The Community Foundation *for* Greater New Haven

QUINNIPIAC RIVER FUND FINAL REPORT- 2017

Please complete and submit completed form via e-mail to dcanning@cfgnh.org at The Community Foundation for Greater New Haven by March 30, 2018.

Date: 5/30/19

Group/Organization Name: Yale School of Forestry & Environmental Studies

Address: 195 Prospect Street

City, State, & Zip: New Haven, CT 06511

Telephone #: __203-432-5139

Project Name: Mercury in Fish of Ponds of the Quinnipiac River Watershed

Grant Number: 20170089

Name & title of person completing this form: Gaboury Benoit, Grinstein Class of 1954 Professor of Environmental Chemistry

E-mail address: gabouryb@gmail.com

Please respond to the following statements:

1. List the specific objectives/outcomes of the project and tell how they were met during the grant period. Also, provide an update on any special conditions of the grant (if applicable).

The objective was to better understand the risk to human health of eating locally caught fish within the Quinnipiac River watershed. Needed is a more detailed understanding of Hg levels by species, by fish age or body size, and by where they are caught (which lakes). This research aimed to provide the first evaluation having high spatial resolution of Hg in fish for the Quinnipiac watershed. Another goal was to afford up to date information on an environmental issue which is clearly changing significantly over time.

To achieve these objectives, three lines of evidence were sought: (1) Hg in fish of the Quinnipiac River watershed, (2) water quality characteristics known to promote elevated Hg levels (esp. low pH and alkalinity), and (3) sediment grab samples to evaluate and compare total Hg burdens in the various lakes. The plan was to sample up to 20 named lakes and ponds within the watershed. Not all of these ponds are used by anglers, but many of them are fished and more information can provide a better sense of which factors can be predictive of food safety.

Studying Hg in fish from lakes in the Quinnipiac River watershed is important for several reasons. First, is the question of possible risks to human health. Mercury is an especially virulent toxin, and fish are the main dietary pathway for people. Second, the study can help document the possible success or failure of costly measures that have been emplaced to reduce atmospherically delivered contaminants. This could be especially important in an era when coal burning is being reconsidered as an energy supply. Finally, the proposed research builds on a valuable range of information that is available to understand an important river and its watershed in the state of Connecticut and the northeast region. The investigation can add to our understanding of Hg cycling and inform management to lessen its environmental impact. This is important because metals like Hg can bioaccumulate through the food chain, leading to unsafe levels in top predator fish species. On a larger scale, this research can contribute in a fundamental way to our overall understanding of the potential risk posed by Hg in fish, which is a serious knowledge gap throughout the country. Thus, this research can have local, regional, and national significance.

It is important to sample across a broad geographic range to see how Hg varies spatially. The attached shows all the 112 named ponds found in the Quinnipiac River watershed. Another attachment shows an initial division of the Quinnipiac River watershed into 13 subwatersheds, with representative ponds in each. Also attached are the final 10 subwatersheds and primary and secondary ponds selected from each to represent the entire watershed. It is also important to try to capture biological variability. To that end we are assessing multiple fish species. Another attachment shows the list of all fish from which samples are selected.

2. Please share your successes, challenges and any lessons learned through the implementation of your project. Were there any unintended consequences or lessons learned that may affect how you operate your program moving forward?

We were very surprised by the high level of permitting hurdles that must be crossed to collect and analyze fish. Thousands of recreational anglers take uncounted numbers of fish from local waters, and treat them with no regard to pain and stress. Yet for our team as scientists to collect an insignificantly small number required permitting from state agencies that required many months of efforts. In addition, because fish are vertebrates, they fell under regulations governing higher animals. This required additional training and permitting from Yale's Institutional Animal Care & Use Committee (IACUC). Without judging the importance or need of these regulatory measures, it was a major challenge in conducting this project and delayed us by more than a year.

3. What are the opportunities and needs of your organization as it continues to move forward with its work to positively impact the Quinnipiac River?

We continue to find the Community Foundation for Greater New Haven, and the Quinnipiac River Fund to be incredibly valuable partners in helping us to protect and restore the environmental health of this important river and regional resource.

Also, please include a photo or image that can be uploaded along with your report to The Quinnipiac River Fund website.

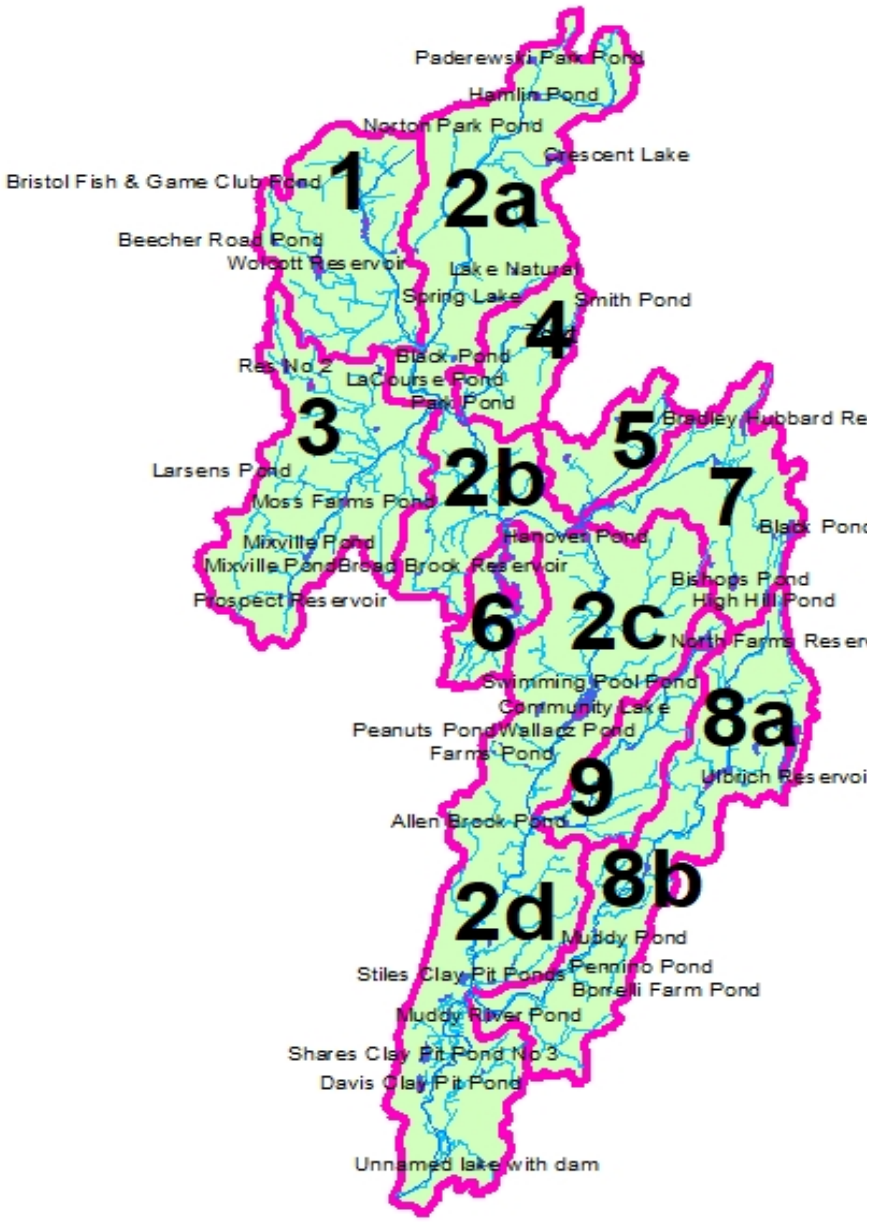
To be added.

	NAME	AREA (acres)
1	Broad Brook Reservoir	290.3
2	Ulbrich Reservoir	154.1
3	Community Lake	94.5
4	Hanover Pond	70.5
5	North Farms Reservoir	66.1
6	Wolcott Reservoir	54.2
7	Crescent Lake	51.2
8	Bradley Hubbard Reservoir	35.3
9	Black Pond	35.2
10	MacKenzie Reservoir	33.5
11	Grannis Pond	28.1
12	Compounce Lake	25.4
13	Muddy River Pond	23.6
14	Davis Clay Pit Pond	21.3
15	Res No 2	19.1
16	Res No 3	16.0
17	Paderewski Park Pond	15.8
18	Shares Clay Pit Pond No 3	15.0
19	MacKenzie Reservoir	14.8
20	Slopers Pond	14.8
21	Bristol Fish & Game Club Pond	12.3
22	Hamlin Pond	12.0
23	Bishops Pond	11.8
24	Scards Pond	11.0
25	High Hill Pond	10.1
26	Broad Brook Reservoir	9.8
27	Manson Dam	8.1
28	Bishops Pond	8.1
29	Spring Lake	7.7
30	Mirror Lake	7.5
31	Moss Farms Pond	7.0
32	Spring Brook Reservoir	6.8
33	Beecher Road Pond	6.8
34	Spring Lake	6.7
35	Dayton Pond	6.6
36	Stiles Clay Pit Ponds	6.1
37	LaCourse Pond	6.0
38	Mixville Pond	6.0
39	Wallacz Pond	5.9
40	Lake Natural	5.7
41	Baldwins Pond	5.4
42	Prospect Reservoir	5.1
43	Black Pond	4.9
44	Allen Brook Pond	4.8
45	Mixville Pond	4.7
46	Bruces Ice Pond	4.6
47	Brooks Pond	4.2
48	Elmere Reservoir	4.1
49	Larsens Pond	4.1
50	Kifmire Pond	4.0
51	Simpson Pond	4.0
52	Black Pond	4.0
53	Unnamed lake with dam	3.8
54	Twin Clay Pit Pond No 2	3.1
55	Shares Clay Pit Pond No 2	3.1
56	Weeks Pond	3.0
57	West Johnson Avenue Pond	2.9
58	Florians Pond	2.3
59	Twin Clay Pit Pond No 1	2.2

60	Duksa Farm Pond	1.87
61	Stiles Clay Pit Ponds	1.81
62	Stiles Clay Pit Ponds	1.78
63	Prospect Reservoir	1.77
64	West Brook Reservoir	1.67
65	Little River Pond	1.66
66	Calvanese Pond	1.64
67	Stiles Clay Pit Ponds	1.61
68	Stiles Clay Pit Ponds	1.51
69	Hartens Pond	1.42
70	Farnums Pond	1.39
71	Farms Pond	1.36
72	Swimming Pool Pond	1.29
73	Honeypot Brook Pond	1.28
74	Mansion Road Dam	1.28
75	Smith Pond	1.25
76	Mill Pond	1.22
77	Res No 1	1.11
78	Natural Pond	1.08
79	Hatchery Dam	1.04
80	Carmel Pond	1.00
81	Cuff Brook Pond	0.96
82	Pine Lake	0.95
83	Todds Pond	0.93
84	Golf Pond	0.90
85	Park Pond	0.77
86	Booths Pond	0.76
87	Cheshire Park Pond	0.76
88	Norton Park Pond	0.68
89	Shares Clay Pit Pond No 1	0.63
90	Shapiro Pond	0.58
91	Killam Pond	0.56
92	Muddy Pond	0.54
93	Burritt Street Pond	0.47
94	Woodvale	0.45
95	Eckerts Pond	0.43
96	North Farms Pond	0.42
97	Old Mill Pond	0.41
98	Orchard Pond	0.40
99	New Dam Pond	0.38
100	Pennino Pond	0.38
101	Coes Pond	0.37
102	Borrelli Farm Pond	0.33
103	Stiles Clay Pit Ponds	0.31
104	Fergusons Pond	0.27
105	Stiles Clay Pit Ponds	0.27
106	Sun Dam	0.25
107	Little Black Pond	0.23
108	Minute Pond	0.19
109	Peanuts Pond	0.18
110	Augar	0.12
111	Tiedeman	0.11
112	Hubgard Park Pond	0.09

Select Waterbodies in Subwatersheds of Quinnipiac River Watershed

Subwatershed	Body 1	Body 2
1	Compounce Lake	Wolcott Reservoir
2a	Crescent Lake	Black Pond
2b	Cheshire Park Pond	Honeypot Brook Pond
2c	Hanover Pond	Manson Dam
2d	Stiles Clay Pit Ponds	Shares Clay Pit Pond 3
3	Reservoir Number 2	Prospect Reservoir
4	Slopers Pond	Park Pond
5	Mirror Lake	New Dam Pond
6	Broad Brook Reservoir (North)	Broad Brook Reservoir (South)
7	Bradley Hubbard Reservoir	Bishops Pond
8a	Ulbrich Reservoir	Mackenzie Reservoir
8b	Muddy River Pond	Dayton Pond
9	North Farms Reservoir	Simpson Pond


Paderewski Park Pond
Hamlin Pond
Norton Park Pond
Crescent Lake
Bristol Fish & Game Club Pond
1
2a
Beecher Road Pond
Wolcott Reservoir
Lake Natural
Spring Lake
Smith Pond
4
Black Pond
Res No 2
LaCourse Pond
Park Pond
3
5
Bradley Hubbard Re
Larsens Pond
2b
7
Moss Farms Pond
Hanover Pond
Black Pond
Mixville Pond
Mixville Pond
Broad Brook Reservoir
Bishops Pond
Prospect Reservoir
High Hill Pond
6
2c
North Farms Reser
Swimming Pool Pond
Community Lake
8a
Peanuts Pond
Wallace Pond
Farms Pond
Ulbrich Reservoi
9
Allen Brook Pond
8b
2d
Muddy Pond
Stiles Clay Pit Ponds
Pennino Pond
Borrelli Farm Pond
Muddy River Pond
Shares Clay Pit Pond No 3
Davis Clay Pit Pond
Unnamed lake with dam

Subwatershed	Pond	Town
1. Tenmile		
	Mixville	Cheshire
	Cheshire/Prospect Res	Prospect
	Larsens Pd	Cheshire
	W Brook Res	Prospect
2. Eightmile		
	Florian's Pd	Southington
	Wolcott Res	New Britain
	Grannis Pd	Souhtington
3. Misery		
	Slopers Pd	Southington
	Smith Pd	Southington
	Park Pd	Southington
4. Sodom		
	Mirror Lake	Meriden
	Elsmere Res	Meriden
	Westfort Farm Ponds	Meriden
5. Broad Brook		
	Broad Brook Reservoir (North)	Cheshire
	Broad Brook Reservoir (South)	Cheshire
6. Harbor		
	Black Pd	Middlefield
	Bishops Pd	Meriden
	Baldwins Pd	Meriden
	Kifmire Pd (Ives Pd)	Meriden
	Bradley Hubbard Res	Meriden
7. Wharton		
	No Farms Res	Wallingford
	No Farms Pd	Wallingford
	Simpson Pd	Wallingford
8. Muddy		
	Ulbrich Res	Wallingford
	Muddy R Pd	No Haven
	Mackenzie Res	Wallingford
	Dayton Pd	Wallingford
	Scards Pd	Wallingford
9. Q above Tenmile		
	Paderewski	Plainville
	Crescent Lake	Plainville
10. Q Middle		
	Cheshire Park Pd	Cheshire
	Honeypot Brook Pond	Cheshire

Fish of the Quinnipiac River Watershed	
Common Name	**Scientific Name**
Rock bass	Ambloplites rupestris
Yellow bullhead	Ameiurus natalis
Brown bullhead	Ameiurus nebulosus
White sucker	Catostomus commersonii
Minnow	Cyprinidae spp.
Redfin pickerel	Esox americanus
Tessellated darter	Etheostoma olmstedi
Carp	Family: Cyprinidae
Banded killifish	Fundulus diaphanous
Readbreast sunfish	Lepomis auritus
Pumpkinseed	Lepomis gibbosus
Bluegill sunfish	Lepomis macrochirus
Common shiner	Luxilus cornutus
Largemouth bass	Micropterus salmoides
Golden shiner	Notemigonus crysoleucas
Bridle Shiner	Notropis bifrenatus
Spottail shiner	Notropis hudsonius
Rainbow trout	Oncorhynchus mykiss
Yellow perch	Perca flavescens
Fathead minnow	Pimephales promelas
Black crappie	Promoxis nigromaculatus
Blacknose dace	Rhinichthys atrarulus
Longnose dace	Rhinichthys cataractae
Brown trout	Salmo trutta
Brook trout	Salvelinus fontinalis
Creek Chub	Semotilus atromaculatus
Fallflsh	Semotilus corporalis
Central mudminnow	Umbra limi

Based on Table 4.4 from Technical Memorandum #1:
State of the Quinnipiac River Watershed
Quinnipiac River Watershed Based Plan
Dec 2012 revised June 2013

Prepared for:
Quinnipiac River Watershed Assoc
In cooperation with: CT DEEP & USEPA