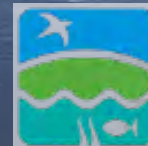


Using Biological Monitoring to Assess Restoration Success and Plan Future Projects in Connecticut Coastal Streams

Alex Krofta

Ecological Restoration Projects Manager



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Action for our region's environment.



Save the Sound[®]

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Save the Sound leads environmental action in the Long Island Sound region. We fight climate change, save endangered lands, protect the Sound and its rivers, and work with nature to restore ecosystems.



Pollution Monitoring



Legal Action



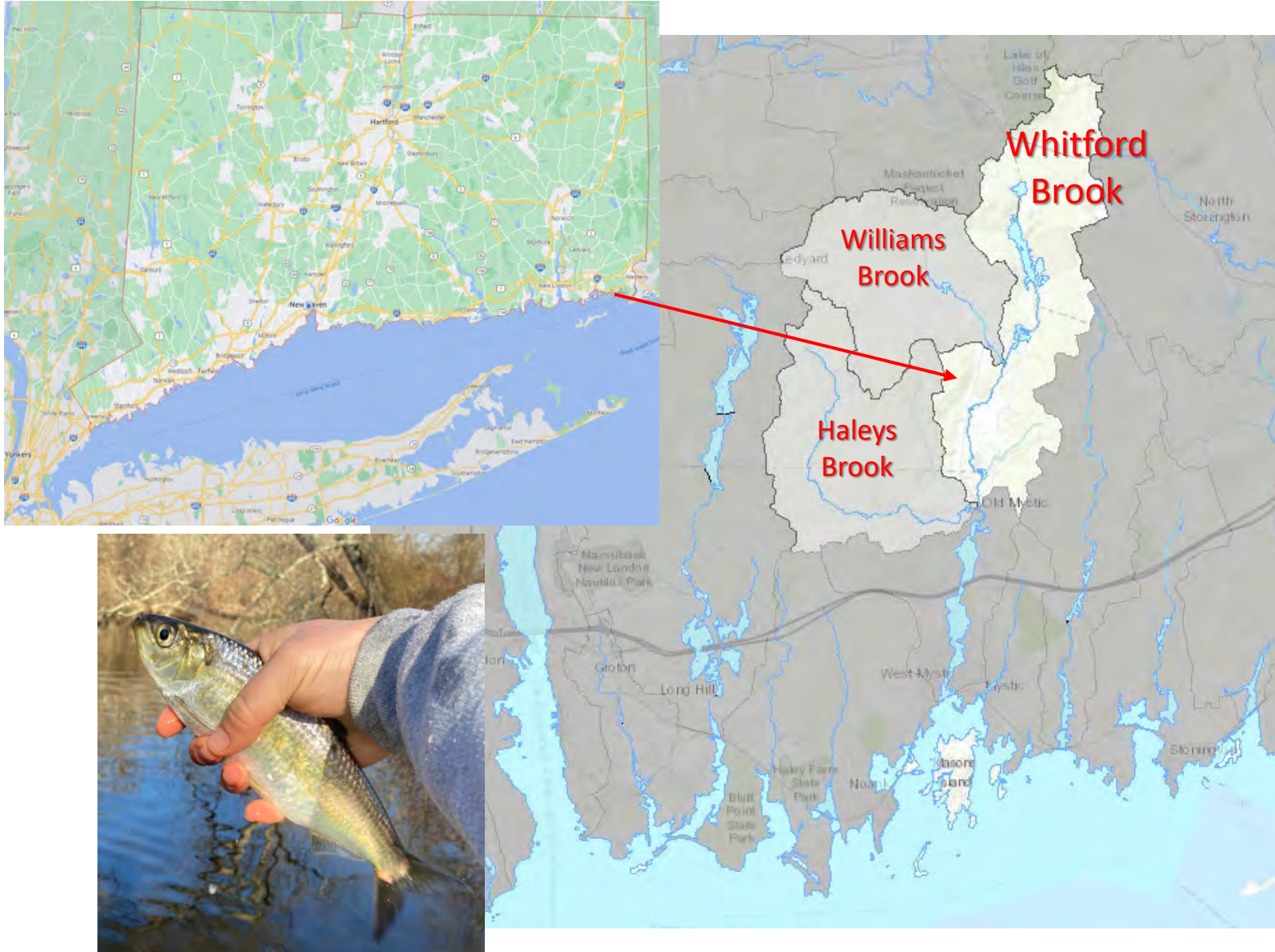
Legislative Advocacy



Ecological Restoration

Overview of Whitford Brook

- Approximately 10 miles long
- Mystic, Connecticut
- Watershed: 8.9 square-miles
- Drains to Mystic River, a 2.4 mile long tidal estuary (along with Haleys, Williams Brook)
- 21 fish species recorded
- Natural Diversity Database habitat along its entire length
- Restored watershed connectivity could support ~250k river herring



Whitford Brook Barriers

Hyde Pond Dam: Removed

- .7 river miles from head of tide
- **Removed** in 2015 by Save the Sound and partners with NFWF support

Lantern Hill Pond Dam: Fishway

- 6.2 river miles from head of tide
- Pool-and-weir fishway completed in 2013 by Mashantucket Pequot Tribal Nation

Long Pond Dam:

- 4.8 river miles from head of tide
- Nature-like fishway design project underway (Save the Sound, LHVA, DEEP, NFWF)

Whitford Pond Dam: Breached

- 3.3 river miles from head of tide
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Old Mystic, CT

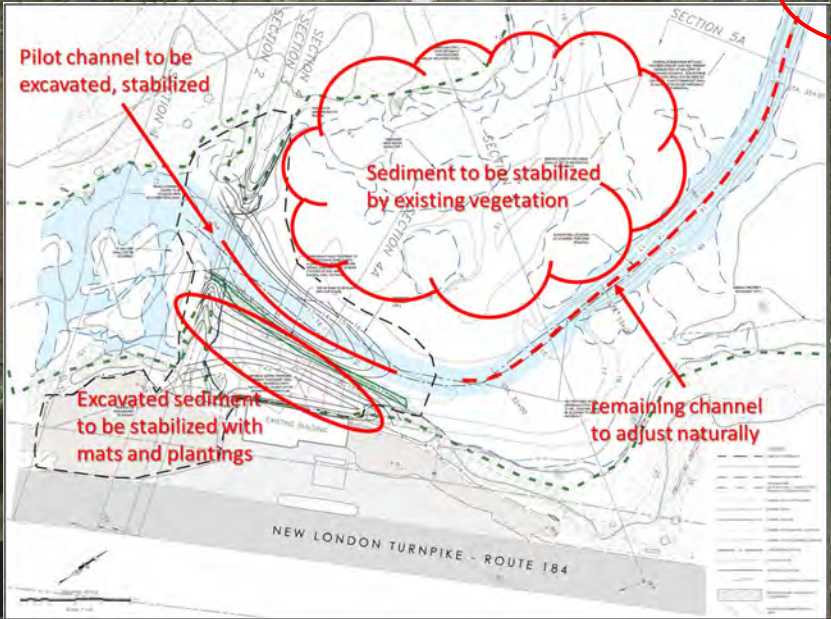
Mystic River

2.8 miles to Mystic Harbor,
Long Island Sound

Whitford Brook Barriers

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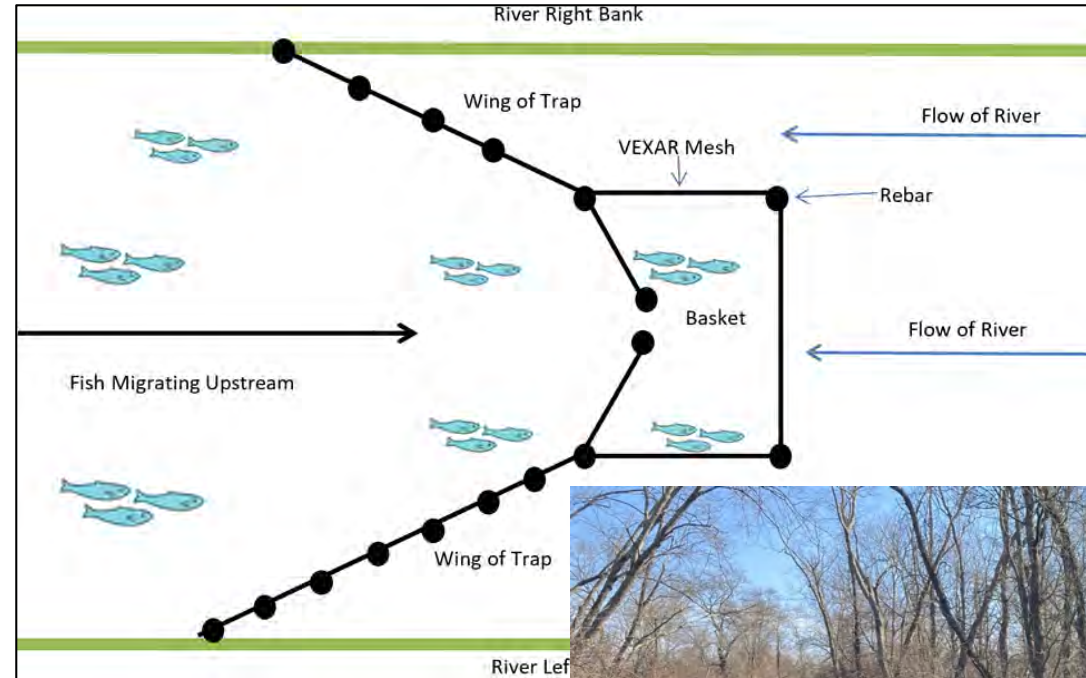
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Hyde Pond Dam: Post-removal Monitoring

Diadromous Fish Passage

What fish are migrating past the former dam site?

- 5 years, 2017-2021
- Large “funnel” trap
- Diadromous migratory period ~March-June
- Daily checks
 - Species ID, count, net and release
 - Maintain trap, remove debris



Hyde Pond Dam: Post-removal Monitoring

Summer Fish Community

What fish live in the former impoundment?

- 5 years, 2017-2021
- “Electro-fishing” sampling method
- Summer low-flow period
- Species ID, count, length measurement, release
- Conducted with CT DEEP Fisheries staff

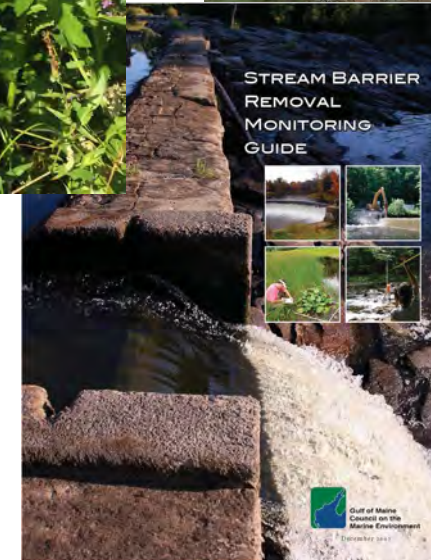


Hyde Pond Dam: Post-removal Monitoring

Impoundment Vegetation

What is growing in the former impoundment?

- 3 years, 2019-2021
- 25x25-meter grid of 36 points, at each:
 - 1x1m plot for herbs
 - 5m radius plot for shrubs
 - 9m radius plot for trees
- Summer growing season
- Percent-cover by species, height class, invasive, wetland indicator status

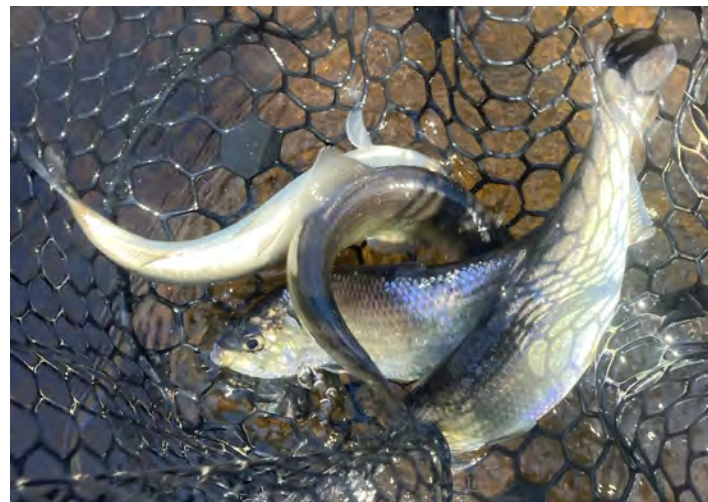


Hyde Pond Dam: Post-removal Monitoring

Fish Passage: Results

- 5 years, 2017-2021
- Annual diadromous species passing – 2017 a “trial year”
- Annual variability is observed statewide
- Range: ~50–1200+
- Primarily alewives... but also American shad, blueback herring, and striped bass

Hyde Pond Trapping Data						
Year	# of Diadromous Species	# of Alewife Trapped	# of Other Diadromous Fish	# of Resident Fish Species	# of Resident Fish	# of Individuals (Total)
2017	0	0	0	3	3	3
2018	1	1284	0	3	3	1287
2019	1	42	0	1	1	43
2020	4	325	24	3	6	355
2021	1	572	0	6	22	594



Hyde Pond Dam: Post-removal Monitoring

Fish Community: Results

- 5 years, 2017-2021
- Riverine species dominate the restored channel



Tessellated Darter from Jacobs, R. P., O'Donnell, E. B., and Connecticut DEEP. (2009). A Pictorial Guide to Freshwater Fishes of Connecticut. Hartford, CT.

Hyde Pond Annual Electrofishing Lotic / Lentic Species Comparison

	Species	2017 (#/RA)	2018 (#/RA)	2019 (#/RA)	2020 (#/RA)	2021 (#/RA)
Lotic	American Eel	23/20.7%	27/26%	139/41.9%	147/38.2%	41/25.3%
	Brook Trout	2/1.8%	1/1%	10/3%	4/1%	16/9.9%
	Longnose Dace	2/1.8%	5/4.9%	31/9.3%	21/5.1%	45/27.8%
	Tessellated Darter	46/41%	33/32%	115/34.6%	157/38.2%	53/32.7%
	Blacknose Dace	---	1/1%	---	29/7.1%	---
	Dace Species	---	30/29.1%	---	---	---
	Redfin Pickerel	5/4.5%	---	1/0.3%	---	---
	Brown Trout	---	---	1/0.3%	1/0.2%	---
Lotic Total / % Lotic		78/70%	97/96%	297/89%	359/87%	155/96%
Lentic	Bluegill	48/43%	---	4/1.2%	---	1/0.6%
	Pumpkinseed	9/8.1%	1/1%	12/3.6%	31/7.5%	---
	Chain Pickerel	---	1/1%	4/1.2%	16/3.9%	5/3.1%
	Banded Sunfish	---	2/1.9%	---	---	---
	Largemouth Bass	---	---	10/3%	2/0.5%	1/0.6%
	Golden Shiner	---	---	3/0.9%	2/0.5%	---
	Yellow Perch	---	---	1/0.3%	1/0.2%	---
Redbreast Sunfish	---	---	1/0.3%	---	---	
Lentic Total / % Lentic		33/30%	4/4%	35/11%	52/13%	7/4%
Total		111	101	332	411	162

Hyde Pond Dam: Post-removal Monitoring

Vegetation: Results

- Full revegetation of the former impoundment
- Wetland-dominated
- Native-dominated (invasive control in 2022)
- “Trends” in the data: likely due to weather and other short-term variability.
- Anecdotally: topographic diversity increases plant diversity



Hyde Pond	2019	2020	2021
sample points	36	36	36
herbaceous cover on site (%)	86	76	70
% of herb layer that is OBL	32	39	38
% of herb layer that is FACW-OBL	89	76	78
% of site that is wetland herbs	76	57	55
shrub cover on site (%)	32	31	25
% of shrub layer that is OBL	18	11	11
% of shrub layer that is FACW-OBL	58	63	48
% of site that is wetland shrubs	18	19	12
tree/vine cover on site (%)	17	13	11
% of tree/vine layer that is OBL	0	0	0
% of tree/vine layer that is FACW-OBL	6	11	12
% of site that is wetland trees/vines	1	1	1
total vegetation cover (%)	135	120	106
total wetland vegetation cover (%)	95	77	68
Total invasive plant cover (%)	10	10	7

Whitford Brook Barriers

- Lantern Hill Pond Dam: Fishway**
- 6.2 river miles from head of tide
- Pool-and-weir fishway completed in 2013 by Mashantucket Pequot Tribal Nation

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Whitford Pond Dam: Breached

- 3.3 river miles from head of tide
- Currently fish-passable with permanent passage designs in progress (by owner)



Mystic River

2.8 m Long

Whitford Pond Dam: Upstream Monitoring

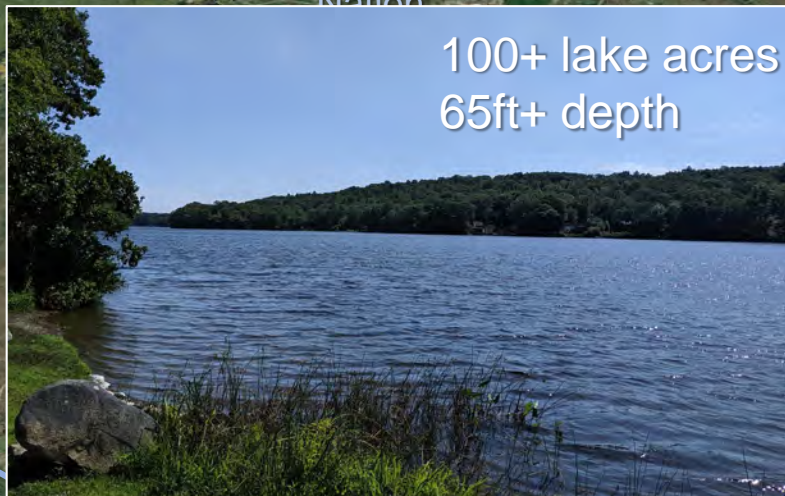
Fish Community: Results

- Whitford Pond Dam breached naturally in 2019
- Presumed fish-passable based on observations
- Funnel trap installed upstream:
 - 2021: no captures
 - 2022: 34 alewives
 - 2023: beaver damage
- Confirmed: migration past Whitford Dam breach to the next upstream barrier

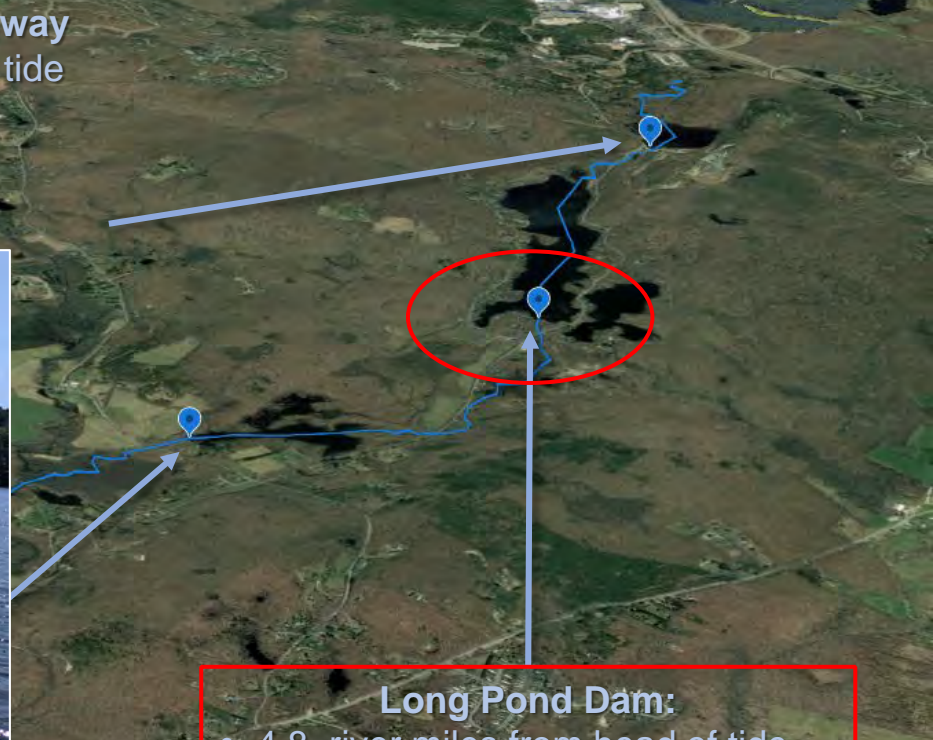


Whitford Brook Barriers

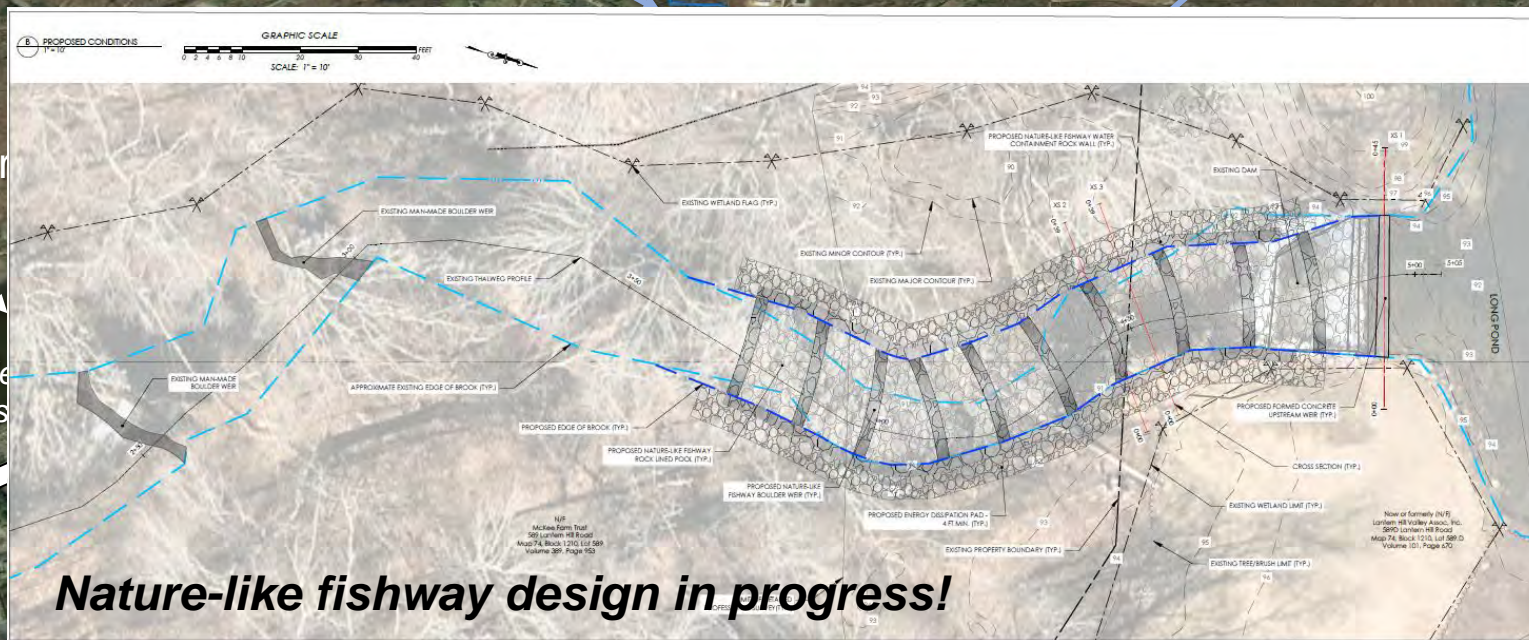
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100+ lake acres
65ft+ depth



- Long Pond Dam:**
- 4.8 river miles from head of tide
 - Nature-like fishway design project underway (Save the Sound, LHVA, DEEP, NFWF)



Nature-like fishway design in progress!

Mystic River

2.8 miles
Long Is

Whitford Brook Restoration Efforts

Hyde Pond Dam: Removed

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Old Mystic, CT

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2.8 miles to Mystic Harbor,
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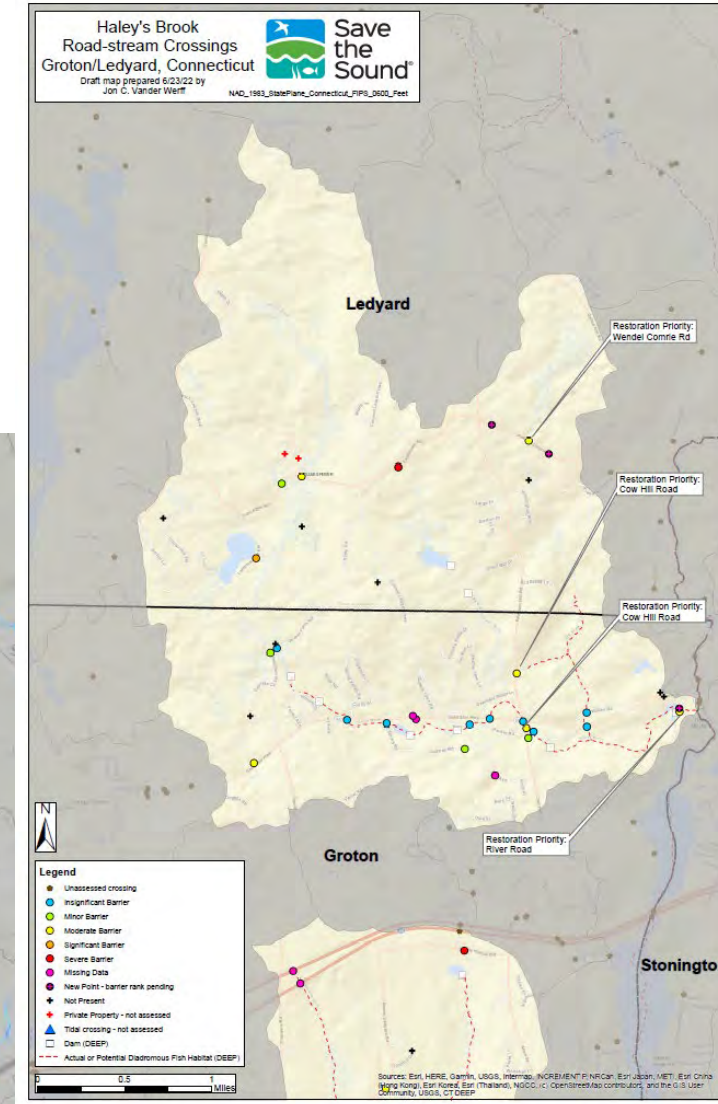
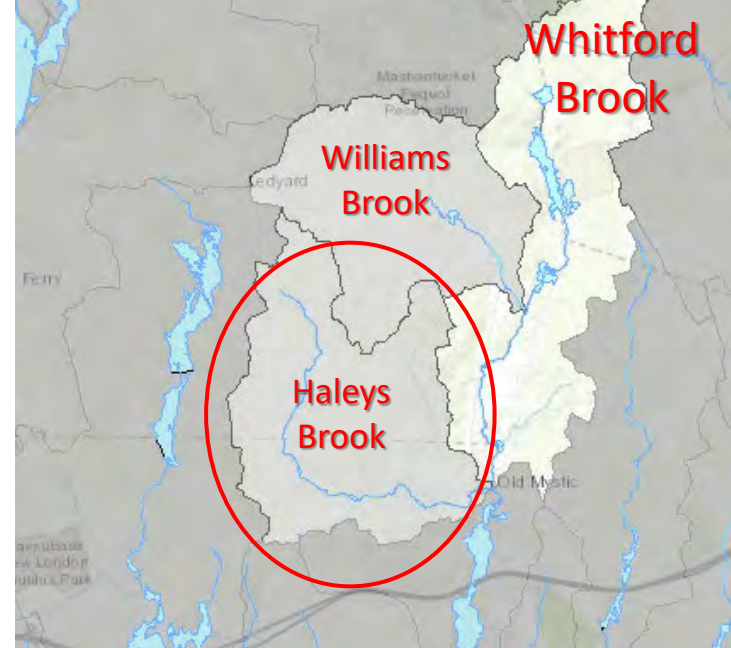
Nature-like fishway design in progress!



23 lake acres
30ft+ depth
waiting for fish

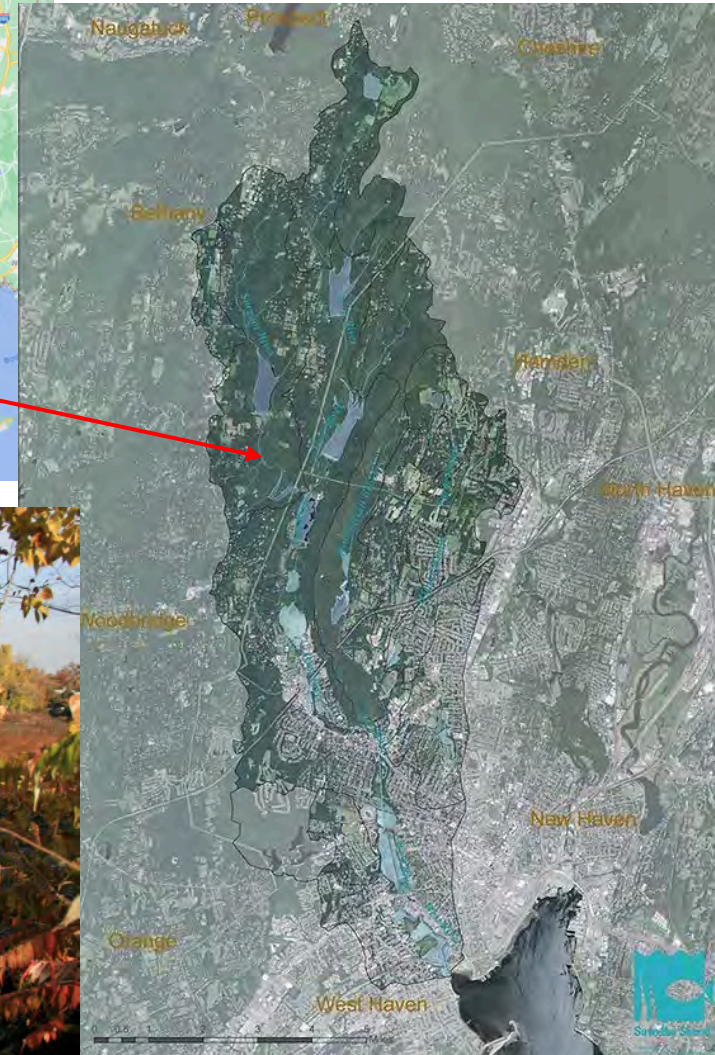
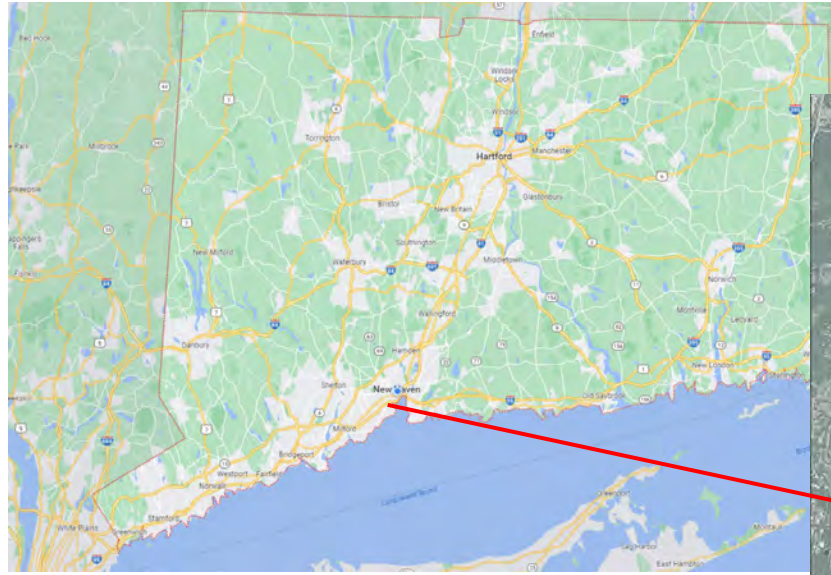
Beyond Whitford Brook...

- Funnel trap at head-of-tide culvert found limited alewife passage into Haley's Brook
- Watershed-wide NAACC assessments with local tech high school students
- Priority passage restoration map and report for Town
- Town/Regional Planners are now pursuing funding for culvert retrofits!



Pond Lily Dam Removal, West River

- Approximately 25 miles long
- Towns: New Haven, West Haven, Woodbridge
- Watershed area: 35 square-miles
- Drains to New Haven Harbor
- Highly-urbanized watershed with lots of public access
- Retrofitted tide gates for diadromous fish passage
- Upstream habitat: large pond and additional stream miles
- Pond Lily Dam removed in 2016





Pond Lily Dam: Post-removal Monitoring

Fish and Vegetation: Results

Same approach as Hyde

- Diadromous trapping:
 - Alewife numbers variable but lower, from 3 to 181.
 - Alewives, lamprey, and gizzard shad
- Riverine species less dominant (56-81%)... due to channel morphology?
Water quality?
- >100% revegetation, with closer to half wetland/upland, 10% invasive



Pages Millpond Dam: Fishway Monitoring

- 300 year-old dam on the Farm River, first full barrier from LI Sound
- Fishway completed in 2020 by StS and partners
- Volunteer monitoring effort coordinated by Owner, DEEP, TU, StS
- “Funnel” trap set in the fishway channel
- Alewives observed the first season after the fishway opening!



Dana Dam: Pre-removal Monitoring

- 4ft x 90ft concrete spillway, built in 1940s
- First barrier on the Norwalk River from LI Sound, 10 open miles upstream
- “Funnel” trap captured one (1) alewife... in between washouts
- Volunteers, staff: StS/TU
- Incidental observations of lamprey below dam
- Removal in progress – right now!

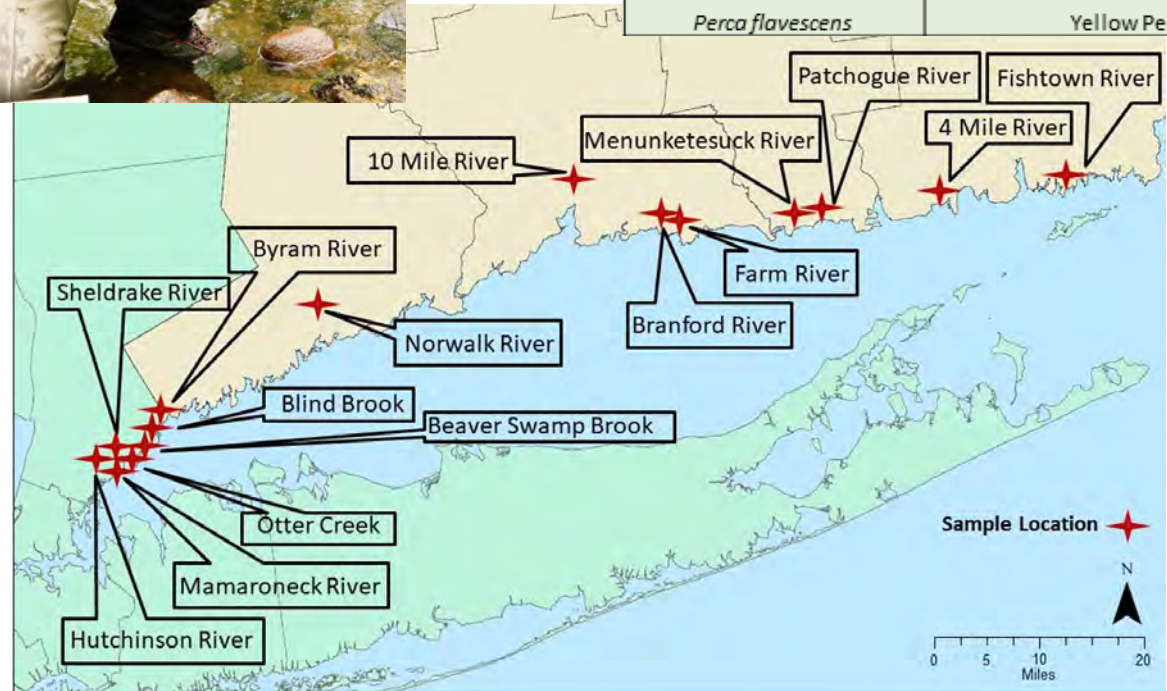


A New Method: eDNA?

- Water sample test that detects genetic material
- “Pilot” studies focused on diadromous species during migratory period over multiple sampling dates
- Less labor-intensive
- Less disruptive to fish
- Presence/absence only
- Some unexpected results...
 - Positive detections driving new restoration projects
 - “known” species undetected



Branford River	
Species Name:	Common Name:
<i>Anguilla rostrata</i>	American Eel
<i>Alosa pseudoharengus</i>	Alewife
<i>Alosa aestivalis</i>	Blueback Herring
<i>Alosa spp.</i>	River Herring Species
<i>Catostomus commersonii</i>	White Sucker
<i>Lepomis gibbosus</i>	Pumpkinseed
<i>Lepomis macrochirus</i>	Bluegill
<i>Apeltes quadracus</i>	Four-spined Stickleback
<i>Micropterus salmoides</i>	Largemouth Bass
<i>Perca flavescens</i>	Yellow Perch



Collaboration with CT Fisheries

CT DEEP Fisheries:

- Contribute to annual, statewide diadromous fish counts
 - Summer electro-sampling results: internal to DEEP and online
- DEEP managers “seed” alewife populations, identify restoration opportunities, and evaluate fishing limits



← Back to message
Last changed: Tuesday, May 26, 2020

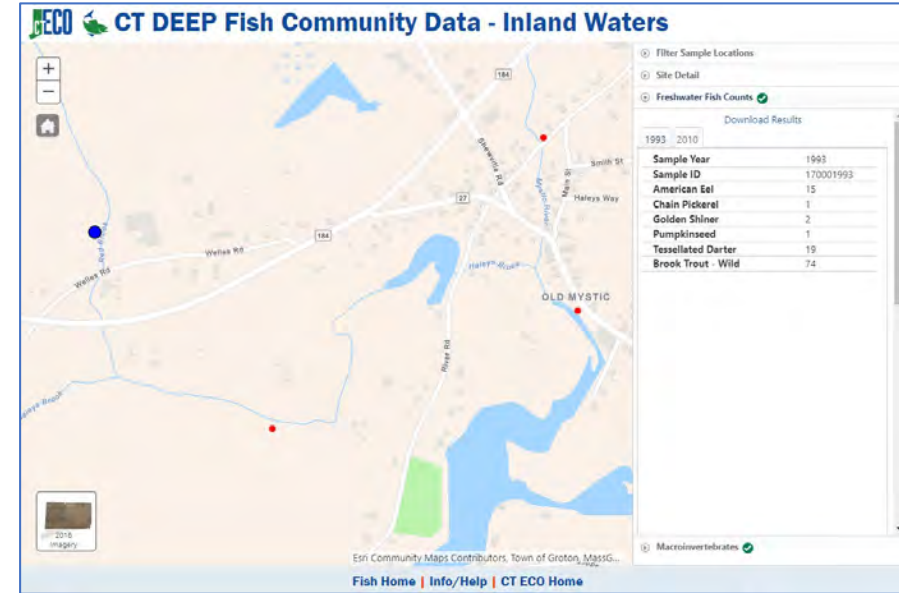
Fish Report 5-26-20.pdf
886 KB

No Fish Left Behind

CONNECTICUT WEEKLY DIADROMOUS FISH REPORT
Report Date: May 26, 2020

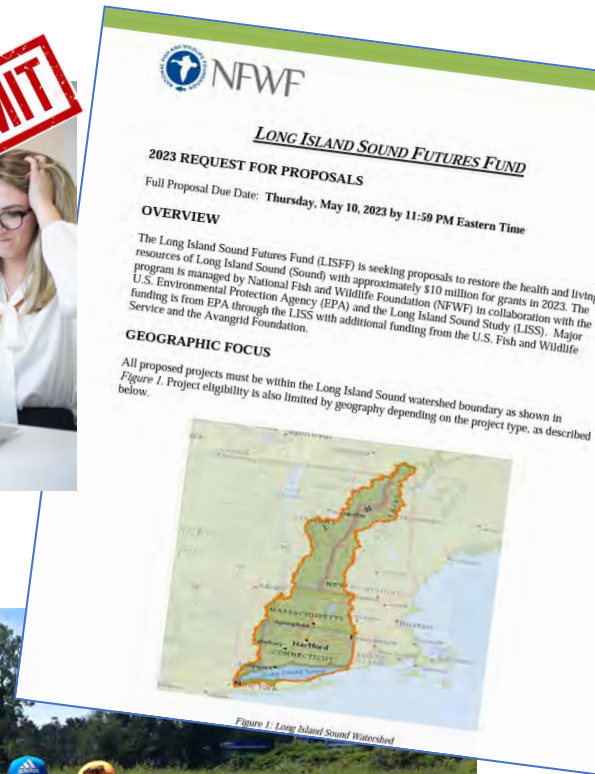
This is a report generated by the Connecticut Department of Energy and Environmental Protection/Fisheries Division- Diadromous Program. For more information, contact Steve Shephard, 860/447-4316. For more information about fish runs on the Connecticut River visit the USFWS website at www.fws.gov/ct. For more information about Atlantic salmon, visit the Connecticut River Salmon Association at www.ctriveralliance.org.

CONNECTICUT RIVER LOCATIONS FISH-WAY (RIVER)	ATLANTIC SALMON		AMER. SHAD	ALEWIFE	BLUEBACK HERRING	SIZZARD SHAD	STRIPED BASS	SEA LAMPREY	STURGEON/ TROUT**	AMER. EEL
Rainbow* (Farmington)	0	496	0	0	0	0	0	1,748	0	0
Leesville (Salem)	0	-	-	0	-	-	-	0**	0	0
Stra-Quee* (Methuen)	0	0	63	16	28	-	9	0	2	-
Meadow Pond* (Eightmile)	0	1	10	90	0	0	1	0	-	-
Mary Streabe* (Mill Brook)	-	-	37,888	FINAL	-	-	-	-	-	-
Rogers Lake* (Mill Brook)	-	-	2,842	FINAL	-	-	-	-	-	-
West Springfield (Westfield-MA)	0	0	0	0	0	0	0	0	0	0
Holyoke (Connecticut-MA)	0	274,370	0	493	33	13	384	0	0	0
Turners Falls* (Connecticut-MA)	0	376	-	0	0	0	0	-	-	-
Verne* (Connecticut-VT)	0	0	-	0	0	0	0	-	-	0
TOTALS=	0	274,867	37,961	898	61	13	2,142	0	2	0
<small>(last year's totals)</small>	<small>3</small>	<small>318,707</small>	<small>11,308</small>	<small>5,413</small>	<small>268</small>	<small>207</small>	<small>20,429</small>	<small>304</small>	<small>0</small>	<small>0</small>



Why Monitor? Reasons and Benefits

- Meet permit conditions
- Manage sites post-project
- Advance the practice and efficacy of restoration – internally, and externally
- Data can inform gov't resource managers
- Prioritize (and fund) new restoration projects based on findings
- Hands-on experience for students, volunteers, press, donors, and practitioners



Thank you!
akrofta@savethesound.org