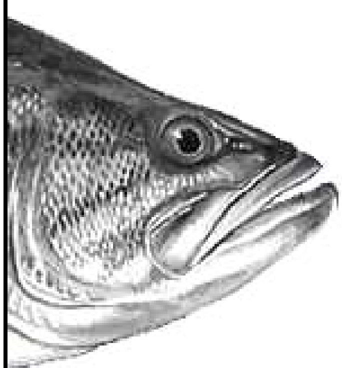
SECOND STATEWIDE ASSESSMENT OF MERCURY CONTAMINATION IN FISH TISSUE FROM CONNECTICUT LAKES (2005-2006)



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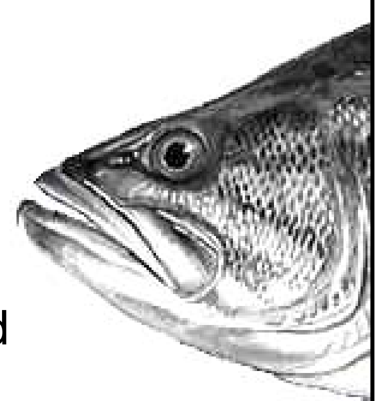

Please Reference:

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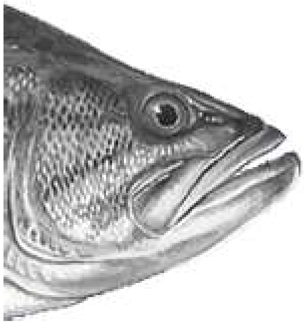


Introduction

This project was undertaken to update the existing knowledge of mercury contamination levels in fish tissue in Connecticut lakes and ponds. Data collection for the first statewide assessment occurred one decade prior to this project (Neumann et al. 1996) and thus marks this report as the beginning of a decadal dataset and the first widespread ability to make comparisons between then and now. A fish consumption advisory was developed for the state of Connecticut shortly after the completion of the previous data collection in 1995, and in a similar fashion, this report will serve to inform future discussions regarding modification of the current consumption advisory.

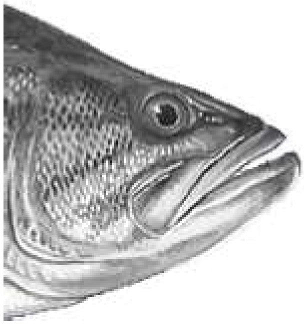
Since the first assessment in Connecticut the prevalence of mercury levels in fish tissue that warrant human health concerns has been widely investigated. In September, 2004, the US Environmental Protection Agency listed 43 states administering fish-flesh consumption advisories within which there were 2,436 active advisories pertaining specifically to mercury contamination (USEPA 2004). It has also become well known that the concentration of mercury in fish flesh increases with fish age and by proxy, size (Lange et al. 1993). Mercury-contaminated fish are the primary source of mercury contamination in humans (NRC 2001). Low doses of mercury can cause developmental and cognitive problems in fetuses (USEPA 2003) and damage the cardiovascular and nervous systems of people (NRC 2001). Humans have elevated the levels of environmental mercury primarily through coal-burning power plants (Jackson 1997). Inorganic mercury settles from the atmosphere onto the surface of the earth and mercury which enters aquatic ecosystems is transformed into highly toxic methylmercury by bacteria (Morel et al. 1998). Methylmercury bioaccumulates (Neumann and Ward 2000) and most of the mercury in fish flesh is methlymercury (Bowles et al. 2001; Bloom 1992).

Elevated environmental mercury levels continue to hold a prominent position in the public and government sectors in the northeast United States. In December 2007, the northeast states entered an agreement with the US EPA to reduce mercury levels through targeting a total maximum daily load (TMDL), that if achieved was believed to facilitate the eventual lifting of all fish consumption advisories in the region. State governments, in the meantime, extend efforts to help citizens understand the risks to their health and to promote risk-reducing behaviors by publicizing the consumption advisories to diverse constituencies (Sheaffer and O'Leary 2005; Surgan et al. 2008).

This work was conducted under contract with the Connecticut Department of Environmental Protection (CT DEP) by the University of Connecticut, as was the first statewide assessment. The University of Connecticut's Center for Environmental Sciences and Engineering (formerly Environmental Research Institute) maintains facilities to perform cold vapor atomic absorption (CVAA) and was the analytical laboratory used to determine mercury levels in fish tissue. The department of Natural Resources Management and Engineering has historically taught and performed research in fisheries and wildlife management at the University and maintains fish collection equipment including electrofishing gear. The Natural Resources department performed primary collection of specimens and necropsy.

The specific objectives of this project were to:

1) update the statewide database on mercury levels in fish tissue
2) compare data with the first assessment conducted in 1995 by sampling many of the same sites.



Methods

This assessment was intended to be an update of previous sampling conducted in 1995 (Neumann et al. 1996) and therefore lake selection was largely constrained by those that were sampled previously. In discussion with CT DEP biologists and environmental scientists, 51 lakes were selected for sampling (Figure 1a and 1b). Lakes were selected to ensure spatial coverage of the state and to represent lakes that had low, medium and high levels of mercury contamination during the 1995 sampling. Six lakes that had not been previously sampled were included either because of CT DEP interest or changes in angler popularity and access. These new lakes were; Ashland Pond, Gorton Pond, Long Pond, Middle Bolton Lake (Lower Bolton Lake was sampled in 1995), Quinebaug Lake and Uncas Lake.

As in 1995, fish were collected in 2005 and 2006 during the summer/fall period using two methods, collection at fishing tournaments (fish captured by angling) and by boat electrofishing. Unlike the 1995 study, only largemouth bass and smallmouth bass were collected in 2005 and 2006. These two species were considered to be adequate indicators of overall mercury contamination given their 'apex predator' status in Connecticut lakes and ponds and widespread use in North American mercury monitoring programs. Whenever possible, largemouth bass were targeted in lakes where both species occurred.

A set of standard operating procedures was adopted to guide fish collection and necropsy/sample preparation.

Field collection preparations

- Fish measuring boards were cleaned with detergent, rinsed five times with de-ionized (DI) water and stored in plastic wrap until use.
- Ice chest and ambient lake water containers were also cleaned with detergent, rinsed with dilute (10%) HNO_3, then rinsed with DI water and tape-sealed until use.
- All utensils that would be in contact with fish were cleaned with detergent, rinsed with dilute HNO_3, then rinsed five times with DI water and stored in plastic bags

Fish collections–fishing tournaments

- Tournament organizers were contacted, informed of the project and voluntarily chose to participate (tournaments are normally catch and release).
- During the tournament weigh-in, 10 (or 15 in the case of the six new lakes) were selected with an attempt to collect three fish from length groups of 12-14.9 inches, 15-17.9 inches, and over 18 inches in total length.
- Whenever possible fish were collected directly from anglers one at a

Figure 1. A) Location and relative size and shape of the 51 lakes sampled in 2005 and 2006 to evaluate mercury concentrations in fish tissue. B) Black and white (dot) version of 51 sampled lakes in A).

time, personnel wore talc-free latex gloves and measured fish to the nearest mm

- Dorsal spines were sheared to minimize bag punctures
- Fish were then rinsed with ambient lake water and placed in a polyethylene bag which was tied shut.
- Fish were then weighed to the nearest gram and placed in a second bag with an identification tag placed between the bags.
- Occasionally, fish were presented too quickly and it was necessary to hold fish in a pre-cleaned container filled with ambient lake water.
- Fish were then packed on ice in a pre-cleaned cooler and returned to the University of Connecticut campus and stored frozen in a chest freezer.

Fish collections–boat electrofishing

- Fish captured during nighttime boat electrofishing were not allowed to come in contact with the surface of the boat during netting.
- Sampling was conducted primarily in a direction that would move outboard motor exhaust away from the boat.
- When a fish was captured, the motor was stopped before proceeding and the driver of the boat never handled the fish
- Fish were measured, bagged, weighed, and placed on ice in the same manner as described for the tournament collection methods.

Necropsy/sample preparation

- Prior to the necropsy of each fish all work surfaces (e.g. cutting board) were acid-washed with dilute HNO_3 and rinsed with DI water.
- Two sets of stainless steel dissection instruments were cleaned with detergent, rinsed with tap water, spayed with dilute HNO_3, rinsed with DI water and then sprayed with DI water (these included scalpels, knives, scissors, and forceps).
- New talc-free latex gloves were worn for each necropsy.
- The outside of each fish was rinsed with DI water and placed on the pre-cleaned cutting board.
- Fish were placed facing left and the fillet was removed with three cuts.
- The fillet knife was rinsed with DI water between cuts.
- The skin was removed (to mimic common consumption patterns) by using the knife to lift and cut away from the muscle the edge of the skin which was held back with forceps.
- The skinless fillet was then placed in a clean whirlpack and frozen until transfer to the analytical laboratory.

Laboratory analytical procedures

Samples were transferred to the University of Connecticut Center for Environmental Sciences and Engineering where fillets were homogenized in an acid-cleaned food processor with a stainless steel blade. Approximately 1 gram of homogenate was removed from the processor and placed in a clean vial prior to analysis.

Homogenate samples were analyzed for total mercury by EPA method 245.6. Each sample was digested with nitric and sulfuric acids, samples were allowed to cool and potassium permanganate was then added, followed by the addition of potassium persulfate. After the samples were allowed to stand overnight, hydroxylamine hydrochloride was added to each tube and then analyzed using cold vapor atomic absorption (CVAA).

The standard curve consisted of five standards for CVAA analysis, with a correlation coefficient greater than 0.999 for all analytical runs. Standard quality assurance procedures were employed, including analysis of duplicate samples, method blanks, spiked samples, laboratory control samples, and standard reference materials (DOLT-3, DORM-2, and 966). Instrument response was evaluated initially, every 20 samples, and at the end of an analytical run using a calibration verification standard and blank. All quality control parameters, including all standard reference material data, were within method specifications for all fish analyzed during this project.

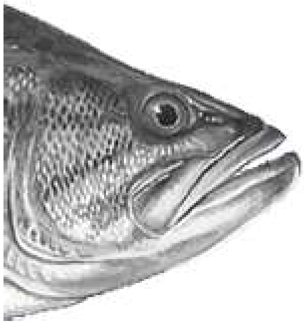
Data analyses

Descriptive statistics. The first analysis procedure provided tabulation of the numbers and percentages of fish and lakes that were either > 0.5 µg/g (wet weight) or > 1.0 µg/g. This mimics the data presentation from the Neumann et al. (1996) report and thus provides easy comparison to the results obtained in that study. When convenient, we have included the descriptive statistics from Neumann et al. (1996) to expedite such comparisons. Use of these thresholds does not imply rationale for or explicit need for consumption advisories, but is rather just a convenient way to describe the dataset. Individual fish Mercury concentrations in µg/g are provided in Appendix 1 for all fish analyzed.

Adjusted-length mercury concentrations. Linear regression (Proc REG; SAS Institute 1990) was used to test for relationships between $\log_{10}$mercury concentration (µg/g wet weight) and $\log_{10}$total length (mm) from each sampling location. When significant ($P<0.05$) relationships occurred for a waterbody, mercury concentrations were adjusted to a standardized fish size to provide a more meaningful comparison between lakes and with the 1995 data. Following Neumann et al. (1996) lengths were adjusted to a standardized fish total length of 356 mm (14 in). Neumann et al (1996) chose 356 mm (14 in) because it was within the range of total lengths of the majority of samples analyzed. When there was no significant relationship between $\log_{10}$mercury concentration and $\log_{10}$total length for largemouth bass, unadjusted means were used in descriptive statistics but were not used in inferential statistical comparisons between 1995 and 2005-2006 data for paired-lake samples. In addition to developing site-specific regressions, regressions of $\log_{10}$mercury concentration and $\log_{10}$total length were also developed for the entire sample of largemouth bass collected throughout the state and for each of five regions used to group lakes in the first statewide assessment; Central Lowlands, Northeast Hills/Uplands, Northwest Hills/Uplands, Southeast Hills/Coastal, Southwest Hills/Coastal.

Statistical comparisons 1995 vs. 2005-2006. Mean adjusted-length mercury concentrations were compared for lakes with a significant $\log_{10}$mercury concentration (µg/g wet weight) and $\log_{10}$total length (mm) regression in both 1995 and 2005-2006 with a paired t-test (Proc TTEST; SAS Institute 2003). Data normality was evaluated with the Shapiro-Wilk statistic and by examining normal probability plots.

Mean concentration data from 2005-2006 were aggregated into the five regions and compared with analysis of variance (PROC GLM; SAS Institute 2003). Pair-wise comparisons were made with Tukey's Honestly Significant Difference (HSD) test. Length-adjusted data were used from lakes with a significant length-concentration linear regression. For lakes without a significant relationship, actual mean concentrations of sampled fish were used.



Results

A total of 492 largemouth bass were analyzed for mercury concentration and are reported individually (by lake) in Appendix 1. Sample size targets were not met in all lakes, although 10 fish or more were collected in 45 of 51 lakes. Largemouth bass were represented from 50 of the 51 lakes sampled; only Rainbow Reservoir did not have largemouth bass analyzed. Smallmouth bass were analyzed from 5 lakes with 21 individuals in the dataset. The descriptive and comparative results that follow will be presented for the analyzed largemouth bass only, unless otherwise noted. All fish results, including smallmouth bass, are catalogued in Appendix 1.

The mean concentration of mercury in largemouth bass was 0.433 µg/g and the maximum concentration in a single individual was 1.773 µg/g. The range of mercury concentrations and proportions of fish over 0.5 and 1.0 µg/g are presented in Table 1. Data from Neumann et al. (1996) are also presented for comparison. The spatial arrangement of mercury concentration levels are displayed in Figure 2a and 2b for the 2005-2006 data and in Figure 2c and 2d reproductions of the 1995 maps are presented. Figure 3 displays data for the maximum concentration observed in an individual fish at each lake, again with the 1995 data presented for comparison.

To facilitate comparison, adjusted-length mean mercury values were developed using linear regression. A significant regression ($P<0.05$) that would allow for adjustment to a common length of 356mm (14in) could not be developed for all lakes. Of the 51 lakes sampled, 34 significant regressions (and length-adjusted mercury concentration levels) were produced (Table 2).

Of the 34 lakes for which a significant regression was developed, 22 also had a significant regression in 1995, and the associated length-adjusted mercury levels are also reported in Table 2. Therefore, a paired comparison was possible for these 22 lakes. By restricting the comparison to those lakes with length-adjusted concentrations for a 356mm fish, the potential bias introduced by concentration differences in the particular sizes of fish sampled now and then were avoided. Within the subset 22 lakes, the mean length-adjusted mercury concentration in 2005-2006 was 0.340 µg/g, lower than the 1995 mean of 0.412 µg/g (t = -2.610; df = 21; P = 0.016). In the 2005-2006 collections, both the minimum, 0.095 µg/g, and maximum, 0.681, were lower than reported in 1995 (minimum = 0.103 µg/g, maximum = 0.710 µg/g) by Neumann et al. (1996).

An effort was made to create regional and statewide regression relationships by aggregating data from multiple lakes. Table 3 contains the linear regression statistics. Although significant for the state and all regions, the variation explained was low overall, the r^2 was 0.180

(Continued on page 19)

Table 1. Summary of number (N) of individual largemouth bass analyzed from Connecticut water bodies, fish total length (TL, mm) ranges, mercury concentration ranges (ug/g wet weight), and number (n) and proportion (q) of fish from each water body with mercury concentrations equal to or exceeding 0.5 ug/g wet weight and 1.0 ug/g wet weight. Historical data from Neumann et al. (1996).

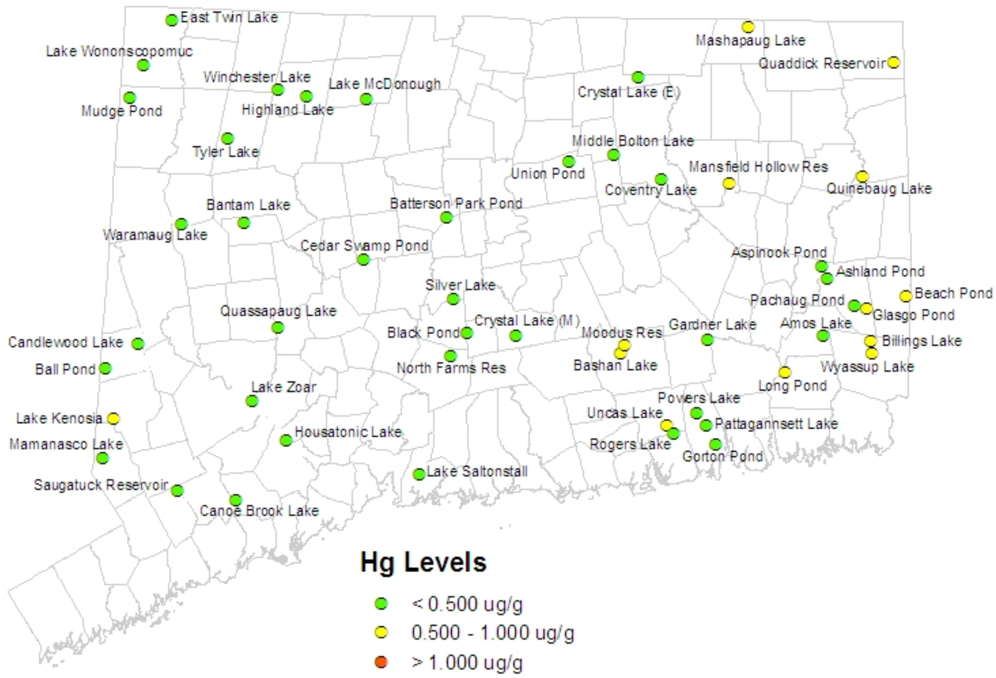
Current Data (2005-06)							
Site	**N**	**TL Range**	**Hg Range**	***n*≥0.50**	***n≥1.0***	***q*≥0.50**	***q≥1.0***
Amos Lake	10	352-463	0.231-0.751	2	0	0.20	0.00
Ashland Pond	15	274-501	0.198-1.296	7	3	0.47	0.20
Aspinook Pond	10	319-463	0.237-0.866	4	0	0.40	0.00
Ball Pond	5	341-457	.236-.531	1	0	0.20	0.00
Bantam Lake	10	304-498	.082-.581	1	0	0.10	0.00
Bashan Lake	10	290-471	0.364-1.742	8	3	0.80	0.30
Batterson Park Pond	10	295-475	0.109-1.306	0	2	0.00	0.20
Beach Pond	10	312-564	.360-1.77	8	3	0.80	0.30
Billings Lake	10	300-379	.283-.774	5	0	0.50	0.00
Black Pond	10	291-387	.178-.584	1	0	0.10	0.00
Candlewood Lake	7	372-486	.185-.644	2	0	0.29	0.00
Canoe Brook Lake	10	289-411	0.121-0.370	0	0	0.00	0.00
Cedar Swamp Pond	10	294-374	0.09-0.15	0	0	0.00	0.00
Coventry Lake	10	286-480	0.09-0.50	1	0	0.10	0.00
Crystal Lake (E)	10	307-550	0.24-0.86	4	0	0.40	0.00
Crystal Lake (M)	10	306-337	0.23-0.35	0	0	0.00	0.00
East Twin Lake	10	350-440	0.21-0.65	2	0	0.20	0.00
Gardner Lake	10	316-413	0.18-0.52	3	0	0.30	0.00
Glasgo Pond	10	284-516	0.428-1.091	6	1	0.60	0.10
Gorton Pond	10	320-378	0.273-0.521	1	0	0.10	0.00
Highland Lake	10	325-420	.164-.470	0	0	0.00	0.00
Housatonic Lake	6	310-433	0.243-1.364	2	2	0.33	0.33
Lake Kenosia	10	282-376	0.290-0.681	5	0	0.50	0.00
Lake McDonough	4	335-485	0.211-0.567	2	0	0.50	0.00
Lake Saltonstall	10	280-500	.120-.666	2	0	0.20	0.00
Lake Wononscopomuc	10	297-413	.134-.537	1	0	0.10	0.00
Lake Zoar	10	305-448	.226-1.02	3	1	0.30	0.10
Long Pond	10	313-405	0.291-0.872	5	0	0.50	0.00
Mamanasco Lake	10	307-348	0.079-0.226	0	0	0.00	0.00
Mansfield Hollow Res.	10	348-455	0.43-0.80	9	0	0.90	0.00
Mashapaug Lake	10	320-407	0.359-1.136	9	1	0.90	0.10
Middle Bolton Lake	10	276-320	.254-.512	1	0	0.10	0.00
Moodus Reservoir	10	334-452	0.341-0.649	7	0	0.70	0.00
Mudge Pond	10	294-451	.094-.468	0	0	0.00	0.00
North Farms Reservoir	9	292-490	0.06-0.38	0	0	0.00	0.00
Pachaug Pond	10	315-405	.267-.613	2	0	0.20	0.00
Pattagannsett lake	10	283-397	.276-.498	0	0	0.00	0.00
Powers Lake	7	320-440	.177-.635	1	0	0.14	0.00
Quaddick Reservoir	9	282-367	.246-.718	1	0	0.11	0.00
Quassapaug Lake	10	318-472	0.15-0.70	4	0	0.40	0.00
Quinebaug Lake	12	310-420	0.34-0.95	8	0	0.67	0.00
Rainbow Reservoir (SMB)	10	278-403	.116-.538	1	0	0.10	0.00
Rogers Lake	6	340-415	.198-.491	0	0	0.00	0.00
Saugatuck Reservoir	7	275-516	.288-.935	1	0	0.14	0.00
Silver Lake	10	290-443	.157-.564	1	0	0.10	0.00
Tyler Lake	10	295-428	.133-.639	1	0	0.10	0.00
Uncas Lake	15	288-497	0.264-1.172	11	1	0.73	0.07
Union Pond	10	290-440	0.253-0.787	4	0	0.40	0.00
Waramaug Lake	10	334-440	0.16-0.42	0	0	0.00	0.00
Winchester Lake	10	293-421	0.27-1.10	3	1	0.30	0.10
Wyassup Lake	10	280-332	0.408-0.772	8	0	0.80	0.00

Table 1. expanded

Historical Data (1995)							
Site	**N**	**TL Range**	**Hg Range**	***n*≥0.50**	***n≥1.0***	***q*≥0.50**	***q≥1.0***
Amos Lake	10	333-472	0.421-1.069	7	2	0.70	0.20
Ashland Pond	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Aspinook Pond	10	323-438	0.293-1.005	5	1	0.50	0.10
Ball Pond	10	325-490	.232-.676	2	0	0.20	0.00
Bantam Lake	10	321-510	.140-.889	2	0	0.20	0.00
Bashan Lake	7	312-436	0.335-0.970	3	0	0.43	0.00
Batterson Park Pond	8	302-462	0.170-0.736	1	0	0.13	0.00
Beach Pond	10	318-456	.348-1.314	2	0	0.20	0.00
Billings Lake	9	311-429	.616-.945	9	0	1.00	0.00
Black Pond	10	279-430	.294-.868	5	0	0.50	0.00
Candlewood Lake	7	372-476	.398-.904	4	0	0.57	0.00
Canoe Brook Lake	9	292-426	0.096-0.297	0	0	0.00	0.00
Cedar Swamp Pond	10	290-458	0.079-0.797	1	0	0.10	0.00
Coventry Lake	9	311-385	0.154-0.411	0	0	0.00	0.00
Crystal Lake (E)	20	267-475	0.152-0.593	1	0	0.05	0.00
Crystal Lake (M)	10	285-500	0.245-1.072	3	1	0.30	0.10
East Twin Lake	10	312-440	0.214-0.828	5	0	0.50	0.00
Gardner Lake	2	378-379	0.281-0.333	0	0	0.00	0.00
Glasgo Pond	7	345-389	0.531-1.235	7	1	1.00	0.14
Gorton Pond	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Highland Lake	10	301-450	.119-.659	3	0	0.30	0.00
Housatonic Lake	9	307-390	0.279-0.578	1	0	0.11	0.00
Lake Kenosia	10	291-498	0.238-1.143	4	1	0.40	0.10
Lake McDonough	10	259-492	0.292-2.462	7	4	0.70	0.40
Lake Saltonstall	10	297-490	.032-.459	0	0	0.00	0.00
Lake Wononscopomuc	10	277-331	.318-.661	4	0	0.40	0.00
Lake Zoar	6	325-386	.331-.968	5	0	0.73	0.00
Long Pond	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mamanasco Lake	2	278-295	0.176-0.201	0	0	0.00	0.00
Mansfield Hollow Res.	10	305-417	0.440-0.675	9	0	0.90	0.00
Mashapaug Lake	10	303-422	0.271-1.115	3	1	0.30	0.10
Middle Bolton Lake	10	310-361	.249-.536	1	0	0.10	0.00
Moodus Reservoir	10	372-479	0.527-1.042	10	1	1.00	0.10
Mudge Pond	10	282-358	.165-.388	0	0	0.00	0.00
North Farms Reservoir	10	253-451	0.075-0.542	1	0	0.10	0.00
Pachaug Pond	7	317-373	.368-.481	0	0	0.00	0.00
Pattagannsett lake	10	306-443	.426-1.036	7	1	0.70	0.00
Powers Lake	10	305-425	.425-.767	4	0	0.40	0.00
Quaddick Reservoir	10	304-433	.342-1.255	8	2	0.80	0.20
Quassapaug Lake	10	303-440	0.280-0.737	4	0	0.40	0.00
Quinebaug Lake	10	261-390	0.266-0.661	3	0	0.30	0.00
Rainbow Reservoir (SMB)	5	277-377	.158-.403	0	0	0.00	0.00
Rogers Lake	10	309-450	.198-.657	6	0	0.60	0.00
Saugatuck Reservoir	9	340-439	.542-1.043	9	1	1.00	0.11
Silver Lake	9	269-512	.162-1.488	7	7	0.78	0.78
Tyler Lake	10	301-512	.282-1.114	5	1	0.50	0.10
Uncas Lake	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Union Pond	8	276-387	0.233-0.443	0	0	0.00	0.00
Waramaug Lake	10	314-405	0.158-0.362	0	0	0.00	0.00
Winchester Lake	10	311-388	0.347-1.026	6	1	0.60	0.10
Wyassup Lake	9	314-505	0.449-1.418	8	3	0.89	0.33

2005-2006

A



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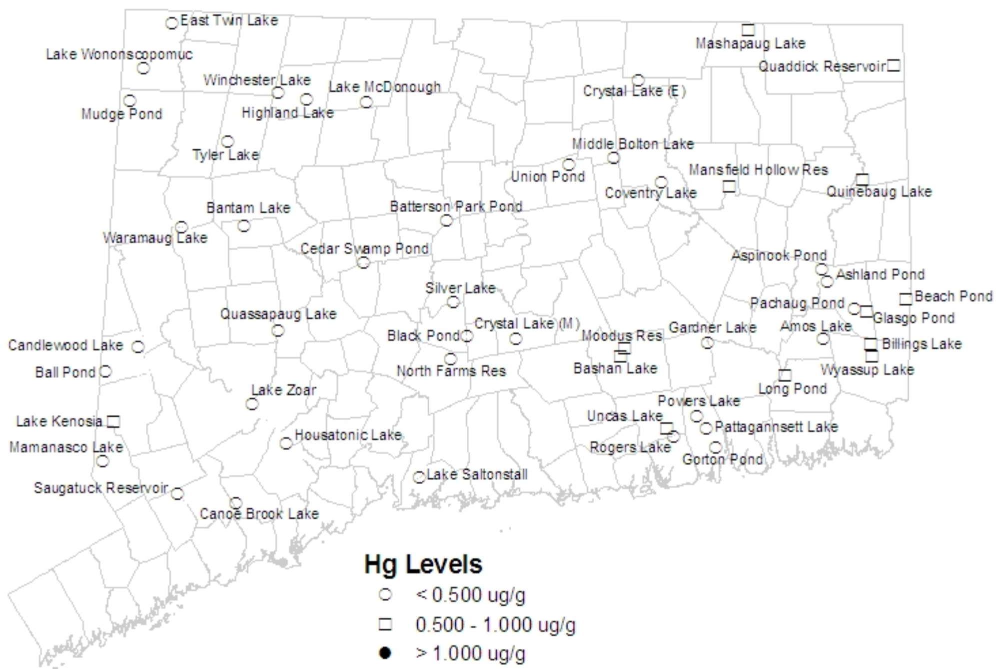
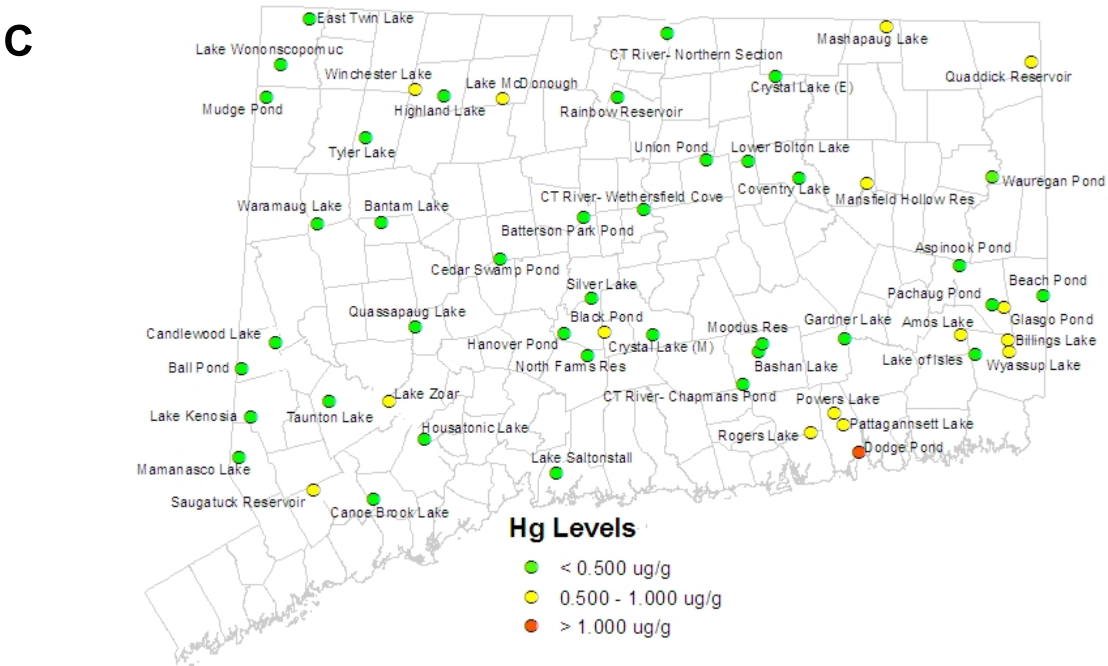


Figure 2. A) Mean mercury levels in fish tissue of largemouth and smallmouth bass from 2005-2006 in 51 sampled Connecticut lakes and ponds. B) Black and white version of 51 sampled lakes in (A). C) Mean mercury levels from 1995 taken from Neumann et al. (1996). D) Black and white version of sampled lakes in (C).

1995



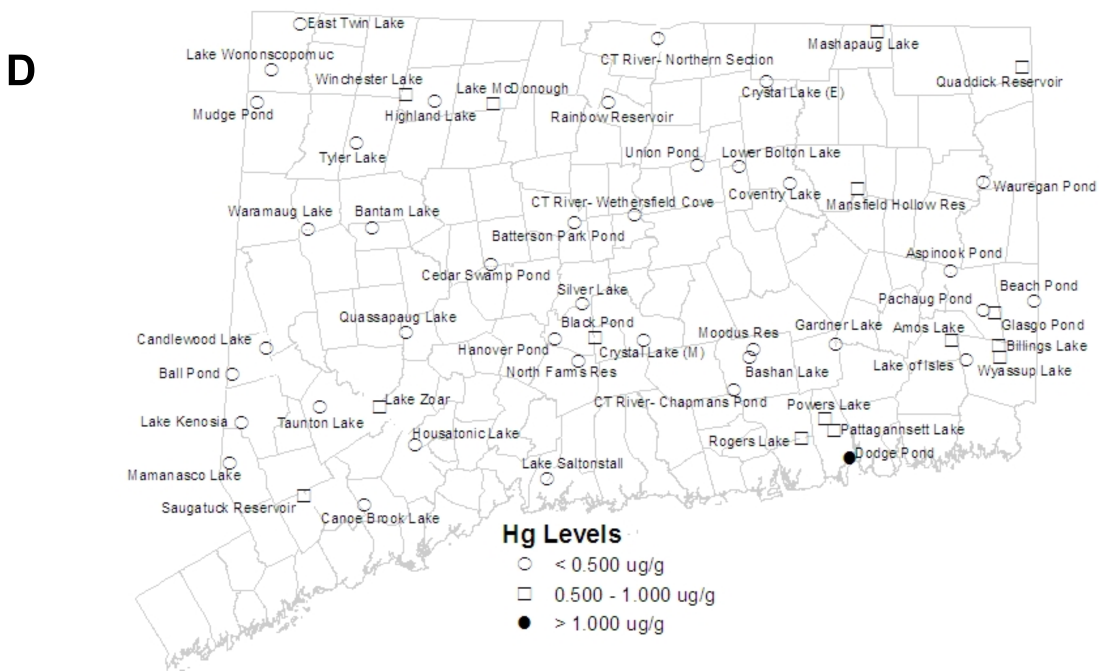


Figure 2. continued

2005-2006

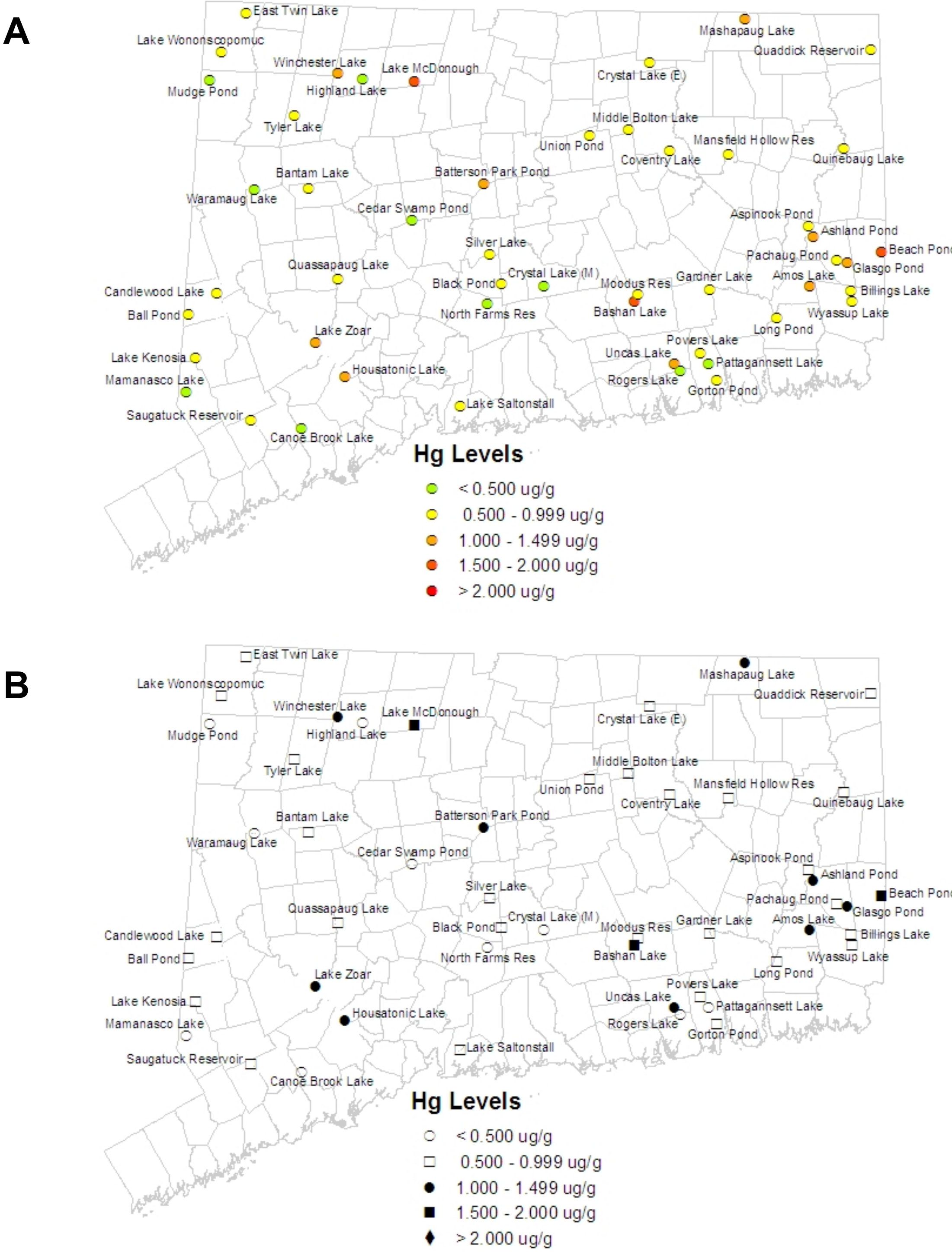
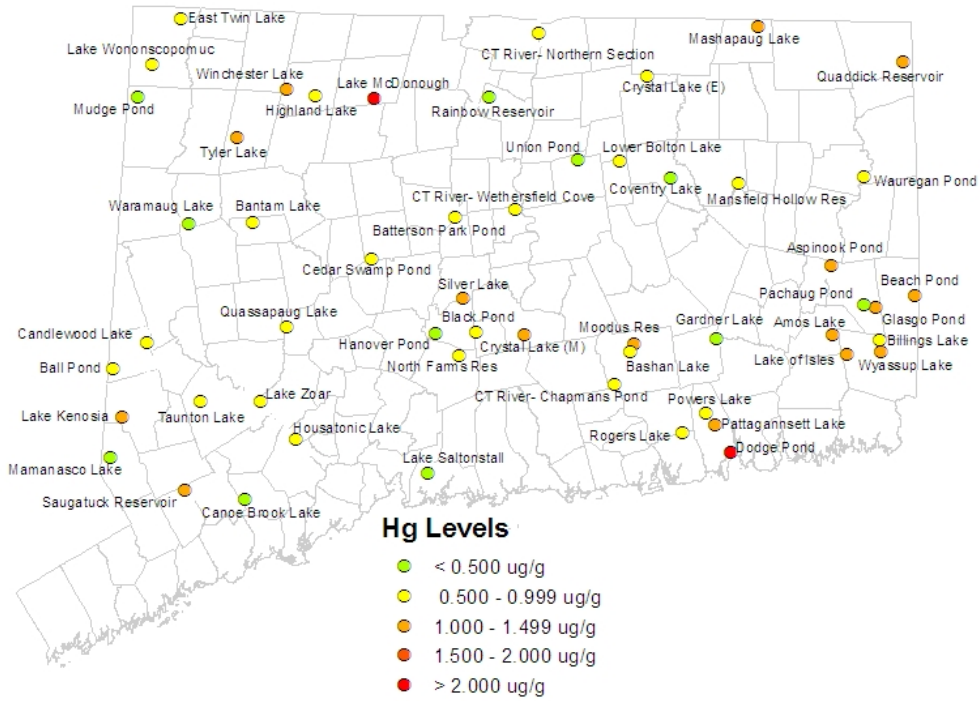


Figure 3. A) Maximum mercury levels in fish tissue of largemouth and smallmouth bass from 2005-2006 in 51 sampled Connecticut lakes and ponds. B) Black and white version of 51 sampled lakes in (A). C) Maximum mercury levels from 1995 taken from Neumann et al. (1996). D) Black and white version of sampled lakes in (C).

1995

C



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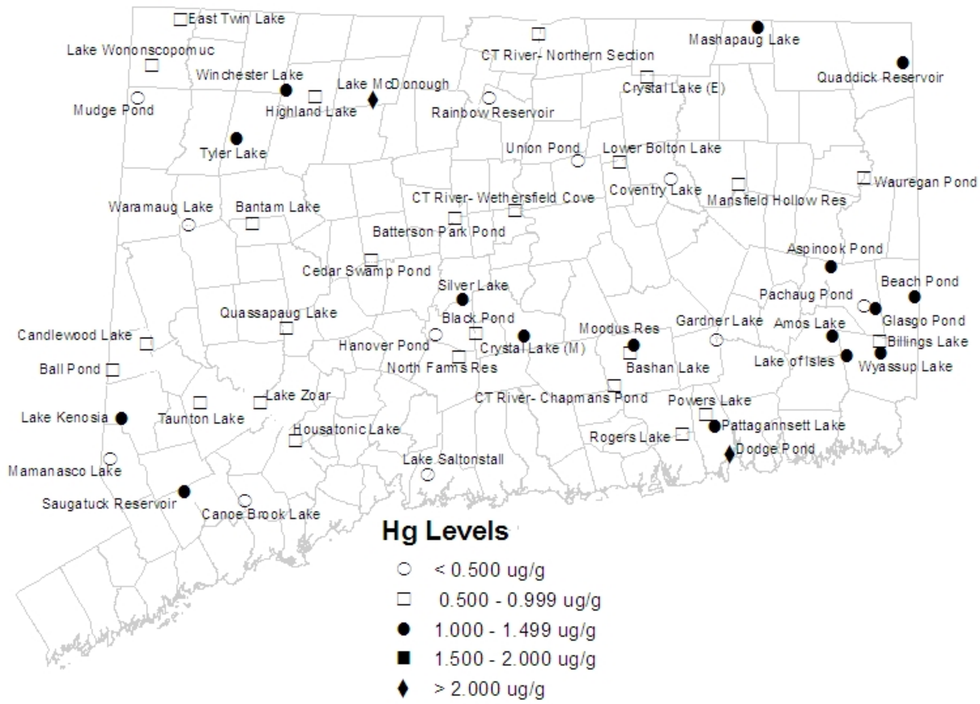


Figure 3. continued

Table 2. Regression statistic (*a*=intercept; *b*=slope) of the relations between $\log_{10}$ total length (mm) and $\log_{10}$ mercury concentration (µg/g net weight of edible muscle tissue) for largemouth bass collected from Connecticut water bodies during 2005-2006. Mercury levels were adjusted to a total length of 356mm. For sites where no significant (P>0.05) relations were observed only the unadjusted mean mercury concentration is listed. Data from 1995 are from Neumann et al. (1996).

Site	*N*	*a*	*b*	r^2	*P*	2005-06 Mean Hg µg/g	2005-06 Adj. Hg µg/g	1995 Mean Hg µg/g	1995 Adj. Hg µg/g
Amos Lake	10	-11.136	4.157	0.618	0.007	0.621	0.295	0.688	0.520
Ashland Pond	15	-7.662	2.868	0.912	0.000	0.621	0.452		
Aspinook Pond	10	-10.480	3.921	0.692	0.003	0.478	0.335	0.553	0.466
Ball Pond	5	-6.107	2.170	0.619	0.114	0.381		0.388	0.315
Bantam Lake	10	-11.587	4.260	0.809	0.000	0.235	0.191	0.367	0.222
Bashan Lake	10	-7.127	2.728	0.827	0.000	0.882	0.681	0.540	0.487
Batterson Park Pond	10	-14.567	5.439	0.835	0.000	0.397	0.204	0.401	
Beach Pond	10	-5.477	2.064	0.446	0.035	0.803	0.615	0.573	0.460
Billings Lake	10	-7.414	2.801	0.550	0.014	0.524	0.541	0.750	.
Black Pond	10	1.586	-0.859	0.038	0.592	0.291		0.542	0.572
Candlewood Lake	7	-11.038	4.037	0.604	0.040	0.385	0.183	0.594	0.361
Canoe Brook Lake	10	-6.701	2.366	0.578	0.011	0.221	0.217	0.192	0.208
Cedar Swamp Pond	10	-4.986	1.596	0.534	0.016	0.113	0.122	0.355	0.271
Coventry Lake	10	-7.540	2.678	0.636	0.006	0.223	0.196	0.252	0.270
Crystal Lake (E)	10	-3.804	1.315	0.307	0.096	0.499		0.307	0.330
Crystal Lake (M)	10	-0.891	0.136	0.001	0.930	0.284		0.471	0.398
East Twin Lake	10	-9.922	3.680	0.628	0.006	0.405	0.293	0.480	0.373
Gardner Lake	10	-8.087	2.966	0.584	0.010	0.389	0.302	0.307	
Glasgo Pond	10	-4.389	1.625	0.758	0.001	0.606	0.572	0.729	
Gorton Pond	10	-1.265	0.313	0.008	0.811	0.349			
Highland Lake	10	-4.901	1.704	0.168	0.239	0.318		0.287	0.235
Housatonic Lake	6	-13.078	4.977	0.945	0.001	0.632	0.418	0.385	
Lake Kenosia	10	-5.277	1.971	0.444	0.036	0.472	0.564	0.520	0.427
Lake McDonough	4	-8.378	3.078	0.754	0.132	0.484		0.905	0.682
Lake Saltonstall	10	-6.846	2.402	0.561	0.013	0.277	0.192	0.227	0.103
Lake Wononscopomuc	10	-9.323	3.455	0.777	0.001	0.330	0.311	0.478	
Lake Zoar	10	-11.232	4.267	0.803	0.000	0.495	0.453	0.627	
Long Pond	10	-5.339	1.982	0.199	0.197	0.512			
Mamanasco Lake	10	-12.735	4.725	0.302	0.010	0.145		0.189	
Mansfield Hollow Res	10	-1.381	0.460	0.049	0.537	0.647		0.601	
Mashapaug Lake	10	-8.264	3.152	0.723	0.002	0.704	0.600	0.551	0.597
Middle Bolton Lake	10	-1.095	0.261	0.004	0.860	0.330			
Moodus Res	10	-2.702	0.942	0.141	0.284	0.535		0.675	0.472
Mudge Pond	10	-9.324	3.385	0.851	0.000	0.190	0.206	0.244	0.281
North Farms Res	9	-8.652	2.990	0.708	0.005	0.135	0.095	0.273	0.246
Pachaug Pond	10	-5.102	1.843	0.256	0.136	0.394		0.427	

Table 2. continued

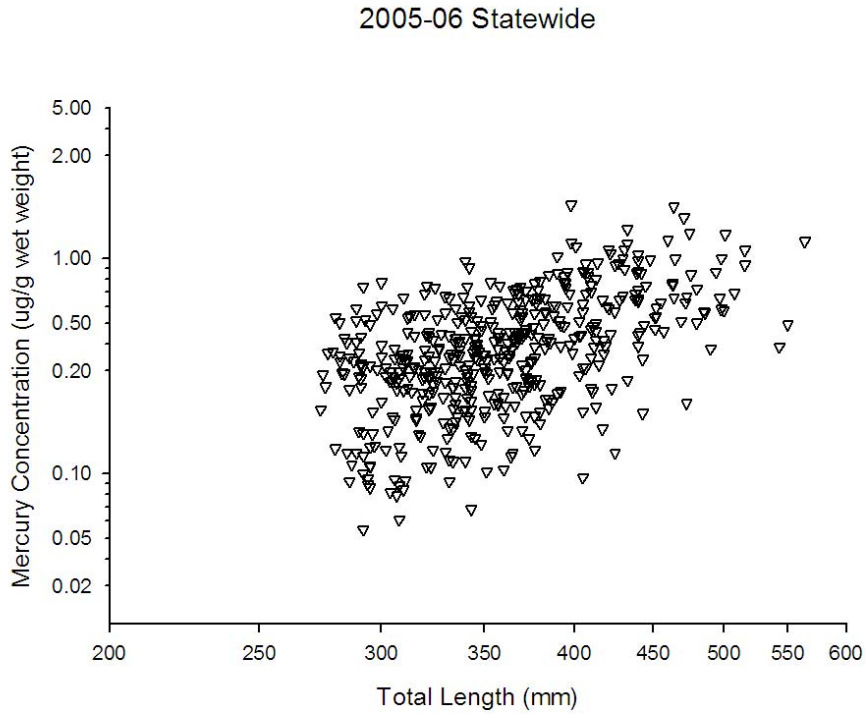
Site	*N*	*a*	*b*	r^2	*P*	2005-06 Mean Hg µg/g	2005-06 Adj. Hg µg/g	1995 Mean Hg µg/g	1995 Adj. Hg µg/g
Pattagannsett Lake	10	-4.128	1.463	0.639	0.006	0.371	0.403	0.635	0.575
Powers Lake	7	-8.813	3.249	0.741	0.013	0.348	0.300	0.533	0.561
Quaddick Reservoir	9	-8.176	3.096	0.699	0.005	0.382	0.530	0.750	0.710
Quassapaug Lake	10	-10.430	3.842	0.820	0.000	0.447	0.235	0.514	0.404
Quinebaug Lake	12	-3.792	1.417	0.288	0.072	0.668			
Rainbow Res. (SMB)	10	-7.050	2.537	0.482	0.026	0.212	0.265	0.258	
Rogers Lake	6	-8.809	3.227	0.435	0.154	0.341		0.509	
Saugatuck Reservoir	7	-5.244	1.914	0.924	0.001	0.459	0.436	0.748	
Silver Lake	10	-4.079	1.391	0.201	0.194	0.300		1.084	0.435
Tyler Lake	10	-10.686	3.992	0.946	0.000	0.240	0.315	0.569	0.461
Uncas Lake	15	-5.300	1.963	0.650	0.000	0.668	0.512		
Union Pond	10	-6.427	2.369	0.530	0.017	0.496	0.415	0.322	0.381
Waramaug Lake	10	-8.608	3.102	0.824	0.000	0.242	0.202	0.240	
Winchester Lake	10	-5.673	2.098	0.400	0.050	0.484	0.479	0.593	0.670
Wyassup Lake	10	-3.467	1.306	0.164	0.245	0.602		0.903	0.795

(Continued from page 11)
in the central lowlands and was highest in the Northwest hills/upland region at 0.532. Figure 4 displays the individual fish concentration levels in scatter plots for both 2005-2006 alongside the 1995 data. Figures 5-9 display the regional scatterplots with the linear regression lines; the 1995 data was overlayed for easier comparison.

The comparison of mercury concentration means for lakes stratified by region resulted in significant differences among some regions (F = 5.56; df = 4, 46; P =0.001). Post-hoc pairwise comparisons indicated that the Northeast hills/uplands region was different from the central lowlands and that the central lowlands region was different from the Southeast hills/coastal region (Figure 10; Tukey's HSD, α = 0.05). Note that regions are arranged left-to-right in descending order of mean mercury concentration rather than geographic position.

Table 3. Regression statistics (*a*=intercept; *b*=slope) for statewide and region-specific relationships between $\log_{10}$ total length (mm) and $\log_{10}$ mercury concentration (µg/g net weight of edible muscle tissue) for largemouth bass collected from Connecticut water bodies during 2005-2006.

Region	*N*	*a*	*b*	r^2	*P*
Statewide	482	-6.185	2.248	0.271	<0.000
Central Lowlands	69	-5.147	1.787	0.180	<0.000
Northeast Hills/Uplands	81	-4.626	1.673	0.241	<0.000
Northwest Hills/Uplands	84	-8.806	3.229	0.532	<0.000
Southeast Hills/Coastal	163	-5.235	1.925	0.364	<0.000
Southwest Hills/Coastal	85	-7.404	2.688	0.330	<0.000



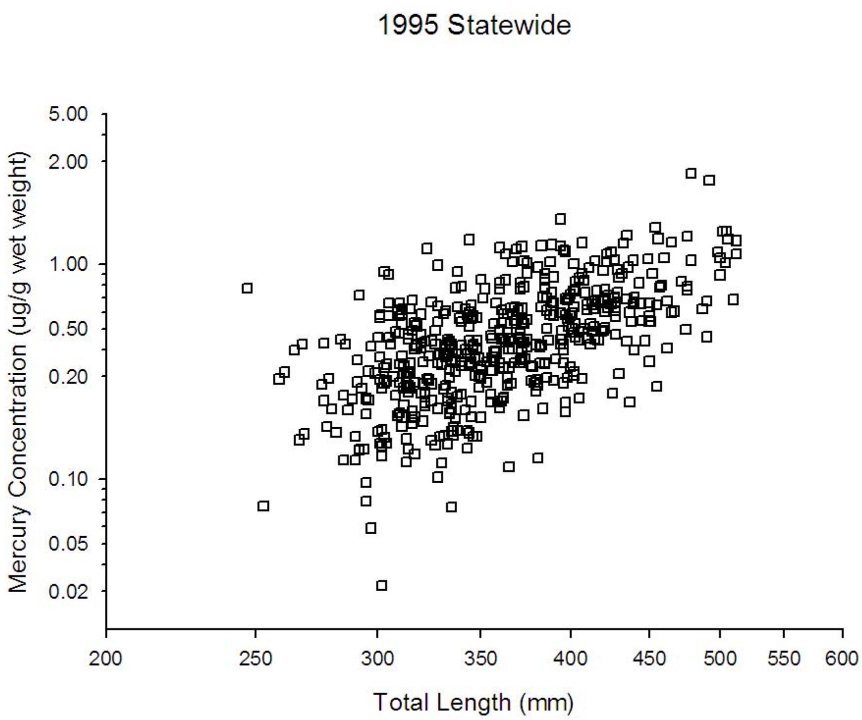


Figure 4. Scatterplots of statewide largemouth bass total length versus mercury concentration for the current study (2005-2006) and reproduced from 1995 sampling (Neumann et al. 1996).

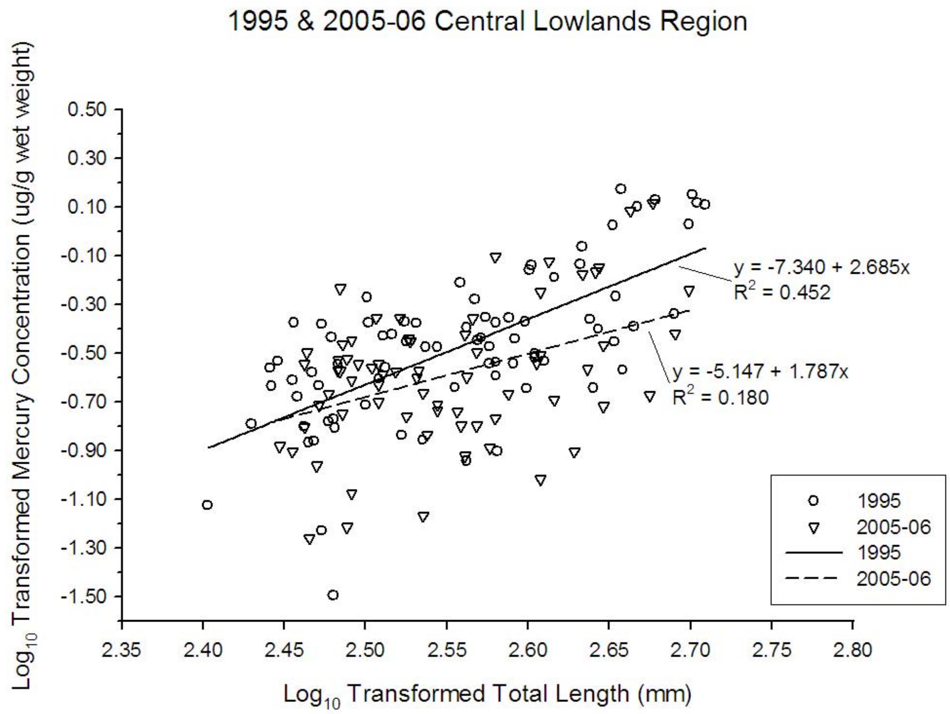


Figure 5. Central lowlands regional scatterplot of largemouth bass total length against mercury concentration for the current study (2005-2006) overlayed with 1995 results reproduced from Neumann et al. (1996).

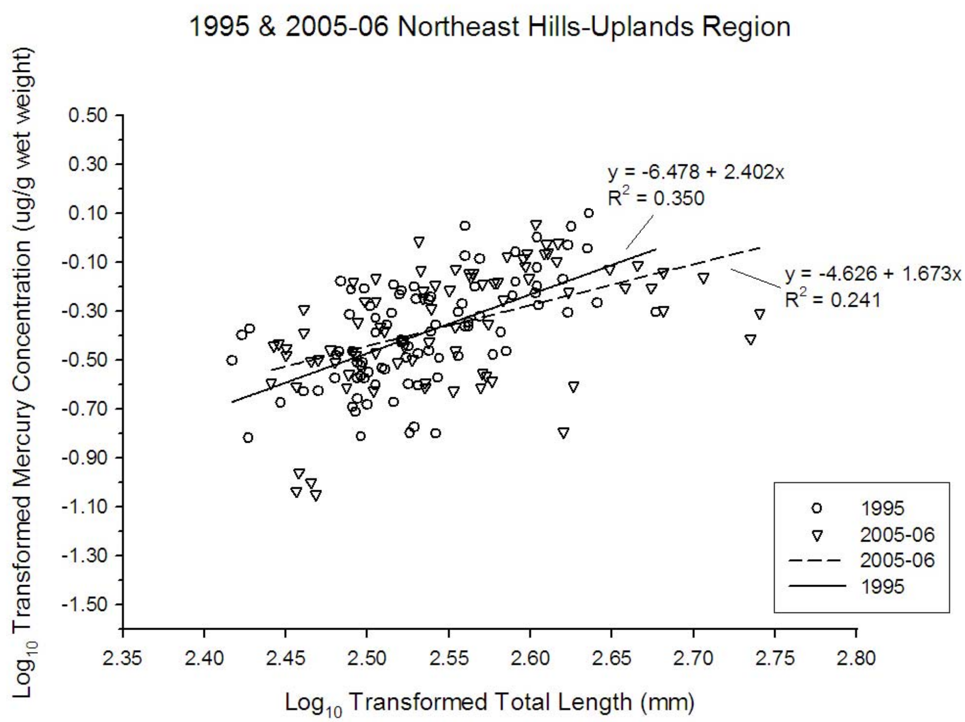


Figure 6. Northeast hills/uplands regional scatterplot of largemouth bass total length against mercury concentration for the current study (2005-2006) overlayed with 1995 results reproduced from Neumann et al. (1996).

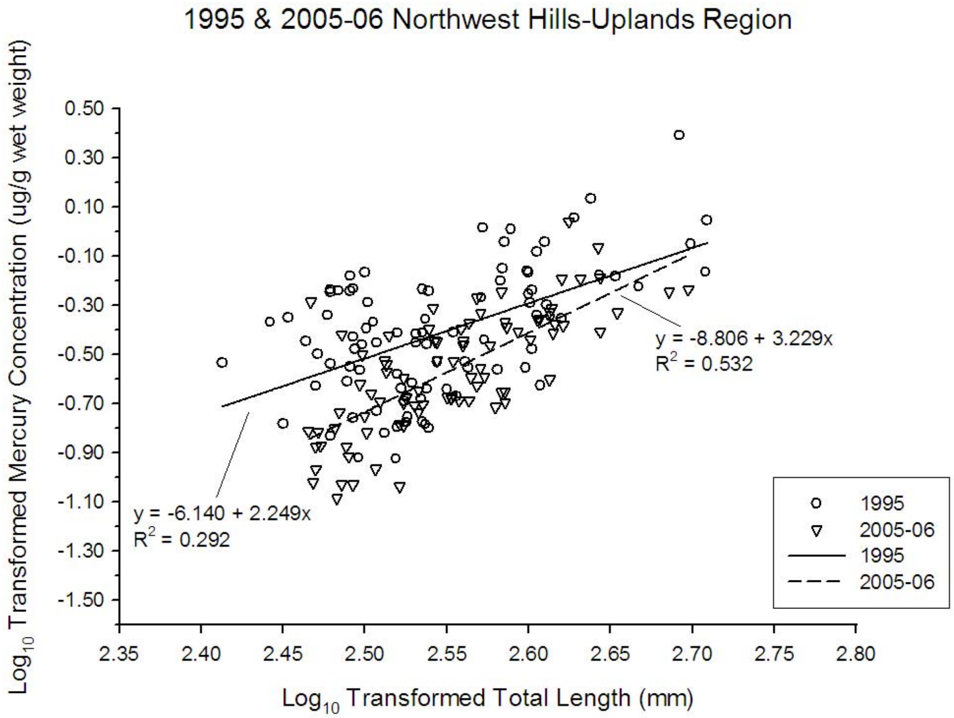


Figure 7. Northwest hills/uplands regional scatterplot of largemouth bass total length against mercury concentration for the current study (2005-2006) overlayed with 1995 results reproduced from Neumann et al. (1996).

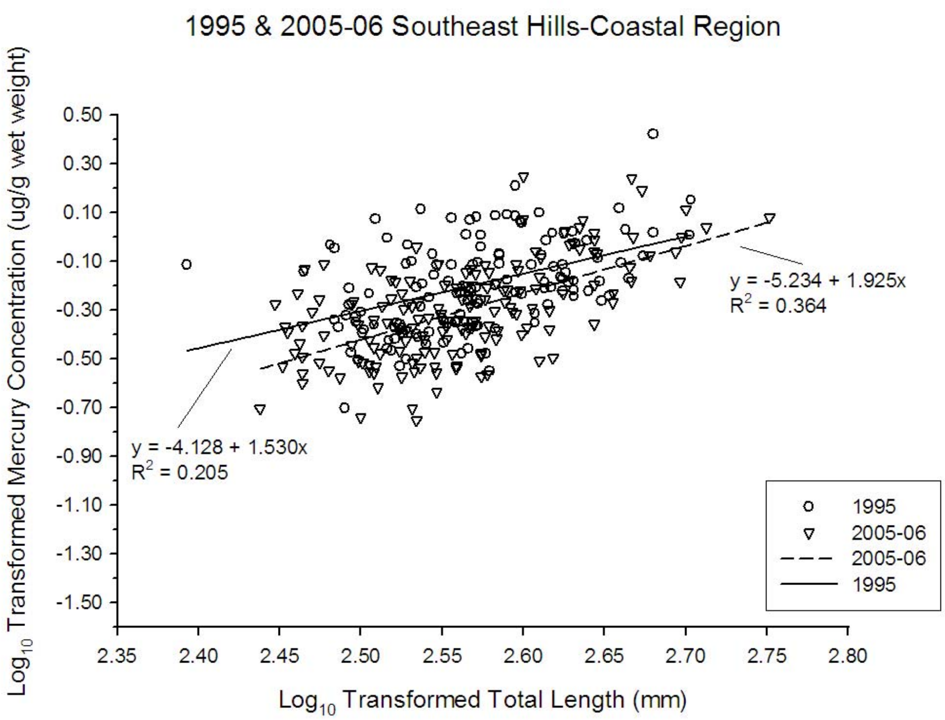


Figure 8. Southeast hills/coastal regional scatterplot of largemouth bass total length against mercury concentration for the current study (2005-2006) overlayed with 1995 results reproduced from Neumann et al. (1996).

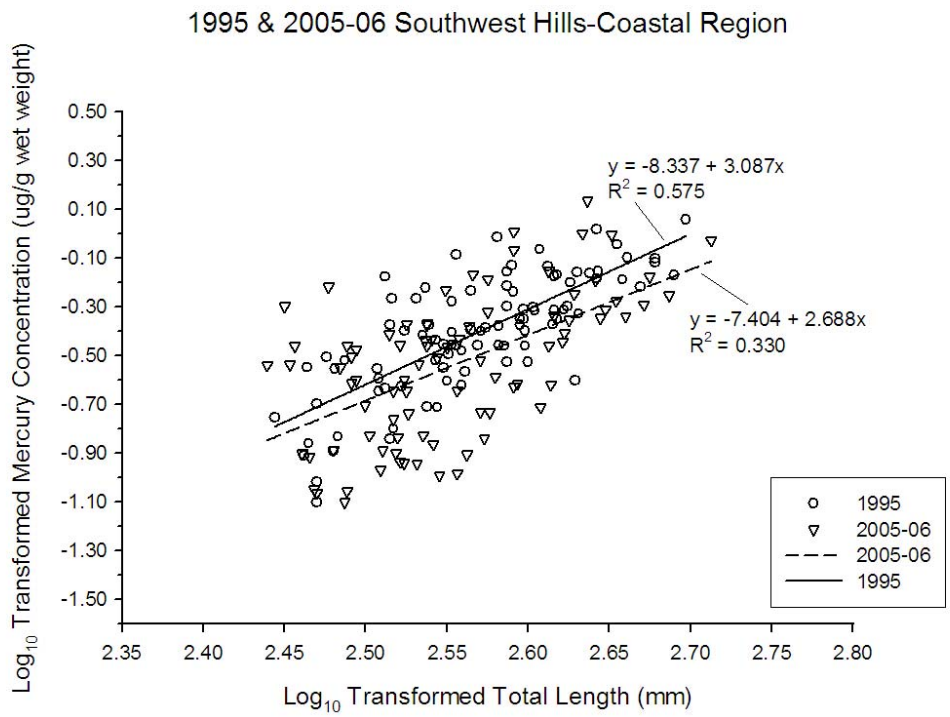


Figure 9. Southwest hills/coastal regional scatterplot of largemouth bass total length against mercury concentration for the current study (2005-2006) overlayed with 1995 results reproduced from Neumann et al. (1996).

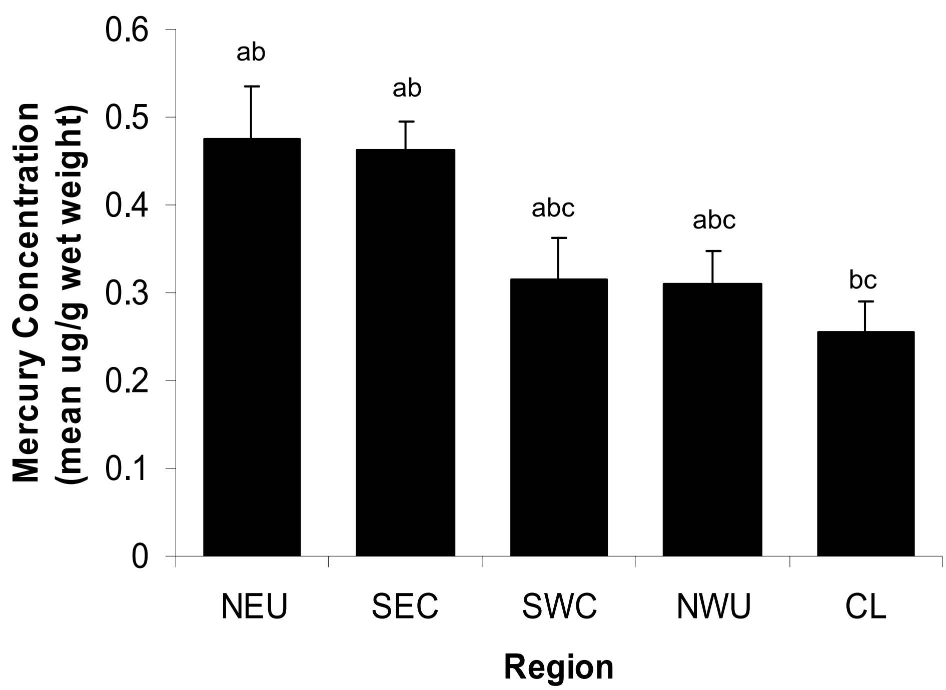
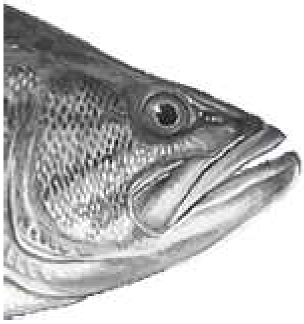


Figure 10. Mean mercury concentration by region. NEU = Northeast hills/uplands; SEC = Southeast hills/coastal; SWC = Southwest hills/coastal; NWU = Northwest hills/uplands and CL = central lowlands. Mean with different letters were significantly different (Tukey's HSD, α = 0.05). Error bars represent one standard error.



Discussion

The mean mercury concentration in a 356mm (14in) largemouth bass in Connecticut lakes was significantly lower in 2005-2006 sampling than reported in 1995. The use of a paired-design statistical comparison (then and now) for lakes with length-adjusted mean mercury concentrations represented the most appropriate test available, even though it restricted the number of lakes used in the comparison. Causes for the mercury reduction are likely numerous, but include reduced mercury emissions from coal-fired power plants as implementation of the federal Clean Air Act progressed during the past decade.

While this report was not intended to provide anything beyond the basic information presented for future decision-makers, it is unlikely that, although significantly lower than a decade ago, Connecticut would be able to remove the statewide fish consumption advisory as contamination levels still commonly exceeded threshold levels (such as 0.50 µg/g) used by state governments in the United States to warn fish consumers and promote risk-reducing behaviors. Qualitatively, there was a smaller proportion of individual fish sampled with mercury concentration values over 0.50 and 1.0, however, these fish were still widespread and occurred in all five regions of the state.

The application of consumption advisories is best thought of in a risk assessment framework (Knuth 1990; Chess et al. 2005). Properly assessing risk to peoples who choose to consume fish in Connecticut requires data in addition to the contamination levels presented in this report. Information about the size distribution of fish from lakes is important, and we remind readers that our sampling was not designed to be representative of the relative proportions of fish sizes found in the lakes sampled. Rather we attempted to collect fish equally from a range of sizes to facilitate length-mercury relationships to create length-adjusted contamination levels. The Inland Fisheries Division of the Connecticut Department of Environmental Protection samples lakes in a standardized manner that would provide the appropriate size distributions.

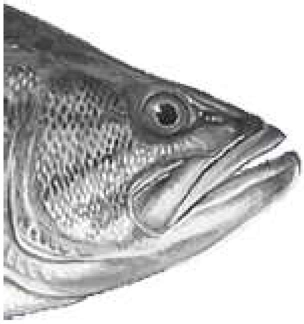
The basic regional distribution of relative mercury contamination remained similar from 1995 (figure 11; Neumann et al. 1996) to the current project. The Eastern half of Connecticut had greater mean values, however, the east-west differences seem to have decreased in magnitude, and eastern and western regions were not significantly different. Only the central lowland lakes were significantly lower than the east regions. As in 1995, the regression relationships in 2005-2006 explained surprisingly little of the variance present in the scatterplots as witnessed by the low r^2 values in figures 5-9. Previous studies have found that mercury concentrations are also related to water chemistry characteristics (McMurtry et al. 1989; Lange et al. 1993;

Hanten, Jr. et al 1998) and waterbody type/retention time (Hanten, Jr. et al. 1998; Simonin et al. 2008). Previous work in Connecticut by Hanten, Jr. et al. (1998) documented the importance of pH, Ca, and conductivity of the water in explaining mercury concentration relationships as well as the retention time and watershed area of a waterbody.

This report used lethal sampling methods as did the first statewide assessment. Skinless fillets (the muscle mass on one side of a fish) were homogenized. It is believed that this method most directly represents the consumption patterns of people. The method is also widely accepted in the scientific literature. Recently, the use of biopsy “plugs” or “punches” to remove a small amount of muscle without euthanizing the individual fish has become popular (Peterson et al. 2004; Schmitt and Brumbaugh 2007). We used the other fillet from a subsample of our euthanized fish to remove plugs which enabled a direct comparison between the two methods. The results of this comparison are presented in Appendix 2 and will be useful should future monitoring move to non-lethal techniques. Fin rays have also recently been explored for mercury monitoring, and if proven useful across a broad range of contamination levels, are even less intrusive than the plug methods (Gremillion et al. 2005; Rolfhus et al. 2008; Ryba et al. 2008).

Finally, we caution that this report is only the second statewide assessment of mercury contamination in fish tissue in Connecticut. While mercury levels were significantly lower in the second data collection, formal inference about any trend through time will require more data to create a proper time-series. It is the authors’ recommendation to continue to monitor at a minimum every 10 years, perhaps with an option to evaluate more frequently if levels continue to fall and the removal of a statewide consumption advisory seems plausible. The recent developments in non-lethal monitoring techniques removes concern about conflicts with anglers and other stakeholder groups.

Acknowlegements-The Connecticut Department of Environmental Protection funded this data collection. William Hyatt and Ernie Pizzuto helped secure funds and select sample lakes. Dustin Edwards led the field crews that collected data, performed necropsy and organized access to the private access lakes and coordinated with fishing tournament anglers. Brad Trumbo performed the majority of necropsy and assisted in field collection. Justin Wiggins, Sam Bourret, Ralph Tingley, Kate Knight, and a host of volunteers worked on the deck of the UCONN electrofishing boat. Daniel Watrous produced the maps and figures in the report and error-checked data presented in the numerous large tables.



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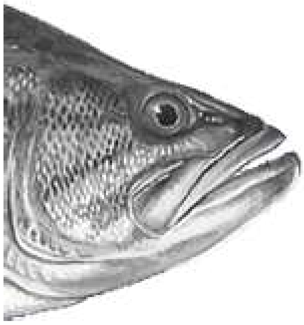


Appendix 1

Appendix Table 1. Individual data for every fish collected with associated mercury concentration data. LMB = largemouth bass, and SMB = smallmouth bass.

Site	Location	Date Collected	Sample ID	Species	Length (mm)	Weight (g)	Hg (µg/g)
Amos Lake	Southeast Hills/Coastal	6/2/2006	Amos1	LMB	362	618	0.296
Amos Lake	Southeast Hills/Coastal	6/2/2006	Amos2	LMB	352	605	0.231
Amos Lake	Southeast Hills/Coastal	6/2/2006	Amos3	LMB	421	1020	0.585
Amos Lake	Southeast Hills/Coastal	6/2/2006	Amos4	LMB	425	995	0.928
Amos Lake	Southeast Hills/Coastal	6/2/2006	Amos5	LMB	440	1380	0.867
Amos Lake	Southeast Hills/Coastal	6/2/2006	Amos6	LMB	379	771	0.431
Amos Lake	Southeast Hills/Coastal	6/2/2006	Amos7	LMB	431	1300	1.092
Amos Lake	Southeast Hills/Coastal	6/2/2006	Amos8	LMB	440	1270	0.439
Amos Lake	Southeast Hills/Coastal	6/2/2006	Amos9	LMB	452	1375	0.587
Amos Lake	Southeast Hills/Coastal	6/2/2006	Amos10	LMB	463	1450	0.751
Ashland Pond	Southeast Hills/Coastal	7/19/2006	Ash1	LMB	501	2040	1.296
Ashland Pond	Southeast Hills/Coastal	7/19/2006	Ash2	LMB	395	898	0.729
Ashland Pond	Southeast Hills/Coastal	7/19/2006	Ash3	LMB	440	1310	1.036
Ashland Pond	Southeast Hills/Coastal	7/19/2006	Ash4	LMB	298	380	0.305
Ashland Pond	Southeast Hills/Coastal	7/19/2006	Ash5	LMB	291	370	0.252
Ashland Pond	Southeast Hills/Coastal	7/19/2006	Ash6	LMB	357	686	0.378
Ashland Pond	Southeast Hills/Coastal	7/19/2006	Ash7	LMB	369	660	0.737
Ashland Pond	Southeast Hills/Coastal	7/19/2006	Ash8	LMB	354	720	0.481
Ashland Pond	Southeast Hills/Coastal	7/19/2006	Ash9	LMB	365	736	0.418
Ashland Pond	Southeast Hills/Coastal	7/19/2006	Ash10	LMB	274	356	0.198
Ashland Pond	Southeast Hills/Coastal	7/19/2006	Ash11	LMB	476	1720	0.840
Ashland Pond	Southeast Hills/Coastal	7/19/2006	Ash12	LMB	317	482	0.305
Ashland Pond	Southeast Hills/Coastal	7/19/2006	Ash13	LMB	346	674	0.338
Ashland Pond	Southeast Hills/Coastal	7/19/2006	Ash14	LMB	498	1998	1.000
Ashland Pond	Southeast Hills/Coastal	7/19/2006	Ash15	LMB	465	1698	0.995

Appendix Table 1 continued

Site	Location	Date Collected	Sample ID	Species	Length (mm)	Weight (g)	Hg (µg/g)
Aspinook Pond	Northeast Hills/Uplands	6/2/2006	Asp1	LMB	463	1280	0.771
Aspinook Pond	Northeast Hills/Uplands	6/2/2006	Asp2	LMB	408	934	0.866
Aspinook Pond	Northeast Hills/Uplands	6/2/2006	Asp3	LMB	357	740	0.237
Aspinook Pond	Northeast Hills/Uplands	6/2/2006	Asp4	LMB	445	1400	0.746
Aspinook Pond	Northeast Hills/Uplands	6/2/2006	Asp5	LMB	385	910	0.838
Aspinook Pond	Northeast Hills/Uplands	6/2/2006	Asp6	LMB	330	544	0.309
Aspinook Pond	Northeast Hills/Uplands	6/2/2006	Asp7	LMB	374	756	0.272
Aspinook Pond	Northeast Hills/Uplands	6/2/2006	Asp8	LMB	319	460	0.237
Aspinook Pond	Northeast Hills/Uplands	6/2/2006	Asp9	LMB	343	556	0.256
Aspinook Pond	Northeast Hills/Uplands	6/2/2006	Asp10	LMB	343	584	0.245
Ball Pond	Southwest Hills/Coastal	7/25/2005	Ball 1	LMB	341	452	0.291
Ball Pond	Southwest Hills/Coastal	7/25/2005	Ball 2	LMB	390	868	0.236
Ball Pond	Southwest Hills/Coastal	7/25/2005	Ball 3	LMB	419	1300	0.390
Ball Pond	Southwest Hills/Coastal	7/25/2005	Ball 4	LMB	457	1450	0.457
Ball Pond	Southwest Hills/Coastal	7/25/2005	Ball 5	LMB	451	1550	0.531
Bantam Lake	Northwest Hills/Uplands	7/24/2005	Bant 1	LMB	399	900	0.363
Bantam Lake	Northwest Hills/Uplands	7/24/2005	Bant 2	LMB	498	1910	0.581
Bantam Lake	Northwest Hills/Uplands	7/24/2005	Bant 3	LMB	309	420	0.121
Bantam Lake	Northwest Hills/Uplands	7/24/2005	Bant 4	LMB	362	610	0.402
Bantam Lake	Northwest Hills/Uplands	7/24/2005	Bant 5	LMB	321	500	0.108
Bantam Lake	Northwest Hills/Uplands	7/24/2005	Bant 6	LMB	367	661	0.254
Bantam Lake	Northwest Hills/Uplands	7/24/2005	Bant 7	LMB	374	671	0.255
Bantam Lake	Northwest Hills/Uplands	7/24/2005	Bant 8	LMB	332	558	0.092
Bantam Lake	Northwest Hills/Uplands	7/24/2005	Bant 9	LMB	304	398	0.082
Bantam Lake	Northwest Hills/Uplands	7/24/2005	Bant 10	LMB	311	380	0.093
Bashan Lake	Southeast Hills/Coastal	8/7/2006	Bash1	LMB	290	315	0.364
Bashan Lake	Southeast Hills/Coastal	8/7/2006	Bash2	LMB	342	470	0.906
Bashan Lake	Southeast Hills/Coastal	8/7/2006	Bash3	LMB	422	890	1.053
Bashan Lake	Southeast Hills/Coastal	8/7/2006	Bash4	LMB	377	790	0.765
Bashan Lake	Southeast Hills/Coastal	8/7/2006	Bash5	LMB	464	1630	1.742
Bashan Lake	Southeast Hills/Coastal	8/7/2006	Bash6	LMB	471	1610	1.549

Appendix Table 1 continued

Site	Location	Date Collected	Sample ID	Species	Length (mm)	Weight (g)	Hg (µg/g)
Bashan Lake	Southeast Hills/Coastal	8/7/2006	Bash7	LMB	407	810	0.686
Bashan Lake	Southeast Hills/Coastal	8/7/2006	Bash8	LMB	394	865	0.774
Bashan Lake	Southeast Hills/Coastal	8/7/2006	Bash11	LMB	312	460	0.529
Bashan Lake	Southeast Hills/Coastal	8/7/2006	Bash20	LMB	322	480	0.455
Batterson Park Pond	Central Lowlands	6/19/2006	Bat1	LMB	343	520	0.217
Batterson Park Pond	Central Lowlands	6/19/2006	Bat2	LMB	475	1475	1.306
Batterson Park Pond	Central Lowlands	6/19/2006	Bat4	LMB	380	970	0.171
Batterson Park Pond	Central Lowlands	6/19/2006	Bat5	LMB	335	535	0.174
Batterson Park Pond	Central Lowlands	6/19/2006	Bat6	LMB	295	460	0.109
Batterson Park Pond	Central Lowlands	6/19/2006	Bat7	LMB	460	1575	1.217
Batterson Park Pond	Central Lowlands	6/19/2006	Bat8	LMB	350	700	0.184
Batterson Park Pond	Central Lowlands	6/19/2006	Bat9	LMB	345	658	0.146
Batterson Park Pond	Central Lowlands	6/19/2006	Bat10	LMB	370	708	0.159
Batterson Park Pond	Central Lowlands	6/19/2006	Bat11	LMB	403	944	0.287
Beach Pond	Southeast Hills/Coastal	7/17/2005	Beach 1	LMB	348	561	0.464
Beach Pond	Southeast Hills/Coastal	7/17/2005	Beach 2	LMB	389	822	0.605
Beach Pond	Southeast Hills/Coastal	7/17/2005	Beach 3	LMB	372	702	0.705
Beach Pond	Southeast Hills/Coastal	7/17/2005	Beach 4	LMB	398	661	1.773
Beach Pond	Southeast Hills/Coastal	7/17/2005	Beach 5	LMB	365	615	0.558
Beach Pond	Southeast Hills/Coastal	7/17/2005	Beach 6	LMB	312	436	0.360
Beach Pond	Southeast Hills/Coastal	7/17/2005	Beach 7	LMB	396	752	0.599
Beach Pond	Southeast Hills/Coastal	7/17/2005	Beach 8	LMB	335	500	0.585
Beach Pond	Southeast Hills/Coastal	7/17/2005	Beach 9	LMB	564	2750	1.200
Beach Pond	Southeast Hills/Coastal	7/17/2005	Beach 10	LMB	398	758	1.182
Billings Lake	Southeast Hills/Coastal	7/28/2005	Bill 1	LMB	328	518	0.445
Billings Lake	Southeast Hills/Coastal	7/28/2005	Bill 2	LMB	370	758	0.427
Billings Lake	Southeast Hills/Coastal	7/28/2005	Bill 3	LMB	302	438	0.283
Billings Lake	Southeast Hills/Coastal	7/28/2005	Bill 4	LMB	300	372	0.395
Billings Lake	Southeast Hills/Coastal	7/28/2005	Bill 5	LMB	369	790	0.576
Billings Lake	Southeast Hills/Coastal	7/28/2005	Bill 6	LMB	379	706	0.716
Billings Lake	Southeast Hills/Coastal	7/28/2005	Bill 7	LMB	367	708	0.714

Appendix Table 1 continued

Site	Location	Date Collected	Sample ID	Species	Length (mm)	Weight (g)	Hg (µg/g)
Billings Lake	Southeast Hills/Coastal	7/28/2005	Bill 8	LMB	378	693	0.619
Billings Lake	Southeast Hills/Coastal	7/28/2005	Bill 9	LMB	353	594	0.774
Billings Lake	Southeast Hills/Coastal	7/28/2005	Bill 10	LMB	346	582	0.381
Black Pond	Central Lowlands	8/8/2005	Black 1	LMB	340	599	0.250
Black Pond	Central Lowlands	8/8/2005	Black 2	LMB	306	412	0.178
Black Pond	Central Lowlands	8/8/2005	Black 3	LMB	296	320	0.193
Black Pond	Central Lowlands	8/8/2005	Black 4	LMB	291	374	0.318
Black Pond	Central Lowlands	8/8/2005	Black 5	LMB	341	508	0.267
Black Pond	Central Lowlands	8/8/2005	Black 6	LMB	321	440	0.441
Black Pond	Central Lowlands	8/8/2005	Black 7	LMB	304	394	0.269
Black Pond	Central Lowlands	8/8/2005	Black 8	LMB	322	524	0.199
Black Pond	Central Lowlands	8/8/2005	Black 10	LMB	387	822	0.215
Black Pond	Central Lowlands	8/8/2005	Black 11	LMB	305	398	0.584
Candlewood Lake	Southwest Hills/Coastal	7/16/2005	Cand 1	SMB	363	720	0.157
Candlewood Lake	Southwest Hills/Coastal	7/16/2005	Cand 2	LMB	438	1450	0.644
Candlewood Lake	Southwest Hills/Coastal	7/16/2005	Cand 3	LMB	486	1420	0.558
Candlewood Lake	Southwest Hills/Coastal	7/16/2005	Cand 4	SMB	470	1725	0.413
Candlewood Lake	Southwest Hills/Coastal	7/16/2005	Cand 5	LMB	441	1750	0.451
Candlewood Lake	Southwest Hills/Coastal	7/16/2005	Cand 6	LMB	377	853	0.185
Candlewood Lake	Southwest Hills/Coastal	7/16/2005	Cand 7	LMB	405	1175	0.194
Candlewood Lake	Southwest Hills/Coastal	7/16/2005	Cand 8	LMB	372	740	0.303
Candlewood Lake	Southwest Hills/Coastal	7/16/2005	Cand 9	SMB	322	420	0.098
Candlewood Lake	Southwest Hills/Coastal	7/16/2005	Cand 10	LMB	418	1180	0.359
Canoe Brook Lake	Southwest Hills/Coastal	7/2/2006	Can1	LMB	380	725	0.259
Canoe Brook Lake	Southwest Hills/Coastal	7/2/2006	Can2	LMB	361	590	0.370
Canoe Brook Lake	Southwest Hills/Coastal	7/2/2006	Can3	LMB	392	940	0.241
Canoe Brook Lake	Southwest Hills/Coastal	7/2/2006	Can4	LMB	372	670	0.185
Canoe Brook Lake	Southwest Hills/Coastal	7/2/2006	Can5	LMB	411	1075	0.240
Canoe Brook Lake	Southwest Hills/Coastal	7/2/2006	Can6	LMB	302	435	0.129
Canoe Brook Lake	Southwest Hills/Coastal	7/2/2006	Can7	LMB	360	625	0.227
Canoe Brook Lake	Southwest Hills/Coastal	7/2/2006	Can8	LMB	350	530	0.309

Appendix Table 1 continued

Site	Location	Date Collected	Sample ID	Species	Length (mm)	Weight (g)	Hg (µg/g)
Canoe Brook Lake	Southwest Hills/Coastal	7/2/2006	Can9	LMB	289	330	0.125
Canoe Brook Lake	Southwest Hills/Coastal	7/2/2006	Can10	LMB	292	300	0.121
Cedar Swamp Pond	Southwest Hills/Coastal	9/26/2006	Cedar1	LMB	360	730	0.104
Cedar Swamp Pond	Southwest Hills/Coastal	9/26/2006	Cedar2	LMB	295	408	0.086
Cedar Swamp Pond	Southwest Hills/Coastal	9/26/2006	Cedar3	LMB	374	730	0.145
Cedar Swamp Pond	Southwest Hills/Coastal	9/26/2006	Cedar4	LMB	334	605	0.114
Cedar Swamp Pond	Southwest Hills/Coastal	9/26/2006	Cedar5	LMB	365	832	0.124
Cedar Swamp Pond	Southwest Hills/Coastal	9/26/2006	Cedar6	LMB	294	374	0.089
Cedar Swamp Pond	Southwest Hills/Coastal	9/26/2006	Cedar7	LMB	323	540	0.107
Cedar Swamp Pond	Southwest Hills/Coastal	9/26/2006	Cedar8	LMB	343	652	0.149
Cedar Swamp Pond	Southwest Hills/Coastal	9/26/2006	Cedar9	LMB	351	720	0.102
Cedar Swamp Pond	Southwest Hills/Coastal	9/26/2006	Cedar10	LMB	340	660	0.114
Coventry Lake	Northeast Hills/Uplands	6/12/2006	Cov11	LMB	292	310	0.100
Coventry Lake	Northeast Hills/Uplands	6/12/2006	Cov12	LMB	286	296	0.092
Coventry Lake	Northeast Hills/Uplands	6/12/2006	Cov13	LMB	287	308	0.110
Coventry Lake	Northeast Hills/Uplands	6/12/2006	Cov14	LMB	294	340	0.089
Coventry Lake	Northeast Hills/Uplands	6/12/2006	Cov15	LMB	337	420	0.318
Coventry Lake	Northeast Hills/Uplands	6/12/2006	Cov16	LMB	377	594	0.260
Coventry Lake	Northeast Hills/Uplands	6/12/2006	Cov17	LMB	358	576	0.345
Coventry Lake	Northeast Hills/Uplands	6/12/2006	Cov18	LMB	417	820	0.161
Coventry Lake	Northeast Hills/Uplands	6/12/2006	Cov19	LMB	423	931	0.248
Coventry Lake	Northeast Hills/Uplands	6/12/2006	Cov20	LMB	480	1750	0.503
Crystal Lake (E)	Northeast Hills/Uplands	10/25/2006	CrysE1	LMB	307	405	0.244
Crystal Lake (E)	Northeast Hills/Uplands	10/25/2006	CrysE2	LMB	375	750	0.445
Crystal Lake (E)	Northeast Hills/Uplands	10/25/2006	CrysE3	LMB	372	705	0.279
Crystal Lake (E)	Northeast Hills/Uplands	10/25/2006	CrysE4	LMB	396	730	0.864
Crystal Lake (E)	Northeast Hills/Uplands	10/25/2006	CrysE5	LMB	371	710	0.244
Crystal Lake (E)	Northeast Hills/Uplands	10/25/2006	CrysE6	LMB	480	1420	0.721
Crystal Lake (E)	Northeast Hills/Uplands	10/25/2006	CrysE7	LMB	472	1810	0.624
Crystal Lake (E)	Northeast Hills/Uplands	10/25/2006	CrysE8	LMB	508	2270	0.688
Crystal Lake (E)	Northeast Hills/Uplands	10/25/2006	CrysE9	LMB	550	2070	0.492

Appendix Table 1 continued

Site	Location	Date Collected	Sample ID	Species	Length (mm)	Weight (g)	Hg (µg/g)
Crystal Lake (E)	Northeast Hills/Uplands	10/25/2006	CrysE10	LMB	543	2565	0.388
Crystal Lake (M)	Central Lowlands	6/22/2006	CrystM1	LMB	322	406	0.284
Crystal Lake (M)	Central Lowlands	6/22/2006	CrystM2	LMB	322	410	0.234
Crystal Lake (M)	Central Lowlands	6/22/2006	CrystM3	LMB	337	536	0.354
Crystal Lake (M)	Central Lowlands	6/22/2006	CrystM4	LMB	319	400	0.276
Crystal Lake (M)	Central Lowlands	6/22/2006	CrystM5	LMB	308	320	0.299
Crystal Lake (M)	Central Lowlands	6/22/2006	CrystM6	LMB	313	418	0.284
Crystal Lake (M)	Central Lowlands	6/22/2006	CrystM7	LMB	330	499	0.266
Crystal Lake (M)	Central Lowlands	6/22/2006	CrystM8	LMB	310	396	0.245
Crystal Lake (M)	Central Lowlands	6/22/2006	CrystM9	LMB	306	380	0.343
Crystal Lake (M)	Central Lowlands	6/22/2006	CrystM10	LMB	324	504	0.259
East Twin Lake	Northwest Hills/Uplands	6/24/2006	East1	LMB	355	738	0.212
East Twin Lake	Northwest Hills/Uplands	6/24/2006	East2	LMB	377	811	0.344
East Twin Lake	Northwest Hills/Uplands	6/24/2006	East3	LMB	372	783	0.466
East Twin Lake	Northwest Hills/Uplands	6/24/2006	East4	LMB	385	851	0.426
East Twin Lake	Northwest Hills/Uplands	6/24/2006	East5	LMB	350	720	0.355
East Twin Lake	Northwest Hills/Uplands	6/24/2006	East6	LMB	358	701	0.297
East Twin Lake	Northwest Hills/Uplands	6/24/2006	East7	LMB	412	1082	0.386
East Twin Lake	Northwest Hills/Uplands	6/24/2006	East8	LMB	372	857	0.277
East Twin Lake	Northwest Hills/Uplands	6/24/2006	East9	LMB	417	1022	0.639
East Twin Lake	Northwest Hills/Uplands	6/24/2006	East10	LMB	440	1282	0.649
Gardner Lake	Southeast Hills/Coastal	10/24/2006	Gard1	LMB	369	575	0.521
Gardner Lake	Southeast Hills/Coastal	10/24/2006	Gard2	LMB	316	450	0.182
Gardner Lake	Southeast Hills/Coastal	10/24/2006	Gard3	LMB	375	820	0.333
Gardner Lake	Southeast Hills/Coastal	10/24/2006	Gard4	LMB	413	1040	0.417
Gardner Lake	Southeast Hills/Coastal	10/24/2006	Gard5	LMB	413	1040	0.500
Gardner Lake	Southeast Hills/Coastal	10/24/2006	Gard6	LMB	403	1480	0.510
Gardner Lake	Southeast Hills/Coastal	10/24/2006	Gard7	LMB	384	820	0.414
Gardner Lake	Southeast Hills/Coastal	10/24/2006	Gard8	LMB	400	980	0.424
Gardner Lake	Southeast Hills/Coastal	10/24/2006	Gard9	LMB	352	515	0.277
Gardner Lake	Southeast Hills/Coastal	10/24/2006	Gard10	LMB	407	1008	0.310

Appendix Table 1 continued

Site	Location	Date Collected	Sample ID	Species	Length (mm)	Weight (g)	Hg (µg/g)
Glasgo Pond	Southeast Hills/Coastal	10/3/2006	Glas1	LMB	291	318	0.432
Glasgo Pond	Southeast Hills/Coastal	10/3/2006	Glas2	LMB	284	322	0.428
Glasgo Pond	Southeast Hills/Coastal	10/3/2006	Glas3	LMB	338	516	0.535
Glasgo Pond	Southeast Hills/Coastal	10/3/2006	Glas4	LMB	339	556	0.659
Glasgo Pond	Southeast Hills/Coastal	10/3/2006	Glas5	LMB	336	450	0.506
Glasgo Pond	Southeast Hills/Coastal	10/3/2006	Glas6	LMB	363	638	0.454
Glasgo Pond	Southeast Hills/Coastal	10/3/2006	Glas7	LMB	368	643	0.629
Glasgo Pond	Southeast Hills/Coastal	10/3/2006	Glas8	LMB	357	638	0.430
Glasgo Pond	Southeast Hills/Coastal	10/3/2006	Glas9	LMB	431	1175	0.893
Glasgo Pond	Southeast Hills/Coastal	10/3/2006	Glas10	LMB	516	1486	1.091
Gorton Pond	Southeast Hills/Coastal	7/17/2006	Gort1	LMB	351	640	0.335
Gorton Pond	Southeast Hills/Coastal	7/17/2006	Gort2	LMB	375	818	0.332
Gorton Pond	Southeast Hills/Coastal	7/17/2006	Gort3	LMB	368	786	0.429
Gorton Pond	Southeast Hills/Coastal	7/17/2006	Gort4	LMB	326	496	0.521
Gorton Pond	Southeast Hills/Coastal	7/17/2006	Gort5	LMB	351	728	0.293
Gorton Pond	Southeast Hills/Coastal	7/17/2006	Gort6	LMB	322	502	0.277
Gorton Pond	Southeast Hills/Coastal	7/17/2006	Gort7	LMB	378	892	0.273
Gorton Pond	Southeast Hills/Coastal	7/17/2006	Gort8	LMB	320	552	0.298
Gorton Pond	Southeast Hills/Coastal	7/17/2006	Gort9	LMB	341	666	0.281
Gorton Pond	Southeast Hills/Coastal	7/17/2006	Gort10	LMB	370	790	0.448
Highland Lake	Northwest Hills/Uplands	7/7/2005	High 1	LMB	325	519	0.298
Highland Lake	Northwest Hills/Uplands	7/14/2005	High 2	LMB	403	1052	0.436
Highland Lake	Northwest Hills/Uplands	7/14/2005	High 3	LMB	363	664	0.345
Highland Lake	Northwest Hills/Uplands	7/14/2005	High 4	LMB	410	1060	0.250
Highland Lake	Northwest Hills/Uplands	7/14/2005	High 5	LMB	410	1068	0.470
Highland Lake	Northwest Hills/Uplands	7/14/2005	High 6	LMB	392	930	0.390
Highland Lake	Northwest Hills/Uplands	7/14/2005	High 7	LMB	383	844	0.221
Highland Lake	Northwest Hills/Uplands	7/14/2005	High 8	LMB	332	540	0.164
Highland Lake	Northwest Hills/Uplands	7/14/2005	High 9	LMB	366	766	0.206
Highland Lake	Northwest Hills/Uplands	7/7/2005	High 10	LMB	346	530	0.399
Housatonic Lake	Southwest Hills/Coastal	6/12/2006	Hous1	LMB	430	1200	1.001

Appendix Table 1 continued

Site	Location	Date Collected	Sample ID	Species	Length (mm)	Weight (g)	Hg (µg/g)
Housatonic Lake	Southwest Hills/Coastal	6/12/2006	Hous2	SMB	376	482	0.694
Housatonic Lake	Southwest Hills/Coastal	6/12/2006	Hous3	LMB	433	1410	1.364
Housatonic Lake	Southwest Hills/Coastal	6/12/2006	Hous4	LMB	355	648	0.342
Housatonic Lake	Southwest Hills/Coastal	6/12/2006	Hous5	LMB	376	776	0.477
Housatonic Lake	Southwest Hills/Coastal	6/12/2006	Hous6	LMB	344	578	0.364
Housatonic Lake	Southwest Hills/Coastal	6/12/2006	Hous7	LMB	310	378	0.243
Lake Kenosia	Southwest Hills/Coastal	7/25/2006	Ken1	LMB	286	385	0.345
Lake Kenosia	Southwest Hills/Coastal	7/25/2006	Ken2	LMB	300	435	0.605
Lake Kenosia	Southwest Hills/Coastal	7/25/2006	Ken3	LMB	284	270	0.290
Lake Kenosia	Southwest Hills/Coastal	7/25/2006	Ken4	LMB	376	760	0.648
Lake Kenosia	Southwest Hills/Coastal	7/25/2006	Ken5	LMB	308	445	0.347
Lake Kenosia	Southwest Hills/Coastal	7/25/2006	Ken6	LMB	327	445	0.385
Lake Kenosia	Southwest Hills/Coastal	7/25/2006	Ken7	LMB	282	270	0.503
Lake Kenosia	Southwest Hills/Coastal	7/25/2006	Ken8	LMB	312	375	0.334
Lake Kenosia	Southwest Hills/Coastal	7/25/2006	Ken9	LMB	354	730	0.586
Lake Kenosia	Southwest Hills/Coastal	7/25/2006	Ken10	LMB	368	1025	0.681
Lake McDonough	Northwest Hills/Uplands	7/6/2006	McD1	SMB	340	560	0.352
Lake McDonough	Northwest Hills/Uplands	7/6/2006	McD2	SMB	437	1250	1.514
Lake McDonough	Northwest Hills/Uplands	7/6/2006	McD3	SMB	413	854	0.608
Lake McDonough	Northwest Hills/Uplands	7/6/2006	McD4	LMB	485	1875	0.567
Lake McDonough	Northwest Hills/Uplands	7/6/2006	McD5	SMB	428	1031	1.036
Lake McDonough	Northwest Hills/Uplands	7/6/2006	McD6	LMB	335	530	0.211
Lake McDonough	Northwest Hills/Uplands	7/6/2006	McD7	LMB	439	1300	0.858
Lake McDonough	Northwest Hills/Uplands	7/6/2006	McD8	LMB	350	650	0.298
Lake McDonough	Northwest Hills/Uplands	7/6/2006	McD9	SMB	304	354	0.308
Lake McDonough	Northwest Hills/Uplands	7/6/2006	McD10	SMB	305	380	0.298
Lake Saltonstall	Central Lowlands	8/16/2005	Salt 1	LMB	430	1078	0.666
Lake Saltonstall	Central Lowlands	8/16/2005	Salt 2	LMB	500	2200	0.573
Lake Saltonstall	Central Lowlands	8/16/2005	Salt 3	LMB	413	1250	0.203
Lake Saltonstall	Central Lowlands	8/16/2005	Salt 4	LMB	280	361	0.131
Lake Saltonstall	Central Lowlands	8/16/2005	Salt 5	LMB	405	1045	0.311

Appendix Table 1 continued

Site	Location	Date Collected	Sample ID	Species	Length (mm)	Weight (g)	Hg (µg/g)
Lake Saltonstall	Central Lowlands	8/16/2005	Salt 6	LMB	433	1375	0.271
Lake Saltonstall	Central Lowlands	8/16/2005	Salt 7	LMB	285	350	0.125
Lake Saltonstall	Central Lowlands	8/16/2005	Salt 8	LMB	443	1425	0.191
Lake Saltonstall	Central Lowlands	8/16/2005	Salt 9	LMB	364	779	0.120
Lake Saltonstall	Central Lowlands	8/16/2005	Salt 10	LMB	360	740	0.182
Lake Wononscopomuc	Northwest Hills/Uplands	8/1/2005	Wono 1	LMB	297	344	0.134
Lake Wononscopomuc	Northwest Hills/Uplands	8/1/2005	Wono 2	LMB	411	908	0.485
Lake Wononscopomuc	Northwest Hills/Uplands	8/1/2005	Wono 3	LMB	317	419	0.152
Lake Wononscopomuc	Northwest Hills/Uplands	8/1/2005	Wono 4	LMB	363	660	0.358
Lake Wononscopomuc	Northwest Hills/Uplands	8/1/2005	Wono 5	LMB	314	629	0.239
Lake Wononscopomuc	Northwest Hills/Uplands	8/1/2005	Wono 6	LMB	334	559	0.253
Lake Wononscopomuc	Northwest Hills/Uplands	8/1/2005	Wono 7	LMB	370	688	0.537
Lake Wononscopomuc	Northwest Hills/Uplands	8/1/2005	Wono 8	LMB	413	993	0.418
Lake Wononscopomuc	Northwest Hills/Uplands	8/1/2005	Wono 9	LMB	326	450	0.287
Lake Wononscopomuc	Northwest Hills/Uplands	8/1/2005	Wono 10	LMB	404	1038	0.440
Lake Zoar	Southwest Hills/Coastal	7/31/2005	Zoar 1	LMB	448	1293	0.985
Lake Zoar	Southwest Hills/Coastal	7/31/2005	Zoar 2	LMB	334	554	0.251
Lake Zoar	Southwest Hills/Coastal	7/31/2005	Zoar 3	LMB	390	700	1.020
Lake Zoar	Southwest Hills/Coastal	7/31/2005	Zoar 4	LMB	312	392	0.250
Lake Zoar	Southwest Hills/Coastal	7/31/2005	Zoar 5	LMB	390	762	0.855
Lake Zoar	Southwest Hills/Coastal	7/31/2005	Zoar 6	LMB	332	608	0.348
Lake Zoar	Southwest Hills/Coastal	7/31/2005	Zoar 7	LMB	329	459	0.226
Lake Zoar	Southwest Hills/Coastal	7/31/2005	Zoar 8	LMB	366	668	0.418
Lake Zoar	Southwest Hills/Coastal	7/31/2005	Zoar 9	LMB	305	352	0.281
Lake Zoar	Southwest Hills/Coastal	7/31/2005	Zoar 10	LMB	310	360	0.312
Long Pond	Southeast Hills/Coastal	7/9/2006	Long1	LMB	370	610	0.558
Long Pond	Southeast Hills/Coastal	7/9/2006	Long2	LMB	337	584	0.411
Long Pond	Southeast Hills/Coastal	7/9/2006	Long3	LMB	335	500	0.403
Long Pond	Southeast Hills/Coastal	7/9/2006	Long4	LMB	344	568	0.291
Long Pond	Southeast Hills/Coastal	7/9/2006	Long5	LMB	343	534	0.539
Long Pond	Southeast Hills/Coastal	7/9/2006	Long6	LMB	405	784	0.872

Appendix Table 1 continued

Site	Location	Date Collected	Sample ID	Species	Length (mm)	Weight (g)	Hg (µg/g)
Long Pond	Southeast Hills/Coastal	7/9/2006	Long7	LMB	321	444	0.747
Long Pond	Southeast Hills/Coastal	7/9/2006	Long8	LMB	357	660	0.452
Long Pond	Southeast Hills/Coastal	7/9/2006	Long9	LMB	315	524	0.309
Long Pond	Southeast Hills/Coastal	7/9/2006	Long10	LMB	313	428	0.542
Mamanasco Lake	Southwest Hills/Coastal	9/6/2006	Mam1	LMB	348	585	0.137
Mamanasco Lake	Southwest Hills/Coastal	9/6/2006	Mam2	LMB	335	450	0.226
Mamanasco Lake	Southwest Hills/Coastal	9/6/2006	Mam3	LMB	336	510	0.183
Mamanasco Lake	Southwest Hills/Coastal	9/6/2006	Mam4	LMB	330	544	0.126
Mamanasco Lake	Southwest Hills/Coastal	9/6/2006	Mam5	LMB	332	490	0.116
Mamanasco Lake	Southwest Hills/Coastal	9/6/2006	Mam6	LMB	307	442	0.079
Mamanasco Lake	Southwest Hills/Coastal	9/6/2006	Mam7	LMB	324	490	0.129
Mamanasco Lake	Southwest Hills/Coastal	9/6/2006	Mam8	LMB	329	516	0.173
Mamanasco Lake	Southwest Hills/Coastal	9/6/2006	Mam9	LMB	316	410	0.197
Mamanasco Lake	Southwest Hills/Coastal	9/6/2006	Mam10	LMB	308	430	0.088
Mansfield Hollow Res	Northeast Hills/Uplands	6/17/2006	Mans1	LMB	358	623	0.432
Mansfield Hollow Res	Northeast Hills/Uplands	6/17/2006	Mans2	LMB	413	913	0.800
Mansfield Hollow Res	Northeast Hills/Uplands	6/17/2006	Mans3	LMB	358	648	0.746
Mansfield Hollow Res	Northeast Hills/Uplands	6/17/2006	Mans4	LMB	365	637	0.715
Mansfield Hollow Res	Northeast Hills/Uplands	6/17/2006	Mans5	LMB	383	754	0.557
Mansfield Hollow Res	Northeast Hills/Uplands	6/17/2006	Mans6	LMB	355	646	0.612
Mansfield Hollow Res	Northeast Hills/Uplands	6/17/2006	Mans7	LMB	348	524	0.641
Mansfield Hollow Res	Northeast Hills/Uplands	6/17/2006	Mans8	LMB	397	996	0.684
Mansfield Hollow Res	Northeast Hills/Uplands	6/17/2006	Mans9	LMB	455	1513	0.625
Mansfield Hollow Res	Northeast Hills/Uplands	6/17/2006	Mans10	LMB	378	901	0.656
Mashapaug Lake	Northeast Hills/Uplands	6/30/2006	Mash1	LMB	380	730	0.657
Mashapaug Lake	Northeast Hills/Uplands	6/30/2006	Mash2	LMB	342	528	0.605
Mashapaug Lake	Northeast Hills/Uplands	6/30/2006	Mash3	LMB	401	760	1.136
Mashapaug Lake	Northeast Hills/Uplands	6/30/2006	Mash4	LMB	346	544	0.514
Mashapaug Lake	Northeast Hills/Uplands	6/30/2006	Mash5	LMB	395	861	0.766
Mashapaug Lake	Northeast Hills/Uplands	6/30/2006	Mash10	LMB	406	878	0.863
Mashapaug Lake	Northeast Hills/Uplands	6/30/2006	Mash13	LMB	407	806	0.943

Appendix Table 1 continued

Site	Location	Date Collected	Sample ID	Species	Length (mm)	Weight (g)	Hg (µg/g)
Mashapaug Lake	Northeast Hills/Uplands	6/30/2006	Mash15	LMB	372	700	0.646
Mashapaug Lake	Northeast Hills/Uplands	6/30/2006	Mash16	LMB	333	485	0.359
Mashapaug Lake	Northeast Hills/Uplands	6/30/2006	Mash19	LMB	320	382	0.55
Middle Bolton Lake	Northeast Hills/Uplands	7/12/2005	MBolt 1	LMB	320	492	0.339
Middle Bolton Lake	Northeast Hills/Uplands	7/12/2005	MBolt 2	LMB	289	311	0.408
Middle Bolton Lake	Northeast Hills/Uplands	7/26/2005	MBolt 3	LMB	289	270	0.512
Middle Bolton Lake	Northeast Hills/Uplands	7/26/2005	MBolt 4	LMB	300	305	0.349
Middle Bolton Lake	Northeast Hills/Uplands	7/26/2005	MBolt 5	LMB	277	252	0.362
Middle Bolton Lake	Northeast Hills/Uplands	7/26/2005	MBolt 6	LMB	276	302	0.254
Middle Bolton Lake	Northeast Hills/Uplands	7/26/2005	MBolt 7	LMB	292	330	0.313
Middle Bolton Lake	Northeast Hills/Uplands	7/26/2005	MBolt 8	LMB	279	264	0.368
Middle Bolton Lake	Northeast Hills/Uplands	7/26/2005	MBolt 9	LMB	282	324	0.353
Middle Bolton Lake	Northeast Hills/Uplands	7/26/2005	MBolt 10	LMB	295	330	0.317
Moodus Res	Southeast Hills/Coastal	6/5/2006	Mood1	LMB	353	530	0.509
Moodus Res	Southeast Hills/Coastal	6/5/2006	Mood2	LMB	334	482	0.341
Moodus Res	Southeast Hills/Coastal	6/5/2006	Mood3	LMB	452	1420	0.537
Moodus Res	Southeast Hills/Coastal	6/5/2006	Mood4	LMB	387	808	0.603
Moodus Res	Southeast Hills/Coastal	6/5/2006	Mood5	LMB	383	750	0.649
Moodus Res	Southeast Hills/Coastal	6/5/2006	Mood6	LMB	377	620	0.556
Moodus Res	Southeast Hills/Coastal	6/5/2006	Mood7	LMB	362	569	0.619
Moodus Res	Southeast Hills/Coastal	6/5/2006	Mood8	LMB	366	674	0.453
Moodus Res	Southeast Hills/Coastal	6/5/2006	Mood9	LMB	356	621	0.635
Moodus Res	Southeast Hills/Coastal	6/5/2006	Mood10	LMB	372	706	0.452
Mudge Pond	Northwest Hills/Uplands	8/15/2005	Mudge 1	LMB	357	577	0.212
Mudge Pond	Northwest Hills/Uplands	8/15/2005	Mudge 2	LMB	294	319	0.095
Mudge Pond	Northwest Hills/Uplands	8/15/2005	Mudge 3	LMB	306	368	0.094
Mudge Pond	Northwest Hills/Uplands	8/15/2005	Mudge 4	LMB	308	360	0.133
Mudge Pond	Northwest Hills/Uplands	8/15/2005	Mudge 5	LMB	295	342	0.108
Mudge Pond	Northwest Hills/Uplands	8/15/2005	Mudge 6	LMB	334	464	0.200
Mudge Pond	Northwest Hills/Uplands	8/15/2005	Mudge 7	LMB	451	1500	0.468
Mudge Pond	Northwest Hills/Uplands	8/15/2005	Mudge 8	LMB	343	540	0.198

Appendix Table 1 continued

Site	Location	Date Collected	Sample ID	Species	Length (mm)	Weight (g)	Hg (µg/g)
Mudge Pond	Northwest Hills/Uplands	8/15/2005	Mudge 9	LMB	380	808	0.193
Mudge Pond	Northwest Hills/Uplands	8/15/2005	Mudge 10	LMB	323	462	0.203
North Farms Res	Central Lowlands	6/26/2006	NFarm1	LMB	490	1520	0.381
North Farms Res	Central Lowlands	6/26/2006	NFarm2	LMB	425	1325	0.125
North Farms Res	Central Lowlands	6/26/2006	NFarm3	LMB	405	1100	0.096
North Farms Res	Central Lowlands	6/26/2006	NFarm4	LMB	343	340	0.068
North Farms Res	Central Lowlands	6/26/2006	NFarm5	LMB	377	816	0.129
North Farms Res	Central Lowlands	6/26/2006	NFarm6	LMB	292	440	0.055
North Farms Res	Central Lowlands	6/26/2006	NFarm7	LMB	308	486	0.061
North Farms Res	Central Lowlands	6/26/2006	NFarm8	LMB	310	424	0.084
North Farms Res	Central Lowlands	6/26/2006	NFarm9	LMB	473	1470	0.212
Pachaug Pond	Southeast Hills/Coastal	8/13/2005	Pach 1	LMB	340	602	0.518
Pachaug Pond	Southeast Hills/Coastal	8/13/2005	Pach 2	LMB	367	695	0.404
Pachaug Pond	Southeast Hills/Coastal	8/13/2005	Pach 3	LMB	335	474	0.267
Pachaug Pond	Southeast Hills/Coastal	8/13/2005	Pach 4	LMB	342	531	0.319
Pachaug Pond	Southeast Hills/Coastal	8/13/2005	Pach 5	LMB	405	908	0.613
Pachaug Pond	Southeast Hills/Coastal	8/13/2005	Pach 6	LMB	340	560	0.305
Pachaug Pond	Southeast Hills/Coastal	8/13/2005	Pach 7	LMB	355	576	0.411
Pachaug Pond	Southeast Hills/Coastal	8/13/2005	Pach 8	LMB	325	464	0.333
Pachaug Pond	Southeast Hills/Coastal	8/13/2005	Pach 9	LMB	315	360	0.435
Pachaug Pond	Southeast Hills/Coastal	8/13/2005	Pach 10	LMB	360	640	0.331
Pattagannsett Lake	Southeast Hills/Coastal	8/2/2005	Patta 1	LMB	322	431	0.352
Pattagannsett Lake	Southeast Hills/Coastal	8/2/2005	Patta 2	LMB	343	472	0.459
Pattagannsett Lake	Southeast Hills/Coastal	8/2/2005	Patta 3	LMB	337	523	0.375
Pattagannsett Lake	Southeast Hills/Coastal	8/2/2005	Patta 4	LMB	283	282	0.294
Pattagannsett Lake	Southeast Hills/Coastal	8/2/2005	Patta 5	LMB	382	718	0.498
Pattagannsett Lake	Southeast Hills/Coastal	8/2/2005	Patta 6	LMB	320	408	0.376
Pattagannsett Lake	Southeast Hills/Coastal	8/2/2005	Patta 7	LMB	397	880	0.397
Pattagannsett Lake	Southeast Hills/Coastal	8/2/2005	Patta 8	LMB	345	531	0.392
Pattagannsett Lake	Southeast Hills/Coastal	8/2/2005	Patta 9	LMB	323	446	0.295
Pattagannsett Lake	Southeast Hills/Coastal	8/2/2005	Patta 10	LMB	291	325	0.276

Appendix Table 1 continued

Site	Location	Date Collected	Sample ID	Species	Length (mm)	Weight (g)	Hg (μg/g)
Powers Lake	Southeast Hills/Coastal	9/6/2005	Powers 1	LMB	440	1225	0.635
Powers Lake	Southeast Hills/Coastal	9/6/2005	Powers 2	LMB	320	450	0.281
Powers Lake	Southeast Hills/Coastal	9/6/2005	Powers 3	LMB	375	756	0.327
Powers Lake	Southeast Hills/Coastal	9/6/2005	Powers 4	LMB	362	590	0.291
Powers Lake	Southeast Hills/Coastal	9/6/2005	Powers 5	LMB	324	494	0.241
Powers Lake	Southeast Hills/Coastal	9/6/2005	Powers 6	LMB	342	558	0.177
Powers Lake	Southeast Hills/Coastal	9/6/2005	Powers 7	LMB	394	824	0.483
Quaddick Reservoir	Northeast Hills/Uplands	8/25/2005	Quadd 1	LMB	308	408	0.276
Quaddick Reservoir	Northeast Hills/Uplands	8/25/2005	Quadd 2	LMB	322	432	0.431
Quaddick Reservoir	Northeast Hills/Uplands	8/25/2005	Quadd 3	LMB	311	424	0.331
Quaddick Reservoir	Northeast Hills/Uplands	8/25/2005	Quadd 4	LMB	367	626	0.718
Quaddick Reservoir	Northeast Hills/Uplands	8/25/2005	Quadd 5	LMB	345	560	0.375
Quaddick Reservoir	Northeast Hills/Uplands	8/25/2005	Quadd 6	LMB	282	320	0.332
Quaddick Reservoir	Northeast Hills/Uplands	8/25/2005	Quadd 7	LMB	286	338	0.246
Quaddick Reservoir	Northeast Hills/Uplands	8/25/2005	Quadd 8	LMB	324	490	0.416
Quaddick Reservoir	Northeast Hills/Uplands	8/25/2005	Quadd 9	LMB	302	400	0.311
Quassapaug Lake	Southwest Hills/Coastal	10/10/2006	Quas1	LMB	425	1175	0.564
Quassapaug Lake	Southwest Hills/Coastal	10/10/2006	Quas2	LMB	444	1560	0.489
Quassapaug Lake	Southwest Hills/Coastal	10/10/2006	Quas3	LMB	413	998	0.459
Quassapaug Lake	Southwest Hills/Coastal	10/10/2006	Quas4	LMB	410	920	0.701
Quassapaug Lake	Southwest Hills/Coastal	10/10/2006	Quas6	LMB	422	1100	0.443
Quassapaug Lake	Southwest Hills/Coastal	10/10/2006	Quas7	LMB	469	1575	0.510
Quassapaug Lake	Southwest Hills/Coastal	10/10/2006	Quas8	LMB	473	1850	0.665
Quassapaug Lake	Southwest Hills/Coastal	10/10/2006	Quas9	LMB	331	576	0.146
Quassapaug Lake	Southwest Hills/Coastal	10/10/2006	Quas10	LMB	318	502	0.149
Quinebaug Lake	Northeast Hills/Uplands	8/8/2006	Quin1	LMB	366	720	0.689
Quinebaug Lake	Northeast Hills/Uplands	8/8/2006	Quin2	LMB	414	910	0.953
Quinebaug Lake	Northeast Hills/Uplands	8/8/2006	Quin3	LMB	340	516	0.969
Quinebaug Lake	Northeast Hills/Uplands	8/8/2006	Quin4	LMB	310	416	0.342
Quinebaug Lake	Northeast Hills/Uplands	8/8/2006	Quin5	LMB	312	442	0.451
Quinebaug Lake	Northeast Hills/Uplands	8/8/2006	Quin6	LMB	310	458	0.658

Appendix Table 1 continued

Site	Location	Date Collected	Sample ID	Species	Length (mm)	Weight (g)	Hg (µg/g)
Quinebaug Lake	Northeast Hills/Uplands	8/8/2006	Quin7	LMB	341	600	0.736
Quinebaug Lake	Northeast Hills/Uplands	8/8/2006	Quin8	LMB	420	1038	0.599
Quinebaug Lake	Northeast Hills/Uplands	8/8/2006	Quin9	LMB	315	430	0.549
Quinebaug Lake	Northeast Hills/Uplands	8/8/2006	Quin10	LMB	342	564	0.567
Quinebaug Lake	Northeast Hills/Uplands	8/8/2006	Quin12	LMB	320	466	0.683
Quinebaug Lake	Northeast Hills/Uplands	8/8/2006	Quin13	LMB	394	822	0.822
Rainbow Reservoir	Central Lowlands	8/11/2005	Rain 1	SMB	327	464	0.181
Rainbow Reservoir	Central Lowlands	8/11/2005	Rain 2	SMB	335	482	0.254
Rainbow Reservoir	Central Lowlands	8/11/2005	Rain 3	SMB	298	300	0.233
Rainbow Reservoir	Central Lowlands	8/11/2005	Rain 4	SMB	305	364	0.153
Rainbow Reservoir	Central Lowlands	8/11/2005	Rain 5	SMB	403	954	0.225
Rainbow Reservoir	Central Lowlands	8/11/2005	Rain 6	SMB	282	298	0.131
Rainbow Reservoir	Central Lowlands	8/11/2005	Rain 7	SMB	279	304	0.116
Rainbow Reservoir	Central Lowlands	8/11/2005	Rain 8	LMB	245	259	0.098
Rainbow Reservoir	Central Lowlands	8/11/2005	Rain 9	SMB	281	310	0.176
Rainbow Reservoir	Central Lowlands	8/11/2005	Rain 10	SMB	360	652	0.538
Rainbow Reservoir	Central Lowlands	8/11/2005	Rain 11	SMB	278	376	0.117
Rogers Lake	Southeast Hills/Coastal	10/4/2005	Rog 1	LMB	340	558	0.198
Rogers Lake	Southeast Hills/Coastal	10/4/2005	Rog 2	LMB	375	720	0.268
Rogers Lake	Southeast Hills/Coastal	10/4/2005	Rog 3	LMB	383	785	0.382
Rogers Lake	Southeast Hills/Coastal	10/4/2005	Rog 4	LMB	377	746	0.388
Rogers Lake	Southeast Hills/Coastal	10/4/2005	Rog 5	LMB	392	812	0.491
Rogers Lake	Southeast Hills/Coastal	10/4/2005	Rog 6	LMB	415	922	0.319
Saugatuck Reservoir	Southwest Hills/Coastal	8/18/2005	Saug 1	LMB	345	668	0.422
Saugatuck Reservoir	Southwest Hills/Coastal	8/18/2005	Saug 2	SMB	393	822	0.576
Saugatuck Reservoir	Southwest Hills/Coastal	8/18/2005	Saug 3	LMB	335	552	0.425
Saugatuck Reservoir	Southwest Hills/Coastal	8/18/2005	Saug 4	LMB	516	2190	0.935
Saugatuck Reservoir	Southwest Hills/Coastal	8/18/2005	Saug 5	LMB	345	599	0.427
Saugatuck Reservoir	Southwest Hills/Coastal	8/18/2005	Saug 6	LMB	347	582	0.367
Saugatuck Reservoir	Southwest Hills/Coastal	8/18/2005	Saug 7	LMB	345	532	0.346
Saugatuck Reservoir	Southwest Hills/Coastal	8/18/2005	Saug 8	LMB	275	284	0.288

Appendix Table 1 continued

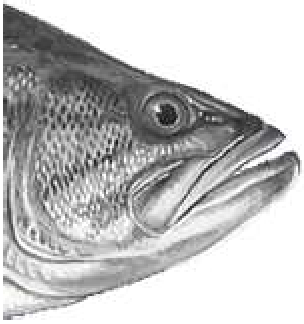
Site	Location	Date Collected	Sample ID	Species	Length (mm)	Weight (g)	Hg (µg/g)
Silver Lake	Central Lowlands	7/18/2005	Silver 1	LMB	304	348	0.297
Silver Lake	Central Lowlands	7/18/2005	Silver 2	LMB	362	650	0.159
Silver Lake	Central Lowlands	7/18/2005	Silver 3	LMB	350	616	0.195
Silver Lake	Central Lowlands	7/18/2005	Silver 4	LMB	405	658	0.564
Silver Lake	Central Lowlands	8/10/2005	Silver 5	LMB	336	545	0.361
Silver Lake	Central Lowlands	8/10/2005	Silver 6	LMB	443	1206	0.341
Silver Lake	Central Lowlands	8/10/2005	Silver 7	LMB	332	404	0.438
Silver Lake	Central Lowlands	8/10/2005	Silver 8	LMB	290	339	0.157
Silver Lake	Central Lowlands	8/10/2005	Silver 9	LMB	300	362	0.215
Silver Lake	Central Lowlands	8/10/2005	Silver 10	LMB	305	363	0.267
Tyler Lake	Northwest Hills/Uplands	8/14/2005	Tyler 1	LMB	296	304	0.153
Tyler Lake	Northwest Hills/Uplands	8/14/2005	Tyler 2	LMB	292	358	0.154
Tyler Lake	Northwest Hills/Uplands	8/14/2005	Tyler 3	LMB	319	501	0.219
Tyler Lake	Northwest Hills/Uplands	8/14/2005	Tyler 4	LMB	428	1275	0.639
Tyler Lake	Northwest Hills/Uplands	8/14/2005	Tyler 5	LMB	341	593	0.225
Tyler Lake	Northwest Hills/Uplands	8/14/2005	Tyler 6	LMB	295	361	0.133
Tyler Lake	Northwest Hills/Uplands	8/14/2005	Tyler 7	LMB	349	729	0.358
Tyler Lake	Northwest Hills/Uplands	8/14/2005	Tyler 8	LMB	316	450	0.177
Tyler Lake	Northwest Hills/Uplands	8/14/2005	Tyler 9	LMB	305	425	0.183
Tyler Lake	Northwest Hills/Uplands	8/14/2005	Tyler 10	LMB	303	392	0.158
Uncas Lake	Southeast Hills/Coastal	7/24/2006	Unc1	LMB	307	400	0.264
Uncas Lake	Southeast Hills/Coastal	7/24/2006	Unc2	LMB	291	375	0.323
Uncas Lake	Southeast Hills/Coastal	7/24/2006	Unc3	LMB	388	965	0.54
Uncas Lake	Southeast Hills/Coastal	7/24/2006	Unc4	LMB	442	1335	0.857
Uncas Lake	Southeast Hills/Coastal	7/24/2006	Unc5	LMB	494	1895	0.866
Uncas Lake	Southeast Hills/Coastal	7/24/2006	Unc6	LMB	440	1270	0.974
Uncas Lake	Southeast Hills/Coastal	7/24/2006	Unc7	LMB	433	1210	1.172
Uncas Lake	Southeast Hills/Coastal	7/24/2006	Unc8	LMB	340	640	0.425
Uncas Lake	Southeast Hills/Coastal	7/24/2006	Unc9	LMB	427	1065	0.948
Uncas Lake	Southeast Hills/Coastal	7/24/2006	Unc10	LMB	330	575	0.667
Uncas Lake	Southeast Hills/Coastal	7/24/2006	Unc11	LMB	408	1050	0.822
Uncas Lake	Southeast Hills/Coastal	7/24/2006	Unc12	LMB	391	920	0.513

Appendix Table 1 continued

Site	Location	Date Collected	Sample ID	Species	Length (mm)	Weight (g)	Hg (µg/g)
Uncas Lake	Southeast Hills/Coastal	7/24/2006	Unc13	LMB	288	445	0.333
Uncas Lake	Southeast Hills/Coastal	7/24/2006	Unc14	LMB	464	1470	0.657
Uncas Lake	Southeast Hills/Coastal	7/24/2006	Unc15	LMB	497	1780	0.654
Union Pond	Central Lowlands	7/12/2006	Union1	LMB	364	810	0.377
Union Pond	Central Lowlands	7/12/2006	Union2	LMB	368	784	0.438
Union Pond	Central Lowlands	7/12/2006	Union3	LMB	438	1550	0.683
Union Pond	Central Lowlands	7/12/2006	Union4	LMB	380	808	0.787
Union Pond	Central Lowlands	7/12/2006	Union5	LMB	410	1010	0.752
Union Pond	Central Lowlands	7/12/2006	Union6	LMB	370	870	0.320
Union Pond	Central Lowlands	7/12/2006	Union7	LMB	310	510	0.357
Union Pond	Central Lowlands	7/12/2006	Union8	LMB	290	378	0.284
Union Pond	Central Lowlands	7/12/2006	Union9	LMB	440	1150	0.711
Union Pond	Central Lowlands	7/12/2006	Union10	LMB	365	790	0.253
Waramaug Lake	Northwest Hills/Uplands	11/1/2006	Wara1	LMB	418		0.416
Waramaug Lake	Northwest Hills/Uplands	11/1/2006	Wara2	LMB	341	647	0.184
Waramaug Lake	Northwest Hills/Uplands	11/1/2006	Wara3	LMB	370	750	0.235
Waramaug Lake	Northwest Hills/Uplands	11/1/2006	Wara4	LMB	361	738	0.205
Waramaug Lake	Northwest Hills/Uplands	11/1/2006	Wara5	LMB	440		0.390
Waramaug Lake	Northwest Hills/Uplands	11/1/2006	Wara6	LMB	339	590	0.196
Waramaug Lake	Northwest Hills/Uplands	11/1/2006	Wara7	LMB	357	670	0.209
Waramaug Lake	Northwest Hills/Uplands	11/1/2006	Wara8	LMB	385	860	0.222
Waramaug Lake	Northwest Hills/Uplands	11/1/2006	Wara9	LMB	334	540	0.162
Waramaug Lake	Northwest Hills/Uplands	11/1/2006	Wara10	LMB	385	944	0.201
Winchester Lake	Northwest Hills/Uplands	10/10/2006	Win1	LMB	421	918	1.097
Winchester Lake	Northwest Hills/Uplands	10/10/2006	Win2	LMB	326	484	0.268
Winchester Lake	Northwest Hills/Uplands	10/10/2006	Win3	LMB	366	518	0.424
Winchester Lake	Northwest Hills/Uplands	10/10/2006	Win4	LMB	315	480	0.315
Winchester Lake	Northwest Hills/Uplands	10/10/2006	Win5	LMB	293	325	0.519
Winchester Lake	Northwest Hills/Uplands	10/10/2006	Win6	LMB	327	770	0.376
Winchester Lake	Northwest Hills/Uplands	10/10/2006	Win7	LMB	348	654	0.489
Winchester Lake	Northwest Hills/Uplands	10/10/2006	Win8	LMB	386	964	0.408

Appendix Table 1 continued

Site	Location	Date Collected	Sample ID	Species	Length (mm)	Weight (g)	Hg (µg/g)
Winchester Lake	Northwest Hills/Uplands	10/10/2006	Win9	LMB	306	470	0.380
Winchester Lake	Northwest Hills/Uplands	10/10/2006	Win10	LMB	383	484	0.568
Wyassup Lake	Southeast Hills/Coastal	7/10/2006	Wyas1	LMB	330	490	0.558
Wyassup Lake	Southeast Hills/Coastal	7/10/2006	Wyas2	LMB	295	348	0.493
Wyassup Lake	Southeast Hills/Coastal	7/10/2006	Wyas3	LMB	332	556	0.654
Wyassup Lake	Southeast Hills/Coastal	7/10/2006	Wyas4	LMB	280	348	0.531
Wyassup Lake	Southeast Hills/Coastal	7/10/2006	Wyas5	LMB	298	382	0.552
Wyassup Lake	Southeast Hills/Coastal	7/10/2006	Wyas6	LMB	325	506	0.730
Wyassup Lake	Southeast Hills/Coastal	7/10/2006	Wyas7	LMB	285	356	0.408
Wyassup Lake	Southeast Hills/Coastal	7/10/2006	Wyas8	LMB	292	382	0.737
Wyassup Lake	Southeast Hills/Coastal	7/10/2006	Wyas9	LMB	300	364	0.772
Wyassup Lake	Southeast Hills/Coastal	7/10/2006	Wyas10	LMB	289	321	0.586



Appendix 2

To facilitate the future adoption of non-lethal monitoring techniques for statewide assessments of mercury concentrations, 50 fish were analyzed with the currently popular biopsy "plug" (sometimes called punch) method. A 7mm x 5mm (diameter) disposable punch was used just below the spines of the dorsal fin on the opposite side of the fish from which the whole fillet was taken (see methods section). Records kept allowed the pairing of plug and fillet results for individual fish. The paired data was used to develop a linear regression (Appendix 2 figure 1). This regression can be used to derive "plug equivalencies" for all the 2005-2006 data as well as the 1995 data.

The biopsy plug and fillet values for the 50 fish are presented in Appendix 2 Table 1. The means were not statistically different when compared with a paired t-test (t=1.42; df = 49; P = 0.16). Any perceived difference among the fillet and plugs (fillets appeared to be lower on average) is negligible to decision-makers as the mean absolute difference between paired fillets and plugs was 0.062 µg/g of mercury.

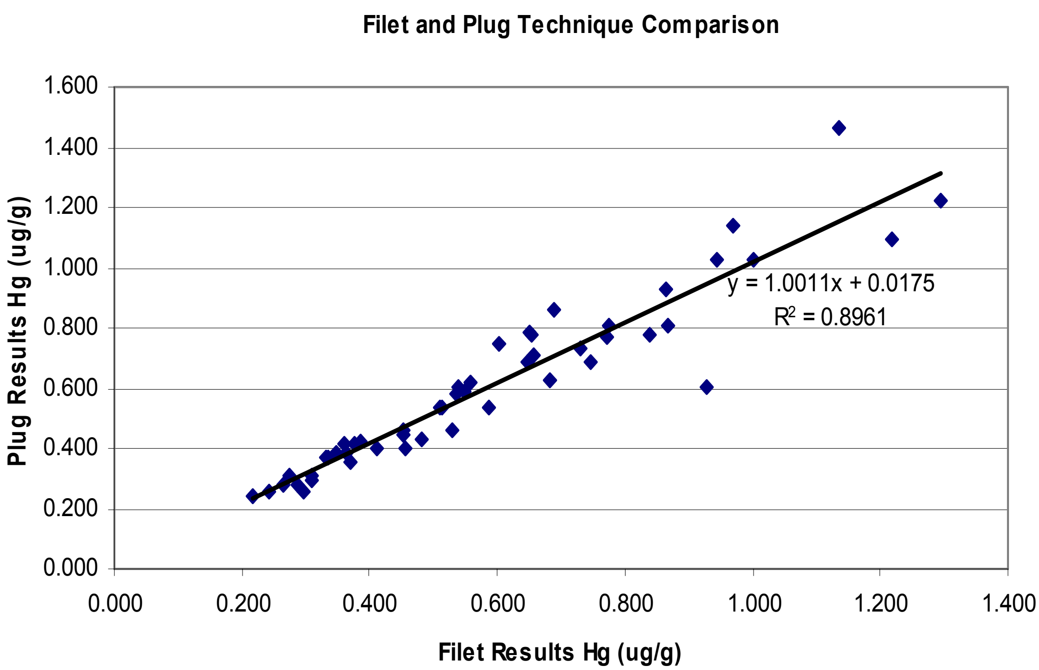


Figure 1. Paired fillet mercury concentrations against plug concentrations for 50 fish from a variety of lakes and sizes in Connecticut. The linear regression equation and associated r^2 value in the plot was statistically significant (α= 0.05).

Table 1. Mercury concentrations (μg/g) of biopsy 'plug" and fillet homogenate pairs from 50 individual fish. Sample IDs can be indexed in Appendix 1 to retrieve fish size and location information.

Sample ID	Plug	Fillet	Absolute Difference
Amos1	0.260	0.296	0.036
Amos4	0.605	0.928	0.323
Amos9	0.533	0.587	0.054
Ash1	1.222	1.296	0.074
Ash2	0.729	0.729	0
Ash8	0.428	0.481	0.053
Asp1	0.767	0.771	0.004
Asp2	0.805	0.866	0.061
Asp5	0.777	0.838	0.061
Bash 11	0.458	0.529	0.071
Bash 20	0.402	0.455	0.053
Bash 8	0.806	0.774	0.032
Batt 11	0.279	0.287	0.008
Batt 7	1.097	1.217	0.12
Batt 1	0.239	0.217	0.022
Can2	0.352	0.370	0.018
Can8	0.295	0.309	0.014
Gart1	0.370	0.335	0.035
Gart2	0.370	0.332	0.038
Gart7	0.309	0.273	0.036
Hous1	1.028	1.001	0.027
Hous6	0.386	0.364	0.022
Hous7	0.255	0.243	0.012
Ken5	0.386	0.347	0.039
Ken6	0.423	0.385	0.038
Long2	0.397	0.411	0.014
Long7	0.684	0.747	0.063
Long8	0.463	0.452	0.011
Long9	0.310	0.309	0.001
Mash1	0.708	0.657	0.051
Mash10	0.929	0.863	0.066
Mash13	1.024	0.943	0.081
Mash15	0.689	0.646	0.043
Mash16	0.413	0.359	0.054

Table 1. continued.

Sample ID	Plug	Fillet	Absolute Difference
Mash19	0.585	0.55	0.035
Mash3	1.465	1.136	0.329
Mood1	0.539	0.509	0.03
Mood10	0.448	0.452	0.004
Mood3	0.583	0.537	0.046
Mood4	0.744	0.603	0.141
Mood5	0.784	0.649	0.135
Quin1	0.860	0.689	0.171
Quin3	1.141	0.969	0.172
Unc1	0.282	0.264	0.018
Unc12	0.536	0.513	0.023
Unc3	0.605	0.54	0.065
Union1	0.413	0.377	0.036
Union3	0.627	0.683	0.056
Wyas1	0.619	0.558	0.061
Wyas3	0.780	0.654	0.126
		mean	0.062