

Tracking marine animals with environmental DNA (eDNA)



Mark Stoeckle

Program for the Human Environment
The Rockefeller University

Monmouth University-Rockefeller University
Marine Science Policy Initiative

eDNA surveys hard-to-survey sites

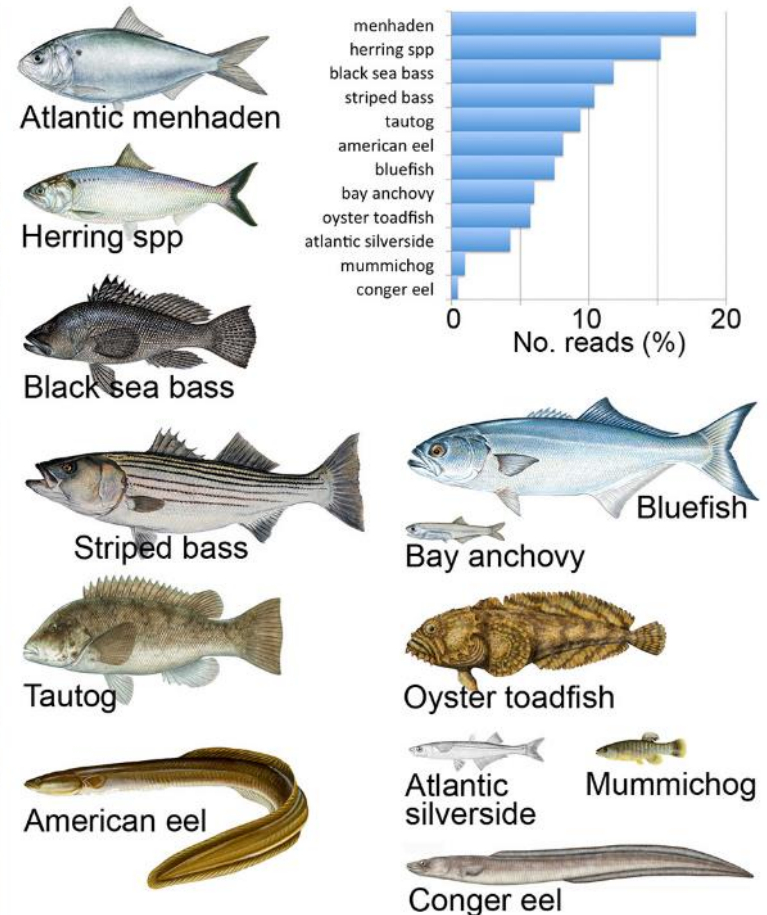
NYC/NJ Aquatic Vertebrate eDNA Project

Location: East River at 63rd ST, Manhattan

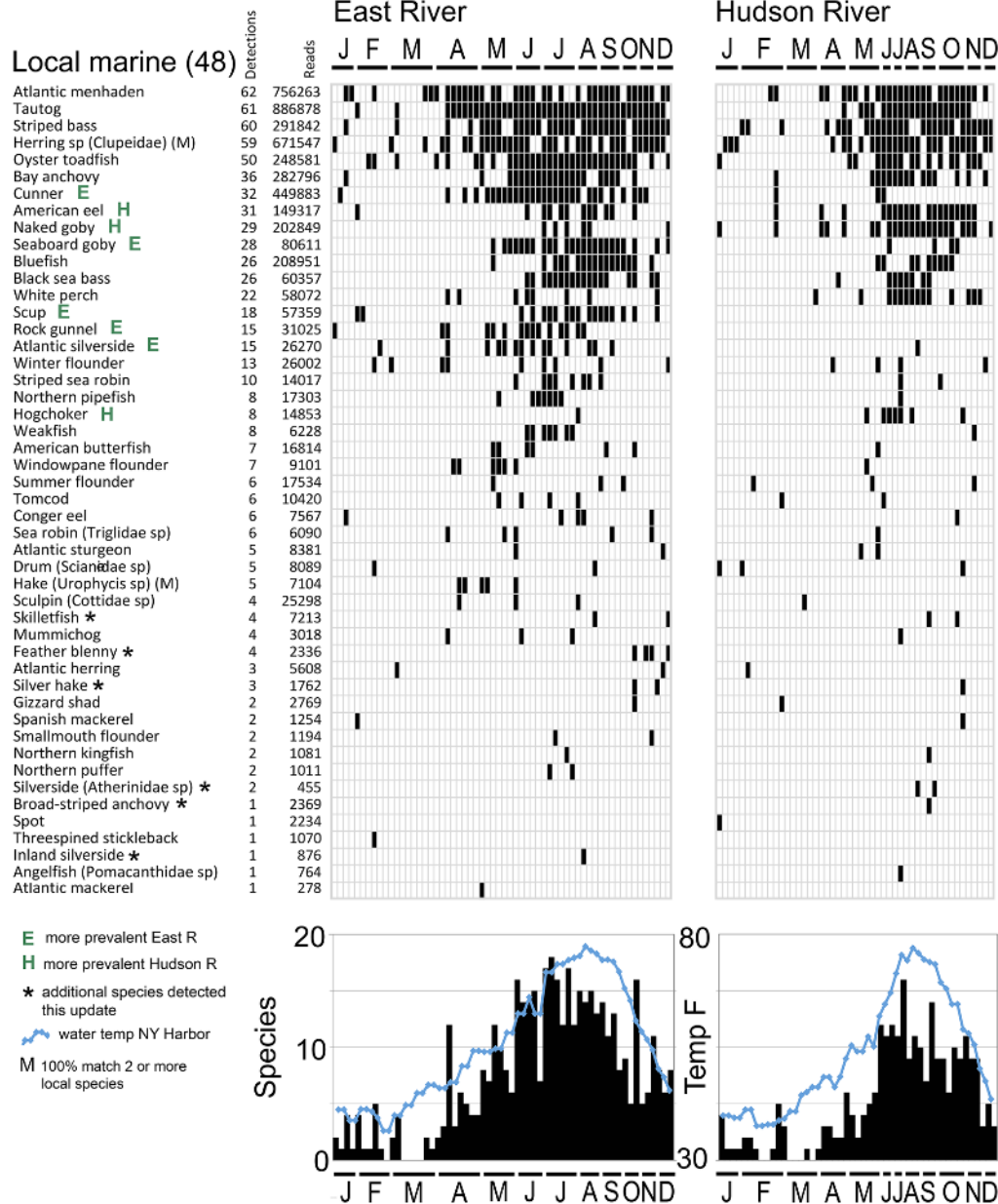
Date: October 30, 2015 Sample: 1 liter



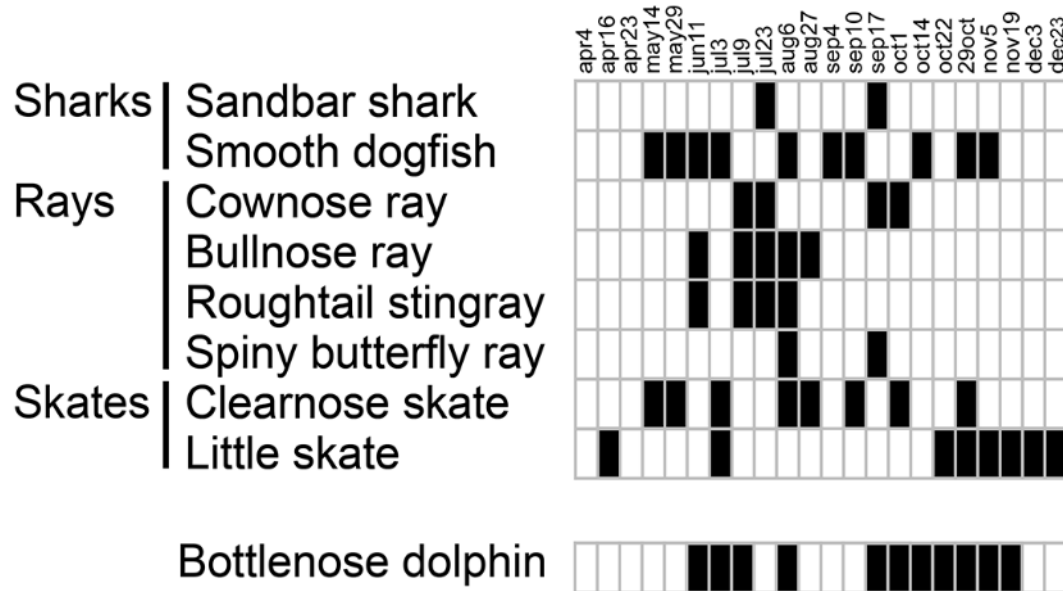
Fish eDNA



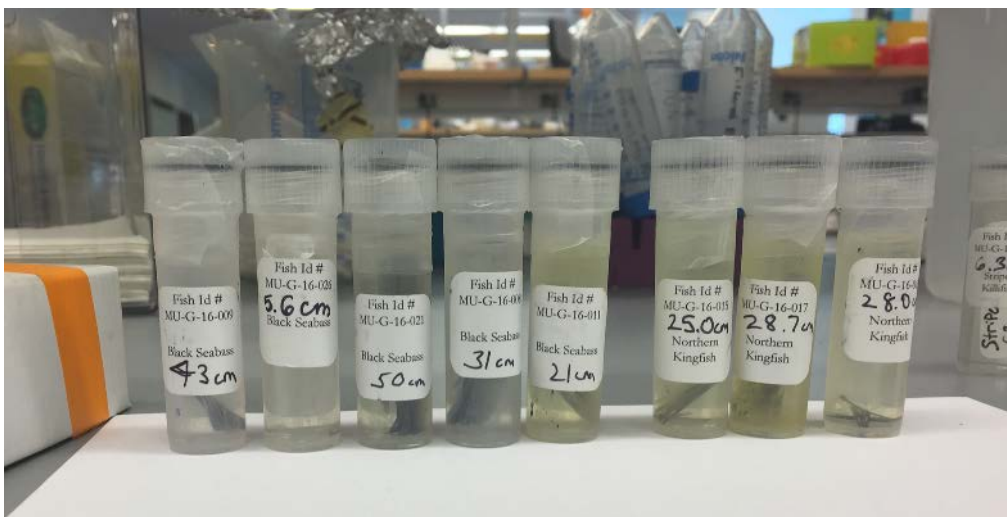
eDNA follows fish through seasons



eDNA sees sharks and monitors marine mammals



eDNA needs DNA databases



Fin clips

(Keith Dunton,
Monmouth University)



Whole fish

(NOAA Spring Trawl survey)

eDNA attracts public interest



Thursday, April 13, 2017
By Lindsey Christ

High School Student, University Researchers Team Up
For Breakthrough on Documenting Fish in NY Waters



Partners, Sponsors

MURU Marine Science Policy Initiative

A collaboration between:

**MONMOUTH
UNIVERSITY**

Urban Coast Institute

Marine Science & Policy Initiative



Salt marsh: mostly salt marsh minnow eDNA

NYC/NJ Aquatic Vertebrate eDNA Project

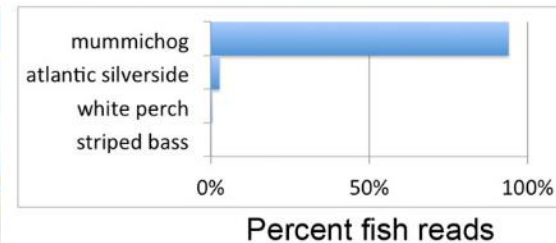
Sample no. 26

Location: Spuyten Duyvil Creek, Manhattan

Date: October 18, 2015 Volume analyzed: 1 liter



Fish eDNA



Mummichog



Atlantic silverside



White perch



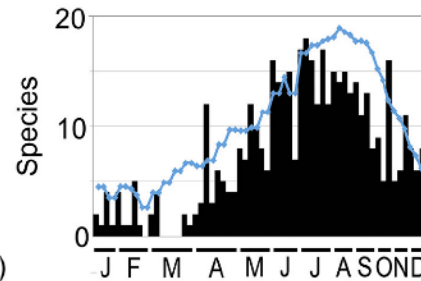
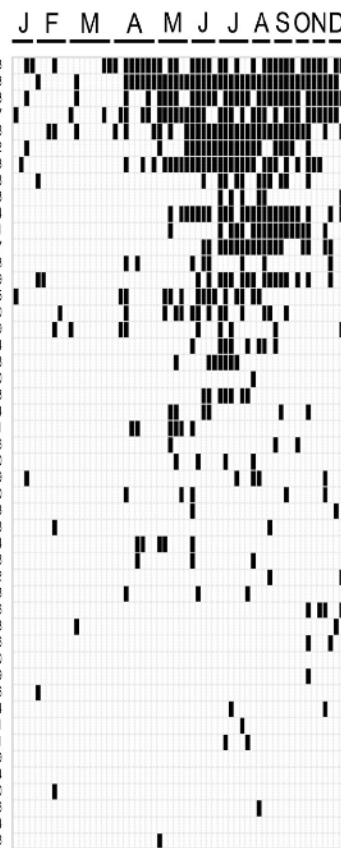
Striped bass

Local marine (48)

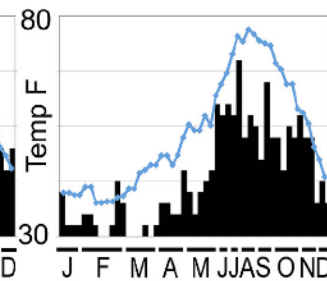
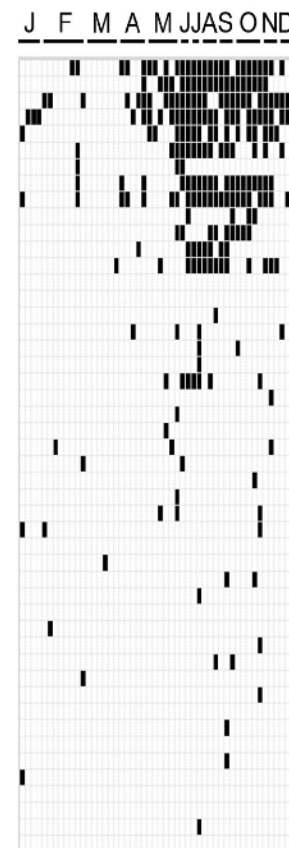
Atlantic menhaden	62	756263
Tautog	61	886878
Striped bass	60	325678
Herring sp (Clupeidae) (M)	59	671547
Oyster toadfish	50	271008
Bay anchovy	35	295012
Cunner E	32	449883
American eel H	31	252563
Naked goby H	29	263333
Seaboard goby E	28	90004
Bluefish	25	223911
Black sea bass	25	60357
White perch	22	76098
Scup E	18	57358
Rock gunnel E	15	31025
Atlantic silverside E	15	26270
Winter flounder	13	29448
Striped sea robin	10	15084
Northern pipefish	8	17303
Hogchoker H	8	15510
Weakfish	8	8468
American butterfish	7	16814
Windowpane flounder	7	9101
Summer flounder	5	22276
Tomcod	5	10420
Conger eel	5	9259
Sea robin (Triglidae sp)	5	6090
Atlantic sturgeon	5	9013
Drum (Sciaenidae sp)	5	8623
Hake (Urophycis sp) (M)	5	7104
Sculpin (Cottidae sp)	4	25298
Skilletfish ★	4	10352
Mummichog	4	3018
Feather blenny ★	4	2336
Atlantic herring	3	5608
Silver hake ★	3	2206
Gizzard shad	2	3040
Spanish mackerel	2	2769
Smallmouth flounder	2	1826
Northern kingfish	2	1194
Northern puffer	2	1081
Silverside (Atherinidae sp) ★	2	1011
Broad-striped anchovy ★	1	2369
Spot	1	2234
Threespined stickleback	1	1070
Inland silverside ★	1	876
Angelfish (Pomacanthidae sp)	1	764
Atlantic mackerel	1	278

E more prevalent East R
H more prevalent Hudson R
★ additional species detected this update
— water temp NY Harbor
M 100% match 2 or more local species

East River

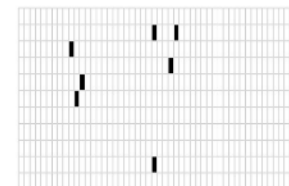
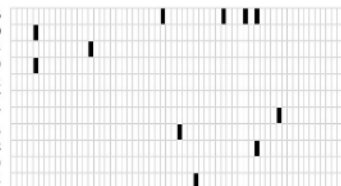


Hudson River



Fresh, exotic (11)

Common guppy	4	2556
Common carp	3	1310
Atlantic salmon	2	23785
Pacific red snapper	2	2419
Catfish (Ictalurus sp)	1	6062
White sucker	1	4397
Large yellow croaker ★	1	3297
European sea bass	1	1245
Red grouper ★	1	1008
Darter (Etheostoma sp)	1	469
Pacific sand lance	1	153

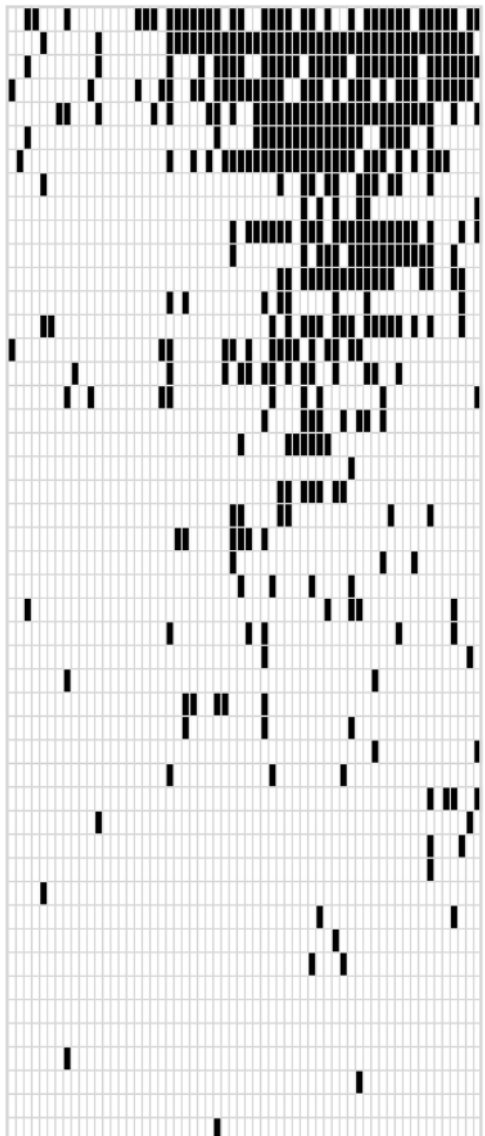


Local marine (48)

	Detections	Reads
Atlantic menhaden	62	756263
Tautog	61	886878
Striped bass	60	291842
Herring sp (Clupeidae) (M)	59	671547
Oyster toadfish	50	248581
Bay anchovy	36	282796
Cunner E	32	449883
American eel H	31	149317
Naked goby H	29	202849
Seaboard goby E	28	80611
Bluefish	26	208951
Black sea bass	26	60357
White perch	22	58072
Scup E	18	57359
Rock gunnel E	15	31025
Atlantic silverside E	15	26270
Winter flounder	13	26002
Striped sea robin	10	14017
Northern pipefish	8	17303
Hogchoker H	8	14853
Weakfish	8	6228
American butterfish	7	16814
Windowpane flounder	7	9101
Summer flounder	6	17534
Tomcod	6	10420
Conger eel	6	7567
Sea robin (Triglidae sp)	6	6090
Atlantic sturgeon	5	8381
Drum (Sciaenidae sp)	5	8089
Hake (Urophycis sp) (M)	5	7104
Sculpin (Cottidae sp)	4	25298
Skilletfish *	4	7213
Mummichog	4	3018
Feather blenny *	4	2336
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Broad-striped anchovy *	1	2369
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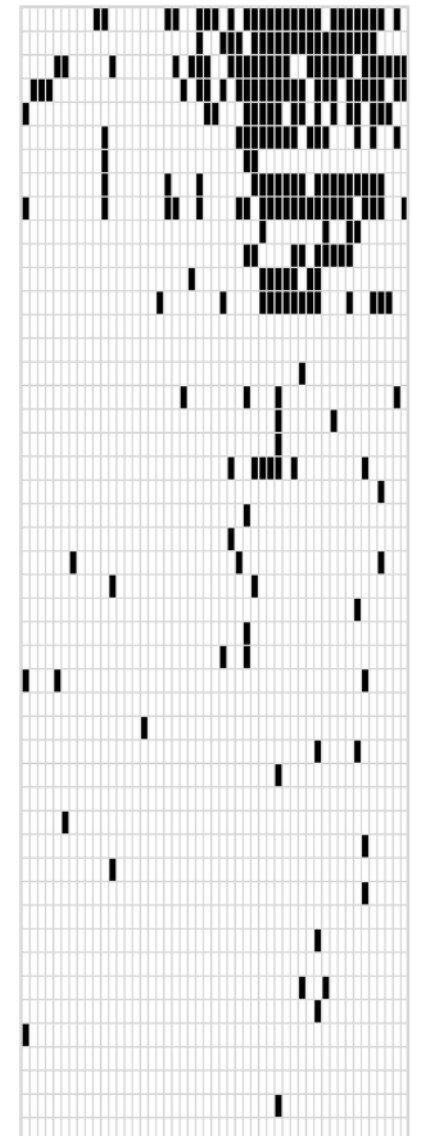
East River

J F M A M J J A S O N D



Hudson River

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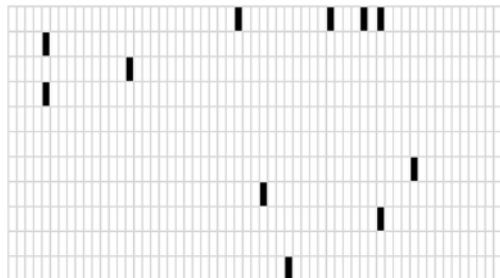


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Red grouper *	1	1008
Darter (<i>Ethiostoma</i> sp)	1	469
Pacific sand lance	1	153

East River

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Hudson River

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