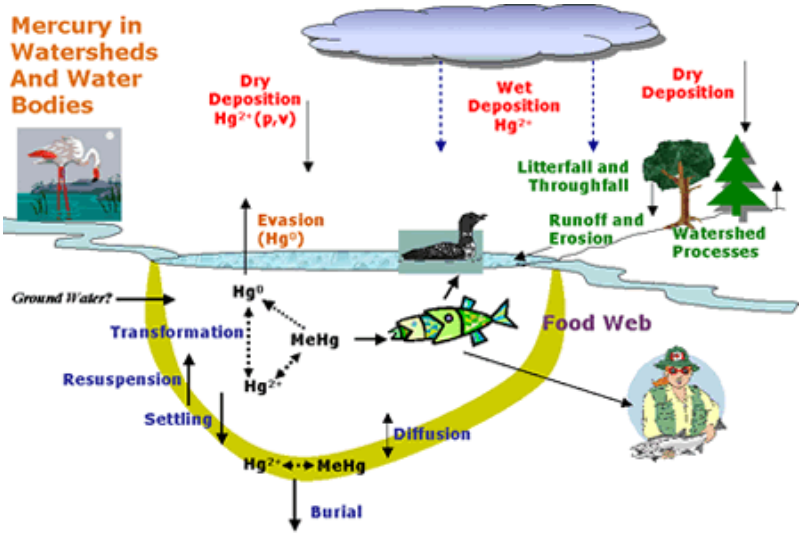
2006-2010

Tissue Contaminant Monitoring



http://www.epa.gov/athens/research/modeling/mercury/

Connecticut Department of Energy and Environmental Protection
Bureau of Water Protection and Land Reuse
79 Elm Street, Hartford, CT 06106

Project Summary Report:
Tissue analysis for Total Mercury 2006-2010

Synopsis:

The purpose of this document is to summarize total mercury and percent solid data found in fish and crayfish tissue collected from 148 sites between 2006 and 2010. In 2010 the United States Environmental Protection Agency (EPA) published a criterion for methylmercury in fish and shellfish tissue. This 2010 document focuses on an organic mercury compound known as methylmercury. Methylmercury most often results from microbial activity in wetlands, the water column, and sediments, and it is the form of mercury that presents the greatest environmental risks to human health (USEPA 2010). EPA also suggests that analysis for total mercury, as a surrogate for methylmercury, might be a useful means for implementing the methylmercury criterion as nearly 100 percent of the mercury that bioaccumulates in upper-trophic-level fish (predator) tissue is methylmercury (USEPA 2010). If total mercury concentrations in tissue exceed the criterion, further investigation of the methylmercury component might be desired .This report focuses on total mercury as it is a more cost effective method for screening samples for elevated mercury concentration.

The use of thresholds does not imply an explicit need for fish consumption advisories on a particular waterbody, but rather a way to describe the data. Although these data may be considered as part of a fish consumption advisory process it is not the intent of this report to recommend or imply fish consumption advisories in this summary report. The CT Department of Health (CT DPH) provides an annual advisory to inform the public of the relative health risks associated with consuming fish from state waters and may consider these data as part of their evaluation.

Four hundred fifty-three samples were submitted by Connecticut Department of Energy and Environmental Protection (DEEP) Bureau of Water Protection and Land Reuse (WPLR) to the University of Connecticut Center for Environmental Sciences and Engineering (CESE) for analysis. These data were collected in support of several projects including; probabilistic monitoring, rotating basin, specific requests (DEEP Inland Fisheries, CT DPH, and the Candlewood Valley Chapter of Trout Unlimited), and legacy mercury evaluation in the Still River Regional Basin, Danbury.

Total mercury values in roughly 6% of the samples for each tissue category (5.6 % fish and 5.8% crayfish) were above the 0.3 ug/g wet weight methylmercury (CH_3Hg) EPA criterion* (USEPA 2010). Almost all of the crayfish values above 0.3 ug/g wet weight were from samples collected as part of the Still River, Danbury project. Only 1 crayfish sample outside of the Still River regional basin was greater than 0.3 ug/g wet weight. Total mercury in crayfish did not appear to have a species-specific gradient.

Highest concentrations in fish tended to be in lake population of black bass species (largemouth and smallmouth) while stream populations of self-sustaining trout (brook and brown) tended to have very low levels. Data from 5% (5/100) of the randomly selected sites (probabilistic monitoring project) exceeded the 0.3 ug/g wet weight value.

Background:

Historically, WPLR has submitted tissue samples for mercury analysis in response to limited specific requests from Connecticut Department of Public Health (CT DPH) to help DPH with determination of fish consumption advisories (http://www.ct.gov/dph/cwp/view.asp?a=3140&Q=387460). The majority of information on mercury in fish tissue are from 51 Connecticut Lakes collected via 2 studies (Vokoun and Perkins 2008, Neumann et. al. 1996) or unpublished data collected as part of the Inland Fisheries statewide stream survey project 1988-1994 (WPLR memo 03/07/2011).

In an attempt to obtain more recent data on the state rivers and streams WPLR collected fish and crayfish from sites selected as part of the statewide probabilistic monitoring project and the rotating basin strategy both from 2006-2010. Crayfish were collected to establish levels as they have been found to be reliable indicators of mercury in the food web (McKee 2009, Hothem et al 2007, Pennuto et. al 2005).

A second major effort involving mercury was to collect crayfish from a series of sites within the Still River regional basin, Danbury to see if a longitudinal tissue contamination gradient could be detected in crayfish.

Literature Cited

US EPA. 2010. Guidance for Implementing the January 2001 Methylmercury Water Quality Criterion. EPA 823-R-10-001. U.S. Environmental Protection Agency, Office of Water, Washington, DC.

Vokoun, J.C. and C.R. Perkins. 2008. Second statewide assessment of mercury contamination in fish tissue from Connecticut Lakes 2005-2006. Completion report submitted to Connecticut Department of Environmental Protection. University of Connecticut, Storrs. 49 pp.

Neumann R.M., R.J. Carley, C.R. Perkins, and R. Pirrie. 1996. Preliminary assessment of total mercury concentrations in fishes from Connecticut waterbodies. Completion report submitted to Connecticut Department of Environmental Protection. University of Connecticut, Storrs. 117 pp.

Pennuto, C.M., O.P. Lane, D.C Evers, R.J. Taylor, and J. Loukmas. 2005. Mercury in the Northern Crayfish Orconectes virilis (Hagen), in New England, USA. Ecotoxicology, 14, 149-162.

Hothem R. L., D.R Bergen, M.L Bauer, J.J. Crayon, A.M. Meckstroth. 2007. Mercury and trace elements in crayfish from northern California. Bulletin Environmental Contamination and Toxicology. 79:628-632.

McKee M.J. 2009. MDC fish contaminant monitoring results: 2007 calendar year. Missouri Department of Conservation, Columbia, MO.

What was done?

Sample collection: Samples were collected using electofishing gear; boat mounted for lakes and either backpack or tote-barge for rivers and streams depending upon stream width. Animal type and sample quantity were dependent upon each individual project. In general for stream sampling a target of at least 15 crayfish, 5 white sucker, and 5 non-stocked game fish (black bass, brook or brown trout) was established. The minimum size for crayfish was 15-20 mm carapace length and 200 mm total length for fish species. For lake sampling only black bass species were collected. All individuals were stored on ice immediately following collection and frozen upon return to the WPLR laboratory.

Sample preparation:

The intent of the data was to evaluate the concentration of total mercury in the edible portion of these animals. To that end all total length of all fish were measured to the nearest centimeter, weighed to the nearest ounce. Each fish was scaled and a fillet with skin remaining on taken from each side. Each collection of 15 crayfish were split into 3 composite samples consisting of the 5 largest, 5 medium and 5 smallest specimens. In some instances, extra large crayfish were collected and these not considered for composite samples, but instead tissues samples were analyzed separately. Species and total wet weight of tail meat for each of the samples were recorded. All fish and crayfish samples were submitted to CESE for analysis of total mercury (CVAA EPA 245.6) and percent solid (EPA ILM 3.0).

Data manipulation:

The extra-large crayfish samples tended to be discrete samples consisting of 1 individual. To normalize for the difference between composite samples of 5 and discrete sample of 1 specimen, a statistic call Hg per specimen was calculated by dividing total mercury reported for the composite sample by number of specimens that made up the composite sample.

Project Details:

Statewide probabilistic monitoring was to collect data from randomly selected locations with the intent to review total mercury in stream dwelling fish and crayfish. At each of the site locations the target sample included 5 individuals of white sucker, 5 individuals of either brook or brown trout (not stocked), and 15 crayfish with a carapace length greater than 25 mm .

Samples collected in support of the **Rotating Basin strategy** were often sampled concurrent with probabilistic sites, but unlike most probabilistic sites rotating sites, were primarily on large or waste receiving waters with historical water quality impairments.

Specific requests were submitted by DEEP Inland fisheries to obtain samples from the lower Housatonic River and Beach Pond. A second request was from DPH for data on the Quinnipiac River and Eightmile River, Southington. A third request from Candlewood Valley Chapter of Trout Unlimited for data on Deep Brook, Newtown.

Still River Regional Basin, Danbury, was initiated to collect crayfish samples only from a known area of legacy mercury contamination. It was hypothesized that if mercury could be useful in crayfish tails, samples from this basin should provide detectable levels. Specifically, crayfish were collected from 17 locations within the Still River Regional Basin on September 3rd and 5th 2008. The intent for this project was to gather samples in and around the greater Danbury area to determine the location of "hot spots" or if a longitudinal gradient can be detected for mercury contamination in crayfish tissue (tails). Mercury is a potential contaminant in the greater Danbury area due to historical industrial use of the element. This work follows previous crayfish tissue data where a series of statewide samples showed only the Still River Danbury to have relatively elevated level of mercury in the crayfish tail meat.

Outcomes and Key Findings:

OVERALL ALL PROJECTS 2006-2010:

-453 samples were generated from specimens collected from 148 stations over the 4 major projects (Figure 1, Table 1, and Appendix A).

-Of the 148 stations sampled between 2006 and 2010 crayfish were collected from 82 and fish from 66. Thirty-one (31) stations had sufficient quantities of both fish and crayfish. Twenty-two (22) stations either had no individuals present or those present were not adequate size or quantity for a tissue sample (Figure 2 and Table 1)

-Overall distribution of total mercury data were very similar for crayfish samples and fish samples with slightly higher median for fish samples (Figure 3 and Table 2).

-Average total mercury in fish tissue samples for 5 of 66 stations (7.6%) exceeded the EPA recommended 0.3 ug/g level (Figure 4). No fish samples were collected within the Still River Basin-Danbury.

- Average total mercury in crayfish tissue samples for 5 of 88 stations (5.7%) exceeded the EPA recommended 0.3 ug/g level (Figure 5). All of these occurrences were in the Still River Basin, Danbury.

-Total mercury appears to be independent of percent solid for both fish and crayfish samples (Figure 6 thru Figure 9).

PAIRED CRAYFISH AND FISH TISSUE SAME STATION:

-For all samples pooled together Total Mercury data of paired crayfish and fish samples had a similar distribution of the data, with the median slightly higher in fish tissue samples (Figure 10 and Table 3).

-Total mercury in fish tissue tends to be slightly higher than crayfish tissue data when compared on a site by site basis for both total mercury and percent solid (Figure 11 and Figure 12).

-Crayfish data appears to be more similar to both brook trout and brown trout tissue levels while smallmouth bass and white sucker tend to have higher levels than their corresponding crayfish tissue sample pair (Figure 11).

SPECIFICS TO FISH TISSUE SAMPLES:

-Total mercury data were much higher for fish collected in lake (Beach Pond, Voluntown is the only lake in this data set) than in streams. All fish data from DEEP hatcheries were at below detection limit (Figure 13 and Table 4).

-Only 2 species, largemouth bass and smallmouth bass were collected from the single waterbody type = lake, Beach Pond in Voluntown. Smallmouth bass had a slightly higher median than largemouth bass (Figure 14 and Table 5).

-A total of 9 fish species were collected from streams. Of these fallfish and smallmouth bass had the highest median values (Figure 15 and Table 6.)

-Total mercury data varied with fish species. The highest mercury levels were found in large old fish like the smallmouth and largemouth bass (top carnivore/picivore). Relatively young resident trout (brook and brown) and young white suckers had relatively low levels when compared to the bass (Figure 16, Figure 17, and Table 7).

-Rainbow trout were from the state hatchery in Burlington and were used as a control. All levels for rainbow trout were lowest amongst fish species (Figure 16, Figure 17, and Table 7).

-Percent solid also varied with species but was more consistent than total mercury (Figure 18).

-The highest mercury levels were found as part of the Fisheries Request Project = Beach Pond, Voluntown. The lowest levels were found in the probabilistic project (Figure 19, Figure 20, and Table 8).

-Ten fish samples out of 179 (5.6%) were over the 0.3 ug/g EPA level (Table 9).

-Samples by collected as part of the probabilistic monitoring project ranged from a low of 0.014 ug/g in a white sucker sample to a high of 0.418 ug/g in a smallmouth bass sample (Table 10).

-Distribution of total mercury data varied by species for samples collected as part of the probabilistic monitoring project. With the exception of smallmouth bass, most species were below the 0.3 ug/g level (Figure 21).

-Percent solids tended to be slightly higher in both brook and brown trout than other species collected as part of the probabilistic monitoring project (Figure 22).

SPECIFICS TO CRAYFISH SAMPLES:

-When all crayfish samples are pooled together, total mercury (ug/g) varied slightly by crayfish species with *Orconectes rusticus* having the highest values (Figure 23, Figure 24, and Table 11). This however is an artifact of pooling samples collected from the Still River-Danbury project with other statewide data. Since the Still River-Danbury was a project to evaluate a known "hot-spot" any crayfish present could have detectable levels of total mercury. Since *Orconectes rusticus* was the only species collected at the Still River Danbury project sites it appears to be a species prone to bioaccumulation of mercury. When the Still River-Danbury samples are removed from the dataset, there is no pattern across species (Figure 30).

-Total mercury (ug/g) did not seem to vary greatly across crayfish size. Many of the small and medium crayfish samples had greater levels than large or extra large [xlarge] (Table 12 and Figure 25). The xlarge samples tended to be discrete samples consisting of 1 individual. To normalize for the difference between composite of 5 and discrete of 1 a statistic call Hg per specimen was calculated by dividing total mercury by number of specimens in the sample. With this statistic the xlarge specimens tend to have relatively higher total mercury (Figure 25).

-Total mercury (ug/g) normalized by the total wet weight (g) of the sample showed that mercury did not have a relationship with specimen size (Figure 26).

- Total mercury (ug/g) and calculated Hg per specimen were much higher for samples collected as part of the Still River, Danbury project than any other project where crayfish tissue were collected and analyzed (Figure 27, Figure 28, and Table 13).

-Total mercury (ug/g) was very similar across species for samples collected at sites supporting the probabilistic monitoring project (Figure 29). Total mercury (ug/g) normalized by the total wet weight (g) of the sample showed that mercury did not have a relationship with specimen size for samples collected in support of the probabilistic monitoring project (Figure 30).

-Total mercury (ug/g) data were much higher in the Housatonic major basin as many of the samples in this basin are part of the Still River, Danbury project and as such have the highest levels (Figure 31).

-Total mercury (ug/g) was similar across major basins for samples collected at sites supporting the probabilistic monitoring project (Figure 32).

-Only one crayfish sample (from the Aspetuck River-station id 2685) out of the 168 samples collected at sites supporting the probabilistic monitoring project statewide was greater than 0.3 ug/g (Table 14).

SPECIFICS TO STILL RIVER DANBURY CRAYFISH PROJECT

-Crayfish were collected at 18 stations in the Still River regional basin (Figure 33 and Table 15).

-There was an increase of total mercury in crayfish from most upstream to most downstream on the Still River-Danbury mainstem. Tributary samples were slightly lower (Figure 34, Figure 35, and Figure 36).

-Total mercury appears to be independent of crayfish size in this system (Figure 37).

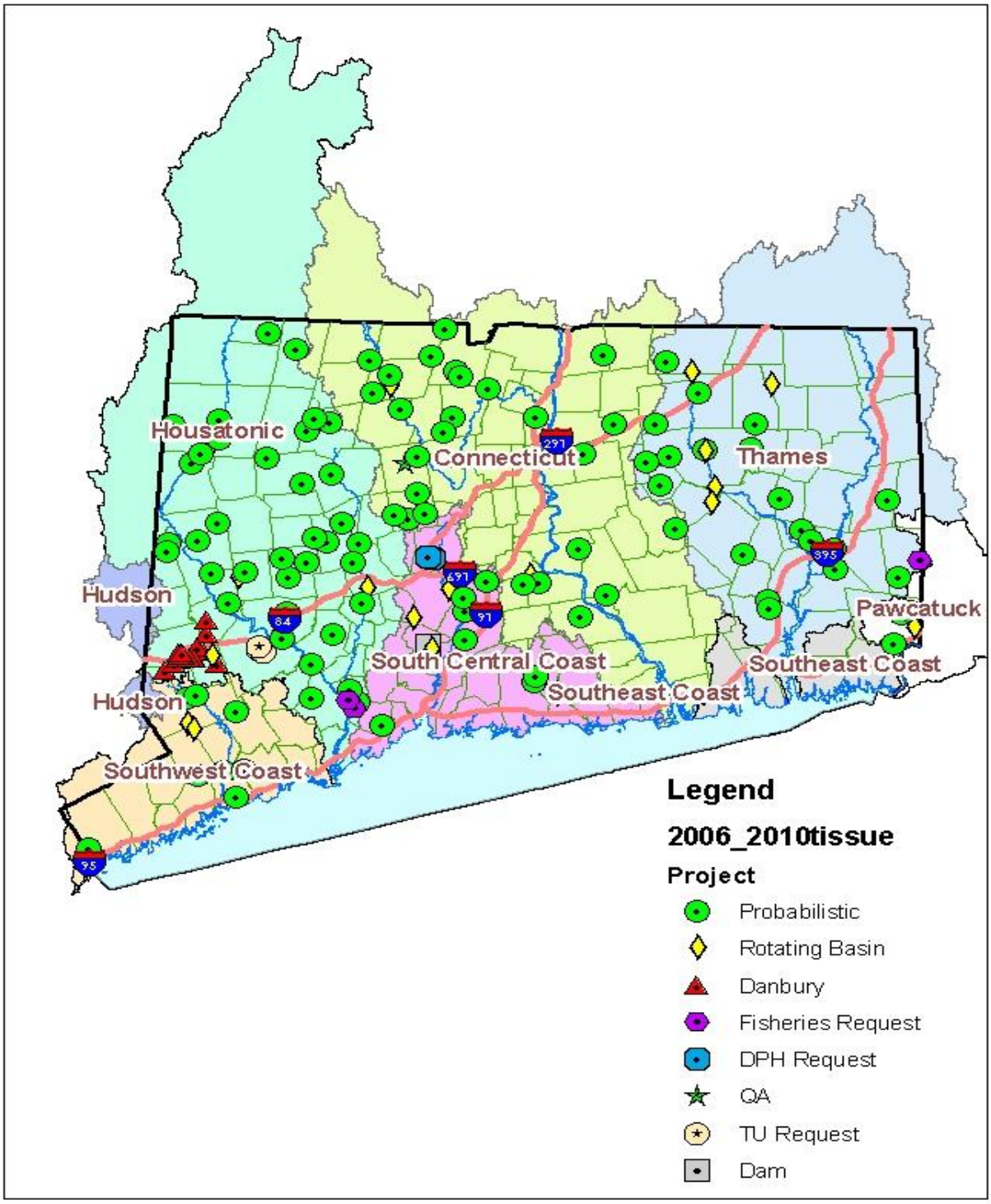


Figure 1. Locations where fish and or crayfish samples were collected for a variety of projects between 2006 and 2010.

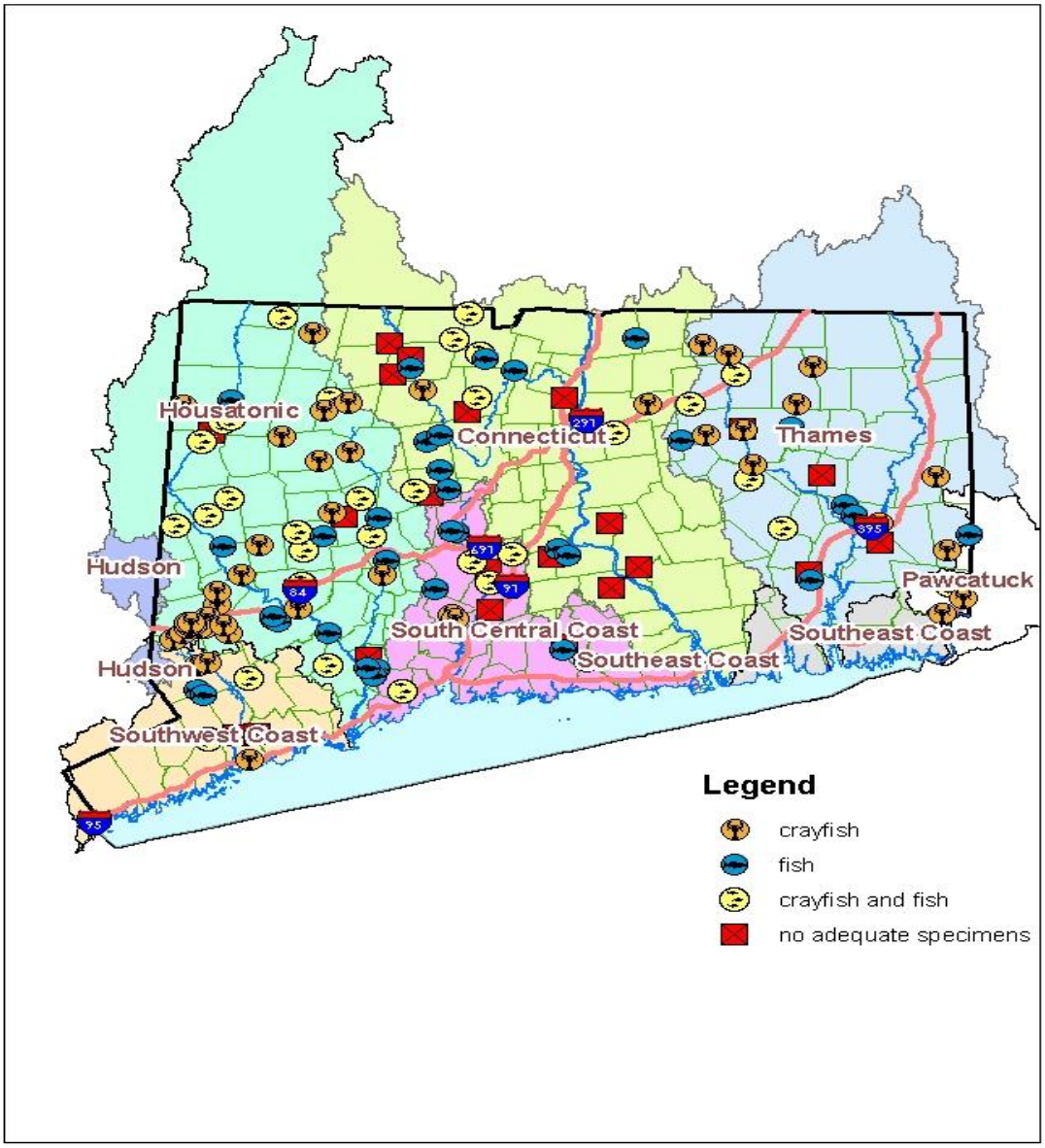


Figure 2. Locations where crayfish, fish, crayfish and fish (paired), or no adequate specimens were collected between 2006 and 2010. No adequate specimen means that there were not enough or individuals present were smaller than the target size (crayfish carapace > 15-20 mm and fish individual > 200 mm) specified for these projects.

Table 1. Number of sample locations with tissue samples submitted to CESE for mercury analysis by project for samples collected between 2006 and 2010.

Project	Crayfish	Fish	Both Crayfish and Fish (paired)	No adequate specimens
Probabilistic	**53**	**47**	**28**	**22**
Rotating Basin	**10**	**10**	**3**	**0**
Request	**0**	**8**	**0**	**0**
Still River, Danbury	**18**	**0**	**0**	**0**
Total	**82**	**66**	**31**	**22**

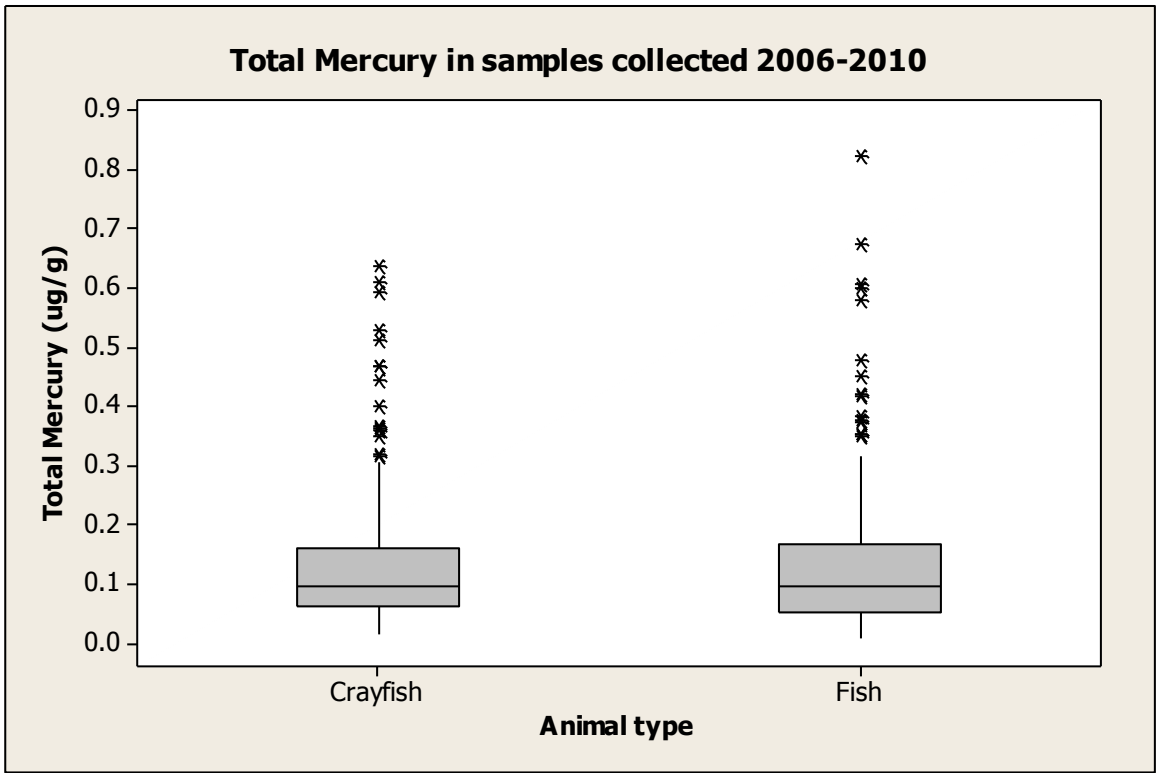


Figure 3. The distribution of total mercury (ug/g wet weight) results from crayfish and fish tissue samples collected between 2006 and 2010 for a variety of projects.

Table 2. Descriptive statistics for total mercury in ug/g wet weight. For crayfish and fish tissue samples collected between 2006 and 2010 for a variety of projects.

Animal	N	Mean	StDev	Minimum	Q1	Median	Q3	Maximum
Crayfish	274	0.128	0.103	0.016	0.062	0.095	0.159	0.636
Fish	179	0.137	0.132	0.009	0.053	0.096	0.165	0.820

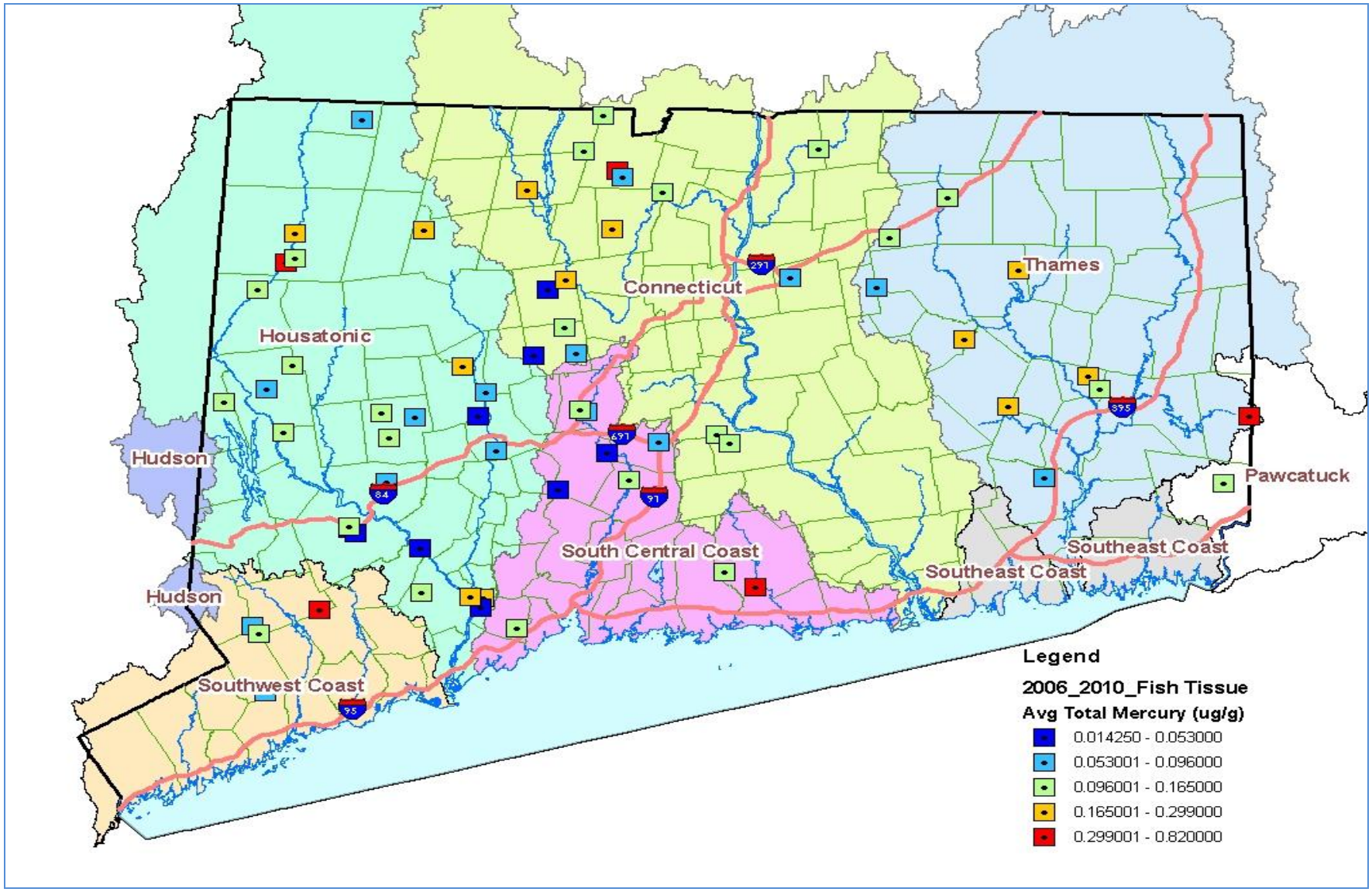


Figure 4. The distribution of average total mercury (ug/g wet weight) data for all fish tissue samples collected between 2006 and 2010 for a variety of projects. Red squares are samples that exceed the EPA recommended threshold of 0.3 ug/g.

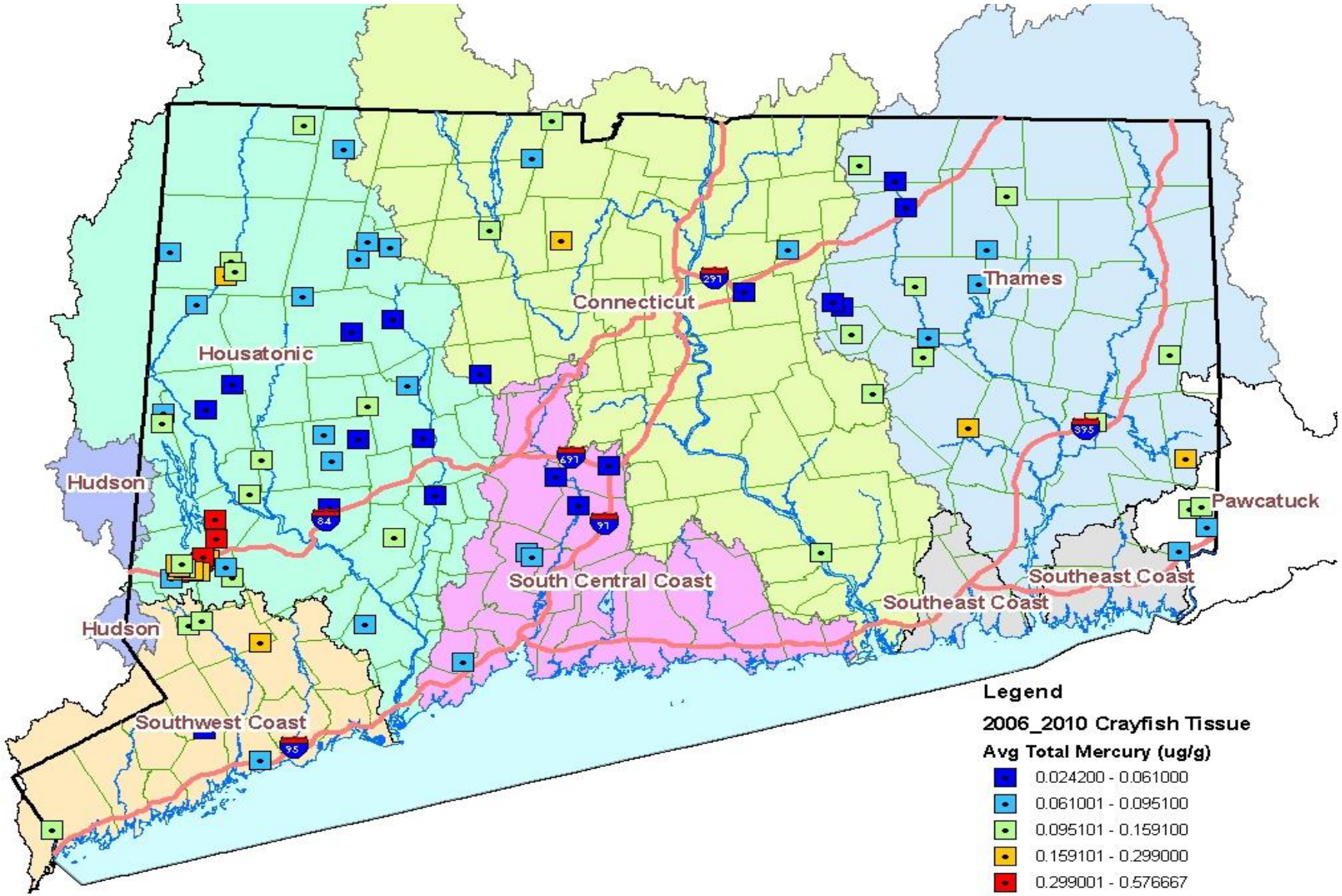


Figure 5. The distribution of average total mercury (ug/g wet weight) data for all crayfish tissue samples collected between 2006 and 2010 for a variety of projects. Red squares are samples that exceed the EPA recommended threshold of 0.3 ug/g.

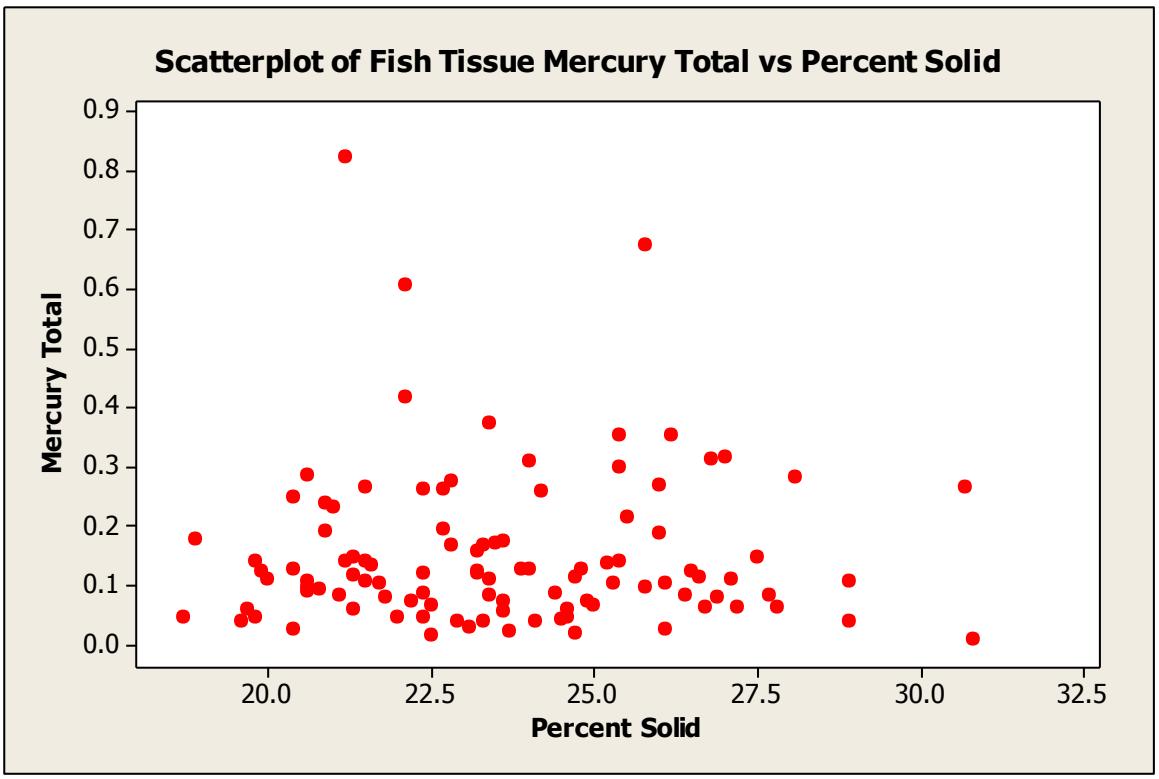


Figure 6. A scatter plot of fish tissue total mercury (ug/g wet weight) versus percent solid (%).

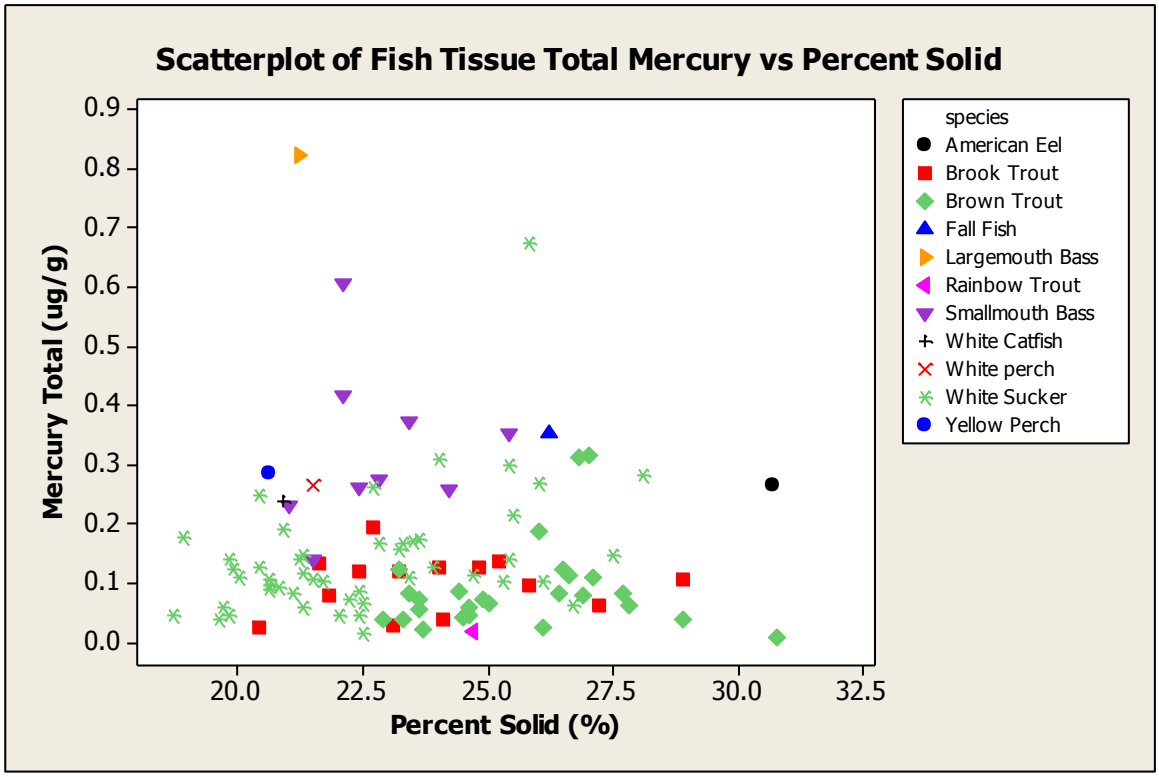


Figure 7. A scatter plot of fish tissue total mercury (ug/g wet weight) versus percent solid by fish species collected between 2006-2010.

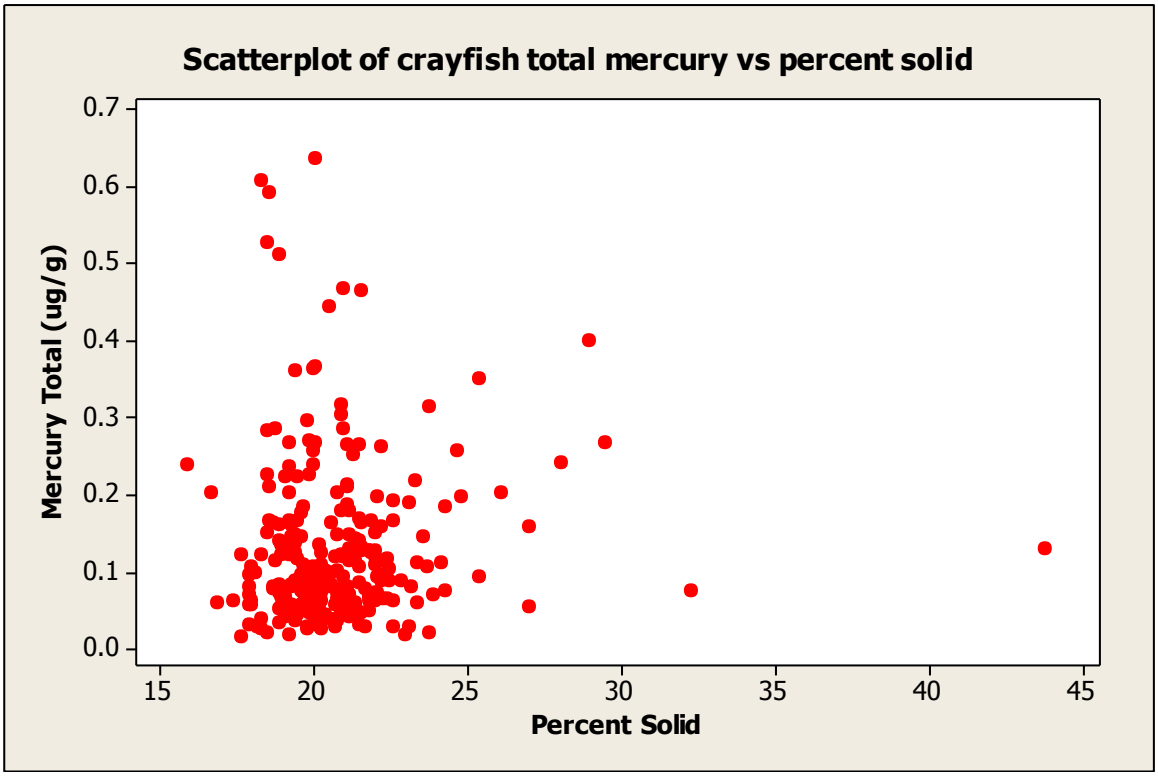


Figure 8. Scatter plot of total mercury (ug/g wet weight) vs. percent solid in crayfish samples collected between 2006-2010.

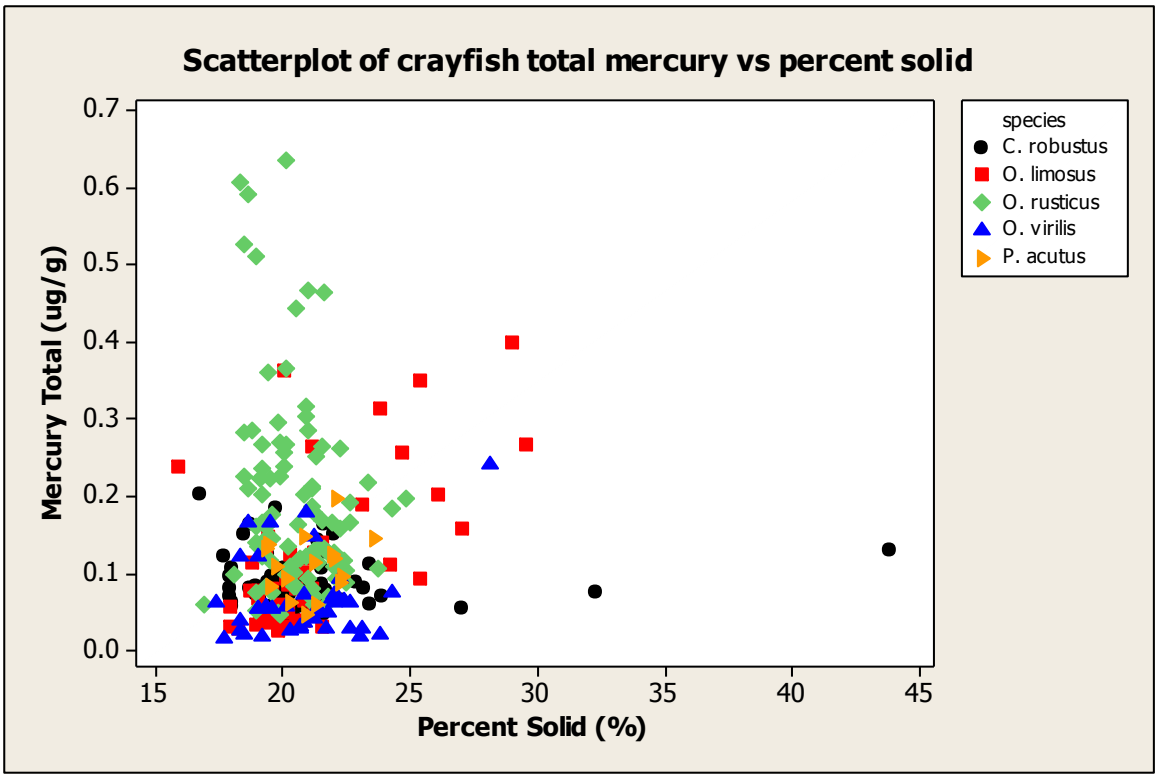


Figure 9. Scatter plot of total mercury (ug/g wet weight) vs. percent solid in crayfish samples collected between 200-2010 by crayfish species.

PAIRED FISH TISSUE AND CRAYFISH TISSUE FROM THE SAME SITE LOCATION:

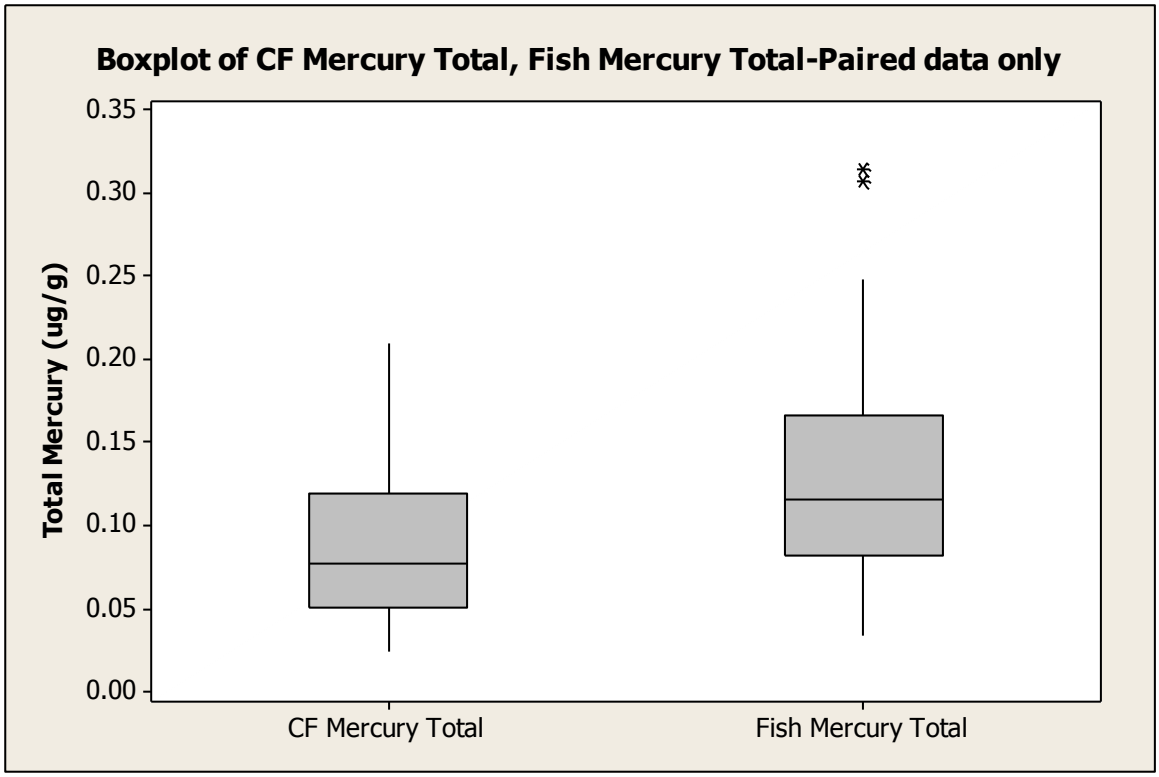


Figure 10. Box plot of total mercury (ug/g wet weight) data for 2 types of tissue collected to compare values found in fish tissue with those in crayfish (CF) tissue from the same location. All of the sites were part of the probabilistic monitoring project.

Table 3. Descriptive statistics for total mercury (ug/g wet weight) for the 32 paired samples collected to compare values found in fish tissue with those in crayfish tissue from the same location. All of the sites were part of the probabilistic monitoring project.

Statistic	Crayfish	Fish
	Total Mercury (ug/g)	Total Mercury (ug/g)
N	32	32
Mean	0.088	0.133
Standard Deviation	0.048	0.070
Minimum	0.024	0.034
Q1 25th percentile	0.051	0.082
Median 50th percentile	0.078	0.116
Q3 75th percentile	0.120	0.166
Maximum	0.210	0.315

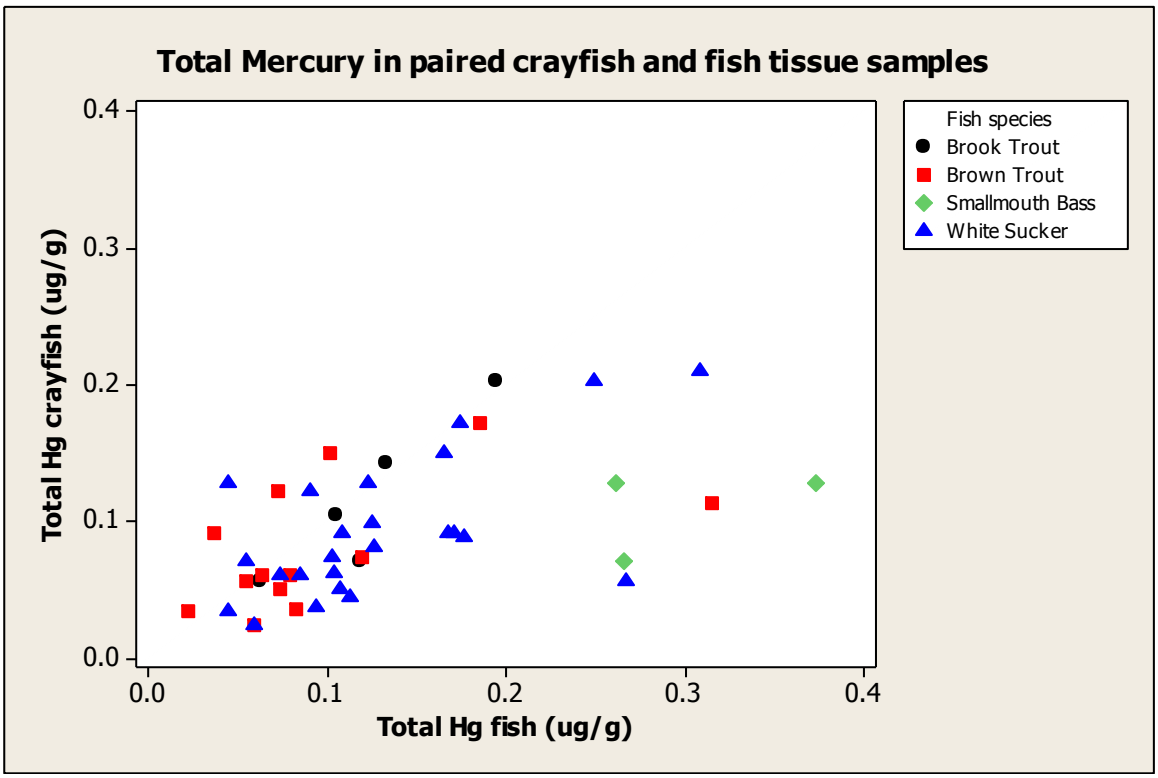


Figure 11. Scatter plot of total mercury data (ug/g wet weight) for the 32 pairs of fish tissue and crayfish tissue data.

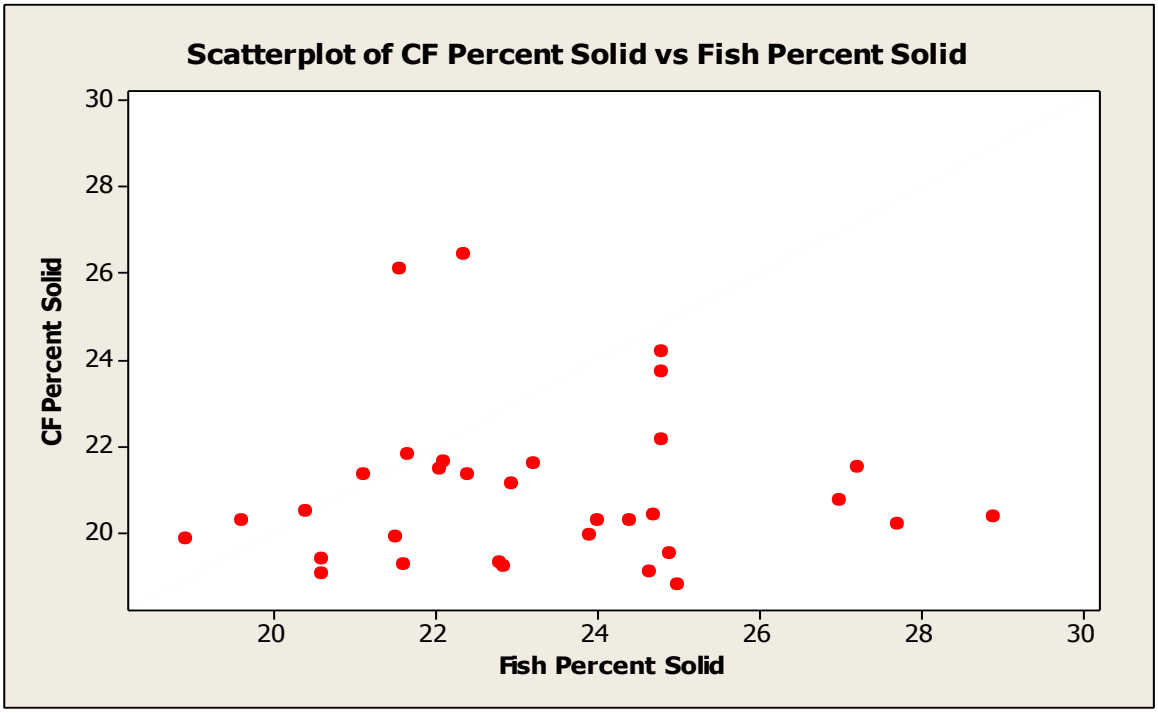


Figure 12. Scatter plot of percent solid data for paired data of fish tissue and crayfish (CF) tissue for the 32 data pairs.

FISH TISSUE RESULTS

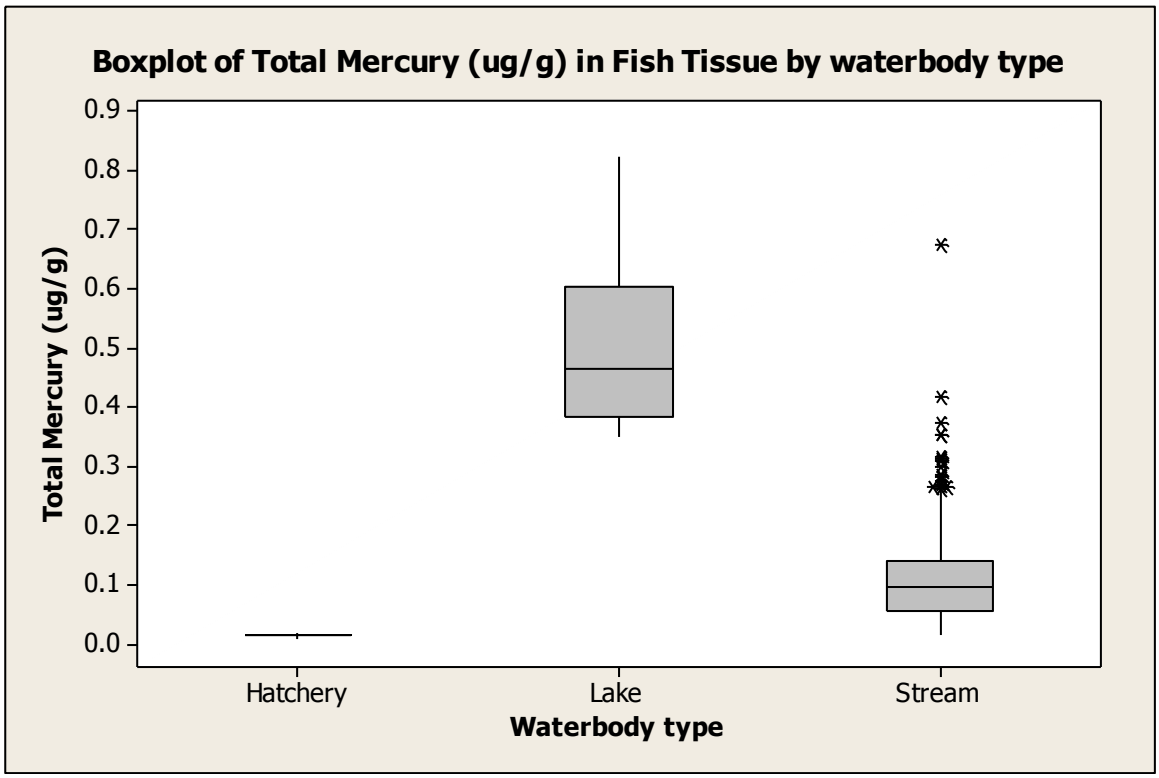


Figure 13. Box plot of total mercury (ug/g wet weight) data by waterbody type, all fish species are combined.

Table 4. Summary statistics for total mercury (ug/g wet weight) in fish tissue samples by waterbody type, all species combined. N= total number of samples, StDev= standard deviation, Q1= 25th percentile, Q3= 75th percentile, *= Not applicable.

waterbody	Count	Mean	StDev	Minimum	Q1	Median	Q3	Maximum
Hatchery	8	0.014	0.003	0.009	0.013	0.015	0.016	0.017
Lake	10	0.506	0.146	0.350	0.382	0.463	0.602	0.820
Stream	161	0.120	0.093	0.014	0.057	0.094	0.139	0.674

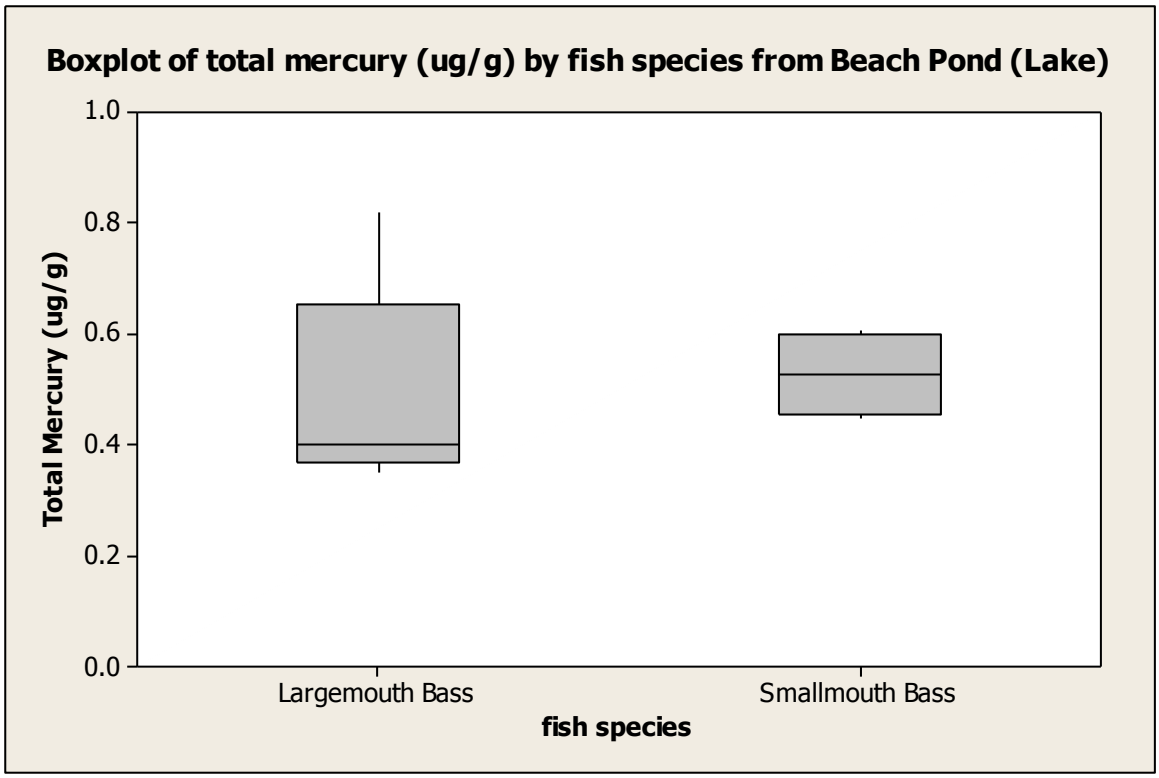


Figure 14. Box plot of total mercury (ug/g wet weight) data from fish species collected from the only lake in the dataset, Beach Pond, Voluntown.

Table 5. Summary statistics for total mercury (ug/g wet weight) for fish species collected from Beach Pond, Voluntown (Lake). The only waterbody of type = lake in this dataset. N= total number of samples, StDev= standard deviation, Q1= 25th percentile, Q3= 75th percentile, *= Not applicable.

Species	Count	Mean	StDev	Minimum	Q1	Median	Q3	Maximum
Largemouth bass	6	0.492	0.184	0.350	0.369	0.403	0.655	0.820
Smallmouth bass	4	0.528	0.077	0.449	0.456	0.528	0.600	0.607

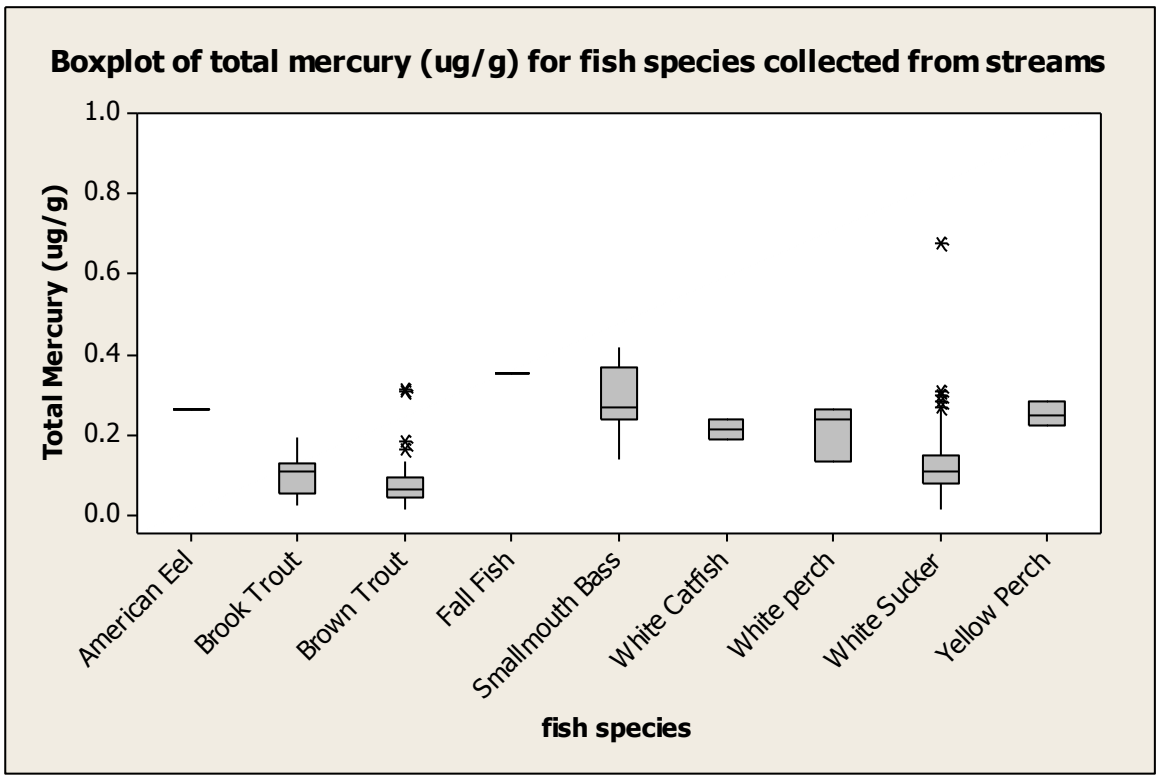


Figure 15. Box plot of total mercury (ug/g wet weight) data for fish species collected from streams.

Table 6. Summary statistics for total mercury (ug/g wet weight) for fish species collected from streams. N= total number of samples, StDev= standard deviation, Q1= 25th percentile, Q3= 75th percentile, *= Not applicable.

species	Count	Mean	StDev	Minimum	Q1	Median	Q3	Maximum
American Eel	1	0.265	*	0.265	*	0.265	*	0.265
Brook trout	14	0.099	0.048	0.024	0.056	0.112	0.129	0.194
Brown trout	68	0.077	0.054	0.017	0.044	0.063	0.092	0.315
Fallfish	1	0.353	*	0.353	*	0.353	*	0.353
Smallmouth bass	8	0.288	0.089	0.139	0.238	0.268	0.368	0.418
White catfish	2	0.212	0.035	0.187	*	0.212	*	0.237
White perch	3	0.213	0.068	0.136	0.136	0.238	0.265	0.265
White sucker	61	0.131	0.097	0.014	0.077	0.108	0.151	0.674
Yellow perch	3	0.252	0.029	0.225	0.225	0.247	0.283	0.283

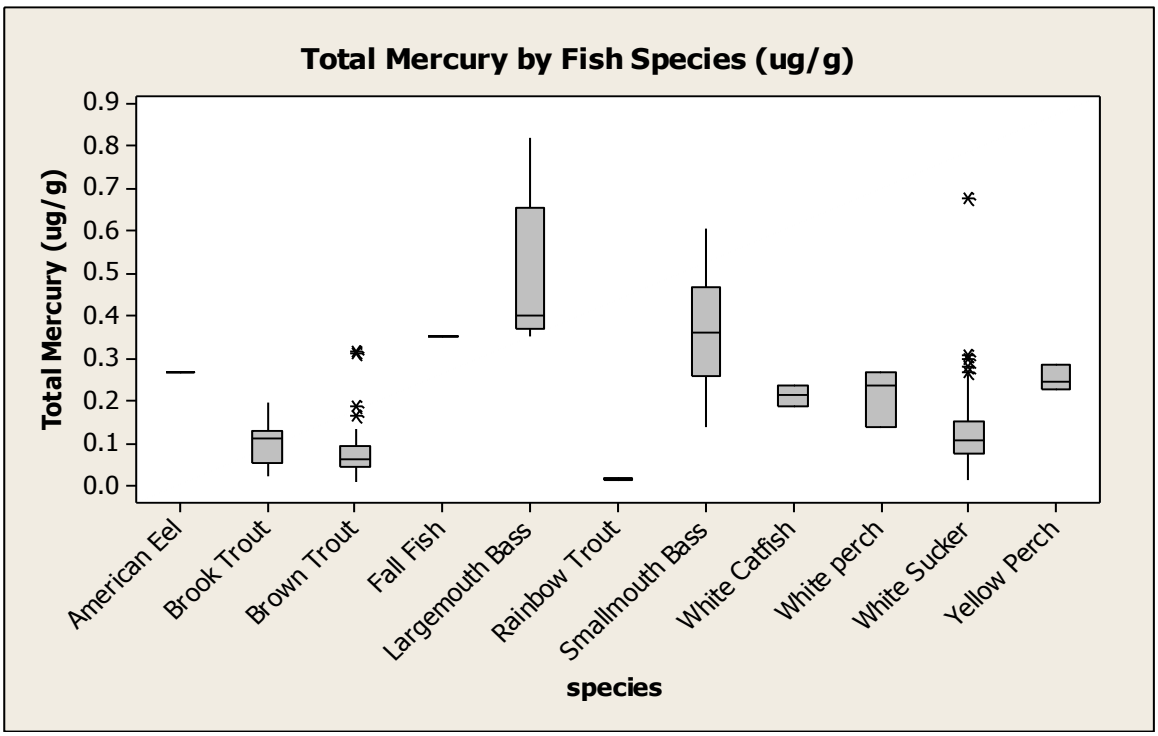


Figure 16. Total mercury (ug/g wet weight) by fish species for samples collected statewide from 2006-2010.

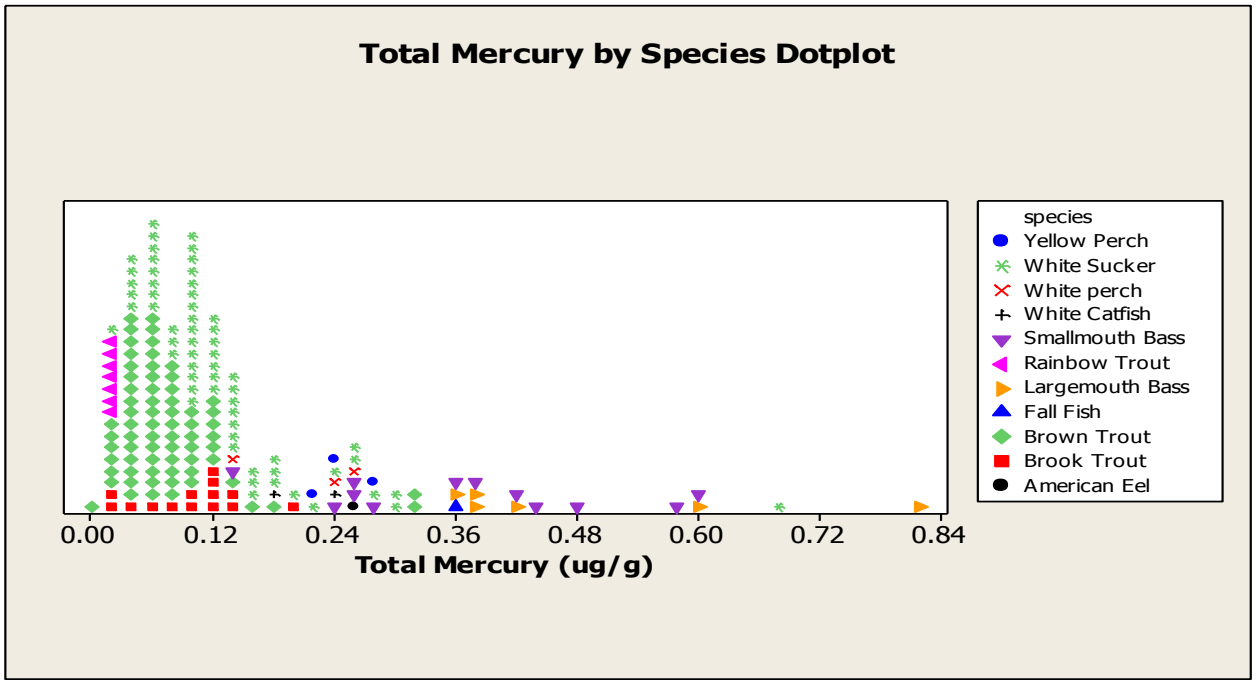


Figure 17. A dot plot of fish tissue total mercury (ug/g wet weight) data by species collected between 2006 and 2010.

Table 7. Descriptive statistics for total mercury (ug/g wet weight) data for fish species collected statewide from 2006-2010. N= total number of samples, StDev= standard deviation, Q1= 25th percentile, Q3= 75th percentile, *= Not applicable.

Species	N	StDev	Minimum	Q1	Mean	Median	Q3	Maximum
American Eel	1	*	0.265	*	0.265	0.265	*	0.265
Brook trout	14	0.0479	0.024	0.0558	0.0989	0.1115	0.1285	0.194
Brown trout	69	0.05385	0.009	0.044	0.07561	0.063	0.0915	0.315
Fallfish	1	*	0.353	*	0.353	0.353	*	0.353
Largemouth bass	6	0.1843	0.35	0.3688	0.4917	0.4025	0.655	0.82
Rainbow trout	7	0.001633	0.013	0.013	0.015	0.016	0.016	0.017
Smallmouth bass	12	0.1433	0.139	0.2598	0.3681	0.362	0.4693	0.607
White catfish	2	0.0354	0.187	*	0.212	0.212	*	0.237
White perch	3	0.068	0.136	0.136	0.213	0.238	0.265	0.265
White sucker	61	0.097	0.014	0.077	0.1314	0.108	0.151	0.674
Yellow perch	3	0.0293	0.225	0.225	0.2517	0.247	0.283	0.283

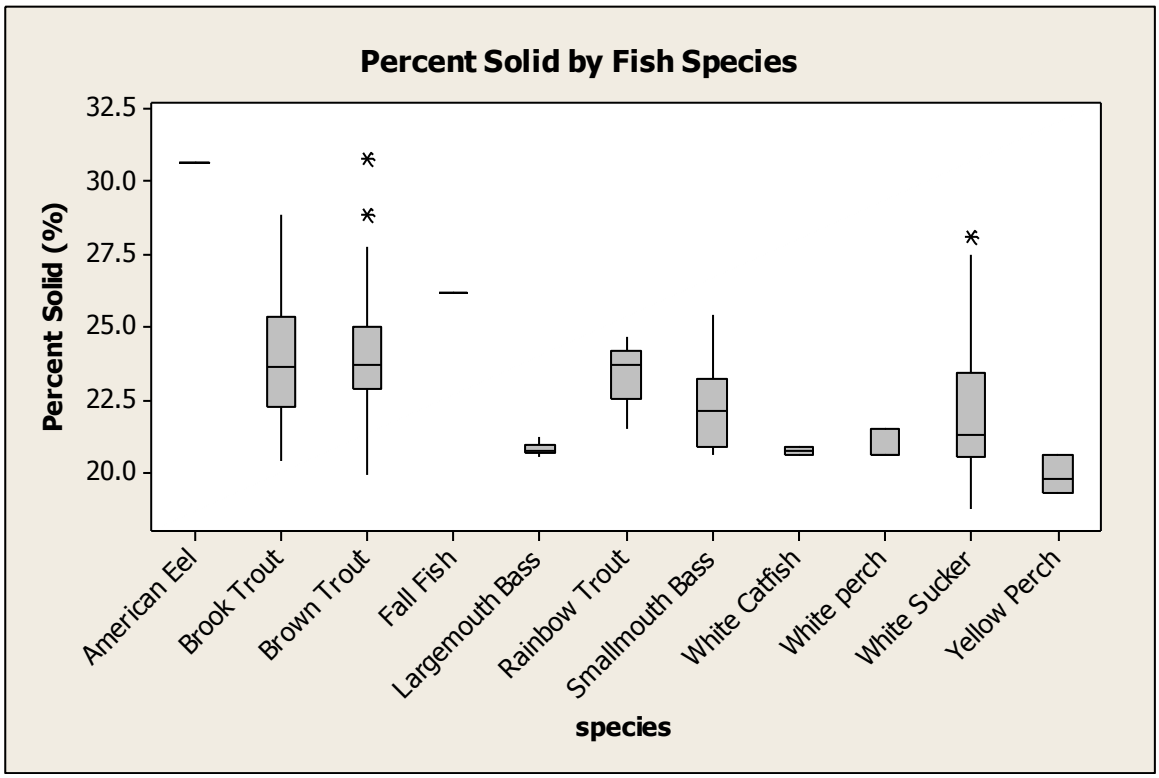


Figure 18. Boxplot of percent solid by fish species collected between 2006-2010.

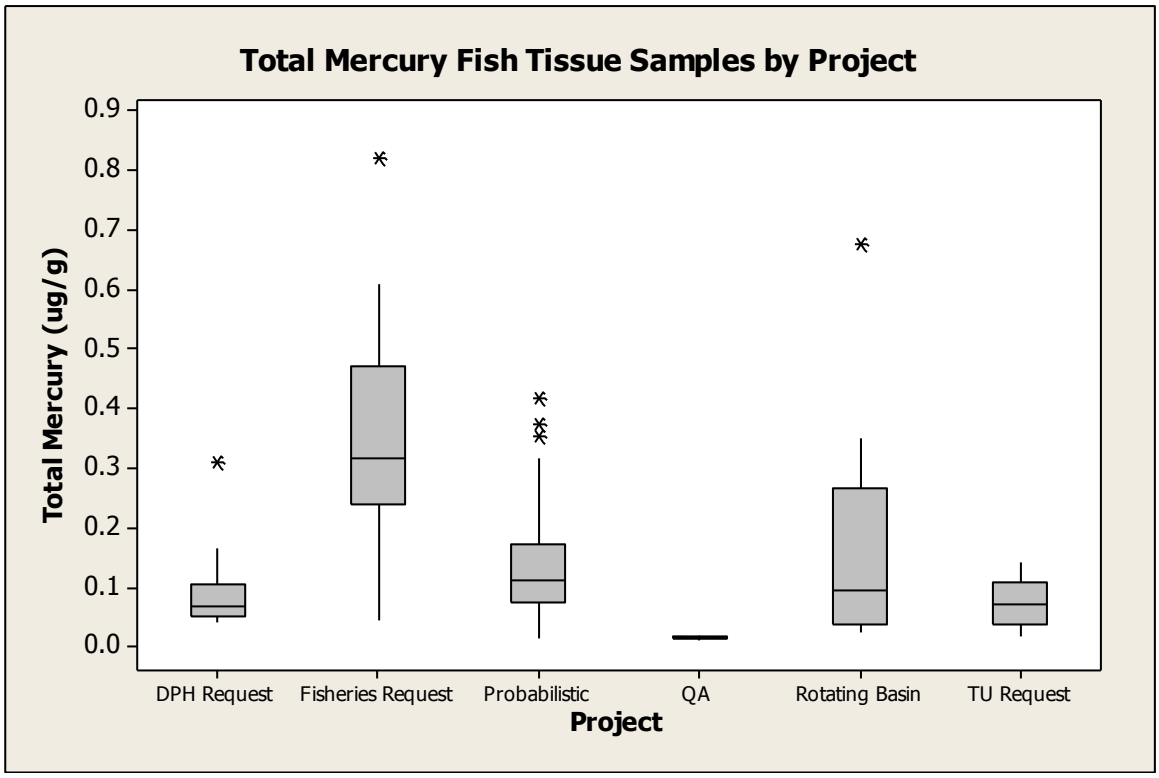


Figure 19. Box plot of total mercury (ug/g wet weight) for fish tissue data categorized by project name.

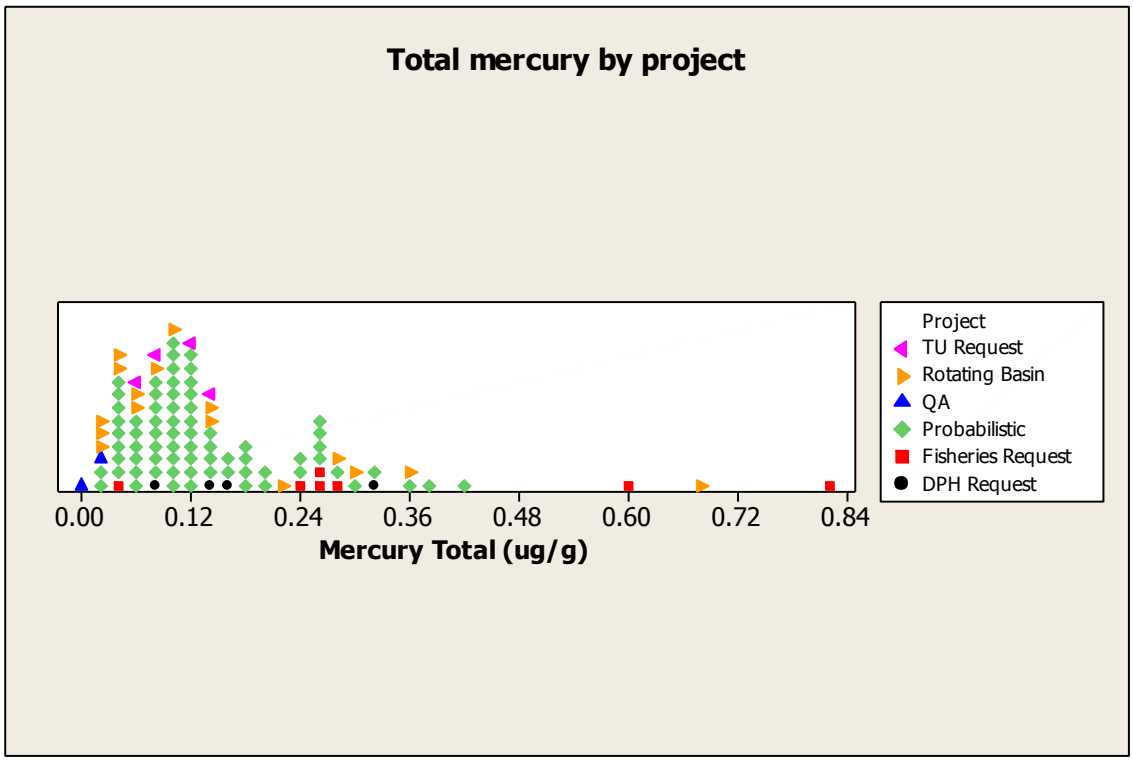


Figure 20. Dot plot of total mercury (ug/g) for fish tissue data categorized by project name.

Table 8. Descriptive statistics for total mercury (ug/g) for fish tissue data categorized by project name. N= total number of samples, StDev= standard deviation, Q1= 25th percentile, Q3= 75th percentile, *= Not applicable.

Project Name		N	Mean	StDev	Minimum	Q1	Median	Q3	Maximum
DPH	Request	43	0.08472	0.04869	0.04	0.052	0.069	0.105	0.31
Fisheries	Request	20	0.3594	0.1876	0.045	0.2372	0.3165	0.4693	0.82
Probabilistic		72	0.1328	0.0874	0.014	0.073	0.111	0.1703	0.418
QA		8	0.01425	0.002605	0.009	0.013	0.015	0.016	0.017
Rotating	Basin	16	0.1598	0.1734	0.023	0.0375	0.0945	0.2645	0.674
TU	Request	20	0.0731	0.04111	0.017	0.03825	0.0725	0.1085	0.141

Table 9. The 25 highest fish tissue total mercury samples out of the 179 that were processed between 2006-2010. Records are sorted by highest total mercury to lowest. The 10 records in red are those that were greater than 0.3 ug/g as proposed by the US EPA for a threshold.

Species	Station ID	Sample id	stream name	Project	Mercury Total	Percent Solid
Largemouth Bass	**1563**	**19876**	**Beach Pond**	**Fisheries Request**	**0.82**	**21.2**
White Sucker	**96**	**14609**	**Hammonasset River**	**Rotating Basin**	**0.674**	**25.8**
Smallmouth Bass	**1563**	**19876**	**Beach Pond**	**Fisheries Request**	**0.607**	**22.1**
Smallmouth Bass	**152**	**8783**	**Little River**	**Probabilistic**	**0.418**	**22.1**
Smallmouth Bass	**2668**	**13763**	**Housatonic River**	**Probabilistic**	**0.373**	**23.4**
Fall Fish	**2679**	**14717**	**West Branch Naugatuck River**	**Probabilistic**	**0.353**	**26.2**
Smallmouth Bass	**914**	**13764**	**Housatonic River**	**Rotating Basin**	**0.351**	**25.4**
Brown Trout	**1433**	**14715**	**West Branch Salmon Brook**	**Probabilistic**	**0.315**	**27**
Brown Trout	**488**	**8792**	**Eightmile River**	**DPH Request**	**0.31**	**26.8**
White Sucker	**2685**	**15461**	**Aspetuck River**	**Probabilistic**	**0.308**	**24**
White Sucker	1777	11823	Farmington River	Rotating Basin	0.297	25.4
Yellow Perch	2691	12331	Housatonic River	Fisheries Request	0.283	20.6
White Sucker	914	13764	Housatonic River	Rotating Basin	0.281	28.1
Smallmouth Bass	2253	11481	Housatonic River	Probabilistic	0.273	22.8
White Sucker	462	15742	Roaring Brook	Probabilistic	0.267	26
American Eel	2691	12331	Housatonic River	Fisheries Request	0.265	30.7
White perch	2691	12331	Housatonic River	Fisheries Request	0.265	21.5
Smallmouth Bass	2242	11418	Housatonic River	Probabilistic	0.262	22.4
White Sucker	2266	12828	Bunnell Brook	Probabilistic	0.261	22.7
Smallmouth Bass	2253	11852	Housatonic River	Probabilistic	0.259	24.2
White Sucker	1944	8607	Stratton Brook	Probabilistic	0.249	20.4
White Catfish	2691	12331	Housatonic River	Fisheries Request	0.237	20.9
Smallmouth Bass	2243	11063	Farmington River	Probabilistic	0.231	21
White Sucker	465	14987	Tenmile River	Rotating Basin	0.215	25.5
Brook Trout	1944	8607	Stratton Brook	Probabilistic	0.194	22.7

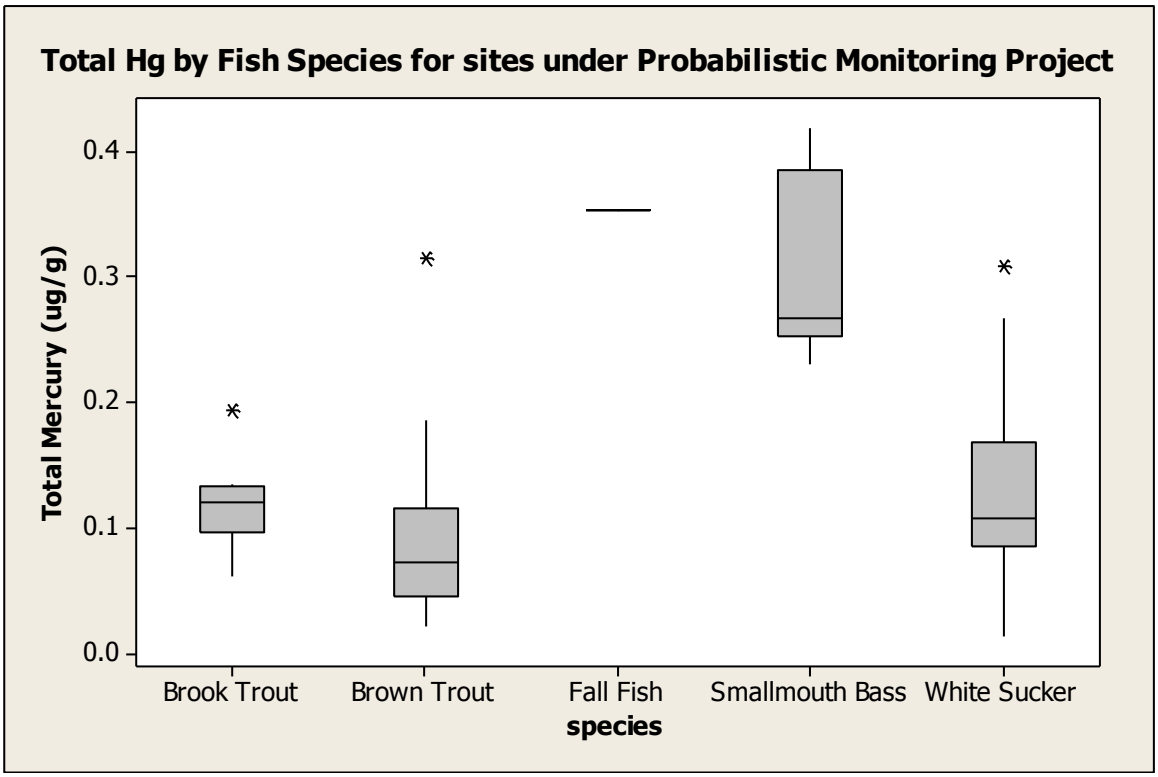
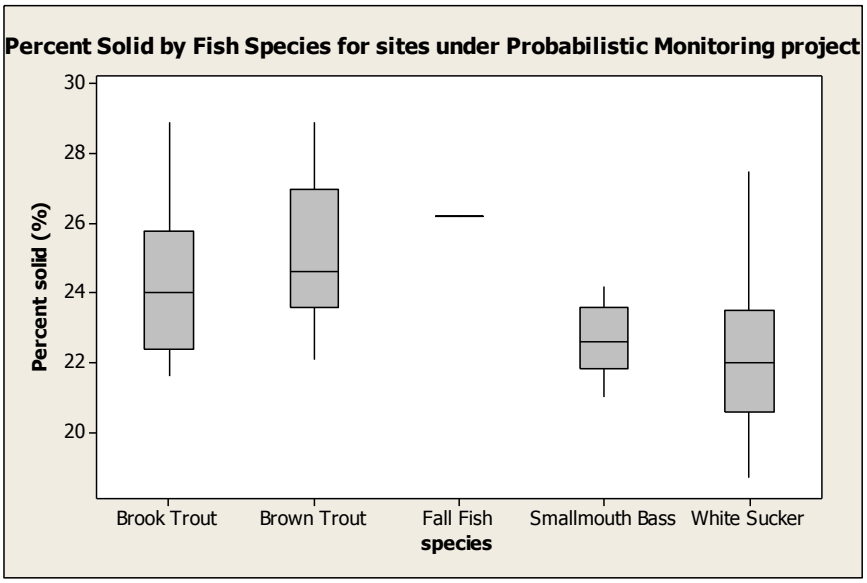


Figure 21. Box plots of total mercury data for fish tissue samples collected as part of the probabilistic monitoring project 2006-2010 by fish species.

Table 10. Descriptive statistics of total mercury (ug/g) data for fish tissue samples collected as part of the probabilistic monitoring project 2006-2010 by fish species. N= total number of samples, StDev= standard deviation, Q1= 25th percentile, Q3= 75th percentile, *= Not applicable.

Species	N	Mean	StDev	Minimum	Q1	Median	Q3	Maximum
Brook trout	11	0.117	0.034	0.062	0.096	0.120	0.133	0.194
Brown trout	19	0.090	0.067	0.022	0.045	0.073	0.116	0.315
Fallfish	1	0.353	*	0.353	*	0.353	*	0.353
Smallmouth Bass	6	0.302	0.074	0.231	0.252	0.267	0.384	0.418
White sucker	35	0.125	0.068	0.014	0.085	0.108	0.168	0.308

Figure 22. Box plots of percent solid data for fish tissue samples collected as part of the probabilistic monitoring project 2006-2010 by fish species.



CRAYFISH TISSUE RESULTS

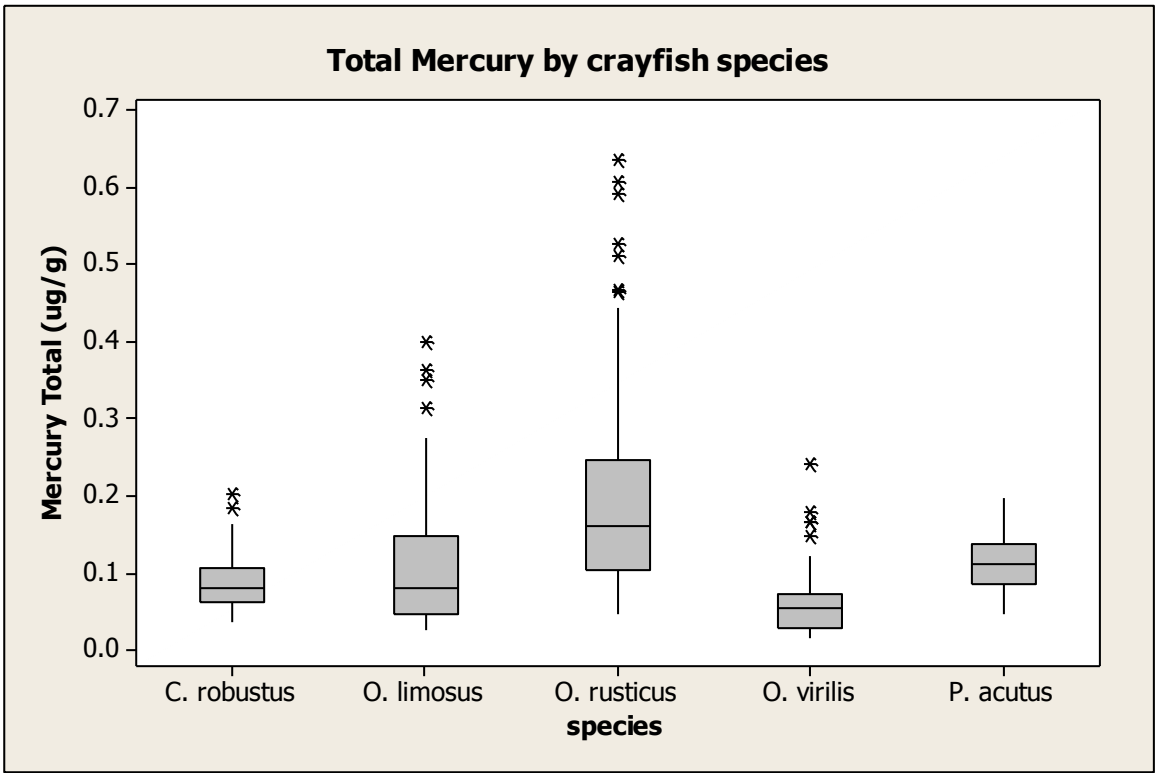


Figure 23. Box plot of total mercury data (ug/g wet weight) for crayfish species collected between 2006-2010.

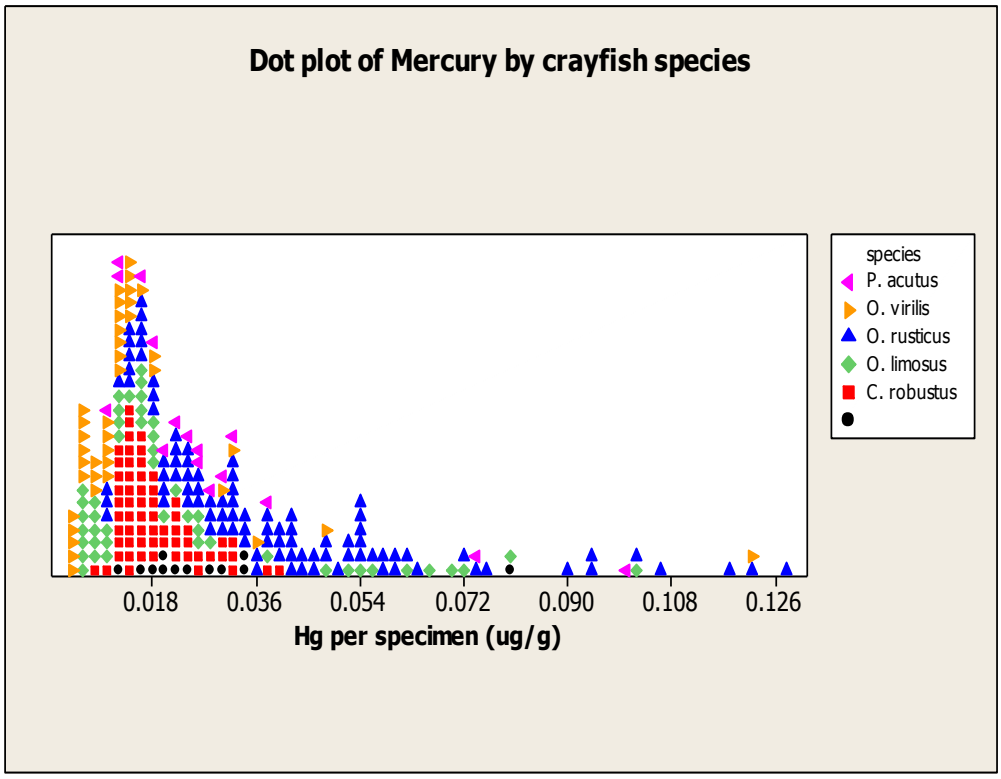


Figure 24. Dot plot of total mercury data (ug/g wet weight) for crayfish species collected between 2006-2010.

Table 11. Descriptive statistics for total mercury data (ug/g) for crayfish species collected between 2006-2010. N= total number of samples, StDev= standard deviation, Q1= 25th percentile, Q3= 75th percentile, *= Not applicable.

species	N	Mean	StDev	Minimum	Q1	Median	Q3	Maximum
Cambarus robustus	66	0.089	0.034	0.035	0.062	0.081	0.105	0.203
Orconectes limosus	51	0.119	0.098	0.026	0.047	0.081	0.149	0.401
Orconetes rusticus	93	0.194	0.130	0.047	0.103	0.161	0.247	0.636
Orconectes virilis	42	0.067	0.050	0.016	0.027	0.055	0.074	0.242
Procambarus acutus	16	0.110	0.039	0.047	0.085	0.112	0.137	0.198

Table 12. Descriptive statistics for total mercury data, total mercury divided by the number of crayfish tails used in the composite (Hg per specimen), and percent solids by relative size of each crayfish. N= total number of samples, StDev= standard deviation, Q1= 25th percentile, Q3= 75th percentile, *= Not applicable.

Variable	Relative Size	N	Mean	StDev	Minimum	Q1	Median	Q3	Maximum
Total Mercury	Large	95	0.1374	0.0974	0.018	0.073	0.117	0.17	0.592
	medium	118	0.1275	0.1155	0.016	0.0617	0.088	0.147	0.636
	small	43	0.1229	0.0985	0.027	0.058	0.083	0.145	0.401
	XLarge	12	0.096	0.0448	0.032	0.0563	0.099	0.1315	0.164
Hg per specimen	Large	95	0.03046	0.023	0.0036	0.015	0.024	0.038	0.1184
	medium	118	0.02615	0.02329	0.0032	0.013	0.0177	0.0311	0.1272
	small	43	0.02483	0.01966	0.006	0.0118	0.0166	0.0305	0.0802
	XLarge	12	0.03853	0.0327	0.0104	0.0147	0.0283	0.0532	0.122
Percent Solids	Large	95	20.739	2.094	16.7	19.4	20.8	21.8	32.3
	medium	118	20.683	1.705	17.7	19.475	20.3	21.625	27
	small	42	21.621	4.476	15.9	19.575	20.65	21.575	43.8
	XLarge	12	19.342	1.365	16.9	18.35	19.3	20.5	21.6

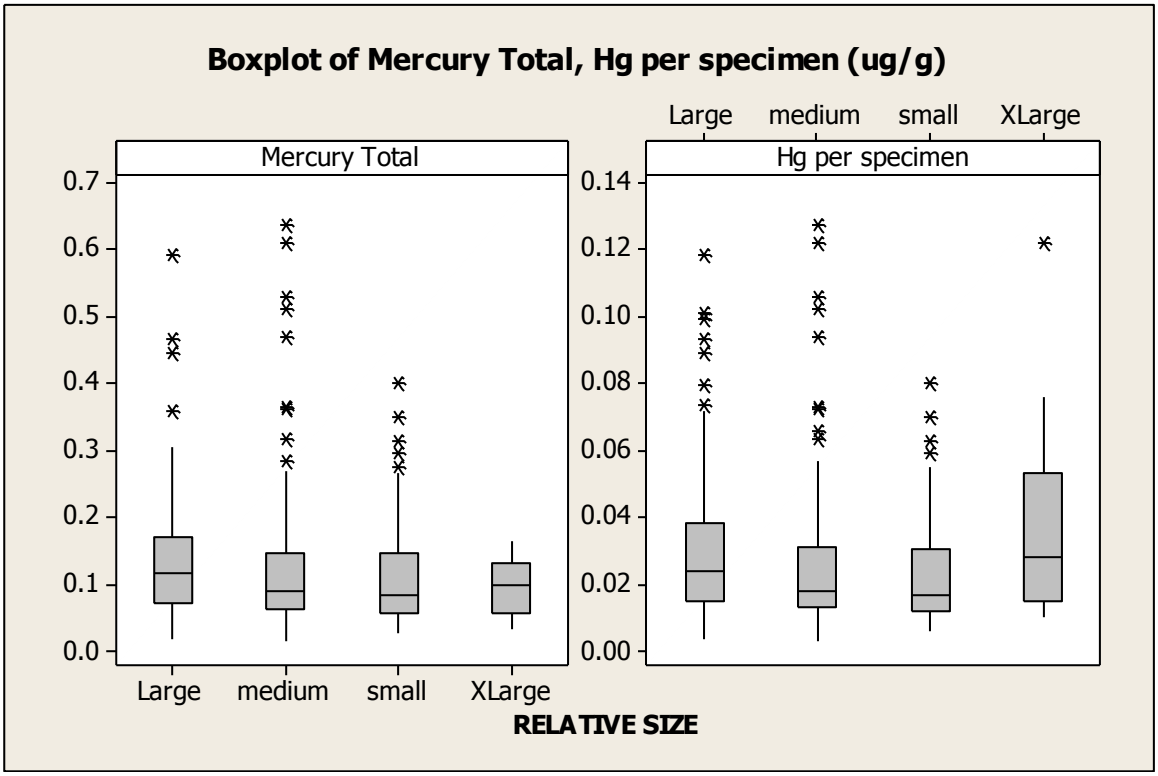


Figure 25. Box plots of total mercury data and total mercury divided by the number of crayfish tails used in the composite (Hg per specimen) by relative size of each crayfish.

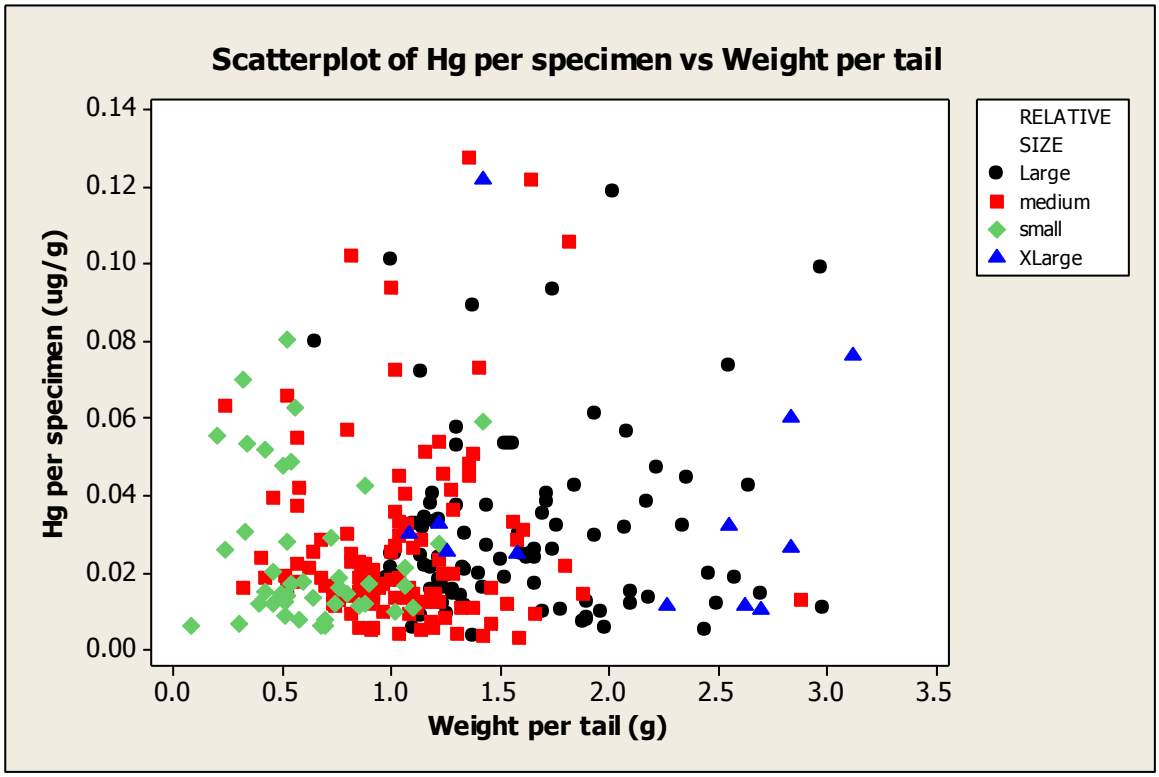


Figure 26. Scatter plot of calculated Hg per specimen (ug/g wet weight) versus the total wet weight (g) for each crayfish sample processed by relative size.

Table 13. The 25 highest total mercury results for crayfish tissue samples collected between 2006 and 2010. Sixteen of the 274 samples (5.8%) were greater than the US EPA guidance value of 0.3 ug/g. 15/16 of these are associated with the Still River, Danbury project. Only a single sample from the Aspetuck River as part of the probabilistic monitoring project had a value >0.3 ug/g.

species	StationID	samplebyste	StreamName	Project	Mercury Total (ug/g)	Percent Solid
O. rusticus	**333**	**13742**	**Still River**	**Danbury**	**0.636**	**20.1**
O. rusticus	**1609**	**13741**	**Still River**	**Danbury**	**0.609**	**18.3**
O. rusticus	**1609**	**13741**	**Still River**	**Danbury**	**0.592**	**18.6**
O. rusticus	**1609**	**13741**	**Still River**	**Danbury**	**0.529**	**18.5**
O. rusticus	**333**	**13742**	**Still River**	**Danbury**	**0.511**	**18.9**
O. rusticus	**1611**	**13744**	**Still River**	**Danbury**	**0.468**	**21**
O. rusticus	**1611**	**13744**	**Still River**	**Danbury**	**0.466**	**21.6**
O. rusticus	**333**	**13742**	**Still River**	**Danbury**	**0.445**	**20.5**
O. limosus	**339**	**10128**	**Still River**	**Danbury**	**0.401**	**29**
O. rusticus	**1611**	**13744**	**Still River**	**Danbury**	**0.366**	**20.1**
O. limosus	**2685**	**15461**	**Aspetuck River**	**Probabilistic**	**0.363**	**20**
O. rusticus	**339**	**13743**	**Still River**	**Danbury**	**0.36**	**19.4**
O. limosus	**338**	**10130**	**Still River**	**Danbury**	**0.35**	**25.4**
O. rusticus	**339**	**13743**	**Still River**	**Danbury**	**0.317**	**20.9**
O. limosus	**337**	**10129**	**Still River**	**Danbury**	**0.314**	**23.8**
O. rusticus	**2736**	**13749**	**Still River**	**Danbury**	**0.305**	**20.9**
O. rusticus	339	13743	Still River	Danbury	0.295	19.8
O. rusticus	1614	13748	Sympaug Brook	Danbury	0.287	18.8
O. rusticus	339	13743	Still River	Danbury	0.285	21
O. rusticus	339	13743	Still River	Danbury	0.283	18.5
O. limosus	339	10128	Still River	Danbury	0.276	
O. rusticus	148	13745	Limekiln Brook	Danbury	0.27	19.9
O. limosus	338	10130	Still River	Danbury	0.267	29.5
O. rusticus	2739	13756	Kohanza Brook	Danbury	0.267	19.2
O. rusticus	2736	13749	Still River	Danbury	0.267	20.1

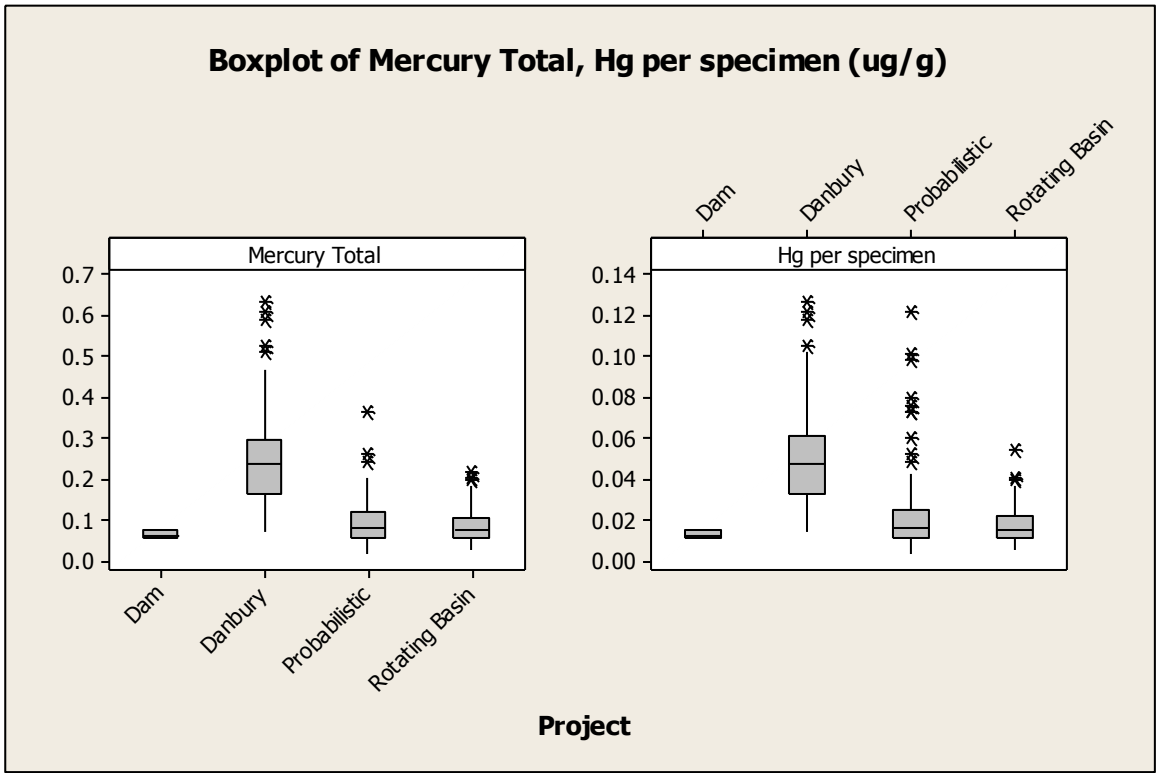


Figure 27. Box plot of total mercury (ug/g) and calculated Hg per specimen (ug/g) for crayfish data categorized by major projects 2006-2010.

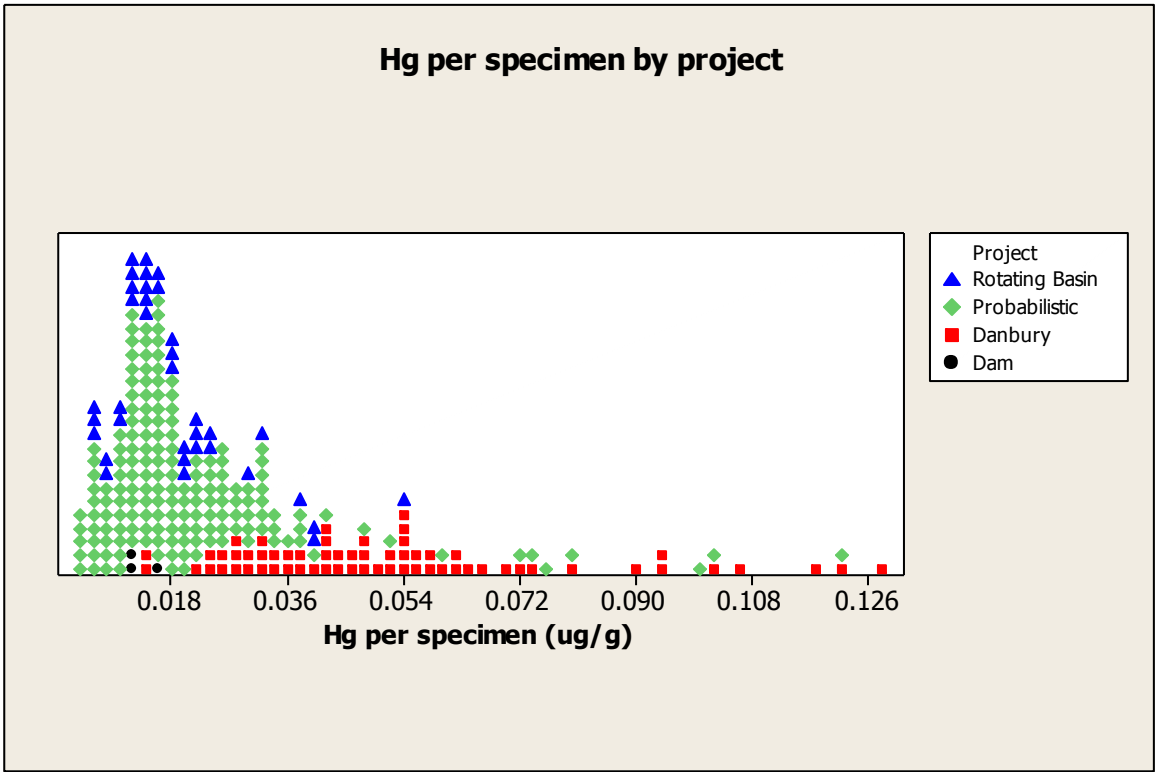


Figure 28. Dot plot of total mercury divided by the number of crayfish tails used in the composite (Hg per specimen) (ug/g) for crayfish data categorized by major projects 2006-2010.

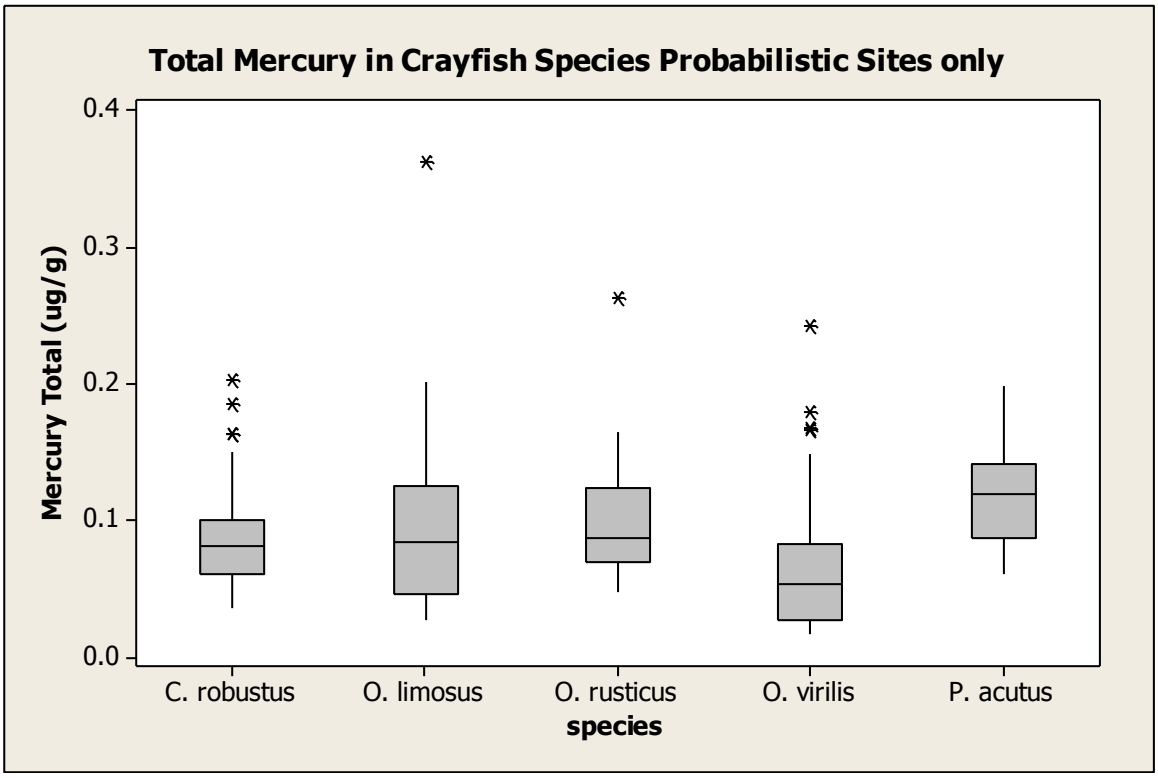


Figure 29. Box plot of total mercury (ug/g wet weight) for crayfish species collected as part of the probabilistic monitoring project 2006-2010. Only a single sample from the Aspetuck River was greater than the US EPA guideline of 0.3 ug/g.

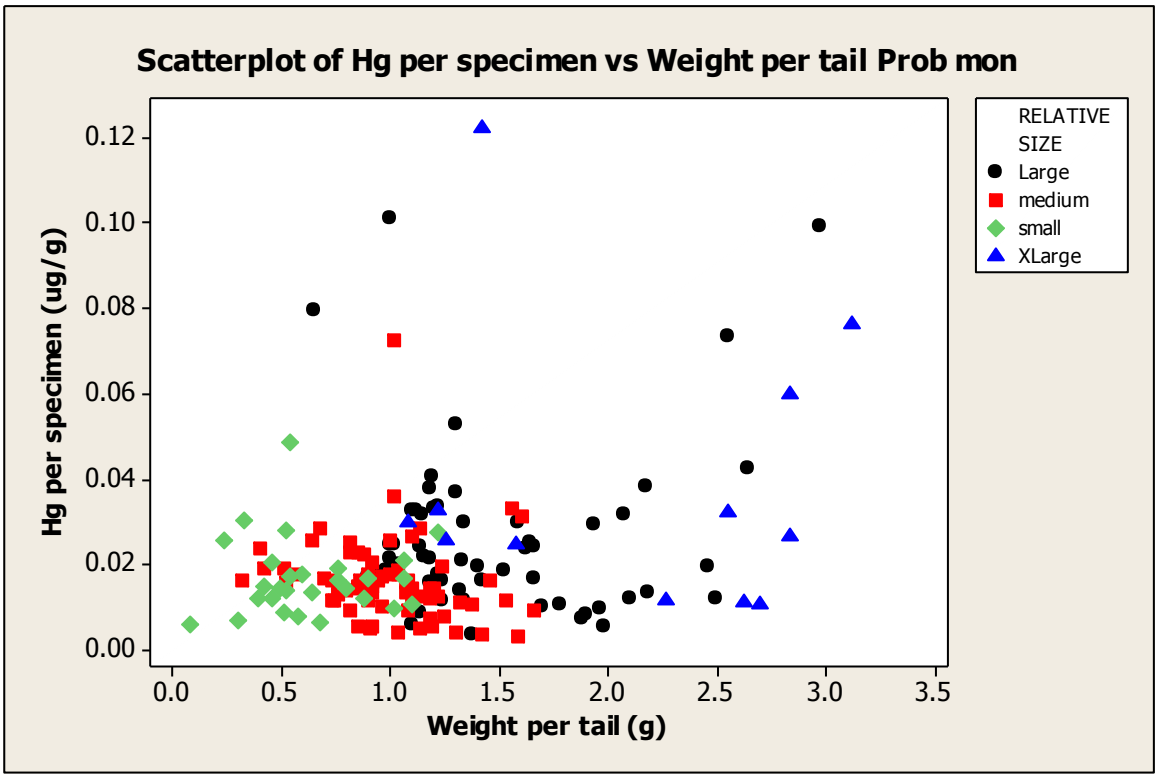


Figure 30. Scatter plot of calculated Hg per specimen (ug/g wet weight) versus the total wet weight (g) for crayfish samples collected as part of the probabilistic monitoring project 2006-2010 and categorized by relative size.

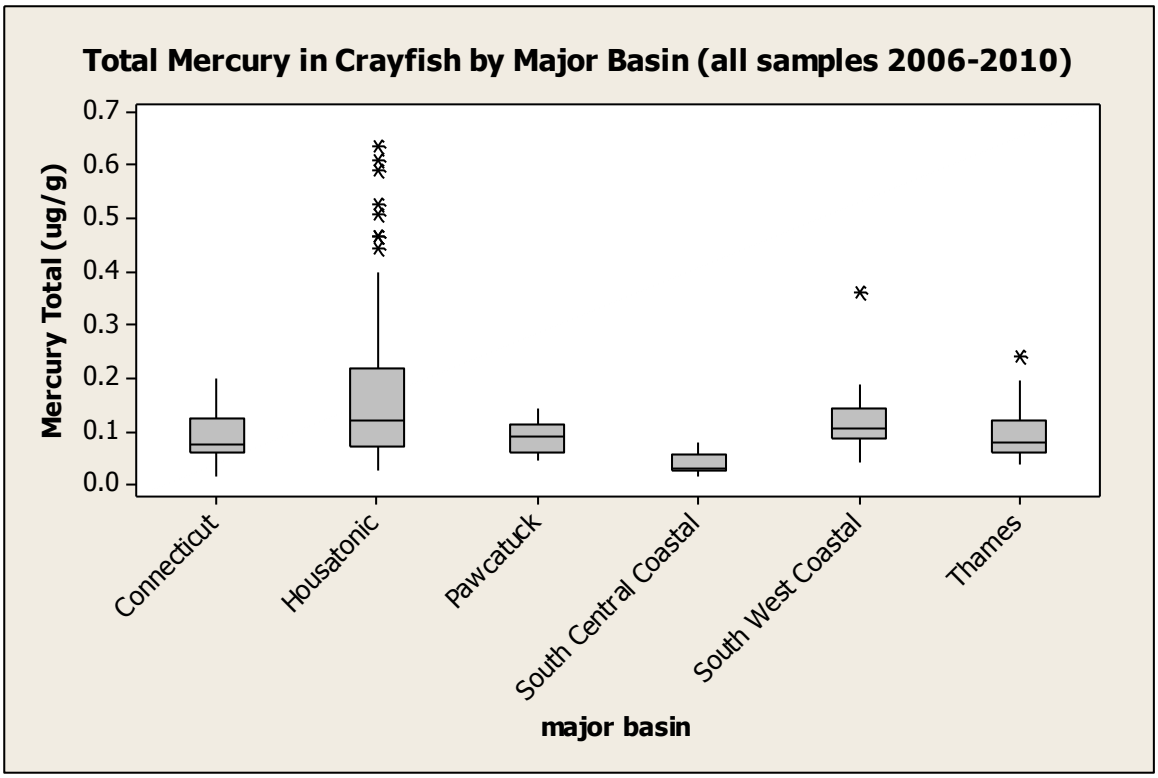


Figure 31. Box plot of total mercury (ug/g wet weight) data 2006-2010 categorized by major basin.

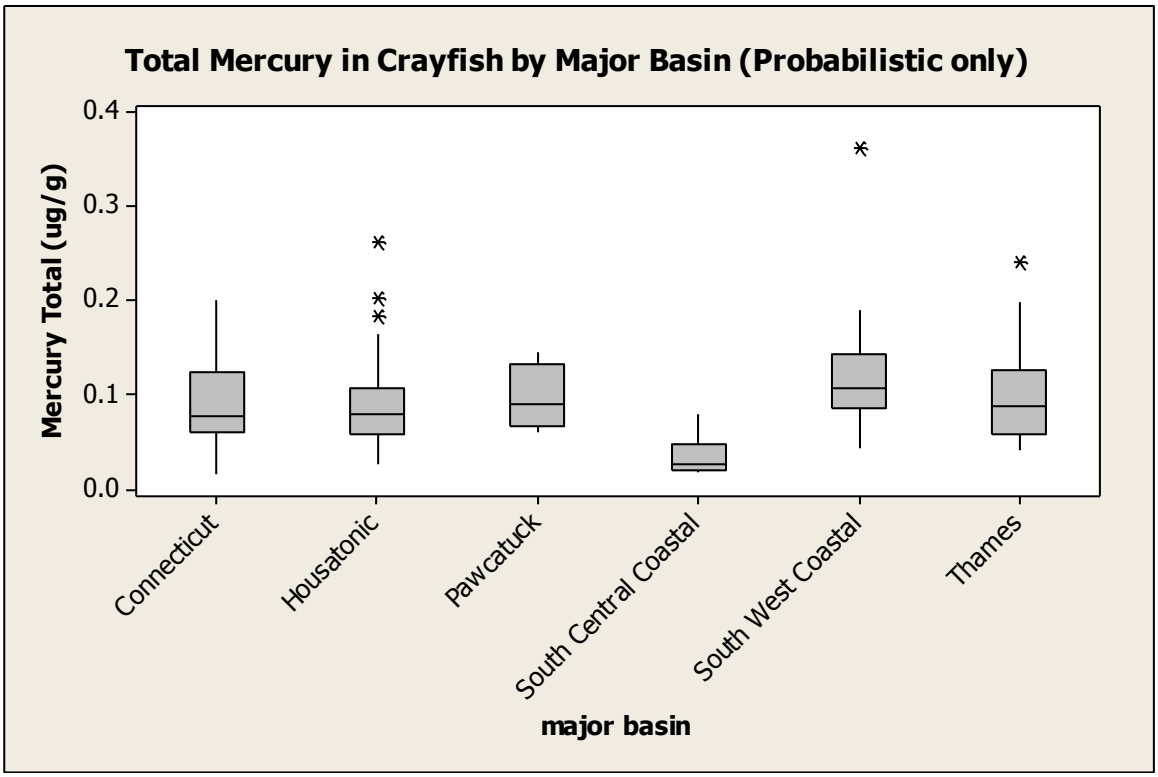


Figure 32. Box plot of total mercury (ug/g wet weight) data collected as part of the probabilistic monitoring project 2006-2010 categorized by major basin.

Table 14. The 25 highest total mercury results for crayfish tissue samples collected between 2006 and 2010 as part of the probabilistic monitoring project. Only one of the 168 samples (0.59%) was greater than the US EPA guidance value of 0.3 ug/g. 15/16 of these are associated with the Still River, Danbury project. Only a single sample from the Aspetuck River as part of the probabilistic monitoring project had a value >0.3 ug/g.

Species	Station id	Sample id	Stream name		Total Hg (ug/g)	% solid
O. limosus	**2685**	**15461**	**Aspetuck River**	**Probabilistic**	**0.363**	**20**
O. rusticus	2671	20657	Naromiyocknowhusunkatankshunk Brook (FKA Morrisey)	Probabilistic	0.263	22.2
O. virilis	1482	15734	Pease Brook	Probabilistic	0.242	28.1
C. robustus	6129	20659	Wewaka Brook	Probabilistic	0.203	16.7
O. limosus	1944	9830	Stratton Brook	Probabilistic	0.202	26.1
P. acutus	5168	20930	Denison Brook	Probabilistic	0.198	22.1
O. limosus	2681	15462	Saugatuck River	Probabilistic	0.19	23.1
C. robustus	2240	10804	Marshepaug River	Probabilistic	0.185	19.7
O. virilis	1482	15734	Pease Brook	Probabilistic	0.179	20.9
O. virilis	2533	13038	Straddle Brook	Probabilistic	0.167	19.5
O. virilis	2533	13038	Straddle Brook	Probabilistic	0.166	18.6
O. rusticus	2242	11418	Housatonic River	Probabilistic	0.165	21.9
O. rusticus	1464	9557	Whiting River	Probabilistic	0.164	20.6
C. robustus	1433	14715	West Branch Salmon Brook	Probabilistic	0.164	21.6
C. robustus	1945	9558	Fox Brook	Probabilistic	0.163	18.7
O. limosus	1955	9553	Pemberwick Brook	Probabilistic	0.159	27
C. robustus	1942	9509	Crystal Lake Brook	Probabilistic	0.15	18.5
O. virilis	2671	20657	Naromiyocknowhusunkatankshunk Brook (FKA Morrisey)	Probabilistic	0.149	21.2
O. limosus	2680	12676	Jacks Brook	Probabilistic	0.149	19.4
P. acutus	5168	20930	Denison Brook	Probabilistic	0.147	20.8
P. acutus	2635	14943	Shunock River	Probabilistic	0.146	23.6
C. robustus	1945	9558	Fox Brook	Probabilistic	0.142	21.4
O. limosus	2685	15461	Aspetuck River	Probabilistic	0.14	21.5
P. acutus	2256	10631	Pendleton Hill Brook	Probabilistic	0.138	19.4
P. acutus	1966	9511	Ekonk Brook	Probabilistic	0.133	19.3

STILL RIVER, DANBURY, CRAYFISH TISSUE PROJECT

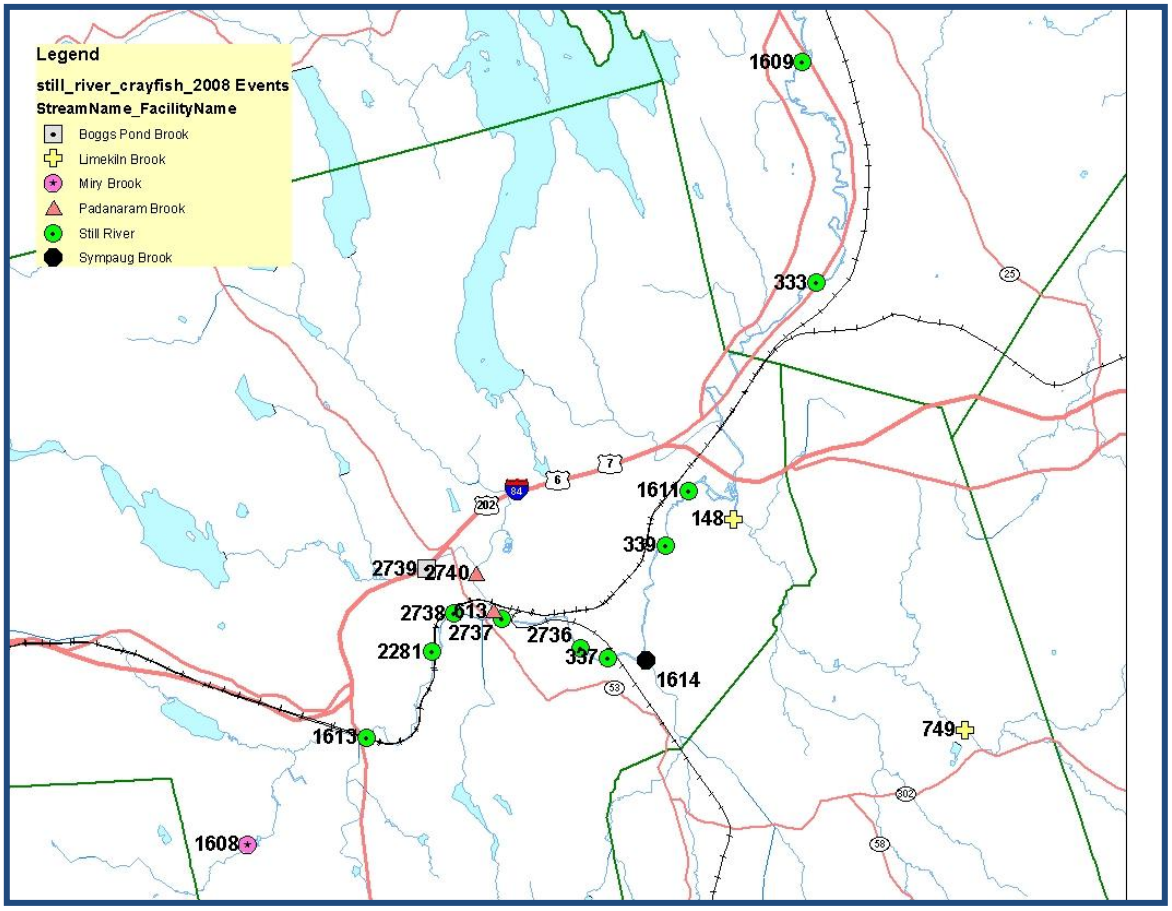


Figure 33. Location of crayfish tissue sample collection within the Still River regional basin, Danbury, during September 2008. At each location at least 15 organisms were obtained. Samples were submitted to CESE for mercury analysis.

Table 15. Descriptive information for each of the locations where crayfish tissue samples were collected as part of the Still River Regional Basin, Danbury project during September 2008. Sequence number refers to the map and figures which follow and is from most upstream to most downstream.

Sequence number	trip date	Sample id	Station ID	Stream Name	proximity	landmark	Municipality	basinid	YLat (DD)	XLong (DD)
1	9/5/2008	13755	1608	Miry Brook	at	Ye Olde Road (Wooster School Driveway)	Danbury	6601	41.3689	-73.4936
3	9/5/2008	13754	1613	Still River	at downstream side of	Segar Street Crossing	Danbury	6600	41.38227	-73.4742
4	9/5/2008	13753	2281	Still River	at	RR bridge adjacent to Lake Street (West Street)	Danbury	6600	41.39292	-73.4636
5	9/5/2008	13752	2738	Still River	at	Rose Street	Danbury	6600	41.39766	-73.46
6	9/5/2008	13756	2739	Boggs Pond Brook	at	Starr Avenue	Danbury	6602	41.40315	-73.4647
7	9/5/2008	13757	2740	Padanaram Brook	between	Patch Ave and confluence with Boggs Pond Bk	Danbury	6603	41.40263	-73.4564
8	9/5/2008	13751	613	Padanaram Brook	upstream	Crosby Road crossing across from Lee Hartel Drive	Danbury	6603	41.398	-73.4534
9	9/5/2008	13750	2737	Still River	at	White Street below Padanaram Brook confluence	Danbury	6600	41.39705	-73.4522
10	9/5/2008	13749	2736	Still River	at	Casper Street	Danbury	6600	41.39347	-73.4392
11	9/3/2008	13746	337	Still River	downstream	Triangle Street	Danbury	6600	41.39233	-73.4348
12	9/5/2008	13748	1614	Sympaug Brook	Adjacent	Cross Street	Danbury	6604	41.39215	-73.4285
13	9/3/2008	13743	339	Still River	upstream	Old Newtown Road	Danbury	6600	41.40633	-73.4253
14	9/3/2008	13744	1611	Still River	downstream side of	Eagle Road Crossing	Danbury	6600	41.41303	-73.4217
15	9/3/2008	13747	749	Limekiln Brook	upstream	Rockwell Road	Bethel	6606	41.38382	-73.3761
16	9/3/2008	13745	148	Limekiln Brook	upstream side of	Route 6 Crossing	Danbury	6606	41.4096	-73.4142
17	9/3/2008	13742	333	Still River	under	Route 7 overpass adjacent to Gray's Bridge Road	Brookfield	6600	41.4389	-73.401
18	9/3/2008	13741	1609	Still River	at	USGS station upstream Rte 7	Brookfield	6600	41.46611	-73.4036

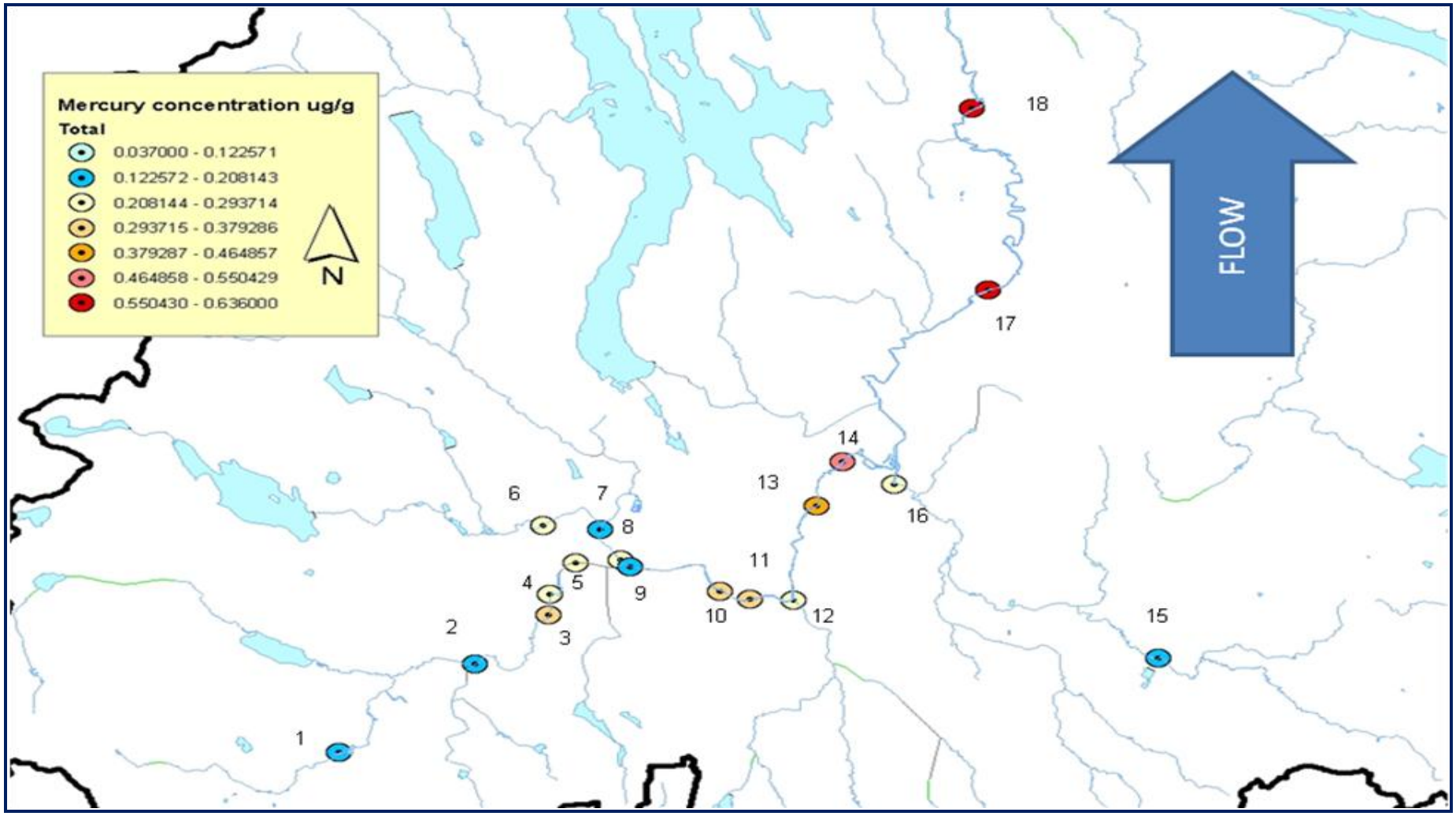


Figure 34. A map of the locations sampled for crayfish tissue as part of the Still River Regional Basin, Danbury project during September 2008. The numbers on the map correspond to sequence number in Table 15.

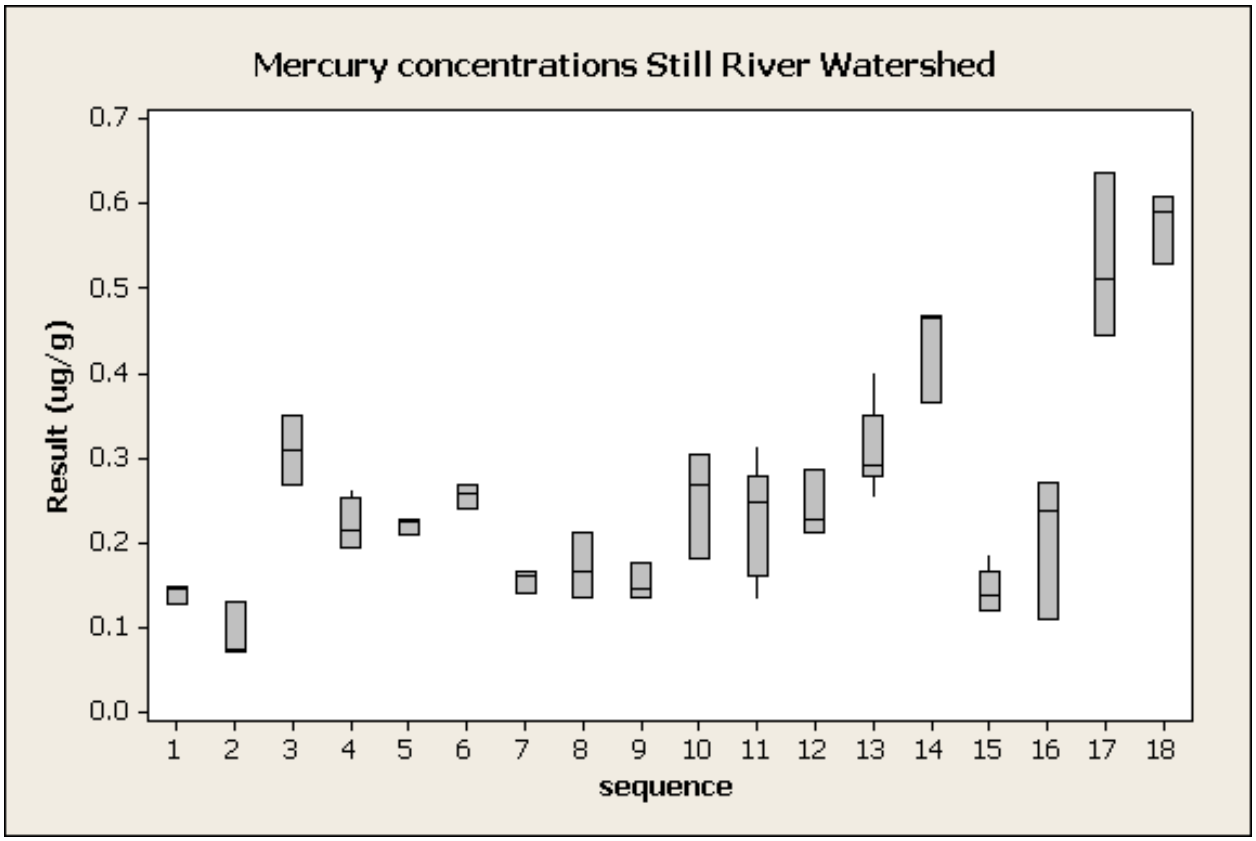


Figure 35. Box plot of total mercury (ug/g wet weight) data for crayfish samples collected at each of 18 locations (refer to sequence number in Table 15) as part of the Still River, Danbury project.

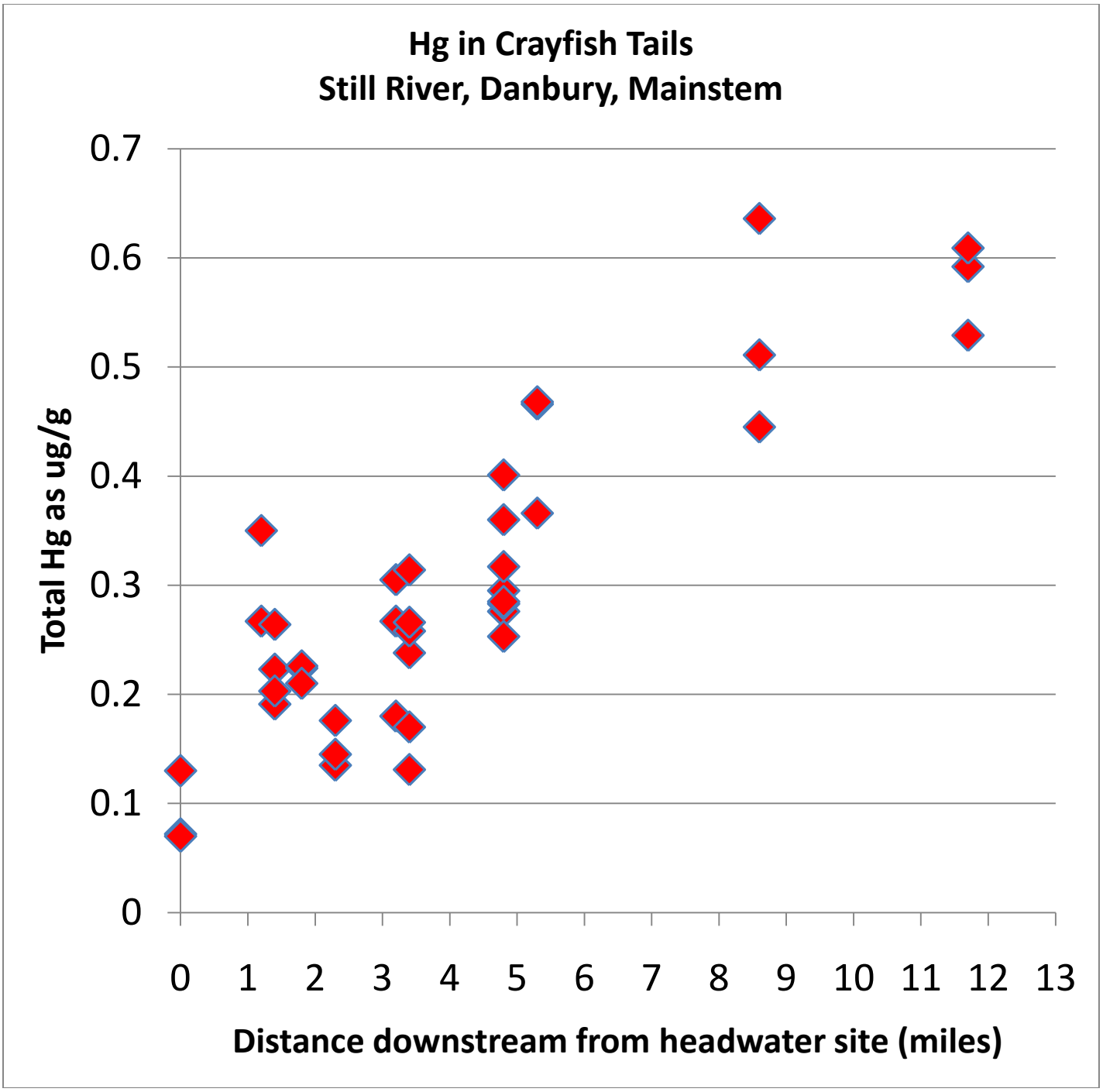


Figure 36. Plot of the total mercury (ug/g wet weight) of each crayfish sample collected as part of the Still River-Danbury project. There is an increasing longitudinal gradient as samples move from upstream of the city of Danbury downstream towards Brookfield.

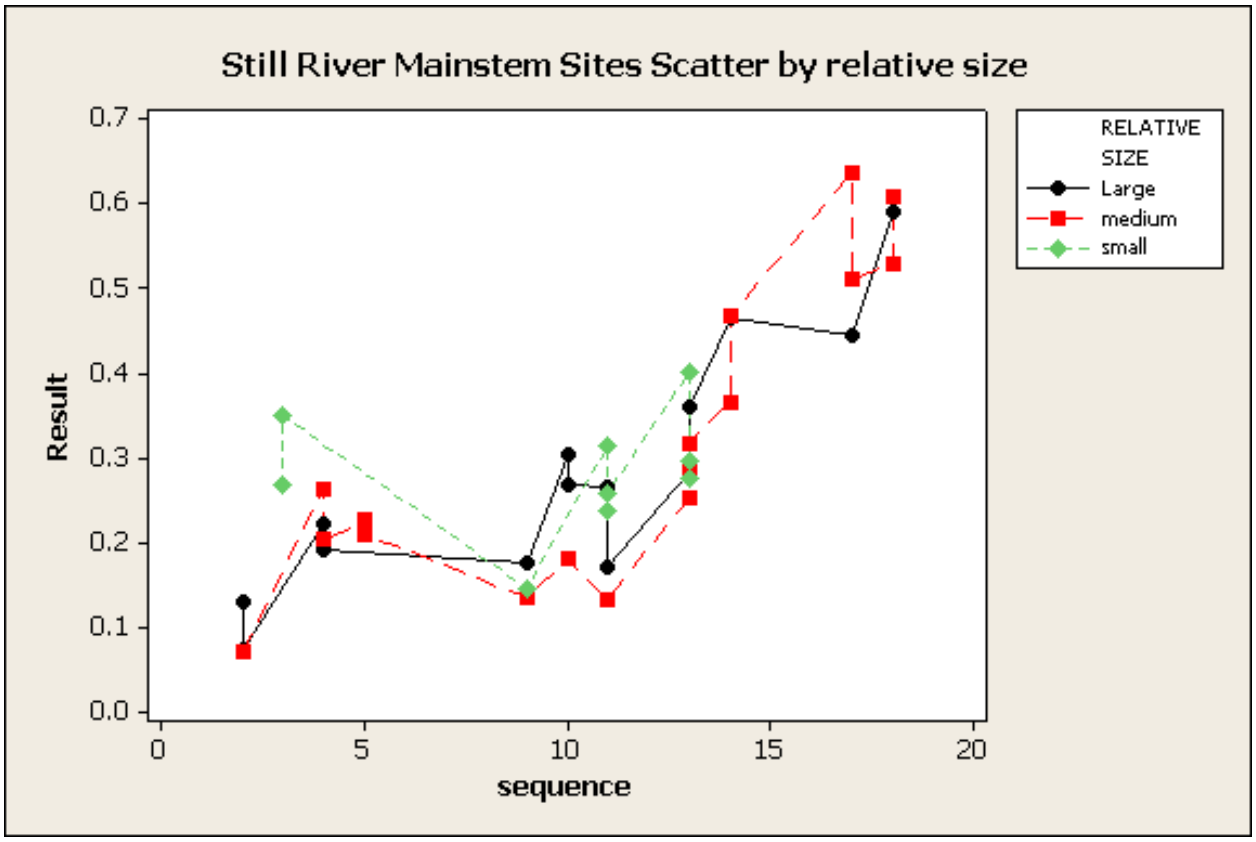


Figure 37. Total mercury (ug/g wet weight) data for crayfish samples collected as part of the Still River-Danbury project. Data are presented by relative size of the crayfish in the sample and are plotted in sequence (Table 15) from most upstream on the left to most downstream on the right. There is an increasing trend as samples move downstream from the headwaters and it appears all concentration is independent of crayfish relative size.

Appendix A. Sample collection location information for tissue samples collected between 2006-2010 and submitted for total mercury and percent solid analysis.

Station ID	Stream	landmark	Basin id	Town	Lat (DD)	Long (DD)	Crayfish	Fish
2685	Aspetuck River	Downstream Poverty Hollow/Valley Road Crossing	7202	Easton	41.29327	-73.3303	X	X
1048	Bantam River	Route 63	6705	Litchfield	41.73054	-73.1868	X	
1563	Beach Pond	deepest part of lake	3600	Voluntown	41.57774	-71.7909		X
1941	Bebbington Brook	at Hastings Memorial Forest (Joshuas Trust) sign	3206-10	Ashford	41.84467	-72.1593	X	
6125	Beebe Brook	Westwood road #1	(blank)	Sharon	41.84055	-73.4807	X	
1025	Branch Brook	High School in Black Rock State Park	6910	Thomaston	41.65411	-73.0948	X	X
2532	Branch Brook	Kozy Corner Road upstream of mouth 3/4 mile	3203	Eastford	41.9199	-72.1256	X	
2674	Bullet Hill Brook	Adjacent to Heritage Rd Downstream Old Field Road	6800-05	Southbury	41.48259	-73.2205	X	X
2266	Bunnell Brook	Punch Brook confluence and Route 179	4311	Burlington	41.7833	-72.9247		X
491	Burlington Fish Hatchery	hatchery	4311	Burlington	41.7689	-72.9542		X
28	Coginchaug River	Route 66	4607	Middletown	41.55466	-72.6737		X
2658	Coppermine Brook	Between Stevens Street and Jerome Ave across from Jefferson Ave	4314	Bristol	41.71366	-72.9261		X
1942	Crystal Lake Brook	at first pull off upstream of most downstream rte 30 crossing	3101	Stafford	41.96423	-72.3635	X	
47	Deep Brook	near Pootatuck River	6019	Newtown	41.41313	-73.2823		X
5168	Denison Brook	US of Fish rd which intersects with 49 across from Hodge rd	3603	Voluntown	41.54861	-71.8422	X	
5924	Dibbles Brook	Cortland lane	6606-03	Bethel	41.3988	-73.3865	X	
2689	Dowd Hollow Brook	Route 80	5108	Madison	41.3508	-72.6611		X
1230	Eagleville Brook	NNT to Eagleville Brook Adj. To N. Eagleville Road	3100-19	Mansfield	41.79318	-72.2756	X	
2673	East Aspetuck River	Downstream of trib on east side adjacent to rte 202 downstream of Spruce Lane	6502	New Milford	41.6546	-73.3785	X	X
2244	East Branch Naugatuck River	Newfield Rd in FCA Sunny Brook State Park	6905	Torrington	41.84848	-73.1248	X	
1947	Eightmile River	Route 34	6023	Oxford	41.38425	-73.1642		X

488	Eightmile River	Prospect Street	5201	Southington	41.59084	-72.9009		X
1966	Ekonk Brook	# 161 New Road	3503	Plainfield	41.69515	-71.8652	X	
2243	Farmington River	Route 189 and old bridge tressells (in town park)	4300	Simsbury	41.91397	-72.765		X
1945	Fox Brook	approx 50 meters upstream of Rte 189	4320-02	Granby	42.02701	-72.8624	X	X
2634	Green Fall River	#225 Denison Hill Road (Tillinghouse Residence)	1002	North Stonington	41.48156	-71.8159	X	
2684	Green Fall River	#183 Clarks Falls Road (Main Residence)	1002	North Stonington	41.4523	-71.809	X	
96	Hammonasset River	Summer Hill Road	5106	Madison	41.32782	-72.6116		X
2248	Hockanum River	Adams Street (Lobo and Associates)	4500	Manchester	41.78744	-72.551	X	X
2641	Hop River	Ash Brook Confluence at South Road	3108	Coventry	41.7712	-72.4089	X	X
464	Hop River	Flanders River Road	3108	Coventry	41.72117	-72.2548	X	
2487	Housatonic River	below confluence with Naugatuck River	6000	Shelton	41.2973	-73.065		X
2668	Housatonic River	Adjacent to Rte 7 at First NNT upstream of Carse Bk	6000	Cornwall	41.8508	-73.3758	X	X
914	Housatonic River	Confluence Gunn Brook at Swifts Bridge	6000	Cornwall	41.80723	-73.3906	X	X
2242	Housatonic River	Guinea Brook Confluence	6000	Cornwall	41.81484	-73.376	X	X
2253	Housatonic River	old bridge abutments end of North Kent Road	6000	Kent	41.76732	-73.4379	X	X
2691	Housatonic River	confluence with Naugatuck River	6000	Derby	41.3131	-73.0807		X
2680	Jacks Brook	Above Riggs St Brook Confluence ADJ to Riggs St near Cedar Lane	6920	Oxford	41.44202	-73.117	X	
2739	Kohanza Brook	Starr Avenue	6602-00-1*	Danbury	41.40315	-73.4647	X	
148	Limekiln Brook	Route 6 Crossing	6606	Danbury	41.4096	-73.4142	X	
749	Limekiln Brook	Rockwell Road	6606	Bethel	41.38382	-73.3761	X	
152	Little River	Potash Hill Road	3805	Sprague	41.63931	-72.0582		X
2648	Long Hill Brook	at Dunkin Donuts near the inlet to long hill pond at South Main Street and Norfo	4013	Middletown	41.54084	-72.653		X
2240	Marshepaug River	Shear shop Road at Litchfield/Goshen Town Line	6701	Litchfield	41.77938	-73.2663	X	
1012	Means Brook	DS Sawmill City Rd.	6024	Shelton	41.31913	-73.1618	X	X
2756	Mill River	New Road (Clarke's Pond)	5302	Hamden	41.41406	-72.895	X	

1089	Mill River	Mount Carmel Ave (Sleeping Giant State Park)	5302	Hamden	41.42111	-72.9022	X	
1608	Miry Brook	Ye Olde Road (Wooster School Driveway)	6601	Danbury	41.3689	-73.4936	X	
469	Mount Hope River	Elizabeth Road	3206	Mansfield	41.79706	-72.1716	X	X
1978	Muddy Brook	Green Farm Road and Center Street	7000-16	Westport	41.12758	-73.3294	X	
2671	Naromiyocknowhusunkatanckshunk Brook (FKA Morrisey)	in Brookland Preserve at end of Crooked Furrows Lane	6017	Sherman	41.59962	-73.49	X	X
2670	Naromiyocknowhusunkatanckshunk Brook (FKA Morrisey)	Adjacent to Church Road upstream of town line	6017	Sherman	41.61503	-73.4889	X	
204	Naugatuck River	South Leonard Street	6900	Waterbury	41.53043	-73.0402		X
191	Naugatuck River	Frost Bridge Echo Lake Rd and Route 262	6900	Watertown	41.61593	-73.0579		X
207	Naugatuck River	North end of Linden Park	6900	Naugatuck	41.50019	-73.0503	X	
1957	Nickelmine Brook	Pothier Road	6903	Torrington	41.83263	-73.1752	X	
2676	Nonewaug River	USGS gage adjacent to route 6	6802	Woodbury	41.57831	-73.1745	X	X
2675	Nonewaug River	On West bank Watertown land trust trail and property	6802	Watertown	41.62549	-73.1593	X	
6126	Norfolk Brook	Yale School Music DS Mountain Road	6100-03	Norfolk	41.98729	-73.2016	X	
2687	Norwalk River	at ASML lithographic company	7300	Wilton	41.1703	-73.4172	X	X
988	Norwalk River	Route 107	7300	Redding	41.25744	-73.429		X
235	Norwalk River	Cooper Pond Brook Confluence at Branchville RR	7300	Ridgefield	41.26747	-73.4414		X
2663	Ogden Brook	Adj to Merline Rd between Howard Dr and Oakmour Dr	4500	Vernon	41.84558	-72.4816	X	
5492	Old Stone Mill Brook	US of potash hill rd	3805	Lisbon	41.62	-72.0383		X
613	Padanaram Brook	Crosby Road crossing across from Lee Hartel Drive	6603	Danbury	41.398	-73.4534	X	
2740	Padanaram Brook	Patch Ave and confluence with Boggs Pond Bk	6603-00-2-R2	Danbury	41.40263	-73.4564	X	
1482	Pease Brook	Pease Brook WMA	3905	Lebanon	41.59467	-72.1923	X	X
1955	Pemberwick Brook	Comley Drive and Pemberwick Road	7411-09	Greenwich	41.02745	-73.661	X	

2256	Pendleton Hill Brook	Route 49 on state property upstream of USGS gage, pole #257 and house # 567	1001-02	North Stonington	41.47809	-71.8354	X	X
2660	Pequabuck River	just upstream small Trib upstream of Barlow and Old Terryville Rd	4315	Bristol	41.67076	-72.9774	X	X
2659	Pequabuck River	Just Upstream of Coppermine Brook off 72 and Fredrick Street	4315	Bristol	41.674	-72.9082		X
278	Pomperaug River	Judson Avenue	6800	Woodbury	41.54908	-73.2165	X	X
281	Pootatuck River	Wasserman Way on Game Club Property (Mile Hill Rd)	6020	Newtown	41.40637	-73.272		X
284	Pootatuck River	Route 84 West overpass	6020	Newtown	41.41621	-73.2824		X
476	Quinebaug River	Route 12 and upstream Patchaug River Confluence	3700	Griswold	41.60216	-71.9868	X	
1940	Quinnipiac River	main street (route 150)	5200	Wallingford	41.48694	-72.8192	X	X
288	Quinnipiac River	behind water company building on Syndall Street	5200	Cheshire	41.52747	-72.856	X	X
292	Quinnipiac River	West Main Street	5200	Southington	41.58778	-72.891		X
2251	Raymond Brook	Mill Stream Road	4701	Hebron	41.64337	-72.3441	X	
462	Roaring Brook	Route 32	3104	Willington	41.90402	-72.2891	X	X
1939	Sanford Brook	Mountain Crest Drive	5301-02	Cheshire	41.47233	-72.9364		X
2681	Saugatuck River	Adjacent Rte 53 at # 636 downstream Black Pond Brook confluence and Whortleberry	7200	Redding	41.32203	-73.4229	X	
2650	Scantic River	at end of Bailey Road	4200	Enfield	41.97811	-72.5033	X	X
325	Shepaug River	Wellers Bridge Road (Route 67)	6700	Roxbury	41.54887	-73.3308	X	
2635	Shunock River	Upstream of rte 95 and parallel access rd and upstream of small trib basin 1004-	1004	North Stonington	41.41961	-71.8544	X	
1952	Silver Brook	#46 Old Tavern Road	5306	Orange	41.2665	-73.0049	X	X
2528	Skungamaug River	Case Road	3106	Coventry	41.7813	-72.3561	X	
1943	Spice Brook	Gerhing Road and Old Kent Road intersection	3106-07	Tolland	41.8459	-72.3865		X
972	Spruce Brook	confluence with Jefferson Hill Brook	6906	Litchfield	41.74807	-73.1194	X	
331	Steele Brook	North Parking Lot for Municipal stadium	6912	Waterbury	41.58051	-73.0703	X	X
338	Still River	Oil Mill Road	6600	Danbury	41.38981	-73.4637	X	
333	Still River	Route 7 overpass adjacent to Gray's Bridge Road	6600	Brookfield	41.4389	-73.401	X	

1609	Still River	USGS station upstream Rte 7	6600	Brookfield	41.46611	-73.4036	X	
1611	Still River	Eagle Road Crossing	6600	Danbury	41.41303	-73.4217	X	
1613	Still River	Segar Street Crossing	6600	Danbury	41.38227	-73.4742	X	
2736	Still River	Casper Street	6600	Danbury	41.39347	-73.4392	X	
2737	Still River	White Street below Padanaram Brook confluence	6600	Danbury	41.39705	-73.4522	X	
2738	Still River	Rose Street	6600	Danbury	41.39766	-73.46	X	
2281	Still River	RR bridge adjacent to Lake Street (West Street)	6600	Danbury	41.39292	-73.4636	X	
337	Still River	Triangle Street	6600	Danbury	41.39233	-73.4348	X	
339	Still River	Old Newtown Road	6600	Danbury	41.40633	-73.4253	X	
2638	Stony Brook	Adjacent to Tramart Drive upstream Fitch Hill Rd (upstream trib to stony draining	3005	Montville	41.48904	-72.1318		X
2533	Straddle Brook	Townsend Road	3108	Andover	41.727	-72.3782	X	
1944	Stratton Brook	between telephone poles # 267 and #268	4318	Simsbury	41.85955	-72.8481	X	X
1614	Sympaug Brook	Cross Street	6604	Danbury	41.39215	-73.4285	X	
465	Tenmile River	Jones Road	3110	Lebanon	41.69373	-72.2632	X	X
1950	Town Farm Brook	Cascade Road	6000-37	New Milford	41.55617	-73.3912		X
2250	TwoMile Brook	Brookside/Opekun Road and Route 34	6000-77	Orange	41.3113	-73.0592		X
2241	Umpawaug Pond Brook	Simpaug Turnpike at RR crossing	7200-03	Redding	41.31685	-73.4443	X	
1975	Weekeepeemee River	Route 132	6804	Woodbury	41.58564	-73.2292	X	X
2245	West Aspetuck River	Merryall Road at Lesh Lane	6500	New Milford	41.62032	-73.4212	X	X
1777	West Branch Farmington River	Rte 318 Bridge	4300	Barkhamsted	41.9168	-72.989		X
1746	West Branch Farmington River	at Upcountry Sports	4300	New Hartford	41.87319	-72.9648	X	
2679	West Branch Naugatuck River	Adjacent to Rte 272 upstream Drakville Trailer Park	6904	Torrington	41.85607	-73.1602	X	X
1433	West Branch Salmon Brook	At Holcomb Farm USGS monitoring well at the site	4319	Granby	41.94639	-72.8392	X	X
2264	West Branch Salmon Brook	Dalene Road	4319	Hartland	41.97451	-72.896	X	X
2246	West Branch Salmon Brook	Simsbury Road on "Rocks" property	4319	Granby	41.93528	-72.8301		X

6129	Wewaka Brook	2nd Wewaka Brook Road crossing up from route 133 just above Beach Hill Road	6000	Bridgewater	41.50103	-73.3497	X	
1464	Whiting River	cornfield below tunnel	6101	North Canaan	42.01973	-73.2651	X	X
458	Willimantic River	Stafford POTW	3100	Willington	41.94227	-72.3058	X	
2666	Willow Brook	behind # 208 Baldwin Ave	5206	Meriden	41.5425	-72.7707	X	X