STAC Introduction Presentation

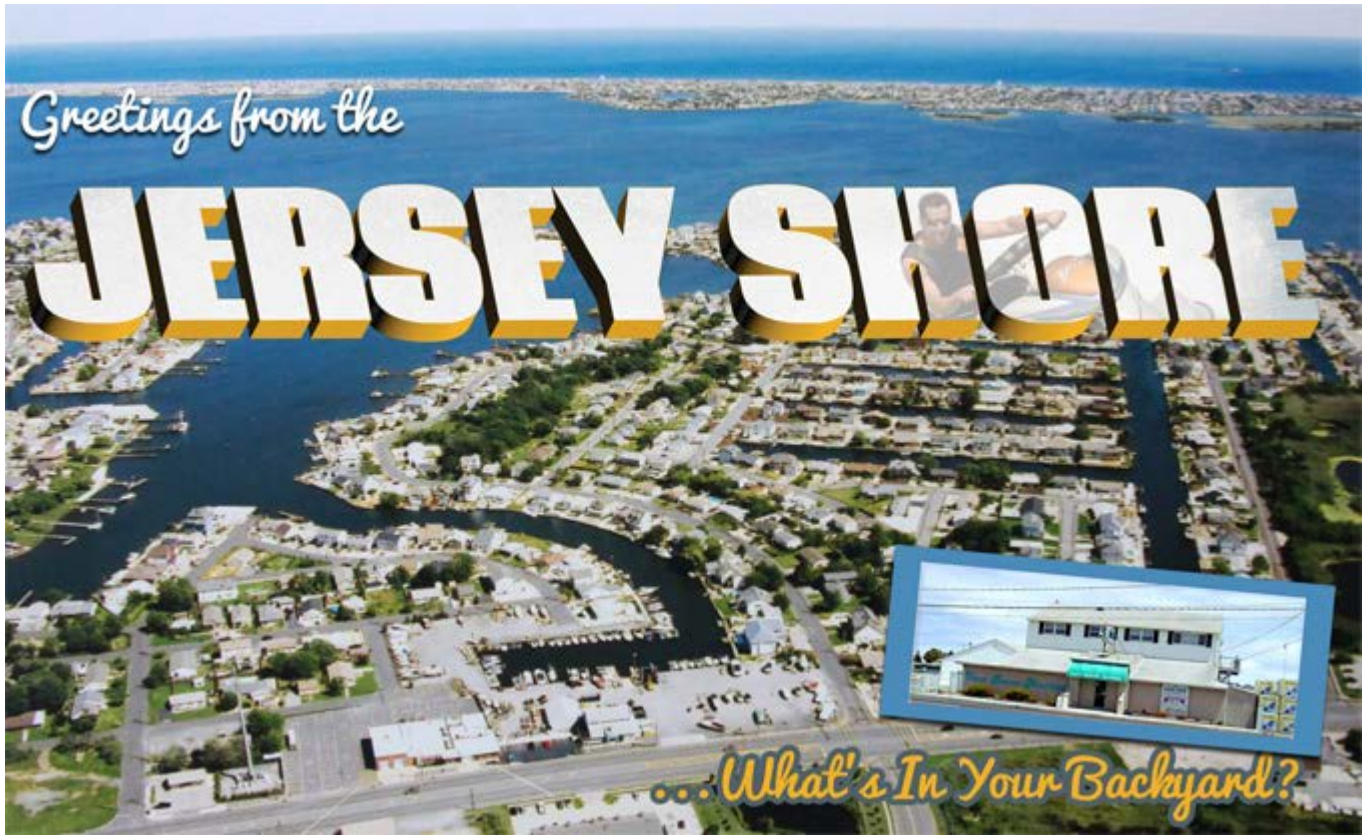
-Andrew McGowan

Environmental Scientist

Delaware Center for the Inland Bays

About Me

- From Toms River, NJ



About Me

- B.S. Biology, East Stroudsburg University

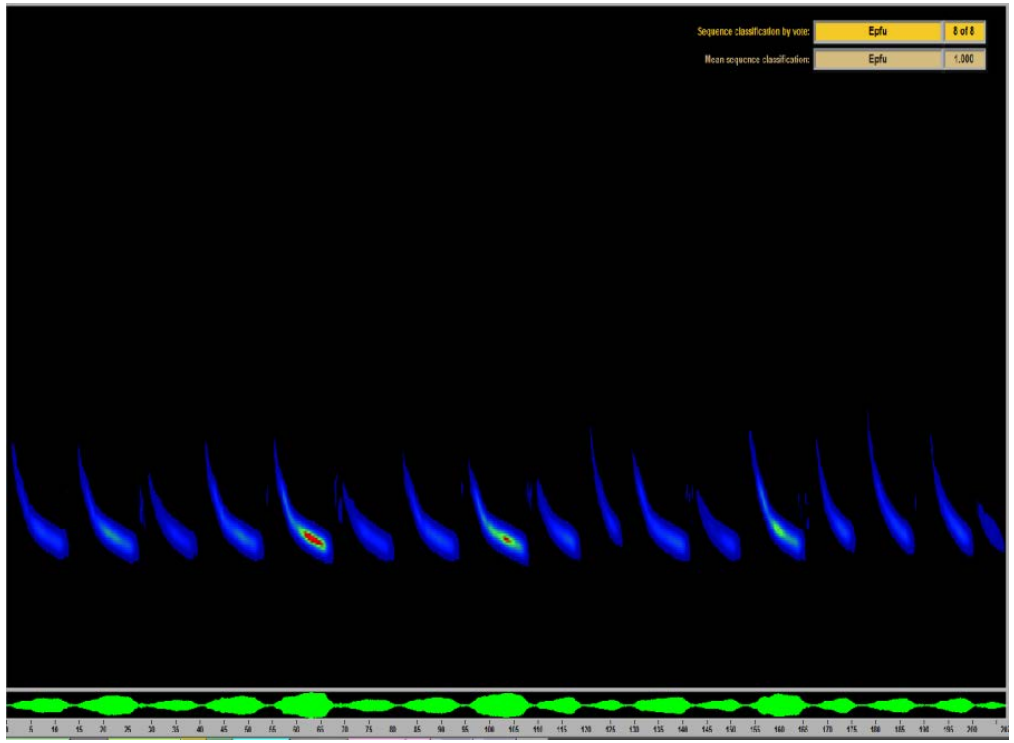
About Me

- M.S. Applied Biology, Salisbury University
- Thesis work: “Bat Occurrence and Habitat Selection on the Delmarva Peninsula” with Dr. Aaron Hogue

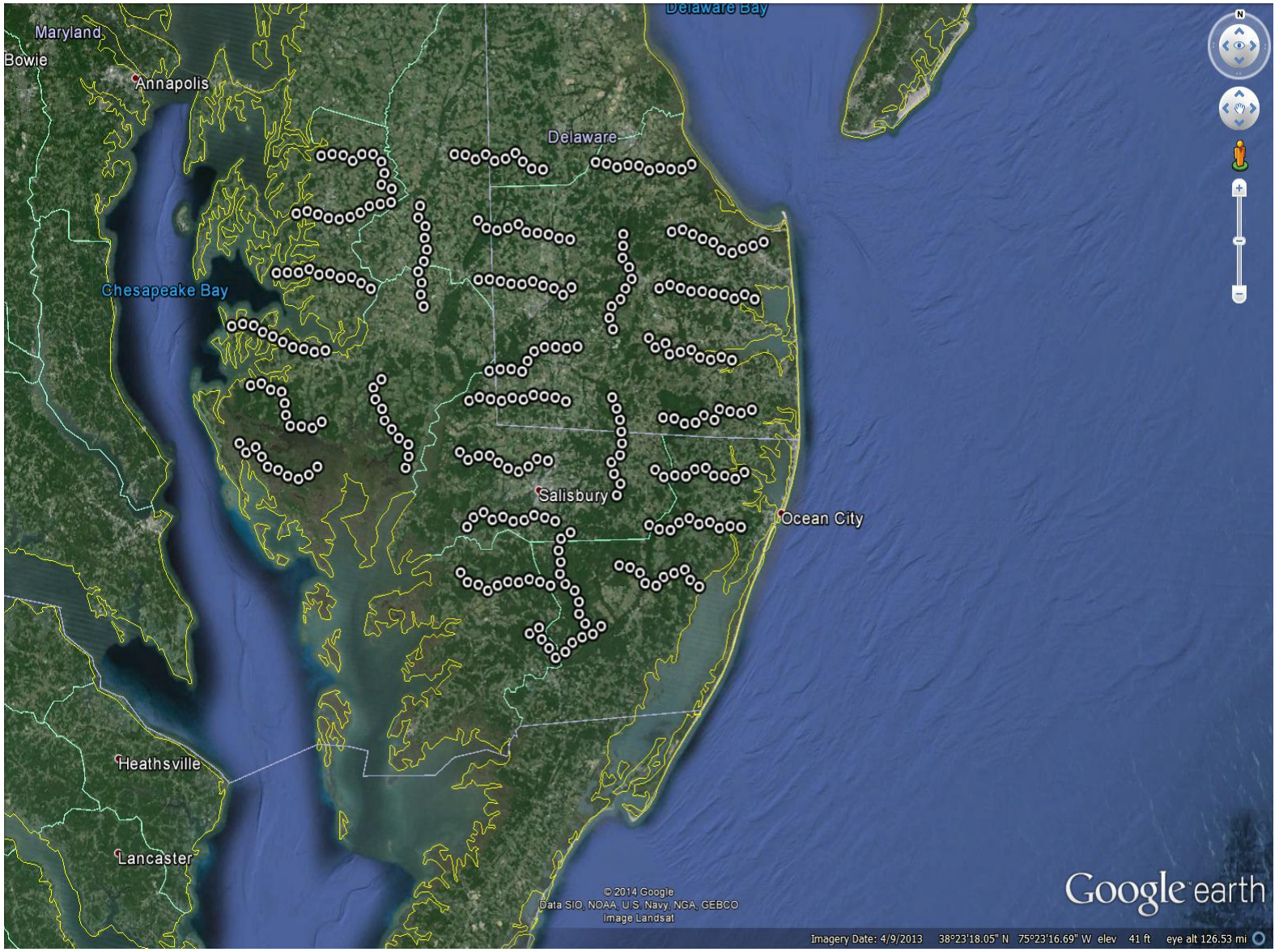
Thesis

Goals:

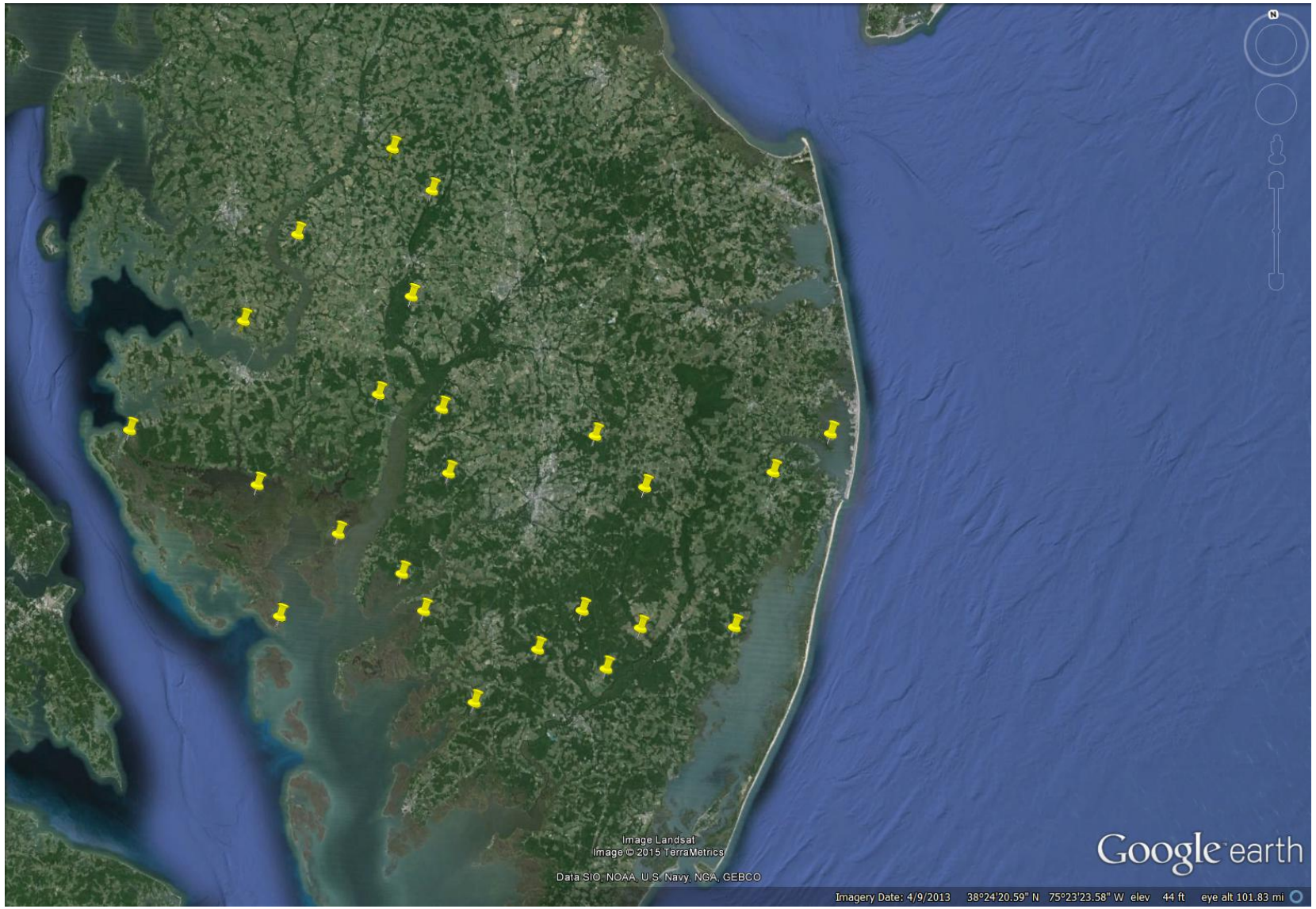
- Document which species are present across the peninsula, in all habitat types
- Identify elements of the landscape important to local foraging bats



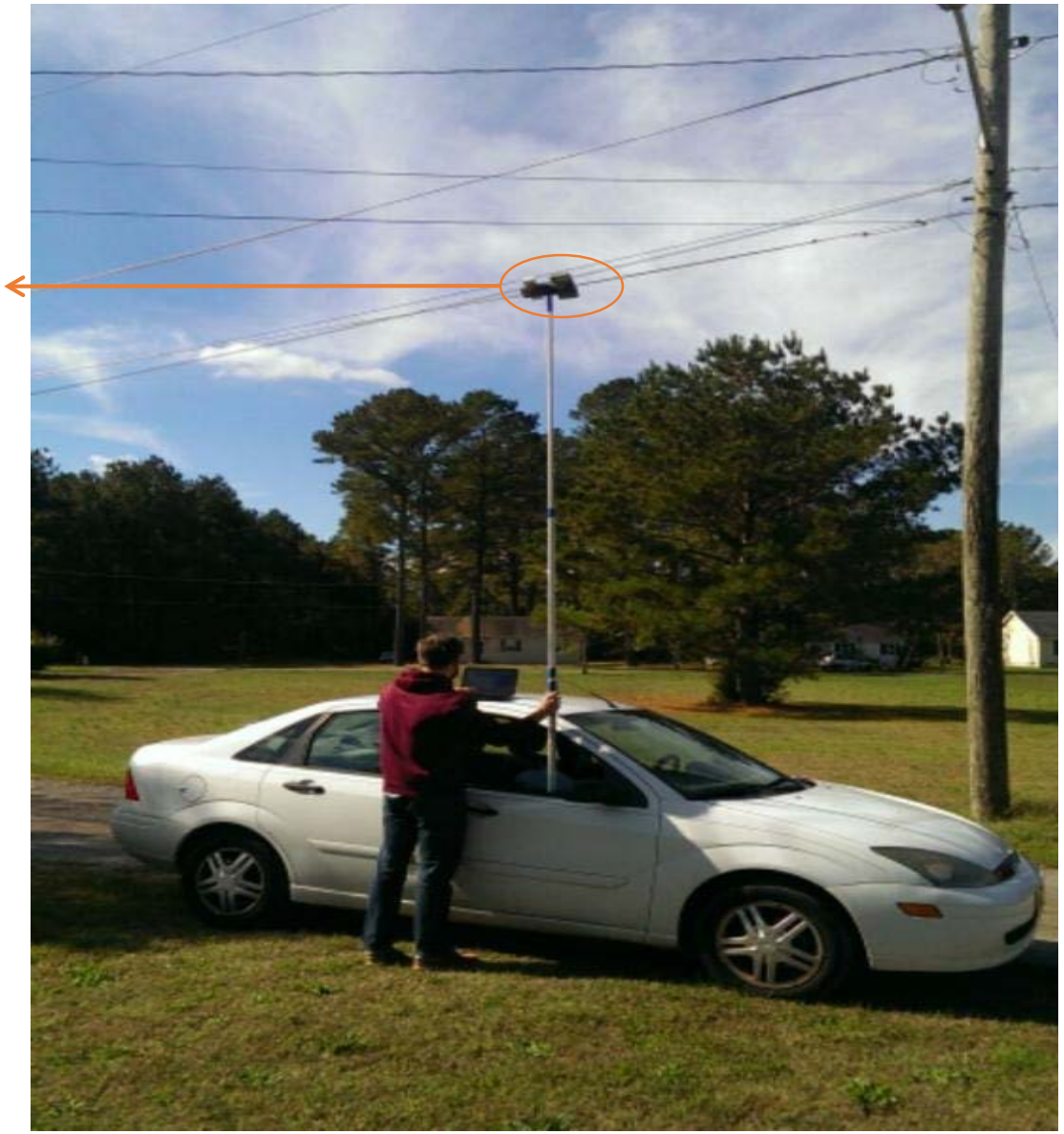
Driving Transects n = 280



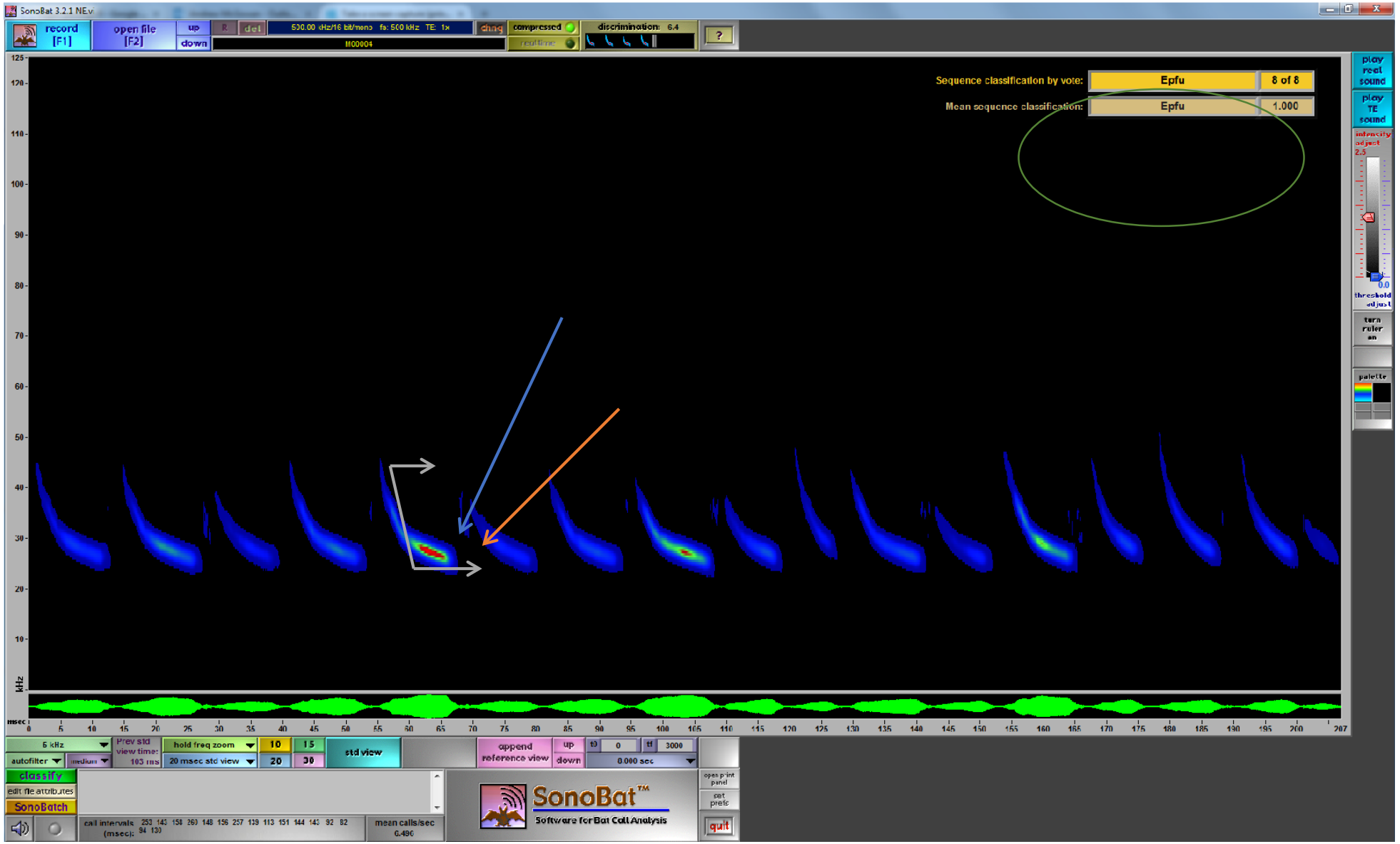
Passive Monitoring Sites n = 24



Field Equipment



Spectrogram of Bat Call Sequence



Species Known to Occur on Delmarva

Red Bat

www.nrri.umn.edu

Hoary Bat

www.nrri.umn.edu

Tri-colored Bat

www.pbase.com

Big Brown Bat

http://www.fcps.edu/islandcreekes/ecology/big_brown_bat.htm

Evening Bat

www.projectnoah.org

Myotis spp.

cdn-3.itsnature.org

Silver-haired Bat

www.ojibway.ca

Paradiso 1969; Fox 2007; Limpert et al. 2007; Johnson and Gates 2008; Wolcott and Vulinec 2012

Observed Species

Red Bat
815

www.nrri.umn.edu

Hoary Bat
75

www.nrri.umn.edu

Tri-colored Bat
31

www.pbase.com

Big Brown Bat
879

http://www.fcps.edu/islandcreekes/ecology/big_brown_bat.htm

Evening Bat
586

www.projectnoah.org

Myotis spp.
16

cdn-3.itsnature.org

Silver-haired Bat
542

www.ojibway.ca

		Edge				Open
Comparison	**n**	**Eastern Red Bat**	**Big Brown Bat**	**Evening Bat**	**Silver-haired Bat**	**Hoary Bat**
Forest edge	148	3.32 (12.73)***	3.14 (6.87)***	2.62 (4.94)***	1.87 (4.06)	0.14 (0.72)
Open	132	0.97 (4.11)	1.54 (5.33)	0.86 (3.29)	1.90 (3.64)	0.39 (1.28)*
Forest only[a]	64	5.87 (18.93)*[b]	3.28 (6.58)*[b]	3.90 (6.30)*[b]	1.50 (3.94)	0.25 (1.02)
Forest-open[a]	84	1.38 (2.52)	3.03 (7.11)*[c]	1.65 (3.28)*[c]	2.15 (4.15)	0.07 (0.30)
Open only[a]	132	0.97 (4.11)	1.54 (5.33)	0.86 (3.29)	1.90 (3.64)	0.39 (1.28)
Mixed only	40	6.65 (22.63)	3.70 (7.79)	4.62 (6.91)*	1.32 (2.77)*	0.40 (1.27)
Pine only	19	4.21 (10.89)	2.89 (4.21)	2.31 (4.71)	0.94 (2.99)	0.00 (0.00)
Forest edge	8	43.25 (61.53)*	35.75 (36.38)**	11.25 (12.44)**	1.50 (1.29)*	0.25 (0.50)
Forest interior	9	0.22 (0.66)	0.22 (0.66)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)

Comparison of mean (SD) number of call sequences recorded for each species at sites with the indicated habitat variable on the local level. Asterisks represent a significant difference in median values (* = $P < 0.05$,** = $P < 0.01$, *** = $P < 0.001$), as assessed by either a Kruskal Wallis and one-tailed Mann-Whitney U test ($\alpha = 0.05$) or Multiple Comparison Kruskal Wallis test with a Bonferroni correction.

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Conclusions

1) All species except for *Myotis* spp. and Tri-colored bats seem to be doing well on the peninsula

2) Red bat, Big Brown bat, and Evening bats show strong preferences for forest edges

3) Silver-haired bats appear less specialized for edge habitat than expected

4) Hoary bats exhibited preference for open habitats as predicted

5) Forest interior habitat very unproductive for regional foraging bats

Maryland Department of Natural Resources Forestry Service

- Conducted inventory of Pocomoke State Forest
- Identified tree species at over 400 forest plots
- Measured tree diameter, number of bolts, merchantable height, insect damage, crown metrics

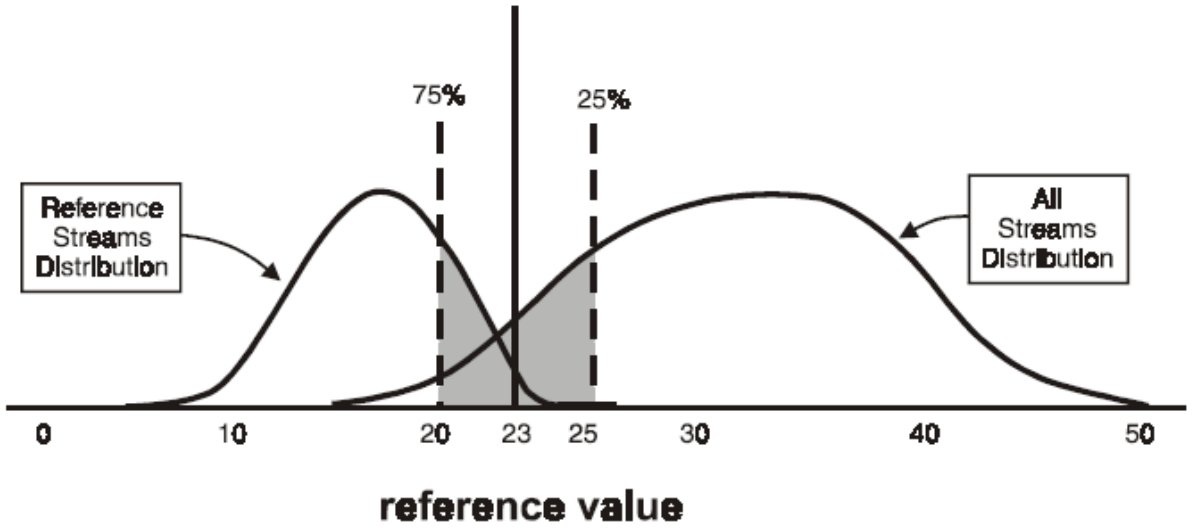
Maryland Coastal Bays
An NEP Program

- Scientific Intern performing data analysis on water quality data and bird data for DNR Wildlife and Heritage

EPA Method for nutrient criteria in rivers & streams (2000)

Three approaches are recommended;

a. *The use of reference streams or data percentiles*
b. *Predictive relationships (trophic classes, Redfield ratios, biocriteria)*
c. *Literature values for nutrient/algal thresholds*



Choosing Reference Sites

1. Where the 75th PCT for all parameters is less than the 25th PCT of the entire data set.

   Result: 2 streams,
   (both in the Chincoteage Bay)
   Purnell Bay UT
   Tanhouse Creek UT

2. Same as above except we ignore chlorophyll a values which exceed the 25th PCT.

   Result: 8 streams, that are more representative of the entire watershed.

Chincoteague :

Hancock Creek
Purnell Bay
Rowley Creek
Scarboro @ EA Vaughn
Tanhouse Creek

Isle of Wight:

Jake Gut

Newport:

Icehouse Branch

Sinepuxent:

South Point

Bay	Stream	CHLOR	TN_mgL	TP_mgL	DIN_mgL	DIP_mgL
Assawoman	Back Creek @ Caterpillar Lane	5.14	8.792	0.04	7.78274	0.01
Assawoman	Drum Creek	6.34	3.402	0.03	2.7034	0.00992
Assawoman	Montego Bay Pond	2.3	1.1308	0.0615	0.03	0.004635
Assawoman	Roy Creek	3.39	0.9135	0.068285	0.18	0.01
Assawoman	White Oak Swamp Ditch	9.1	2.772	0.04	1.94796	0.01
Chincoteague Bay	Boxiron Creek	8.34	0.7448	0.07	0.1897	0.03
Chincoteague Bay	Hancock Creek	1.385	0.9396	0.03	0.04544	0.009455
Chincoteague Bay	Paw Paw Creek	1.49	0.7971	0.065	0.10325	0.02266
Chincoteague Bay	Pikes Creek UT1	3.02	1.07	0.103	0.46494	0.0279
Chincoteague Bay	Purnell Bay UT	0.805	0.6398	0.02116	0.05034	5.00E-04
Chincoteague Bay	Rowley Creek	2.25	0.9016	0.0305	0.07826	0.008685
Chincoteague Bay	Scarboro Creek @ EAVaughn	0.98	1.0416	0.03	0.04662	0.004
Chincoteague Bay	Scarboro Creek UT @ P.Lndg	15.585	0.8857	0.105	0.03929	0.0185
Chincoteague Bay	Swan Gut VA	24.64	2.352	0.13	1.28	0.01
Chincoteague Bay	Tanhouse Creek UT1	0.81	0.5901	0.02	0.04044	0.00403
Isle of Wight	Jake Gut trib to Manklin	4.735	0.4319	0.016	0.06	0.000965
Newport	Holland Creek UT	2.3	1.11	0.03348	0.0343	0
Newport	Icehouse Branch	0.92	0.6181	0.02054	0.02991	0.00713
Newport	Newport Creek	4.65	1.08	0.04	0.48	0.011
Sinepuxent	Eagles Landing Golf Course	16.02	1.2642	0.17	0.09506	0.05
Sinepuxent	South Point	2.73	1.0234	0.02	0.07	0
Sinepuxent	Stephen Decatur ditch	0.6	1.16	0.04	0.03696	0.01

Choosing Impacted Sites:

25th percentile must exceed 75 percentile of all data, for multiple parameters

Result: 10 streams representative of the entire watershed.

Assawoman:

Back Creek

Chincoteague:

Little Mill Run
Powell Creek
Riley Creek
Sand Branch
Waterworks Creek UT

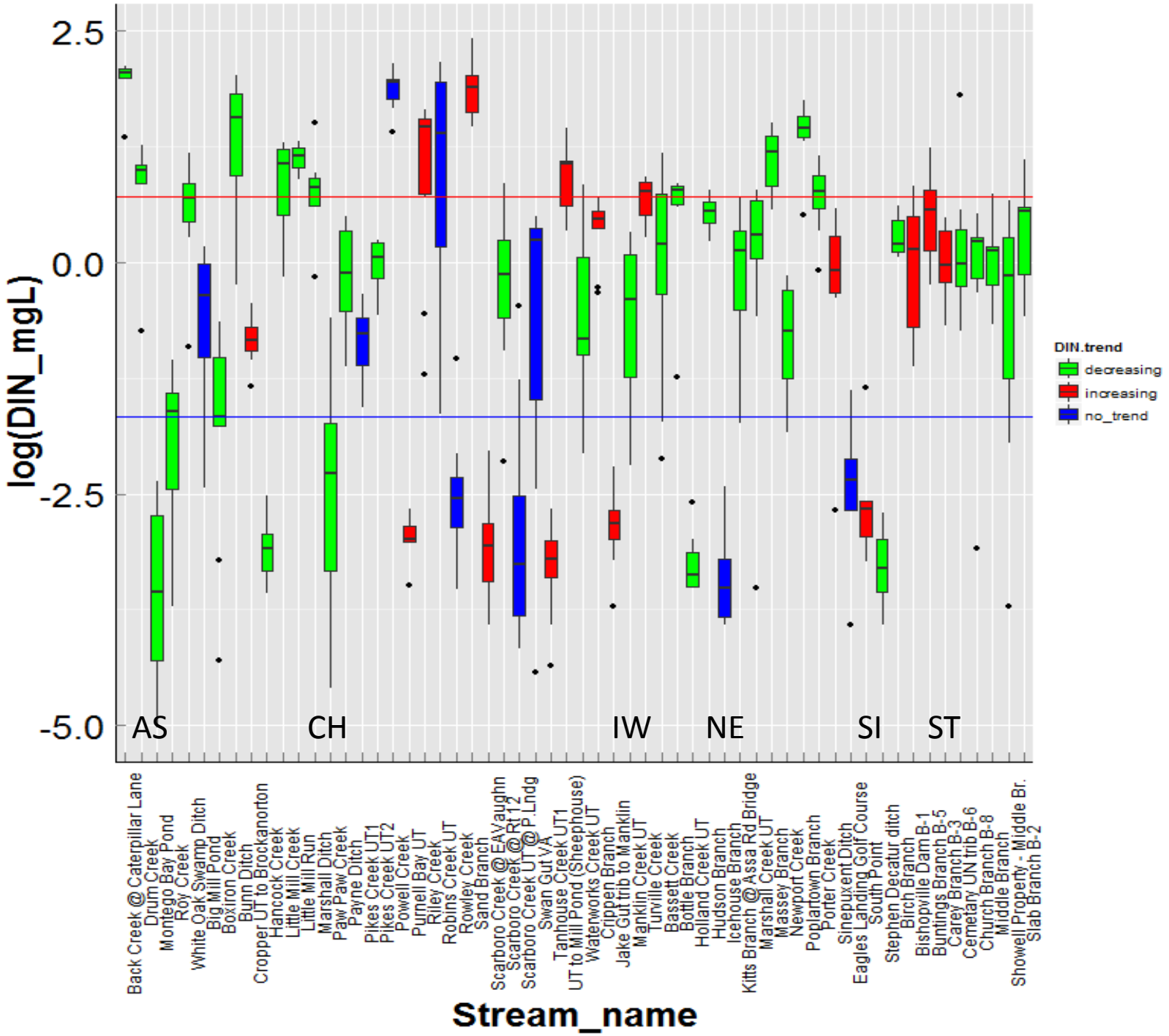
Newport:

Marshall Creek UT
Massey Branch
Poplartown Brnach

St Martin:

Church Branch B-8

Bay.	Stream	DIN	TN	DIP	TP
Assawoman	Back Creek @ Caterpillar Lane	7.34	7.798	0.009	0.039
Assawoman	Drum Creek	2.34932	3.044	0.0035	0.03
Chincoteague Bay	Cropper UT to Brockanorton	0.38751	0.97675	0.0425	0.08162
Chincoteague Bay	Little Mill Creek	1.7425	3.72	0.01176	0.04008
Chincoteague Bay	Little Mill Run	2.83484	3.6935	0.01	0.02182
Chincoteague Bay	Pikes Creek UT1	0.33	0.9562	0.02	0.09
Chincoteague Bay	Powell Creek	5.83189	7.3225	0.01825	0.03196
Chincoteague Bay	Riley Creek	2.11	5.019	0.04	0.0625
Chincoteague Bay	Robins Creek UT	1.2312	4.669	0.02775	0.1025
Chincoteague Bay	Sand Branch	5.08	6.594	0.0062	0.08
Chincoteague Bay	Scarboro Creek UT @ P.Lndg	0.0225	0.82705	0.00855	0.09175
Chincoteague Bay	Waterworks Creek UT	0.37105	1.41	0.03072	0.12216
Newport	Marshall Creek UT	1.0525	2.3195	0.04105	0.1325
Newport	Massey Branch	2.3375	3.024	0.02	0.05153
Newport	Poplartown Branch	3.88494	4.743	0.01175	0.03
Sinepuxent	Eagles Landing Golf Course	0.06902	1.0458	0.04	0.12
St Martin River	Church Branch B-8	0.85	1.9495	0.03141	0.0925



Non log scaled:
Red 75% = 2.05 mg/L

Blue 25% = 0.19 mg/L

Delaware Center for the Inland Bays

Program Manager for:

- Inshore Fish Survey
- Horseshoe Crab Survey

Assist with:

- Long Term Salt Marsh Monitoring Program
- BioEnhancement of Dead-end Canals
- Data Analysis

DELAWARE CENTER FOR THE
INLAND BAYS
Research. Educate. Restore.