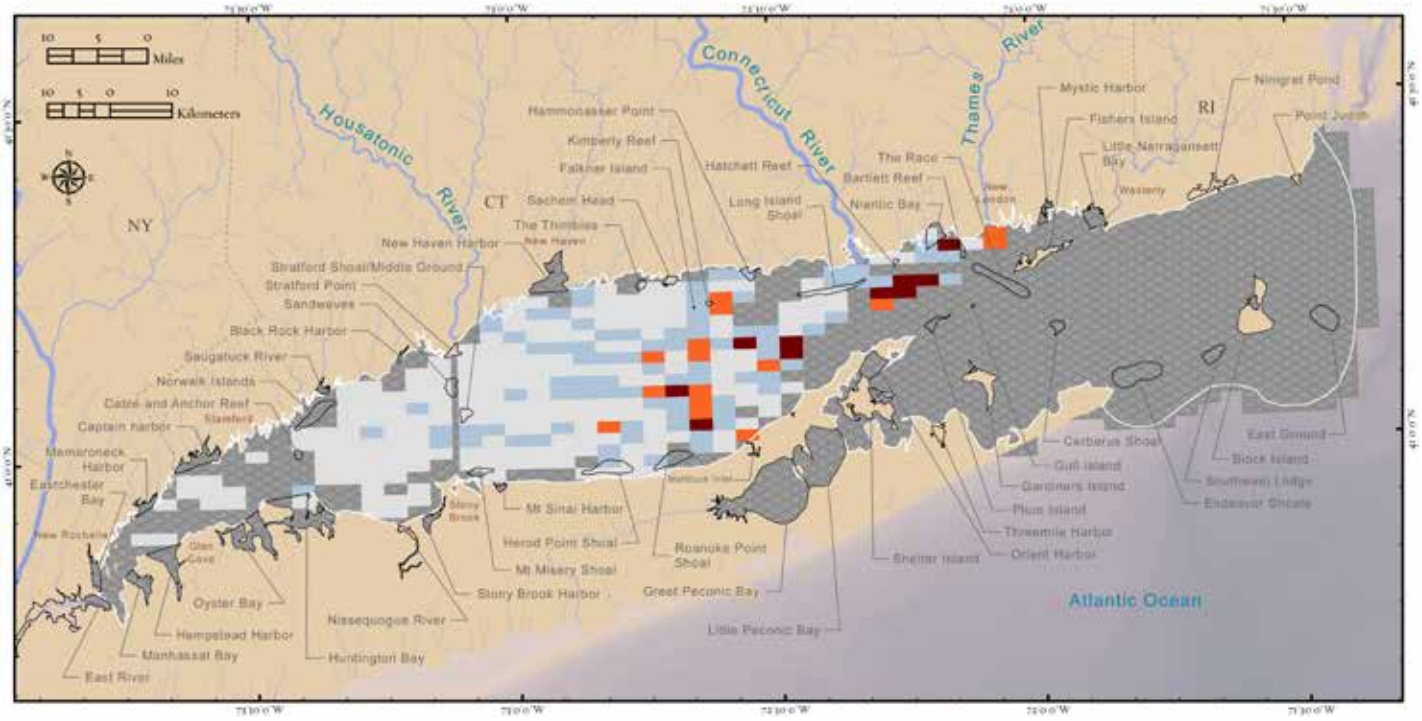
Sea Raven

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

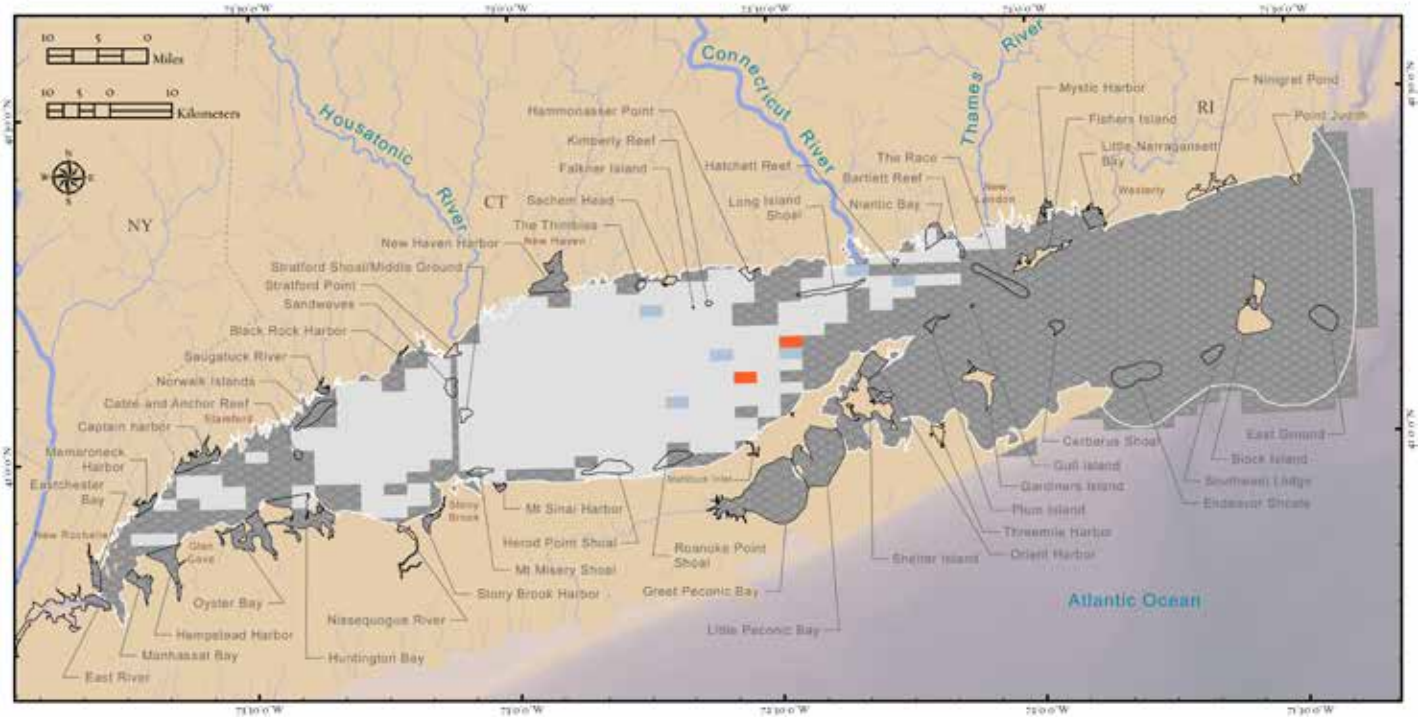
Seasnail

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

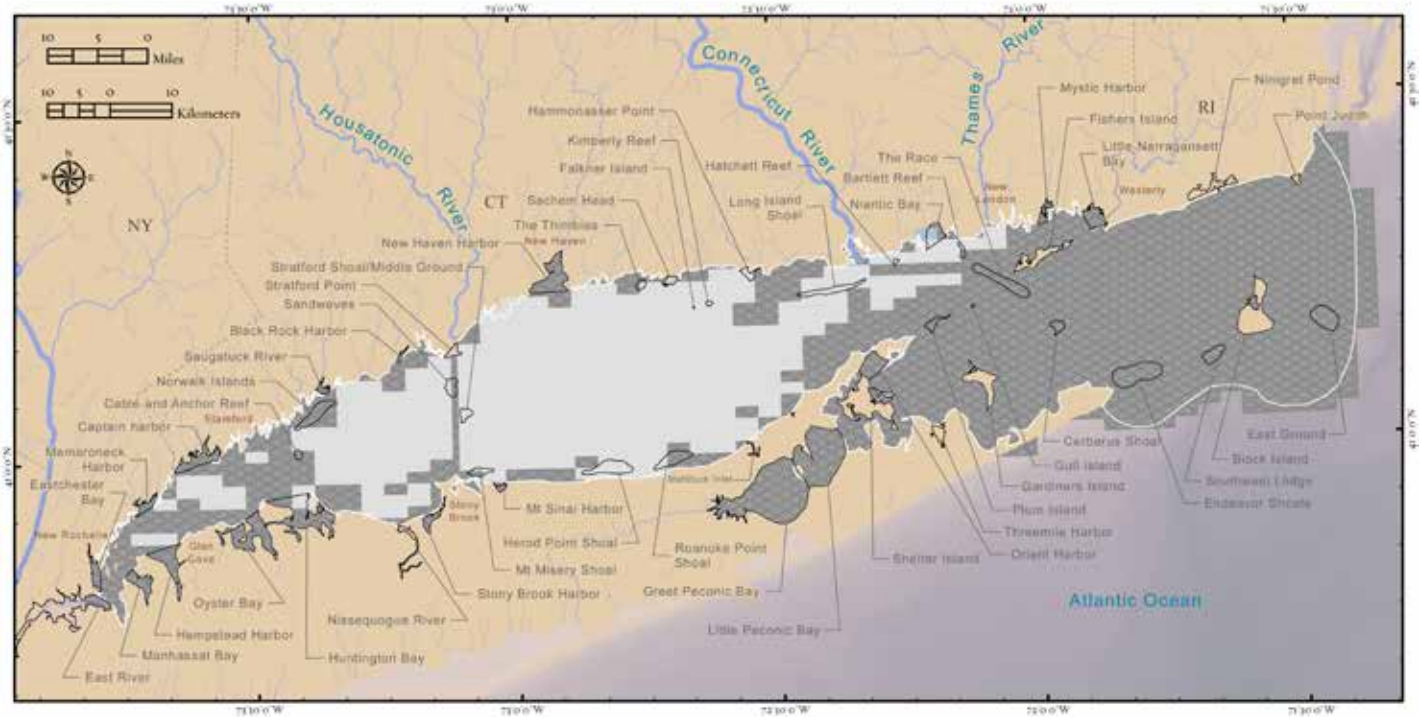
Sharksucker

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

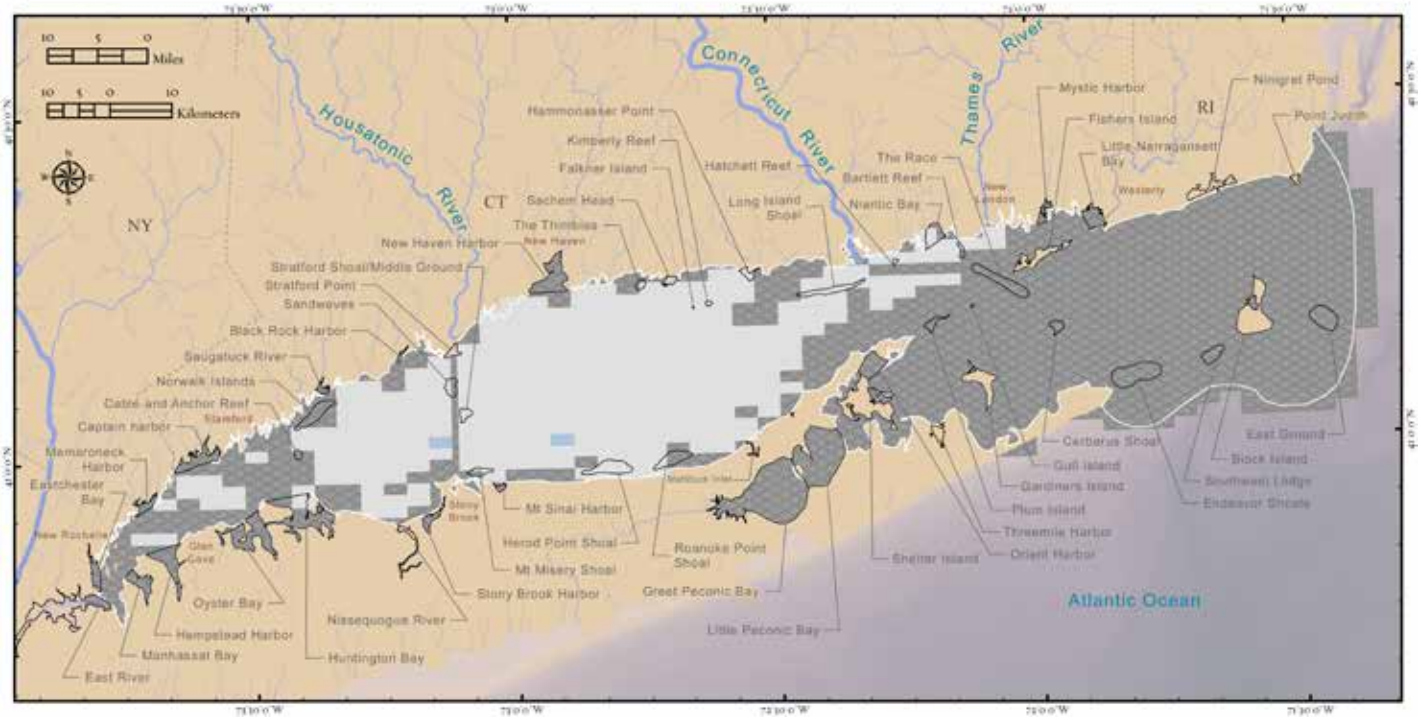
Shore Shrimp

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.

Cells Sampled in Fewer than Two Octads During Summer Months



Long Island Sound Ecological Assessment

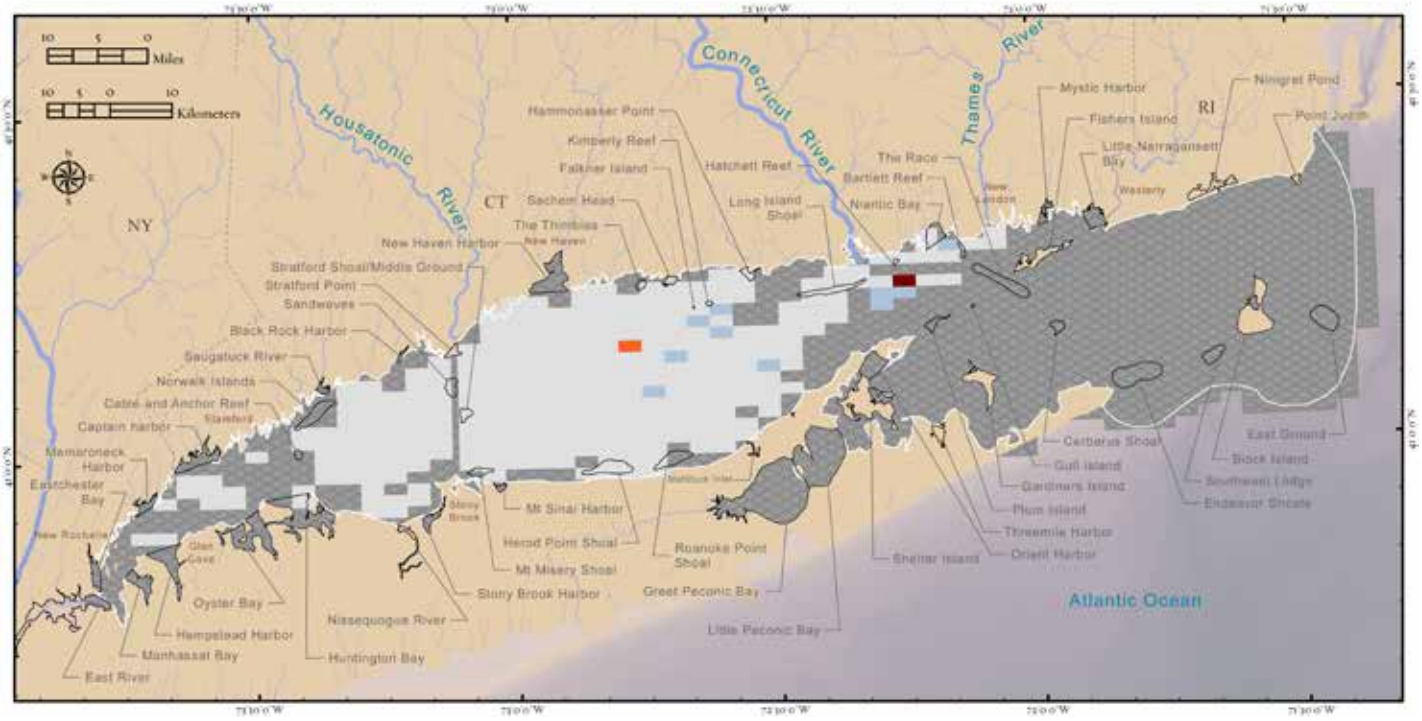
Short Bigeye

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

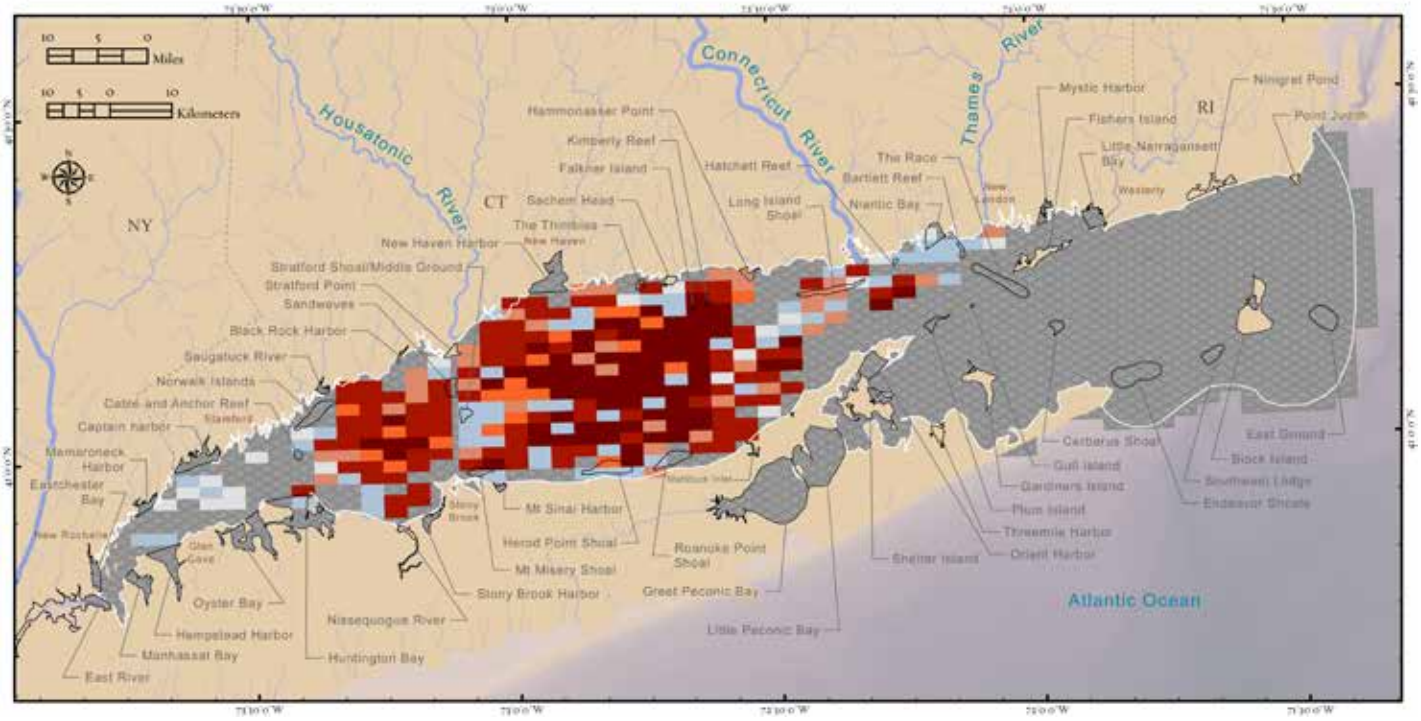
Silver Hake

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

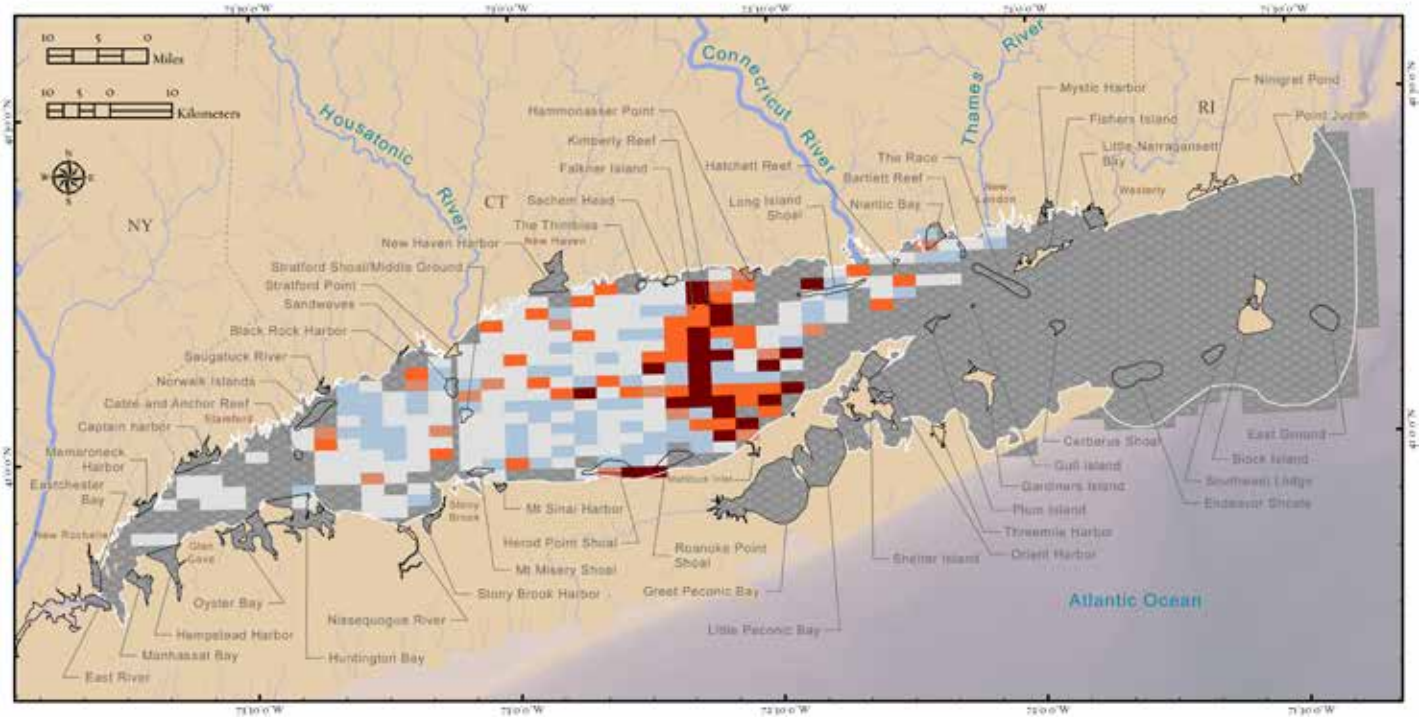
Smallmouth Flounder

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

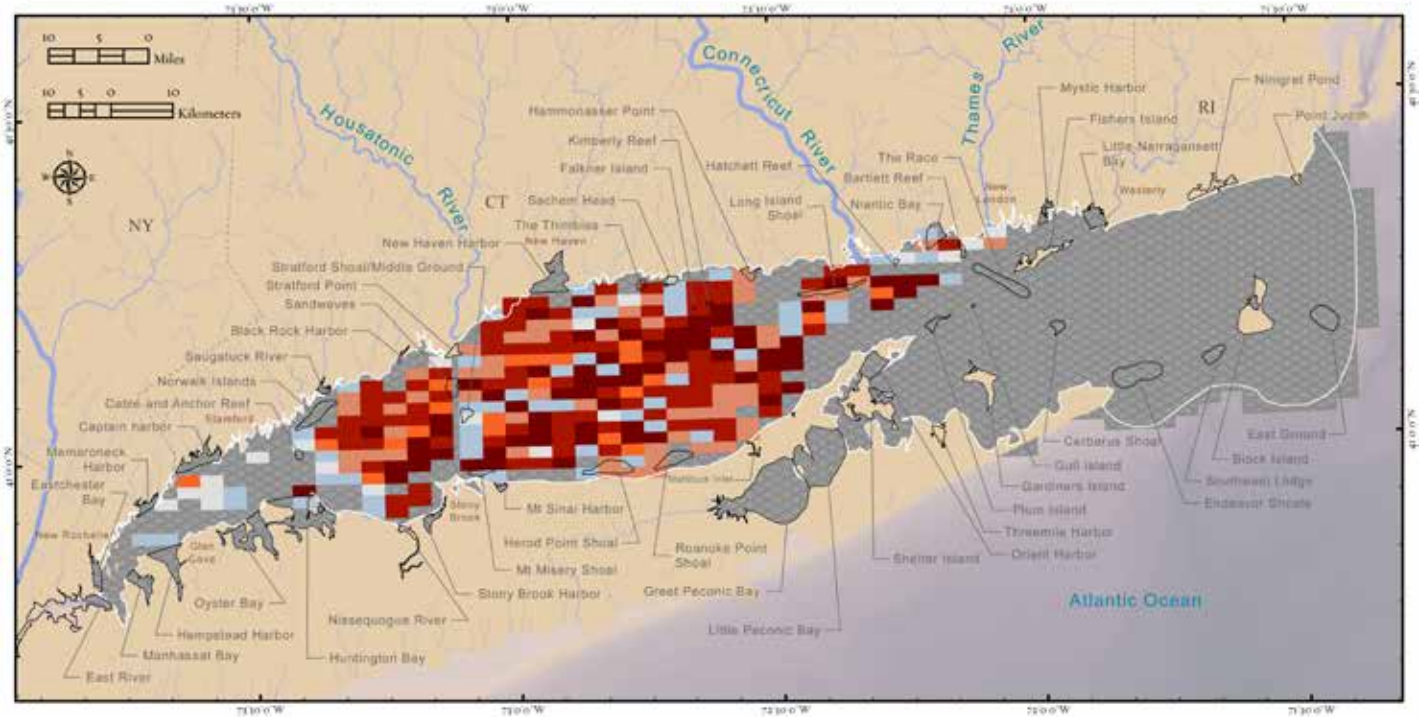
Smooth Dogfish

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

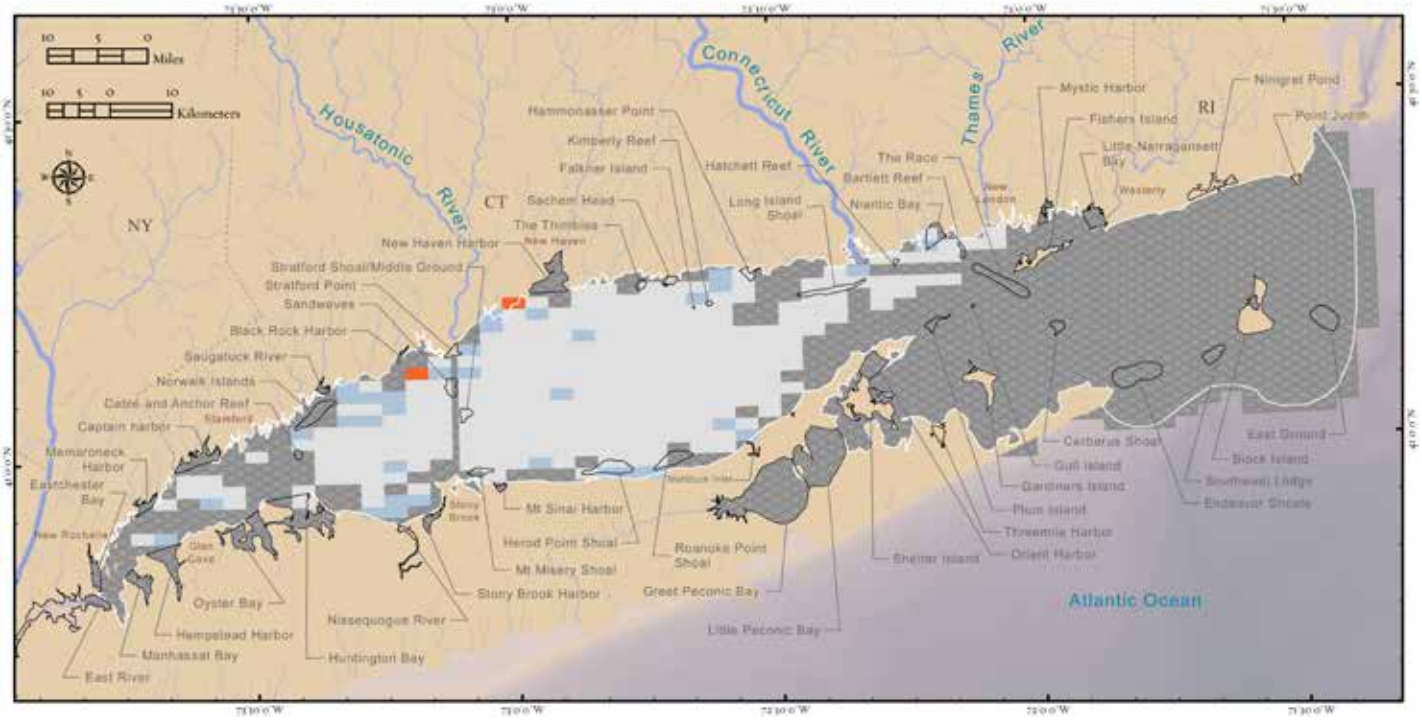
Spanish Mackerel

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

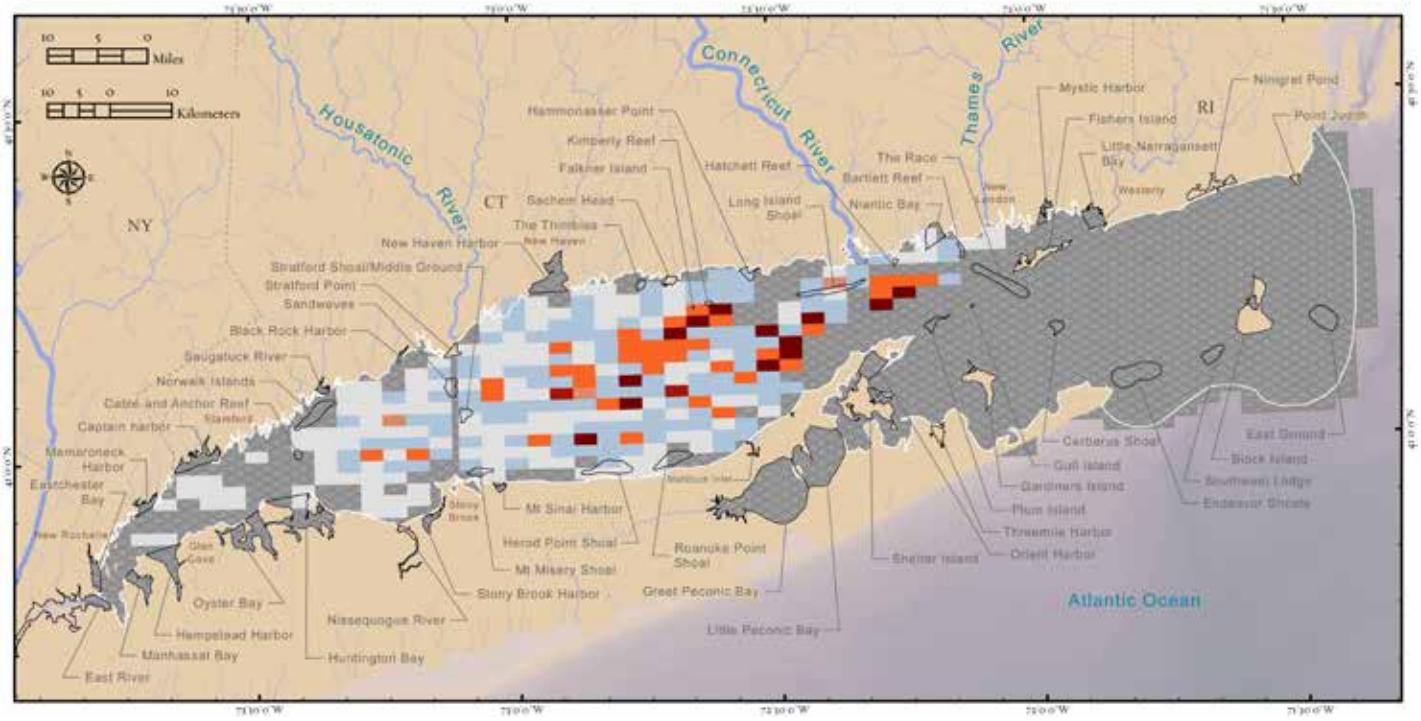
Spiny Dogfish

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

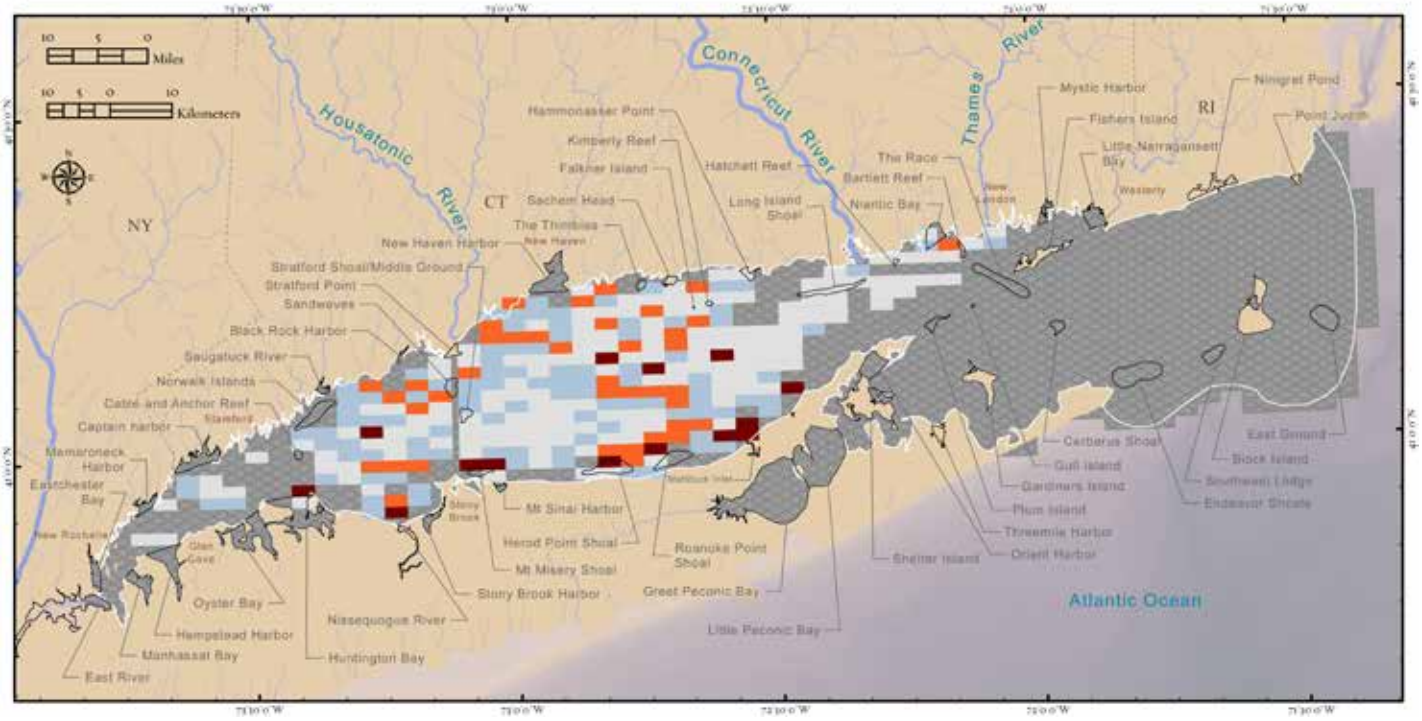
Spot

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

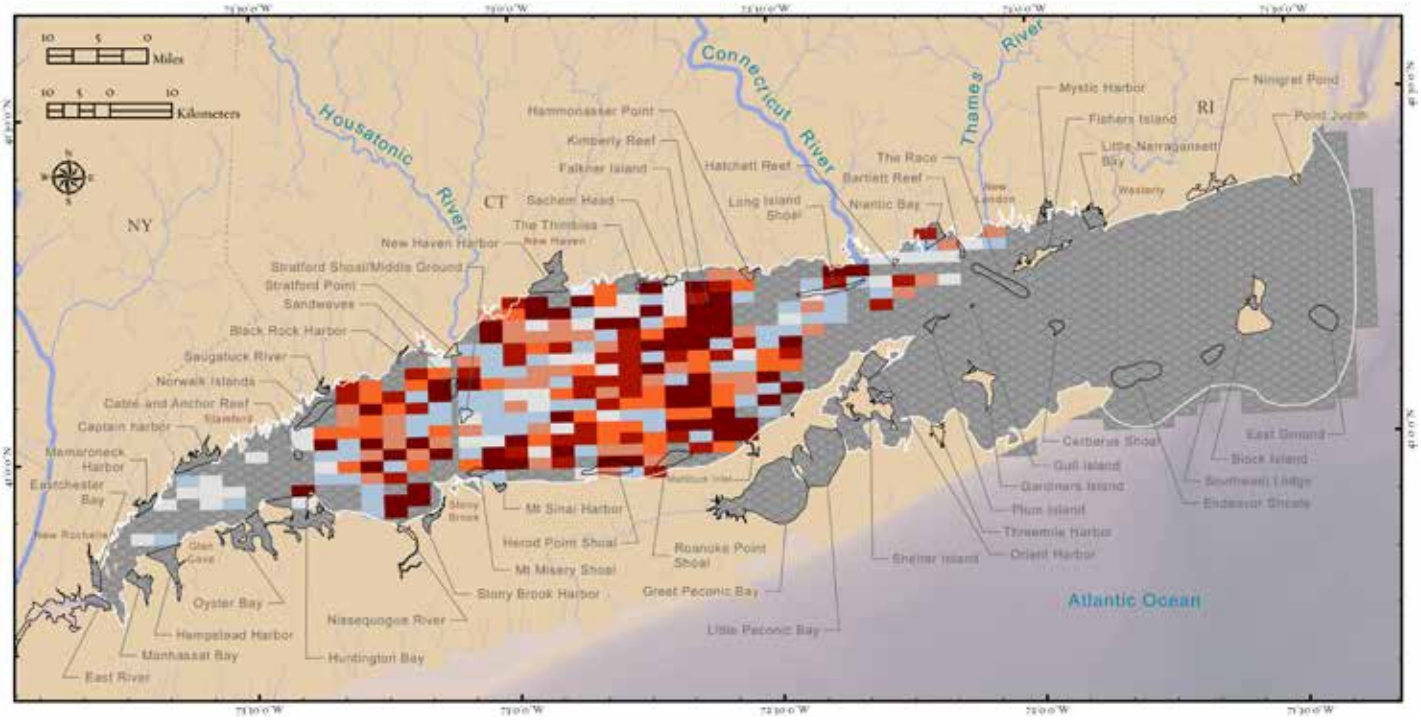
Spotted Hake

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

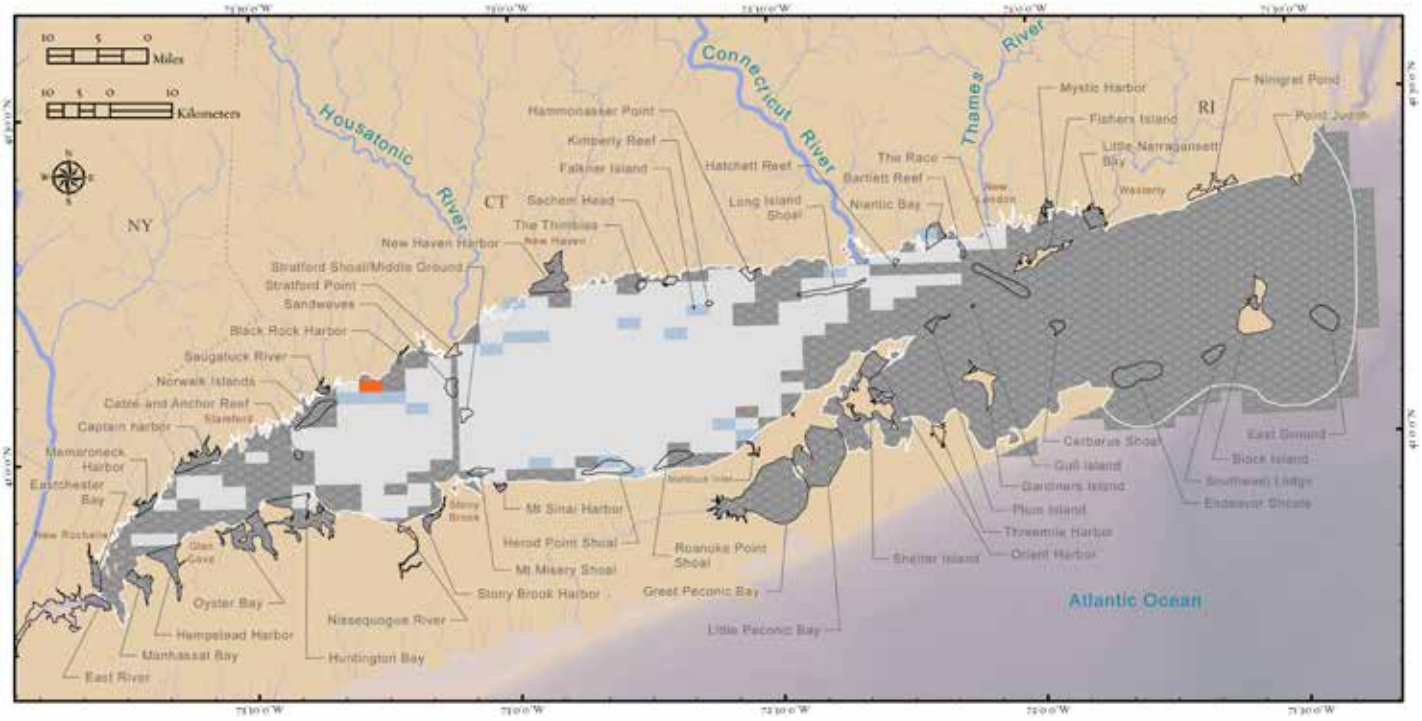
Striped Anchovy

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

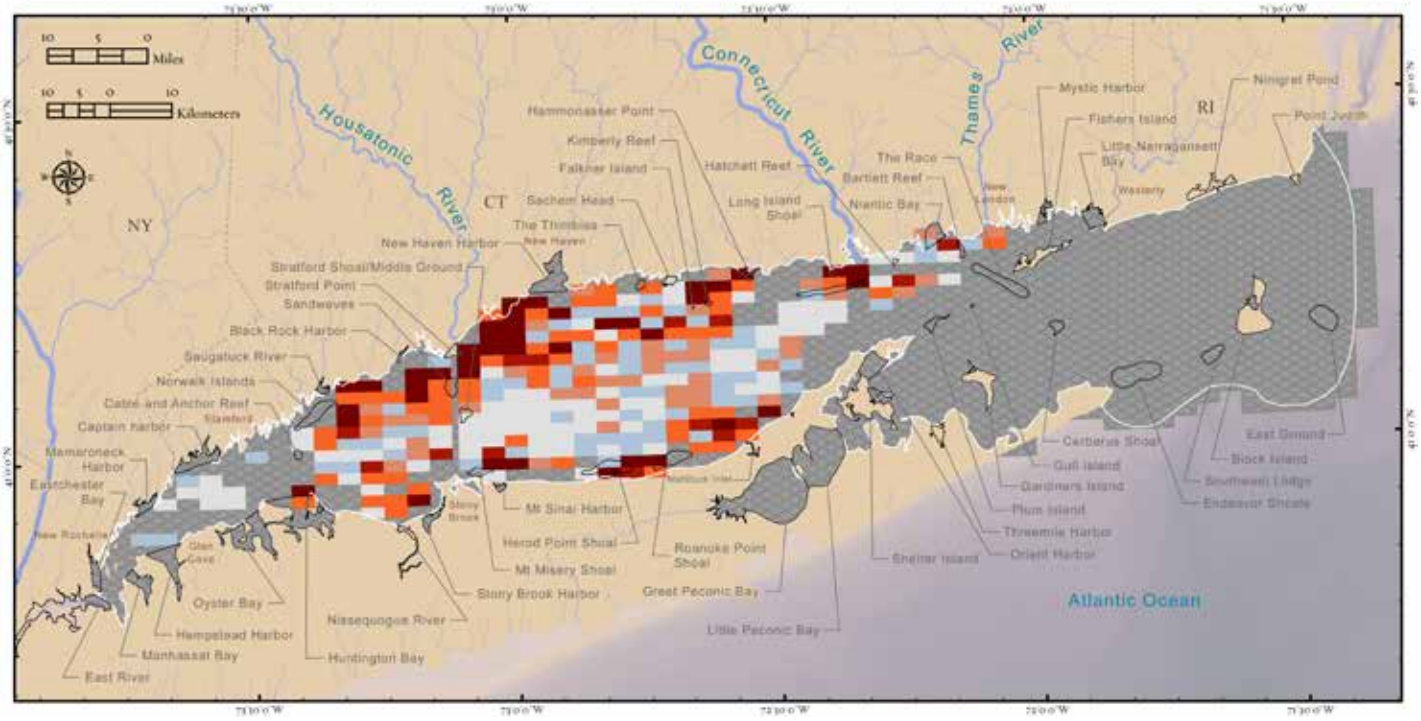
Striped Bass

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

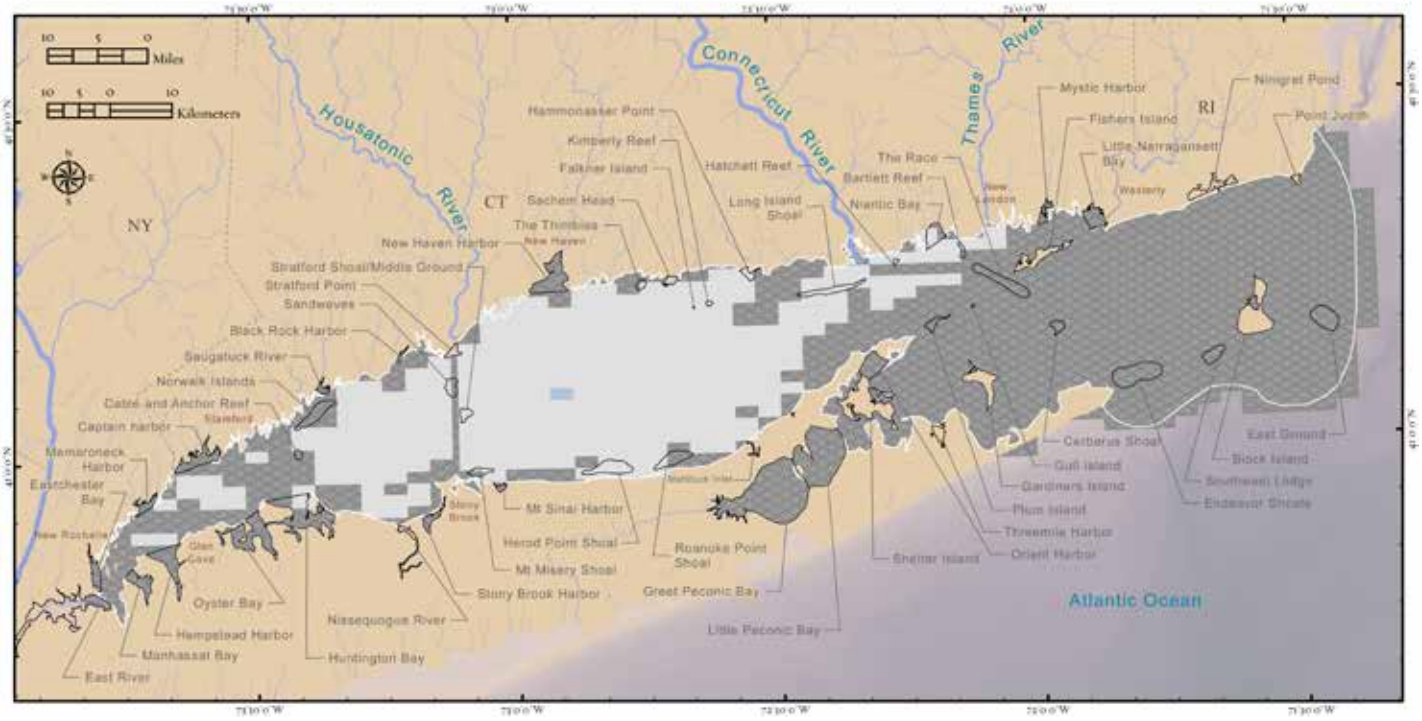
Striped Burrfish

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

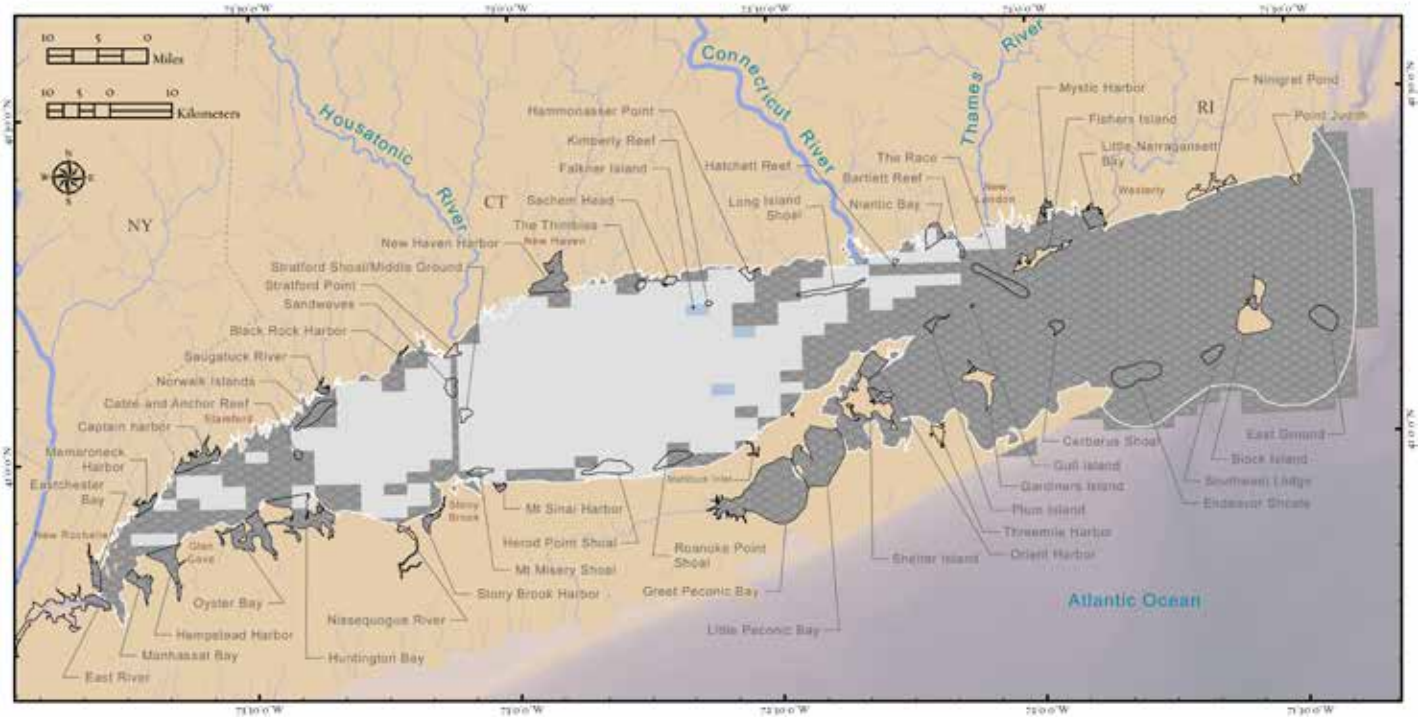
Striped Cusk-Eel

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.

Cells Sampled in Fewer than Two Octads During Summer Months



Long Island Sound Ecological Assessment

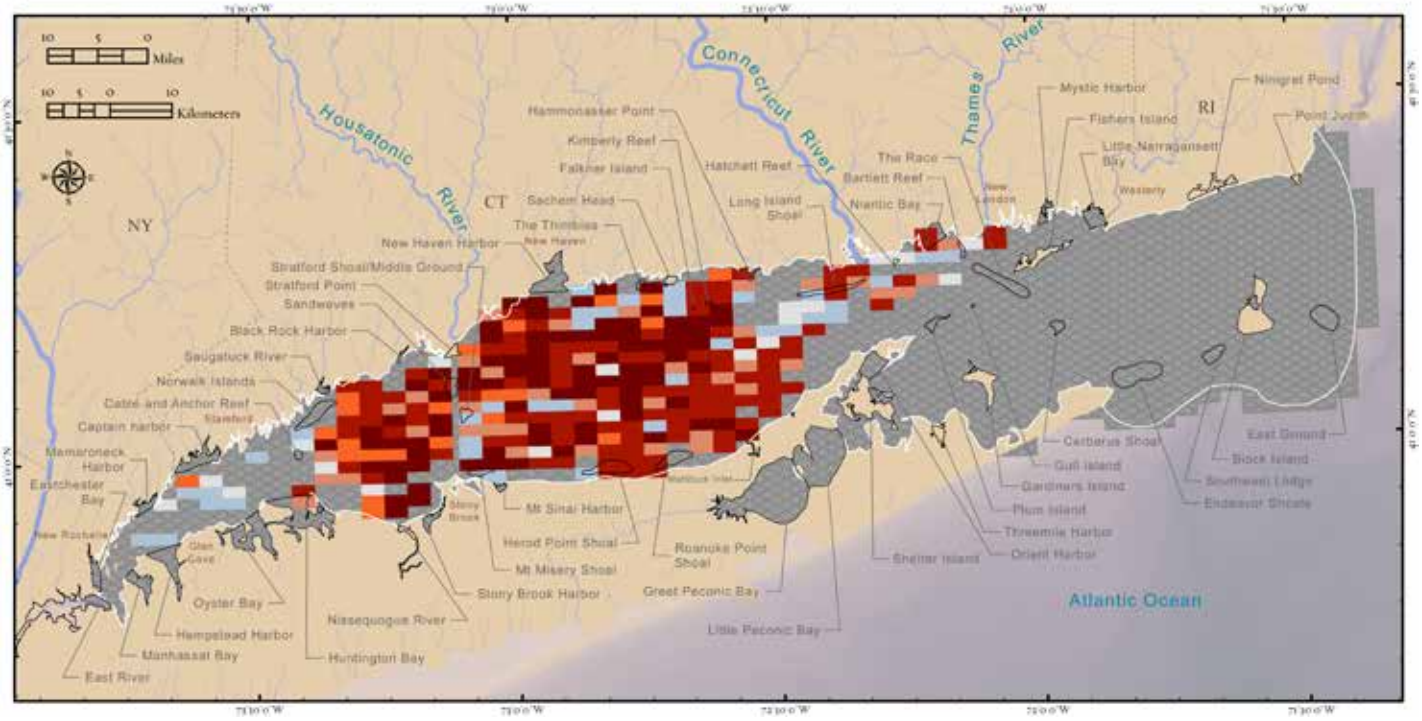
Striped Searobin

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

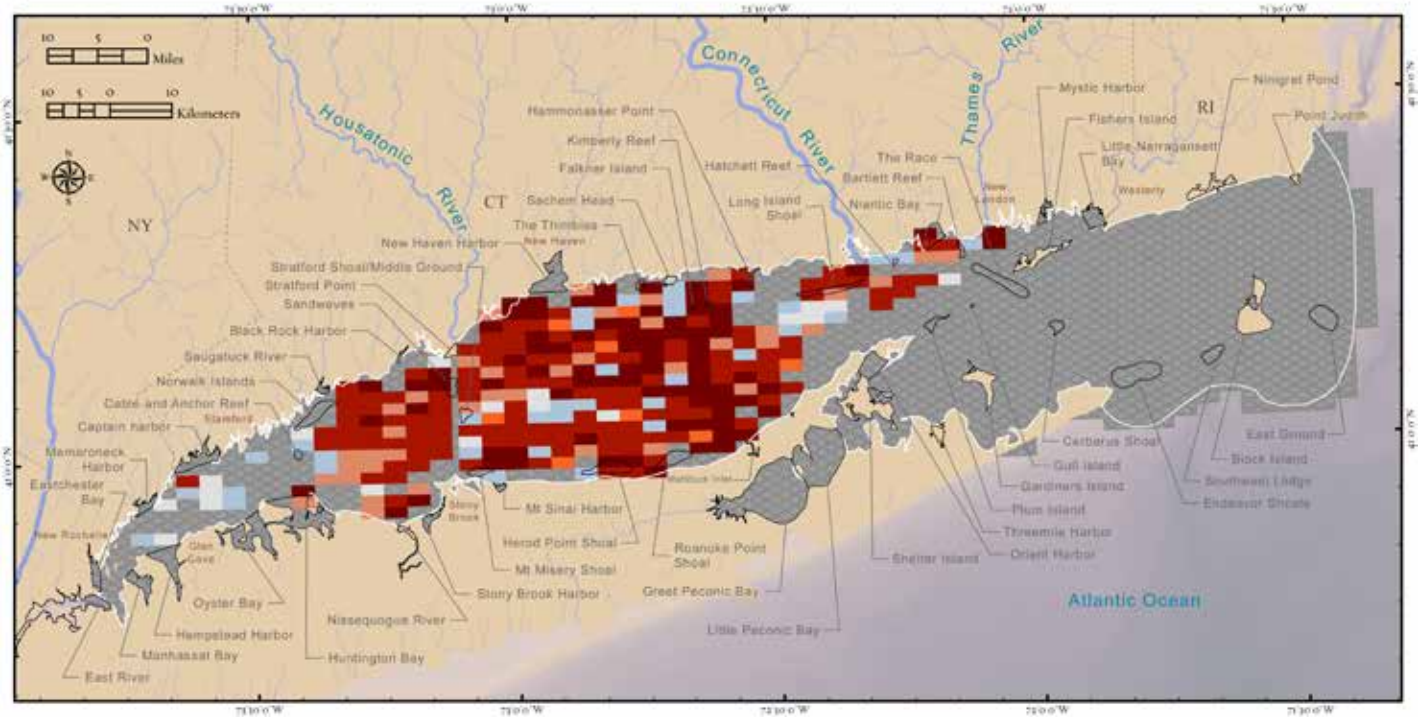
Summer Flounder

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

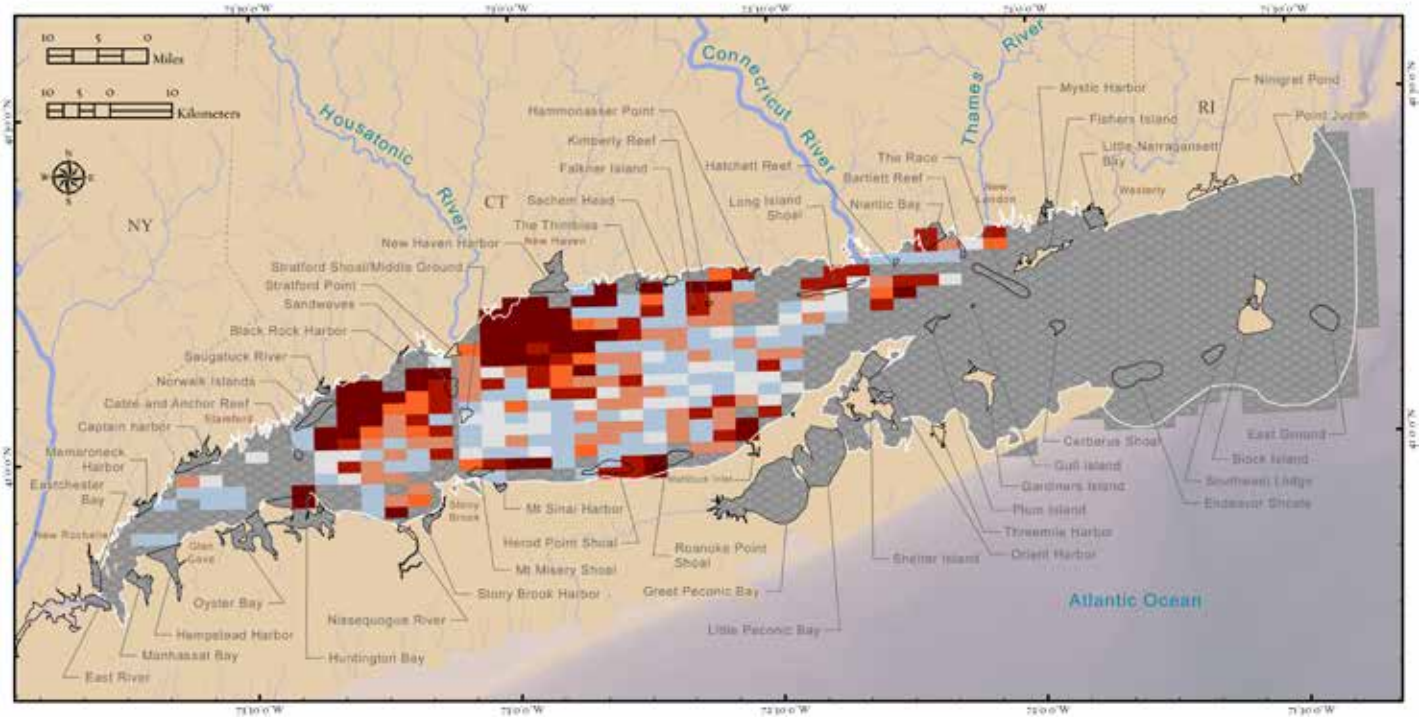
Tautog

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

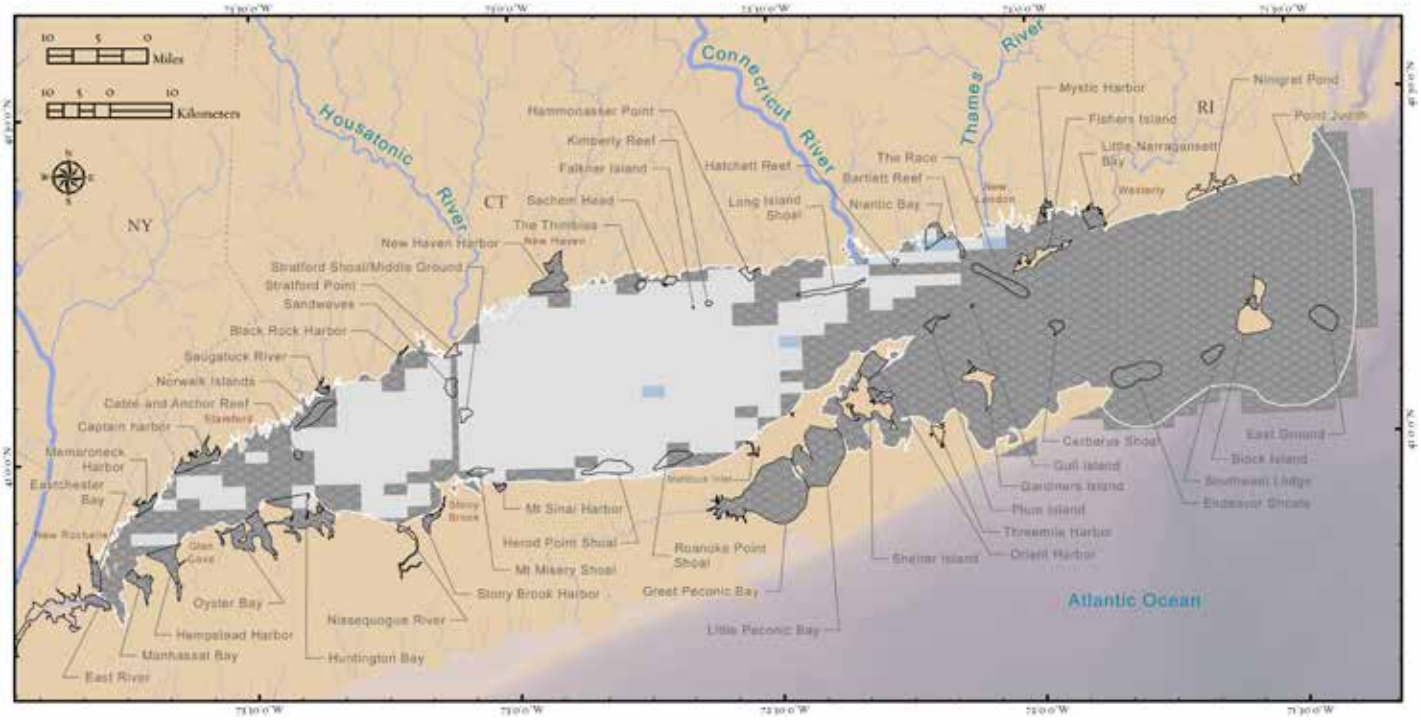
Water Jelly

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.

Cells Sampled in Fewer than Two Octads During Summer Months



Long Island Sound Ecological Assessment

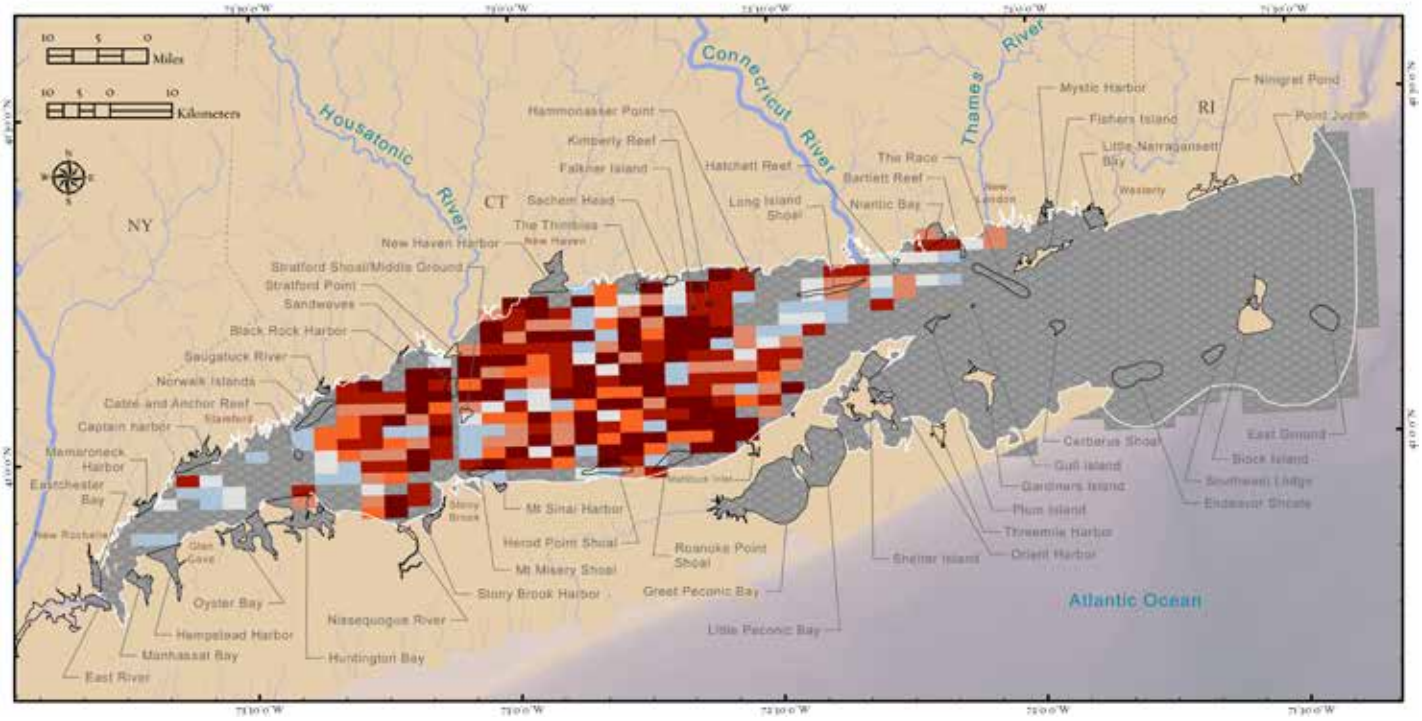
Weakfish

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

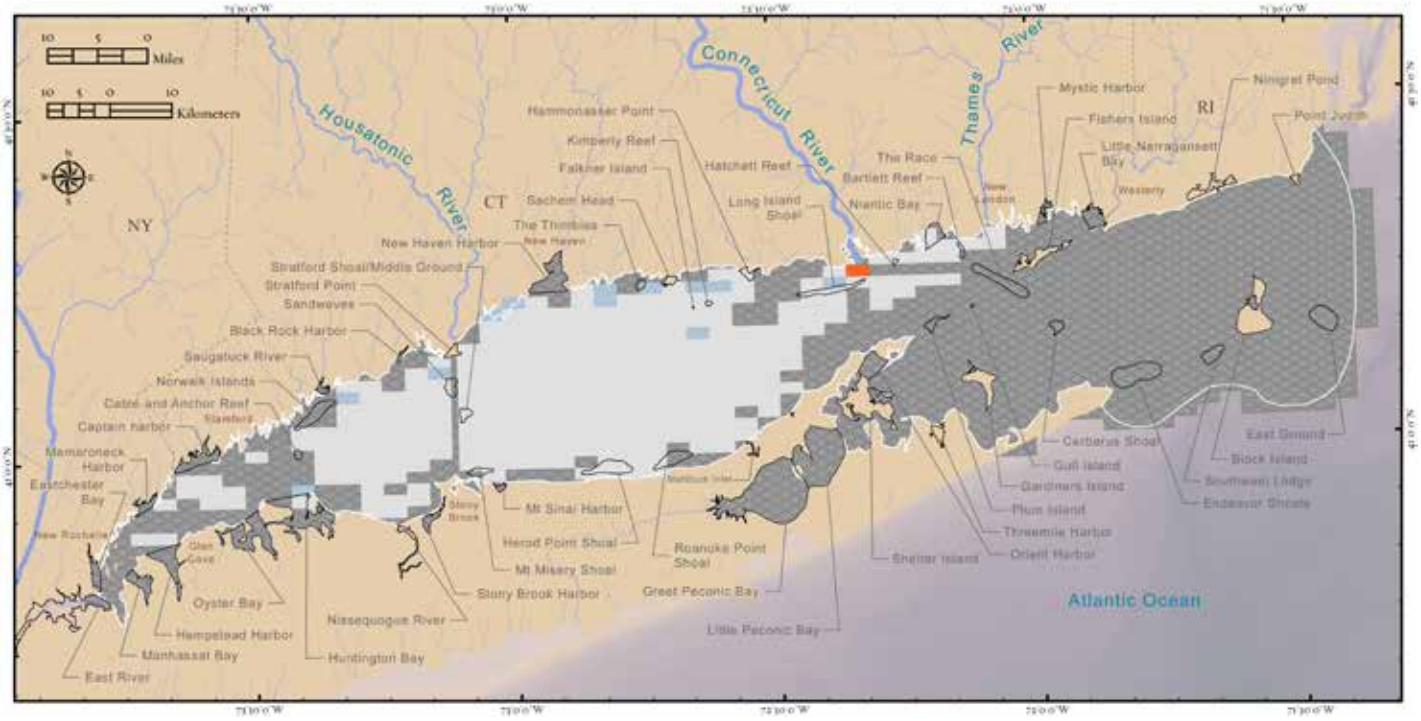
White Perch

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

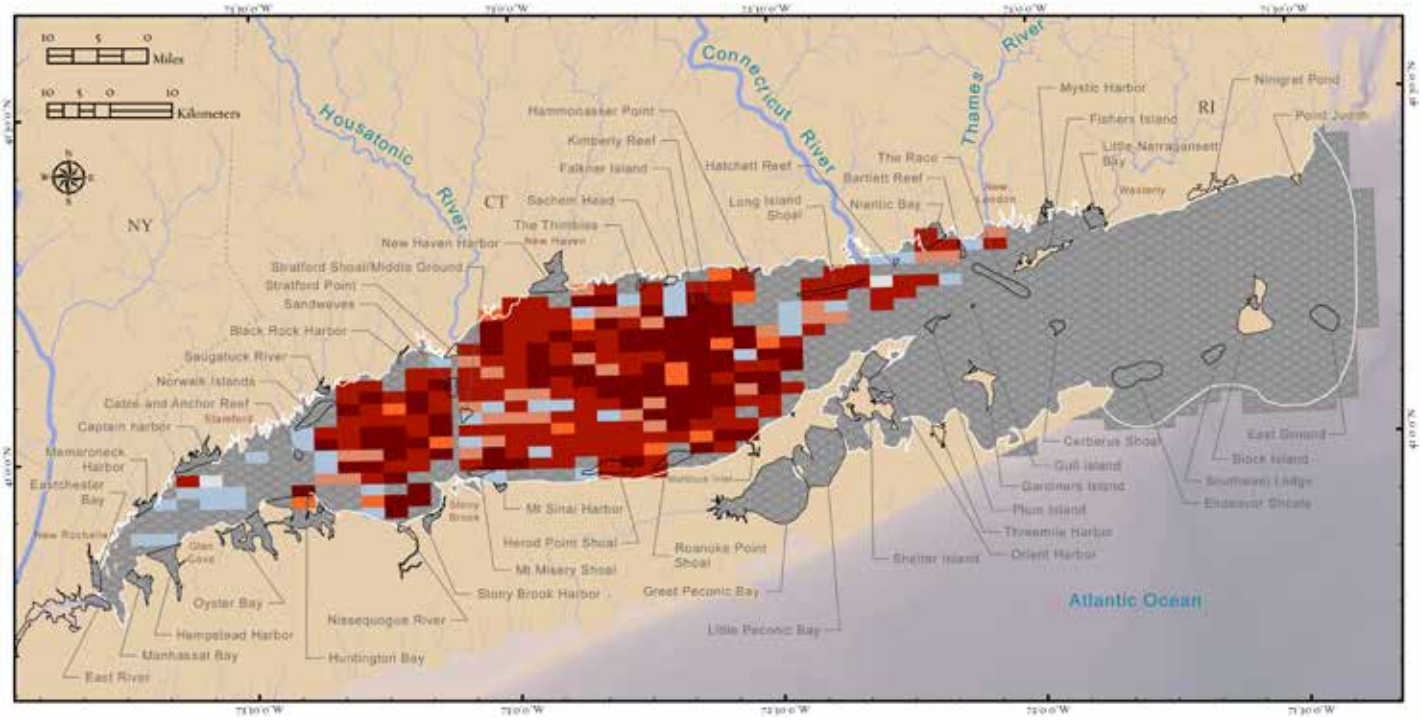
Windowpane Flounder

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

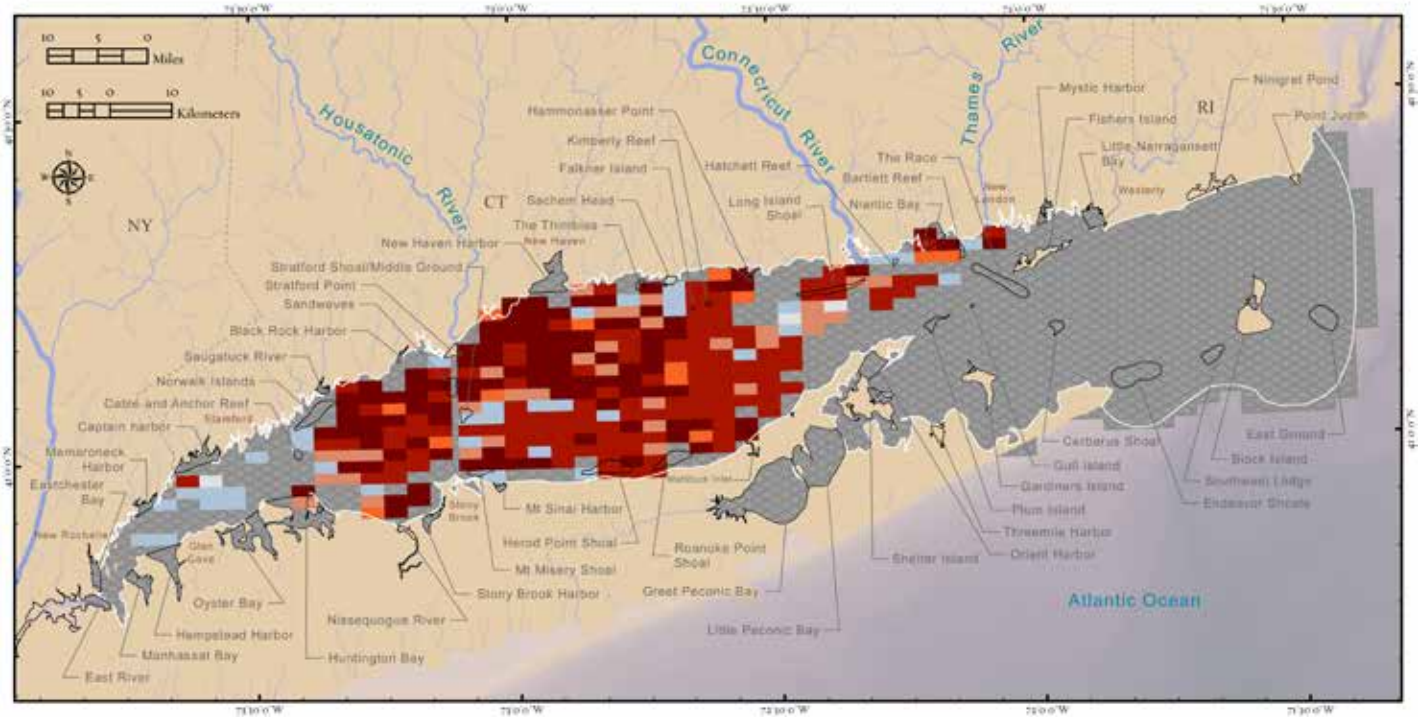
Winter Flounder

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

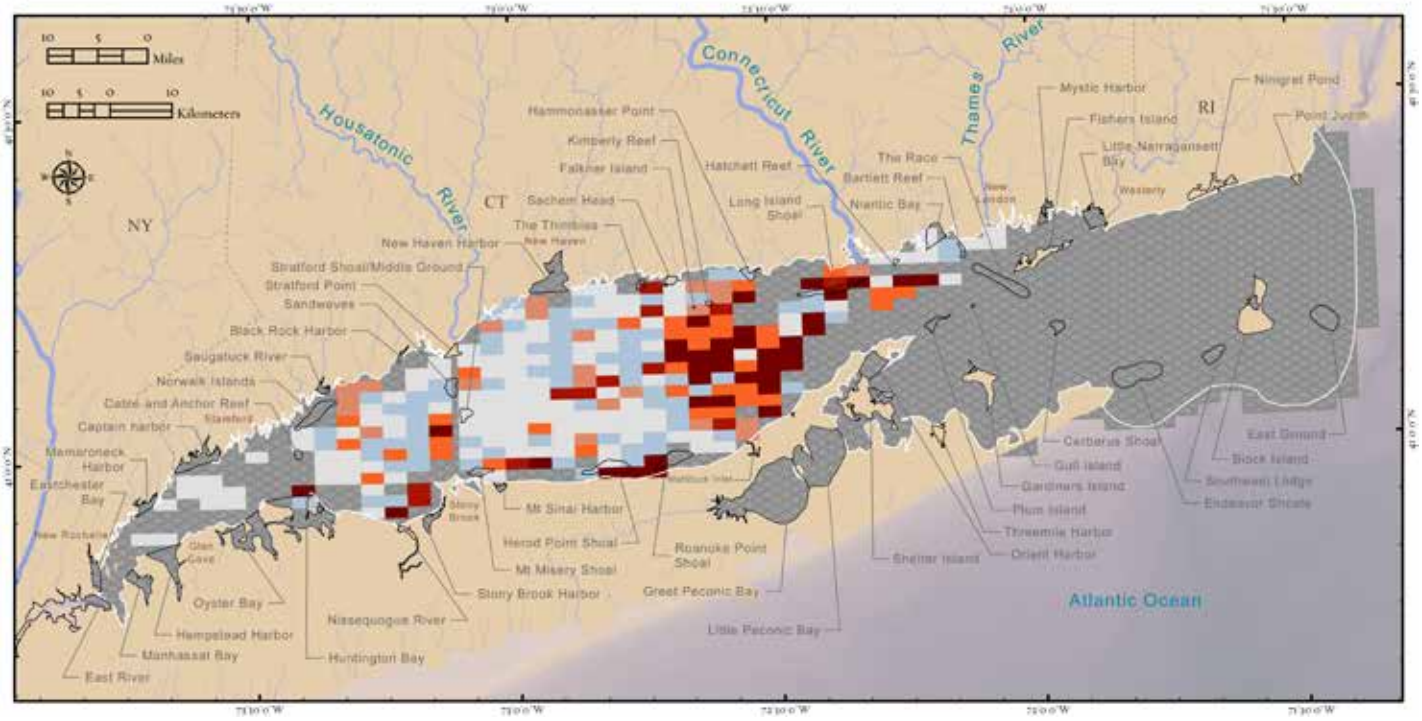
Winter Skate

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

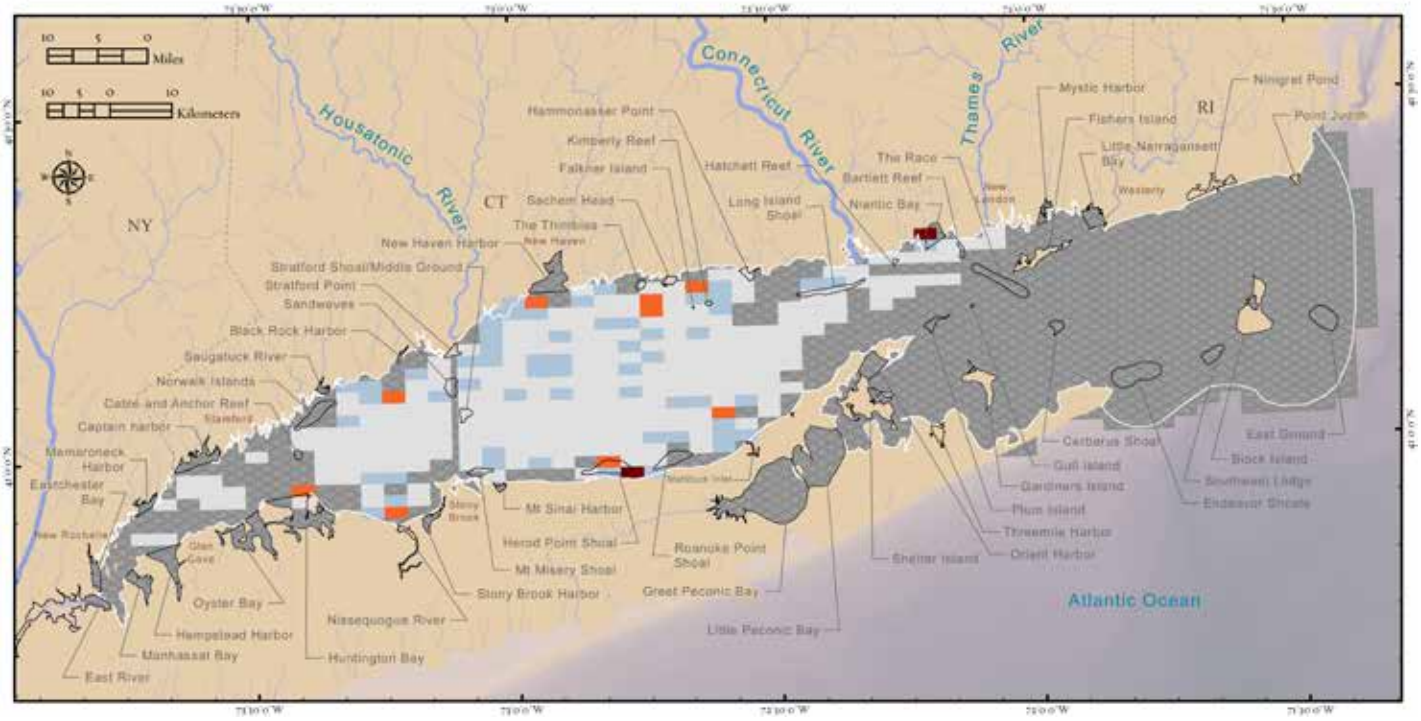
Yellow Jack

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Long Island Sound Ecological Assessment

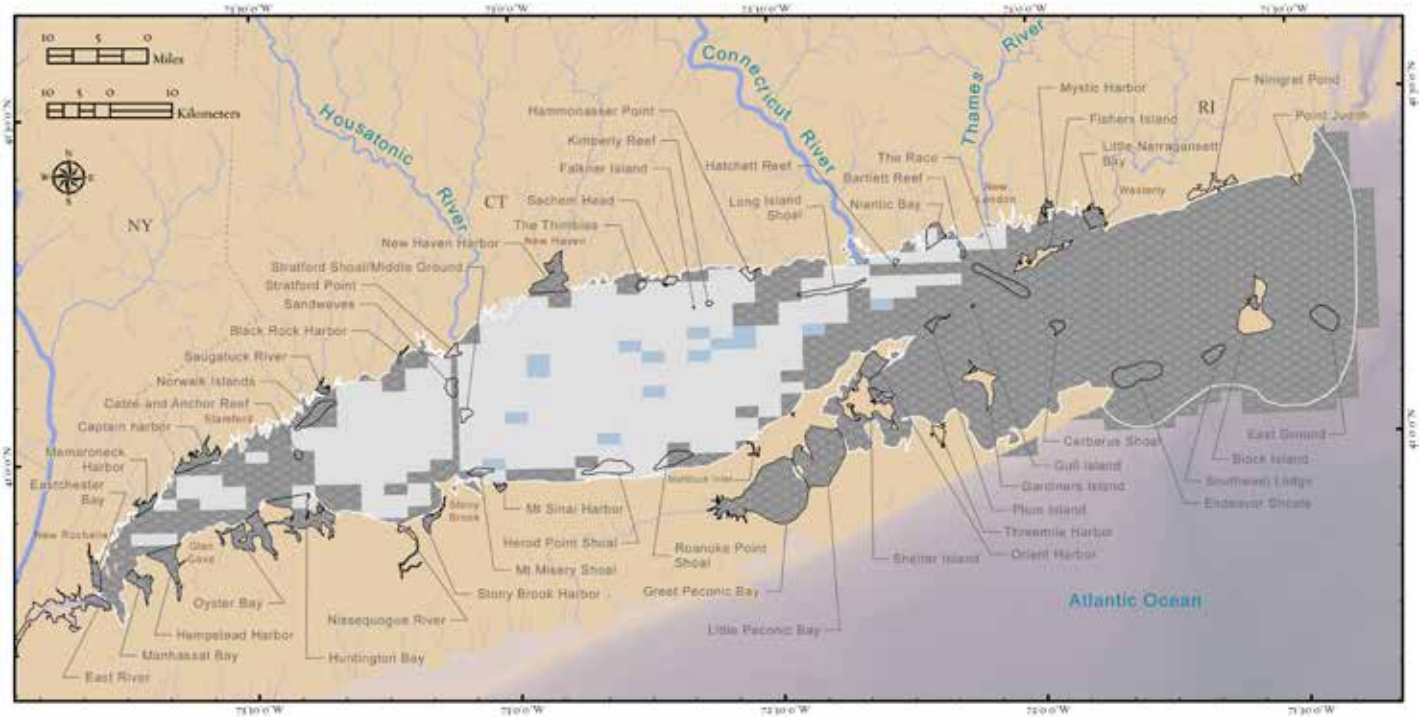
Yellowtail Flounder

Weighted persistence*

0	2.51 - 2.99
1 - 1.99	3 - 3.5
2 - 2.5	3.51 - 3.99

Cells Sampled in Fewer than Two Octads During Summer Months

*The weighted persistence number is broken into two parts:
1) The integer value denotes the number of octads in which the species is found.
2) The decimal value signifies the species persistence above or below average (0.5), in standard deviations.



Appendix C – Report Applications

i. Conservation uses of the LISEA

The ultimate goal of the LISEA is to support the conservation of the ecologically and biologically significant resources of Long Island Sound, particularly those associated with the sea floor and within the water column. There are several potential conservation uses that the LISEA can serve. The primary anticipated use is in support of potential coastal and marine spatial planning for the Sound. There are other conservation uses as well. Each of these are addressed more specifically below.

a. Coastal and Marine Spatial Planning (CMSP)

What is CMSP?

CMSP is a comprehensive, adaptive, and transparent spatial planning process, based on sound science, for analyzing current and anticipated uses of ocean and coastal areas. CMSP identifies areas most suitable for various types or classes of activities in order to reduce conflicts among uses, reduce environmental impacts, facilitate compatible uses, and preserve critical ecosystem services to meet economic, environmental, security, and social objectives. There is currently no coastal and marine spatial plan for the Sound to help the states coordinate with each other and allocate future uses or manage the waters of the Sound on a holistic, locational basis. There have been a substantial number of proposals for use of Long Island Sound in the past, such as the Broadwater Liquid Natural Gas (LNG) facility, that were a wakeup call to the possibility of new uses coming in that could be incompatible with both the Sound's environment and its traditional uses and values (e.g. recreational boating). Without a spatial plan, the Sound remains vulnerable to proposals and uses that may be in conflict with one another, in conflict with traditional uses and/or in conflict with the ecological resources of the Sound.

In general, it is envisioned by proponents of a "Sound spatial plan," that the primary goal would be to protect the Sound's existing natural resources and traditional uses such as fishing, recreation, aquaculture and navigation while assuring all uses – new and existing - are compatible with one another and the environment. The goal is to better manage for multiple public uses and economic well-being and to protect habitats, not to create new restrictions.

Why is CMSP important to the conservation of the Sound's ecological resources?

There are multiple conservation approaches that are needed to conserve the multiple aspects of the Long Island Sound ecosystem. CMSP, arguably, can be one of the most effective vehicles for protecting the spatially significant ecological resources of the Sound, particularly for the water column and seafloor.

In the urban sea that is Long Island Sound with its large adjoining human populations and multiple human uses and demands, any effort to give priority and protection to a particular places for whatever reason, ecological or other, has to also consider and account for the multitude of other potential demands. It is also a matter of political necessity. Trying to establish ecological protection in public, state-owned waters inherently involves consideration of all public interests and the advent of major opposition from parties who may perceive their interests adversely affected by outright protection. With so many interests to serve, arguably the most viable way to ensure conservation of ecologically significant resources is to establish a process where multiple interests have a seat at the table to find the most sensible and effective ways to allocate and integrate multiple uses – including conservation. Because a representative cross section of interests are both included in the process and stand to gain from the process, there is the ba-

sis for much greater political support for a collective plan than would be the case for an effort aimed only at conservation. Once instituted, an official vehicle would be in place to carry out management and decision-making that supports the well-being of important places – whether that importance is for human use or ecological resources.

It is noted that there are currently successful CMSP efforts in Massachusetts and Rhode Island through the Massachusetts Ocean Plan and the Rhode Island Special Area Management Plan that demonstrate the conservation benefit of CMSP. The current National Ocean Policy is supporting CMSP efforts at a regional level that also include regard for environmental resources.

In contrast to CMSP, some other regions of the nation and around the globe have established marine protected areas (MPA) or other similar policies to give direct protection to identified ecologically sensitive areas. For the reasons mentioned above, it is not clear that MPAs would be the best approach or have a realistic political chance of being established in Long Island Sound. It is possible that information and/or conditions could emerge that would suggest the use and viability of MPAs. Certain management regimes to help protect vulnerable habitats such as seagrass beds may be the best approach whether regarded as an MPA or not. For Long Island Sound in general however, at this time, the authors of this report do not consider MPA's as the best overall, viable approach for achieving conservation of the Sound's ecosystem as a whole.

How does the LISEA serve the conservation purpose of CMSP for Long Island Sound?

LISEA helps advance the knowledge of where "ecologically notable areas" are so these spatially relevant places may be included in consideration of Long Island Sound (LIS) management and decision-making, particularly through CMSP. As indicated in the Introduction, there are not many assessments of Long Island Sound available at present that provide spatial information for ecological resources with potential application in planning. It is recognized that the LISEA was not solicited on behalf of a formal CMSP process for the Sound and that additional ecological information beyond that provided by LISEA would be important for such a process. Nevertheless, the LISEA provides a contribution of new spatial knowledge to the ecological picture needed for a LIS CMSP process and a base on which to build additional knowledge and/or marine spatial assessment projects. It also helps clarify where data and knowledge is less complete and more information, research and study would be helpful. Additionally, the LISEA offers a potential model for working with data and producing spatially relevant results. It may serve as a foundation for further advancements in spatial modeling and "derivative products" that utilize data and information to facilitate planning insights and decision-making.

The LISEA project is also serving to prepare The Conservancy to be better able to contribute generally to a Long Island Sound CMSP process, should one materialize. This includes increasing The Conservancy's general knowledge of spatial issues and attributes of the Sound. It also includes enhancing The Conservancy's ability and preparedness to participate meaningfully in the ecological part of a CMSP process. Finally, if a CMSP process is initiated, whether for the Sound specifically or as part of regional CMSP efforts, the LISEA will enhance The Conservancy's ability to help ensure that there is adequate ecological consideration in such processes.

b. Contribution to other TNC conservation efforts

A major use for the LISEA is to assist The Conservancy in carrying out its on-the-ground conservation work related

to Long Island Sound. The LISEA is one of the key information sources that is being used to identify priority areas for conservation work in and around the Sound. These priority areas will include a selection of coastal rivers and embayments, tidal marsh migration areas and natural shorelines along with vulnerable and sensitive submerged habitats such as seagrass and other ecologically notable areas. The conservation work associated with these priority areas includes land conservation, establishing the first Seagrass Management Area in Long Island Sound with the NYS DEC, improving fish passage and working on water quality improvement. For water quality that includes green infrastructure in priority embayments to advocacy for nitrogen reduction throughout the Sound. The conservation work also includes developing coastal climate adaptation strategies with coastal towns and passing key legislation to address sea level rise.

The LISEA will be an important source of information if and when The Conservancy believes it appropriate to weigh in on specific project proposals affecting the Sound. One of the most notable examples was the 2001 Broadwater proposal to build a large LNG facility in the middle of Long Island Sound, as noted above, which if approved could have had a large impact on the environment and many uses of the Sound. If such a proposal were made today, The Conservancy would now have much greater information to bring to the table to assess the project and would be able to participate in the review and comment process. There are many new uses that have been proposed for the Sound such as seaweed farming, short run shipping, tidal turbines, transportation tunnels, port expansion, and energy and telecommunication cables and pipelines. Many of these uses may be compatible with the Sound, but it will be easier to assess that issue with the information provided by the LISEA.

c. Advancing ecological assessment methodology

One of the goals for the LISEA project was to develop methodologies for spatially identifying ecologically notable areas of estuaries. These were to be based in part on the methodologies of the Northwest Atlantic Marine Ecoregional Assessment (NAMERA). For example, the NAMERA pioneered the approach of developing ecological marine units (EMUs) to characterize the sea floor. This was also a key foundation of the LISEA methodologies. Overall, the LISEA project successfully showed that many of the NAMERA methods could be downscaled to a coastal estuary.

It was also a goal of the LISEA to help fill in the geographic gaps of the NAMERA. The footprint of the NAMERA extends from the Bay of Fundy to Cape Hatteras, but it did not generate final results for estuaries such as Long Island Sound, Block Island Sound, or Delaware Bay. The LISEA project allows for the Long Island Sound gap (including the seafloor habitats of Block Island Sound and the Peconic Estuary) to be filled.

d. Contribution to other marine spatial assessments

The LISEA may be useful as a guide or for providing insights in conducting other similar ecological assessments. Current examples of this may include The Nature Conservancy's interest in two similar assessments. The Southeastern New England Regional Ecological Assessment (SNEA) has been identified for marine areas east of Long Island Sound. It is intended to provide the basis of a working road map to the conservation, restoration, protection, and stewardship of the coastal watersheds and living resources of southeastern New England. The Eastern New York Chapter of TNC is currently interested in doing an ecological assessment for the Hudson River Estuary that would tie in through the East River to Long Island Sound.

As noted in the Introduction, the Cable Mitigation "Seafloor Mapping Project" for Long Island Sound, currently underway, is a large, long term $7 million project that is conducting original research and data collection of the seafloor. It is being directed by a steering committee composed of agency officials and scientists associated with Long Island Sound, among others. Contracts with academic and agency consortia are being used to implement the project on the ground. Although there have been some efforts to integrate biological data collection into the project, the primary focus at this point is on the physical characteristics of the seafloor. It is understood that despite the significant funding of the project, not all of the Sound

can or will be studied. Nevertheless, the project is widely seen as the most substantial effort currently underway to assess the seafloor of Long Island Sound due to its size and the prominence of the scientists and officials involved. The LISEA has been informally mentioned by some as a potential support to the Seafloor Mapping Project either as a source of information and/or example of potential methodologies to consider in developing spatial modeling or derived products from data.

Finally, there has been discussion among scientists and planners of the value of completing an expert-based map of ecologically significant areas in Long Island Sound building on the breadth of experience and study of scientists and others. Although this would not be a map based on the rigorous use of scientific data, such an effort could allow the considerable empirical and anecdotal knowledge of the Sound to be collected and integrated to create a more complete picture of the ecologically significant areas of the Sound. The LISEA could provide a strong foundation for such an effort, particularly regarding the seafloor and for fish and invertebrates in many of areas of the Sound where there may be less empirical knowledge. Such an expert-based map could be a practical information source for Long Island Sound CMSP efforts.

Appendix D – Description of Ecologically Notable Places

This appendix offers one-page descriptions for each of the sites (or grid cell locations) that were identified as Ecologically Notable Places (ENP) and where the ENP was at least in part based on the species data. ENP that were identified solely on the basis of Seafloor Complexity and/or Seagrass are not covered – in part because we don't have greater biological data to present for these locations. The one-page descriptions are in the form of a summary of key details for the site, or grid cell. These sheets will allow the reader to see which functional groups and more specifically which species in those groups contributed to a cell's status as ENP.

Used with the key map (shown below) and other LISEA maps, these summary sheets will help the reader to compare sites against others and contribute to a better

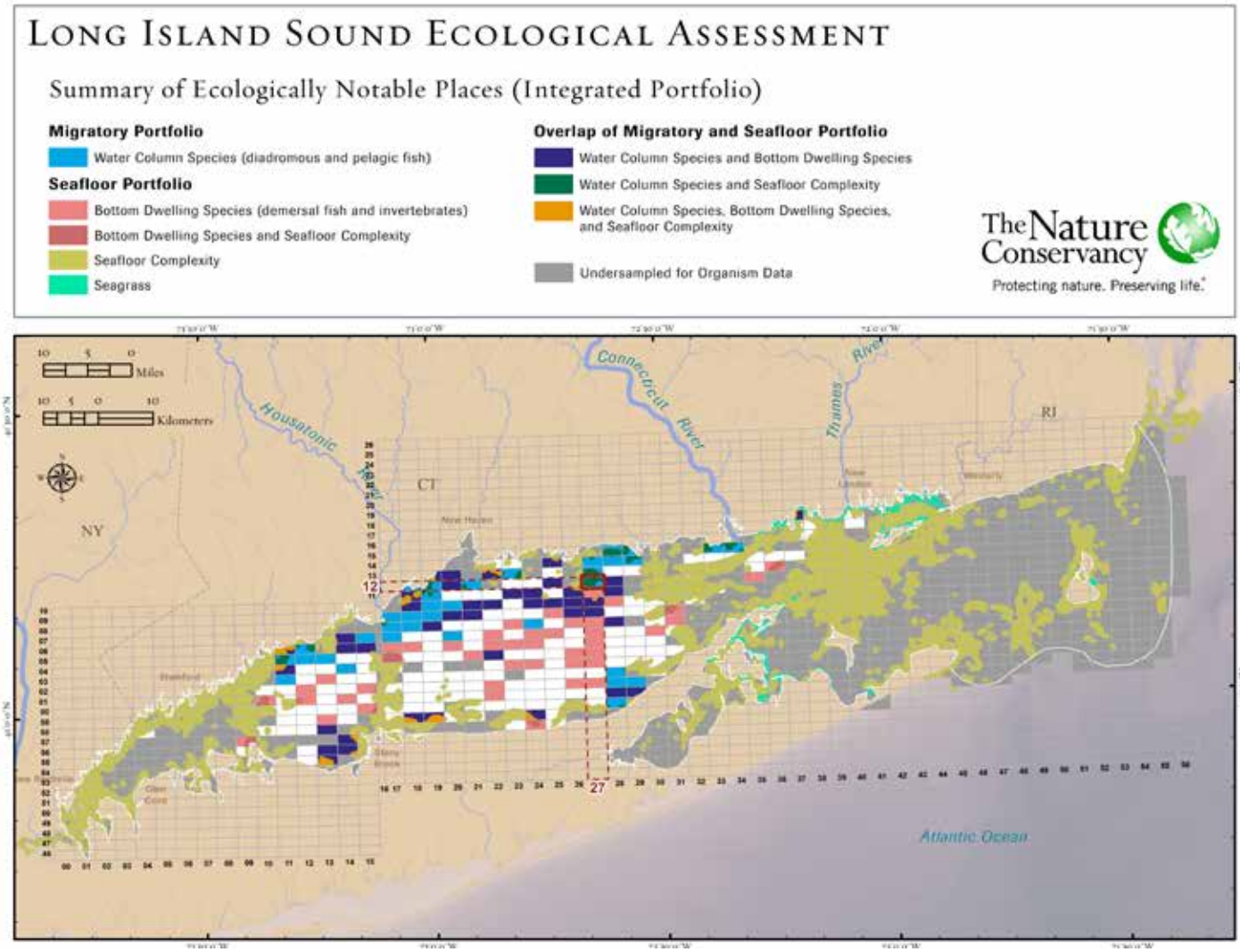


Figure 1: Integrated Portfolio of Ecological Notable Places (ENP) with map index of grid cells used to identify locations of ENP. Sample cell 1227 is shown by the red hash-marks.

understanding of species patterns throughout the sound. The sheets show which species in a given cell scored highly for weighted persistence or contain structurally complex bottom habitat. They also include data describing the shape and texture of the sea floor through breakdowns of the Ecological Marine Units (EMUs) and general water column characteristics. A section on trends highlights which species have shown significant changes over the time period studied (1984-2009).

The following is a detailed breakdown of one sample cell (1227) to illustrate how the sheets are organized and to help the reader use them effectively.

Cell 1227: Cell 1227 is located on the northern end of the sound, about 4 km south of the shore. It is situated at the northeastern extent of the Sound's central basin, where the fine sediments transition from very fine sands to coarser medium grain sand as we head east toward the high energy flows of the Race. The seabed here has a composition of 36 distinct EMU types with flat to moderate slopes and ranging from a moderate depth of about 24 meters to Falkner's Island where it meets the island's waterline. The eastern edge of the cell contains a portion of Kimberly Reef. The cell is known to contain 41 of the 114 species used in the LISEA analysis. This includes 23 of the 59 demersal fish, 6 of the 8 invertebrates, 5 of the 13 diadromous fish, and 7 of the 23 pelagic species. There were no significant trends in species detection rates, the closest being black sea bass that increased at a rate of 0.9 standard deviations per octad.

This cell is included as ENP for both the water column and seafloor. It is in the water column portfolio due to

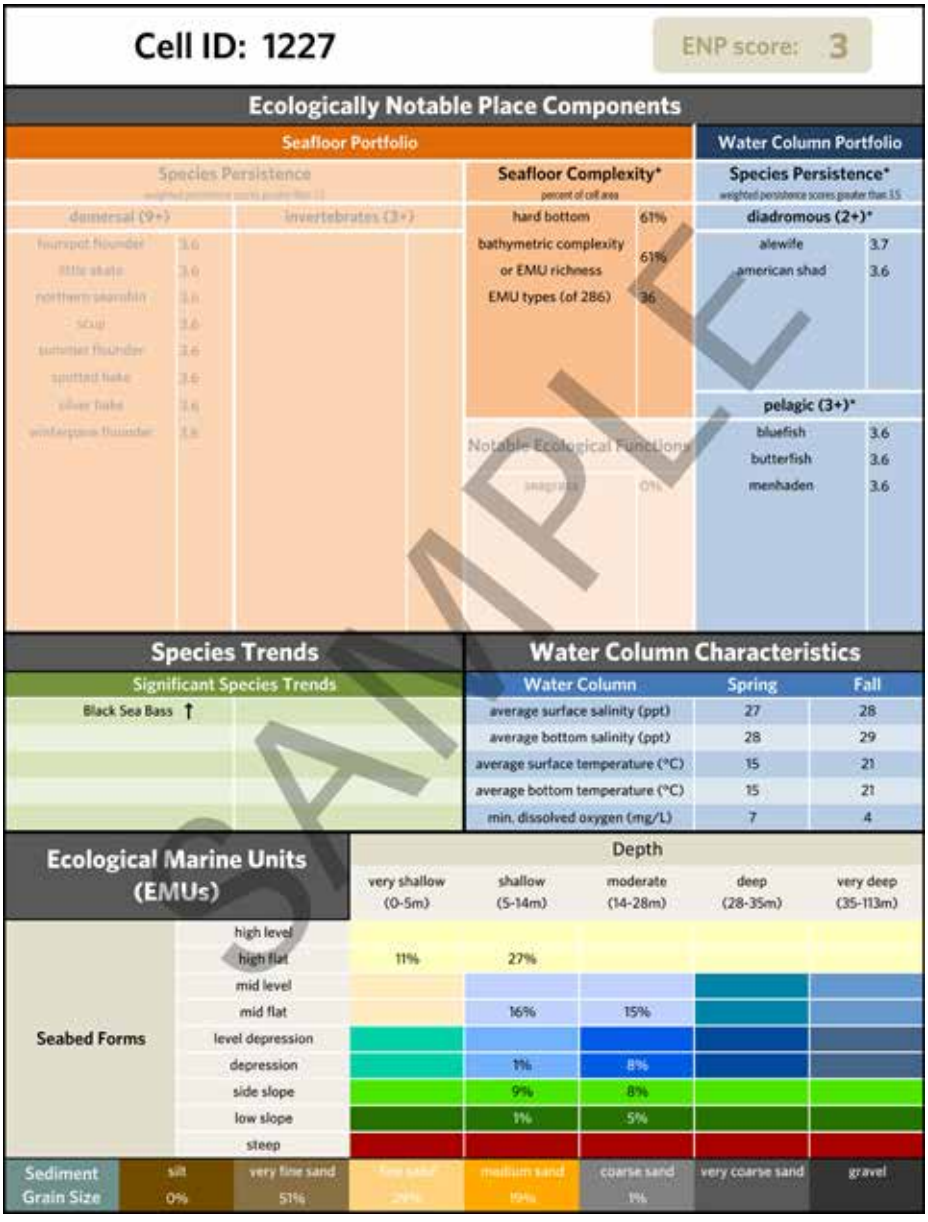


Figure 2: Sample of chart used to summarize the ENP cells.

both diadromous (alewife and American shad) and pelagic (bluefish, butterfish, and menhaden) species with high weighted persistence scores. The cell is relatively close to the outlet of a size 2 river, being about 10 kilometers from Clinton Harbor. The cells central position in the sound provides it with moderate ranges of salinity (27-29 ppt) and temperature (15-21° Celsius) and dissolved oxygen levels that are infrequently anoxic (4-8 mg/L).

Cell 1227 is included in the seafloor portfolio due to its high concentration of confirmed and modeled hard bottom and a high degree of EMU richness and bathymetric complexity, but not due to its weighted persistence of seafloor organism (demersal or invertebrate) scores. It does contain a borderline number of demersal species with a high weighted persistence, with 8 of the required 9 species with scores of 3.6 or higher. These species are: fourspot flounder; little skate; northern searobin; scup; summer flounder; spotted hake; silver hake; and winterpane flounder. Benthic species known to occur in this cell include 4 polychaetes: Asabellides oculata, Clymenella zonalis, Spiophanes bombyx and Nephtsy picta and 1 bivalve: Tellina agilis.

Cell ID: This unique identifier references the X and Y coordinates for a given grid cell. This grid system was developed by CT DEEP, used in their fishery trawl data collection and is shown on figure 1.

ENP Score and Components: This index summarizes the number of components for a given cell that contribute to its characterization as an Ecologically Notable Place (ENP). There are 6 possible components of ENP, each of which can qualify a cell as ENP. These 6 are highlighted here in the boxes with numerals and described in more detail below. Example cell 1227 qualifies for 3 as shown in the index in the upper right: seafloor complexity, diadromous fish persistence, and pelagic fish persistence. For the one-page summaries below, the component or components of ENP for the cell are highlighted with black text and an asterisk to visually indicate them as ENP.

1. Demersal Fish- In this example 8 demersal species had weighted persistence scores at or greater than 3.6. Since it is required to have 9 or greater demersal species with high weighted persistence scores for this group to be counted as

ENP, this cell does not qualify for ENP based on demersal species alone. The text is shown in grey rather than black to indicate that it does not contribute to the ENP score.

2. Invertebrates- It is required to have 3 or greater invertebrate species with high weighted persistence to qualify for ENP. This example cell has none.

3. Seafloor Complexity- The presence of seafloor complexity in a cell counts toward its inclusion as an ENP. These measures of complexity are described in chapter 7 and include: hard bottom, bathymetric complexity, and EMU richness. This example has 61% of its area covered by hard bottom and 61% of its area covered by bathymetrically complex structure.

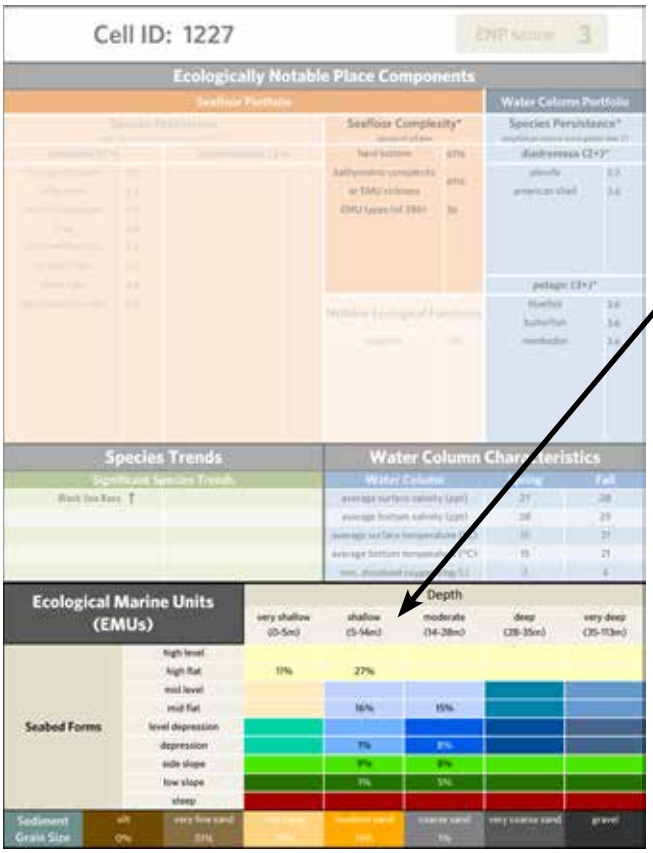
4. Seagrass- The presence of mapped seagrass in a cell. Example cell 1227 has none.

5. Diadromous Fish- It is required to have at least 2 diadromous fish species with high weighted persistence scores to be considered ENP for this group. This example cell has 2 so it qualifies and is highlighted with black text and an asterisk.

6. Pelagic Fish- It is required to have at least 3 pelagic fish species with high weighted persistence scores to be considered ENP for this group. This example cell has 3 so it qualifies and is highlighted with black text and an asterisk.

Species Trends- This category shows which species had a significant positive or negative trend in frequency of detection over the studied time period for the given cell. Species without a significant trend are not shown. To create the weighting factor used for the weighted persistence of species score a residual was calculated for each species in each cell for each time period. This residual measures the difference between the number of times a species was detected and the number times the species was expected to be detected based on an analysis of all cells. The species trend metric looks at the trend of that value over the three time periods. If a species has a slope of 3 or greater it is included in this section with an arrow indicating a positive or negative trend.

Water Column Characteristics - The character of the water column is summarized based on sampled and interpolated data for the study area. The average temperature and salinity values, and the minimum DO values are summarized for the



Spring and Fall time periods for the subject grid cell over a 20 year time period (1992-2011) based on data from CT DEEP. Water quality data is included on this sheet as these factors may help to explain some of the differences seen when comparing between cells.

Ecological Marine Units - The character of the sea-floor habitats in form, depth, and sediment composition together create the Ecological Marine Units (EMUs). This section shows the percent breakdown of a cell's area based on the unique combination of these components. Taken together these variables describe the structure of the seafloor at a given site.

The EMU mapping characterizes the sea floor based on depth, seabed form, and sediment, to create 286 unique types. This is too many to visualize. To simplify on this sheet and the maps, seabed forms and depth are combined and sediment grain size is addressed separately. The percent area values reflect this, as each group sums to 100% The colors of these figures correspond to the colors in the seabed form and sediment grain size maps from the LISEA Report as follows:

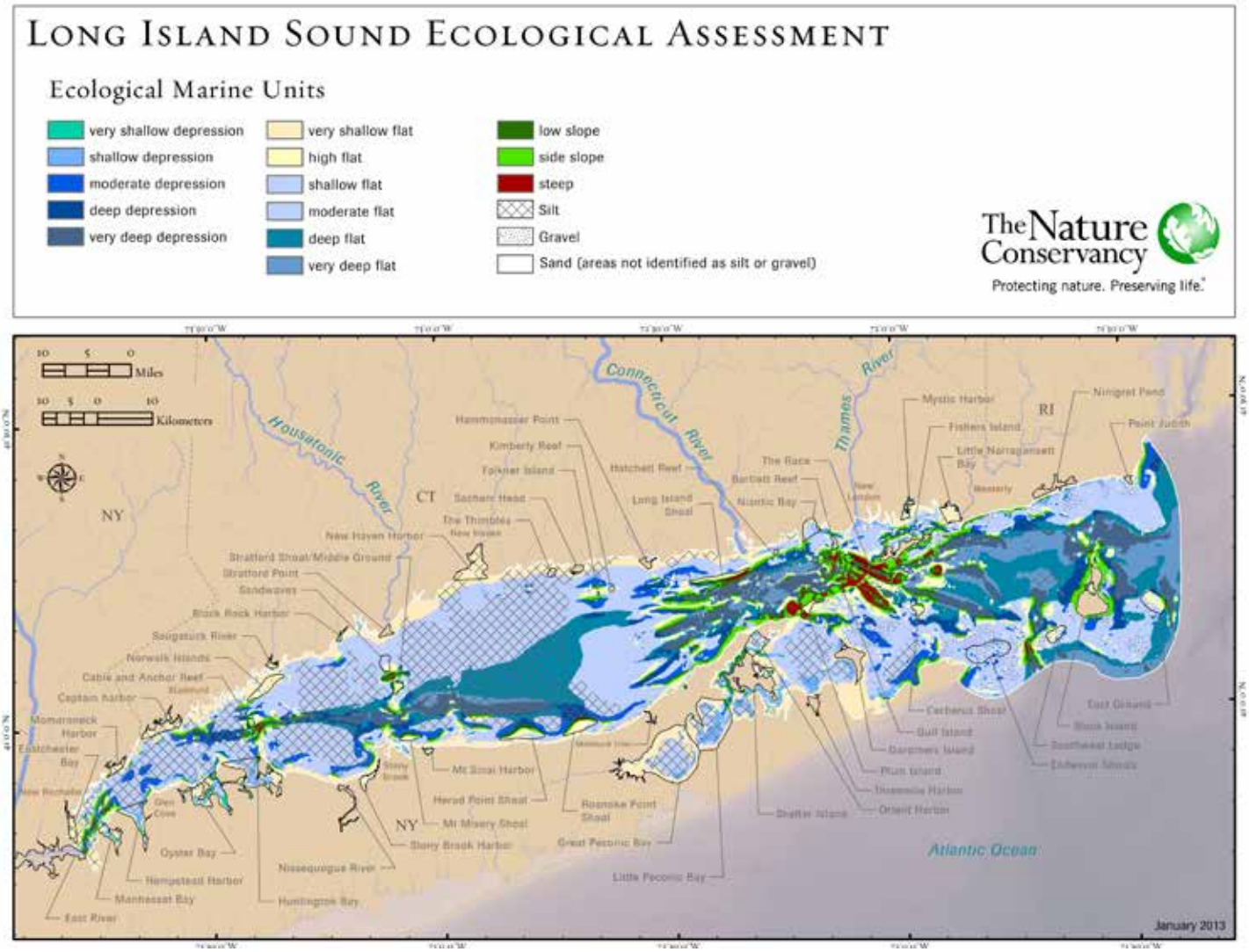


Figure 3. Ecological Marine Units (EMU) map showing seabed form colors that correspond to chart

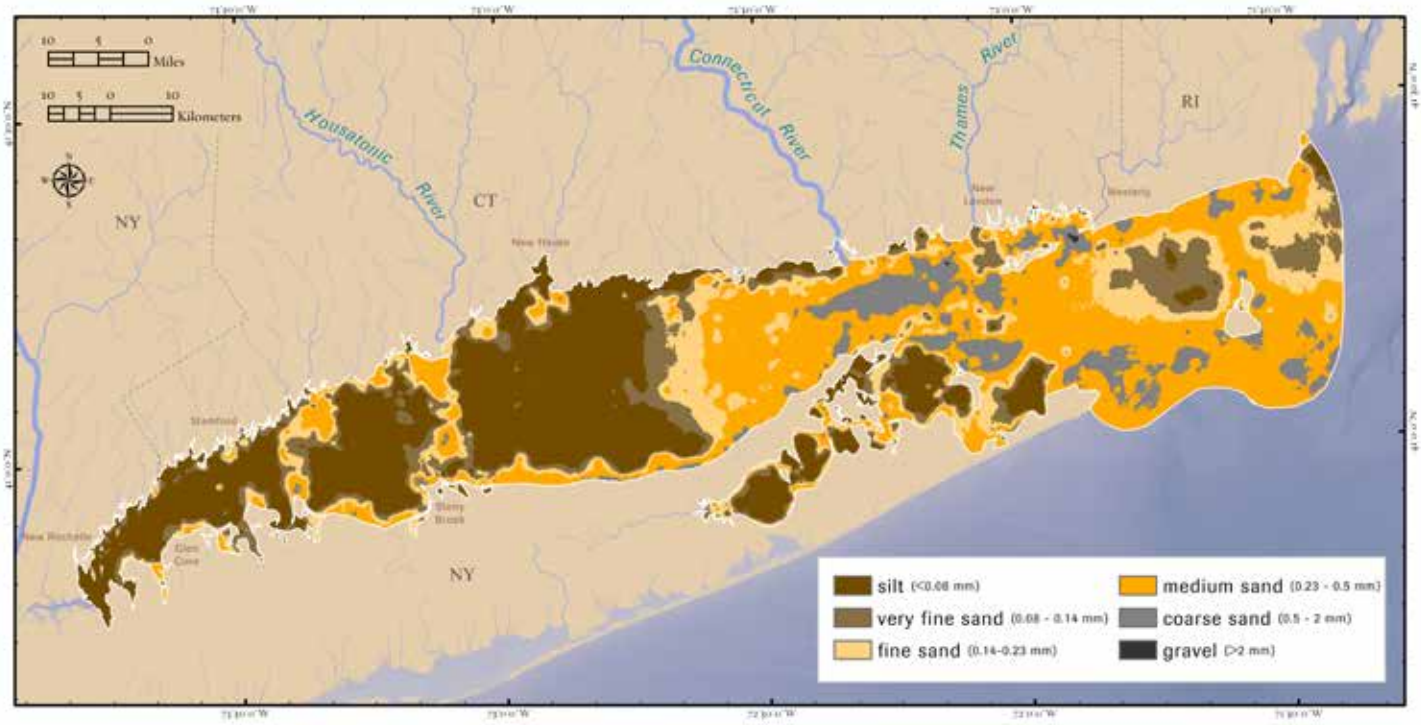


Figure 4. Sediment grain size map showing sediment colors that correspond to chart

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