

# 2011

## Ambient Fish Community



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

# Work Summary Document Ambient Fish Community -2011- Mike Beauchene

## Background:

Each June through September the Connecticut Department of Energy and Environmental Protection (DEEP) Bureau of Water Protection and Land Reuse (WPLR) ambient monitoring and assessment program works cooperatively with the Bureau of Natural Resources Inland Fisheries Division (IFD) to collect ambient fish community data. This cooperative effort began in 1999 and in each year since valuable fish community data have been generated to support a variety of program uses. The primary use is to support WPLR bi-annual water quality assessments as required under the Federal Clean Water Act ([http://www.ct.gov/dep/cwp/view.asp?a=2719&q=325610&depNav\\_GID=1654](http://www.ct.gov/dep/cwp/view.asp?a=2719&q=325610&depNav_GID=1654)). Several other uses of this data include; development of dual fish community multi-metric indices (MMI), development of a Biological Fish Community Model (BCG), water temperature criteria development, support of stream flow standard development, and various projects requiring ambient fish community data. These reports may be available on the WPLR monitoring and assessment summary report page at: [http://www.ct.gov/dep/cwp/view.asp?a=2719&q=487892&depNav\\_GID=1654](http://www.ct.gov/dep/cwp/view.asp?a=2719&q=487892&depNav_GID=1654)

Data are collected from wadeable streams and rivers following the WPLR quality assurance-quality control project plan. In general approximately 10 to 20 times the mean stream width is used for a sample segment. The gear used at a site depends upon the conditions and can be a single backpack electrofishing unit, up to several tote-barge units. As many individual fish as possible are netted, identified to species, and measured to the nearest centimeter. All individuals are released back to the stream segment.



## 2011 summary:

During the 2011 fish community index period (June-September) 173 single pass all species samples were collected at **170 sample locations** (Figure 1). Three (3) of the 173 samples were re-visit and sample of the same segment reach for quality control purposes. From these locations, **38 fish species** were identified and enumerated (Table 1).

In general stream flows were higher than normal for much of the index period and many stream flows were well above median value for much of the index period. With a greater volume of water in most streams than typical, sampling was challenging.

Concurrent with electrofishing, a water sample was collected, frozen, and then submitted to the laboratory at UConn Center for Environmental Sciences and Engineering (CESE). Parameters included general chemistry, nitrogen series, phosphorous series, and key anions & cations.

**Sampling rationale:**

Sampling was focused on locations in the western portion of the state with the majority of the stations located in the Housatonic major basin. Stations were selected based on WPLR data priorities including; index sites sampled annually, bi-annually, every five years (rotating basin), and a single time. Several other projects which required ambient fish community data were; BCG tier assignment, periphyton community analysis, coldwater temperature regime determination, climate, inconclusive aquatic life use support assessments, macroinvertebrate multi-metric index (MMI) model prediction, and various supporting data (Figure 1). Ambient fish community sampling priorities in 2012 will be focused in the Connecticut major basin.

**Level of effort:**

The 173 samples were collected using a total of **62** crew days distributed across the following programs; WPLR aquatic life use support assessments, IFD general monitoring, and IFD wild trout management, trout fry evaluation, and wild rainbow trout evaluation (Figure 2 and Table 2)

Thirty-nine (39) of the 62 crew days were scheduled to support WPLR ambient fish community assessments. Fourteen (14) of the 39 days were WPLR crews and twenty-three (23) by IFD crews. There was one (1) day where sampling required both a crew from the eastern and western districts. As the majority of the WPLR site list was focused in the Housatonic major basin the western district IFD crews had the greatest number of days, sixteen (16), and the eastern district, seven (7).

In addition to the annual cooperative work prioritized above, significant additional effort by IFD biologists Michael Humphreys, Edward Machowski, and Neal Hagstrom provided an additional 23 crew days. As WPLR was focused in the Housatonic major basin and these staff (except for Neal) had sites scheduled in this basin, modification of the sampling effort to single pass all species from game fish only, resulted in an additional 42 samples. Fifteen (15) of the twenty-three (23) sampling days led by Michael Humphreys generated twenty-four (24) samples. Five (5) sampling days led by Edward Machowski generated twelve (12) samples and three (3) sampling days led by Neal Hagstrom generated six (6) samples.

**Fish Summary:**

- Interesting species observations included the banded sunfish, slimy sculpin, central mudminnow, wild rainbow trout (naturalized), and walleye.
- Forty-nine percent (49.4%) of sample locations (84/170) had wild brook trout present.
- Cold water multi-metric index (CWMMI) scores ranged from 80.5 to 13.7. The highest score was at Sages Ravine Brook, Salisbury and the lowest at Norwalk River, Wilton.
- Mixed water multi-metric index (MWMMI) scores ranged from 72.8 to 27.1. The highest score was at Green Fall River, North Stonington and the lowest at Sasco Brook, Westport.

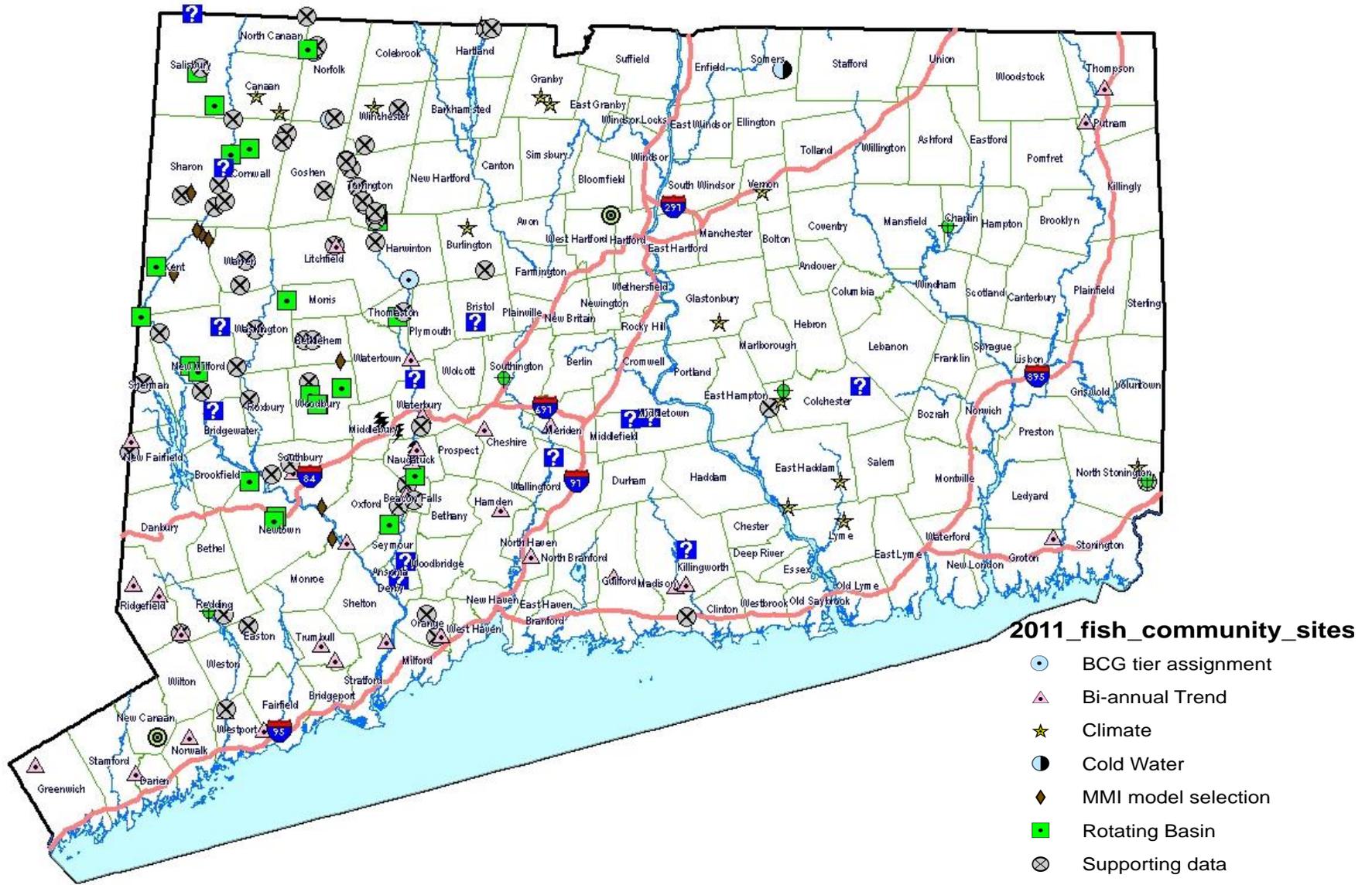


Figure 1. The primary project supported and the location of 170 fish community samples collected during the 2011 index period.

Table 1. Fish species and sample occurrence data for the 2011 index period. Fish species are sorted descending by percentage of sites observed. Each are provided a rank from 1 = most commonly found to 39 = only a single sample occurrence.

Common name	Species code	Percent of samples (out of 170)	Occurrence rank
Blacknose dace	BL	91.8	1
White sucker	WS	78.8	2
Longnose dace	LD	64.1	3
Bluegill sunfish	BG	53.5	4
Creek chub	CR	50.0	5
Brook trout, wild	WBK	49.4	6
Pumpkinseed	PS	48.2	7
Tesselated darter	TD	47.6	8
American eel	AE	40.0	9
Brown trout, naturalized	WBN	40.0	9
Largemouth Bass	LM	32.4	11
Common shiner	CS	31.8	12
Brown trout, stocked	BN	24.1	13
Fallfish	FF	23.5	14
Golden shiner	GS	21.8	15
Rainbow trout, Stocked	RW	19.4	16
Redbreast sunfish	RS	18.2	17
Cutlips minnow	CM	17.6	18
Brown bullhead	BB	16.5	19
Yellow perch	YP	14.7	20
Brook trout, stocked	BK	12.9	21
Smallmouth bass	SM	11.8	22
Rock Bass	RB	10.0	23
Slimy sculpin	SC	8.8	24
Redfin pickerel	RP	7.6	25
Green sunfish	GR	7.6	25
Chain pickerel	CP	6.5	27
Yellow bullhead	YB	5.9	28
Brown trout, Fry Stocked	FSWBN	5.3	29
Atlantic salmon, fry stocked	SA	3.5	30
Bluntnose Minnow	BM	3.5	30
Rainbow Trout (naturalized)	WRW	2.9	32
Sea lamprey	SL	1.8	33
Fathead minnow	FM	1.8	33
Spottail shiner	SS	1.2	35
Common Carp	CA	1.2	35
Black Crappie	BC	1.2	35
Central mudminnow	MM	1.2	35
Mummichog	MU	0.8	39
Swamp darter	SD	0.8	39
Tiger Trout	TT	0.8	39
Banded Sunfish	BS	0.6	39

Tiger Trout	TT	0.6	39
Walleye	WA	0.6	39
White Perch	WP	0.6	39

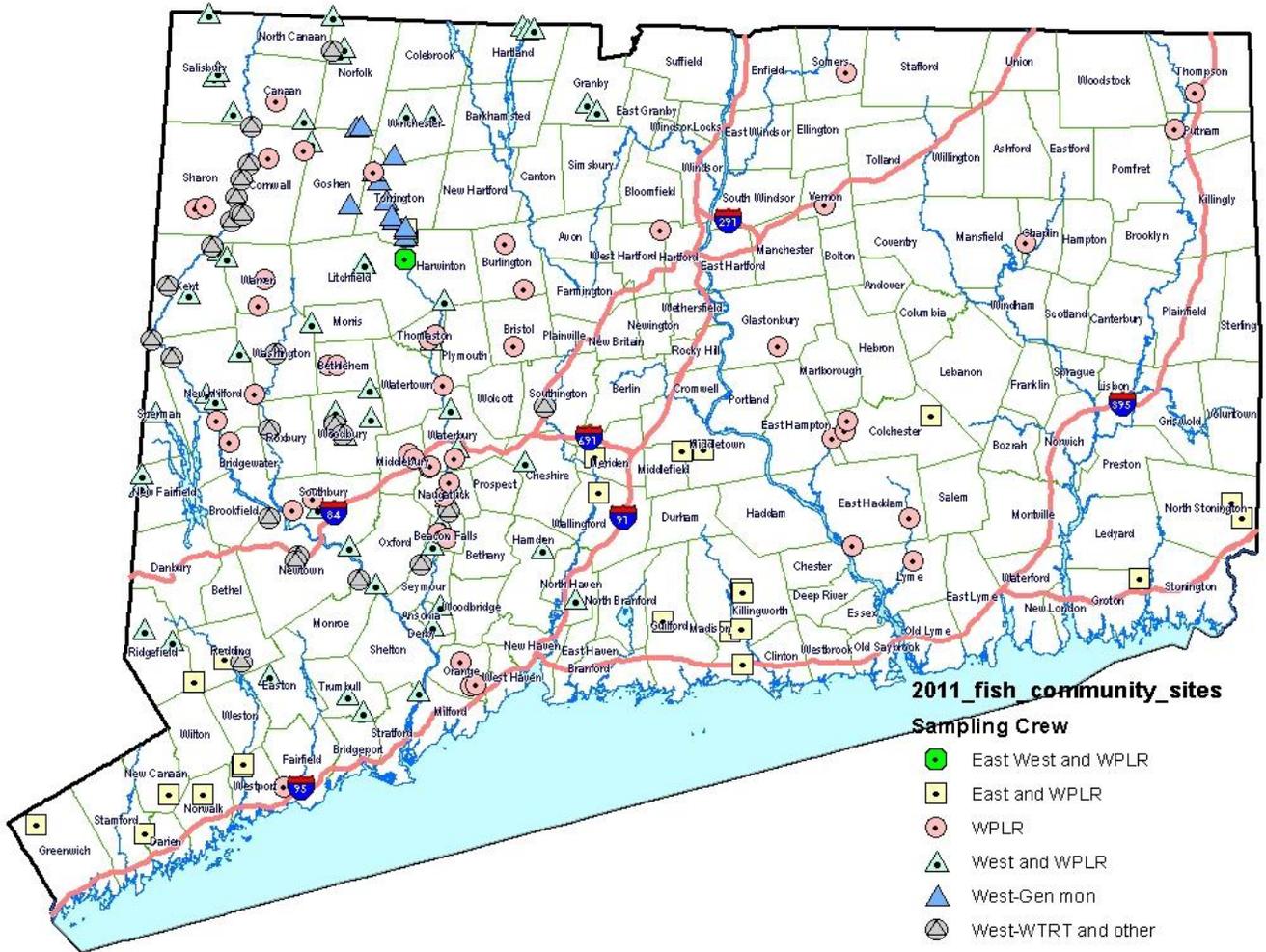


Figure 2. The Locations where ambient fish community data were collected in 2011 and the crew that was responsible for collecting the data at that location.

Table 2. The distribution of the sampling effort, crew days and number of samples collected by collection crew for ambient fish community samples collected during 2011. \* indicates one pass all species data collected by Inland Fisheries staff in addition to traditional game fish only sample methodology at sample locations.

Crew	crew days	Samples collected
East, West & WPLR combined	1	2
East and WPLR	7	25
West and WPLR	16	55
WPLR	14	48
East-general monitoring*	3	6
West-general monitoring*	5	12
West-wild trout management, trout fry stocking evaluation, and wild rainbow trout evaluation*	15	24
<b>Total</b>	<b>62</b>	<b>172</b>

## Details of WPLR site selection rationale:

**Integrated Water Quality Report Aquatic Life Use Support Data Acquisition (75 locations):** The primary rationale for collecting ambient fish community data is to have a second biological community to complement traditional macroinvertebrate community assessments. The benefit of multiple biological communities is that each can have a different response to a stressor. For example if water quantity is limiting, the fish community will respond before the macroinvertebrate community. With only one community, detection of the issue may not be possible. Long-term data sets allow WPLR to track the quality of the biological communities over time. WPLR has divided sampling locations into several groups based upon the frequency of sample collection.

**Annual sampling:** These sites have the longest period of record dating back to the mid 1970's. These sites are primarily historical macroinvertebrate reference sites utilized for the EPA Rapid Bioassessment Protocol 3 comparisons. Sampling every year allows WPLR to maintain this extensive period of record.

**Bi-annual sampling:** These sites have been sampled multiple times since the mid-1980's and in general are sites on major waste receiving streams to evaluate NPDES discharge permit compliance. Sampling every two years allows WPLR to maintain current status and detect significant change should it occur.

**Rotating Basin Sites:** The rotating basin strategy divides into four bins which are roughly equivalent to one or two major basin units. Sampling locations are selected within each bin based on need for data in a particular river segment, to evaluate a potential pollution concern, to have data from as many sub-regional basins as possible, and waters not traditionally targeted for other trend analysis above. Sampling of these

sites once every 5 years allows WPLR to maintain a presence and detect change should it occur.

***Probabilistic Sites:*** WPLR uses randomly selected locations to develop a statistical estimate of aquatic life use support for wadeable streams and rivers. A minimum of 60 sites are selected from a list generated and provided by US EPA. Each of the stream locations has equal probability of being selected. Probabilistic sites are often sampled only once unless results based on the initial sampling warrant increasing the sampling frequency for trend assessment or if other special projects utilize the site. Probabilistic sampling is next scheduled for 2015.

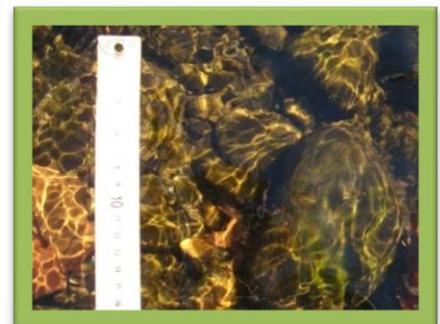
***Inconclusive assessment:*** Occasionally based on the community present, designation of full support or not support cannot be made based on the data collected. In these situations a second sample event is required.

**Climate (15 locations).** As part of an initiative put forth by US EPA and recent discussions regarding climate change and its implications to biological communities, WPLR has selected 15 locations to sample annually. These locations are located statewide and tend to be in minimally-disturbed watershed. The intent of the sampling is to begin a long-term data set in areas where most landuse variables are controlled. The intent would be to attempt to detect community change reflected by any climate change.

**Intensive watershed survey (5 locations).** Occasionally assessments within some waterbodies are very complicated. In these situations several site locations may be targeted in key stream segments. The intent of this approach is to find, if possible, sources of significant community shift. With this data it is possible to begin to determine potential causes and sources which could be helpful in development of a Total Maximum Daily Load (TMDL). Sampling frequency is usually one time at each site per index period.

**Macroinvertebrate MMI model-high quality prediction (9 locations).** A predicative model was developed by WPLR staff. This model uses National Land Cover data coupled with historical macroinvertebrate community data to predict the macroinvertebrate multi-metric index score for any stream segment in the state. As this model has just been finalized in 2011, beginning in 2011, WPLR has selected up to 10 locations predicted to have very high MMI scores. Sampling is one time and the intent is to develop a list of the state's best waters to complement the states' list of impaired waters.

**Periphyton community structure (2 locations):** The focus of this project is to strengthen DEEP's current efforts to develop effects based nutrient criteria through the collection of chemical and biological data across the range of enrichment conditions and varying nutrient loadings in Connecticut's freshwater rivers and streams. Data collection of water chemistry, benthic algae, benthic macroinvertebrates, and fish communities will help to



establish differences in aquatic life response due to changes in enrichment conditions. It will also provide insight into the effects of excess nutrients through anthropogenic input on aquatic life communities.

Data collected will be used to establish a better understanding of aquatic life response to varying enrichment conditions. This understanding will help reinforce achievement of aquatic life use goals through DEEP's current efforts to develop nutrient criteria and will assist in guiding any necessary refinements to better ensure that aquatic life uses are fully attained. Funding for this project was received through an U.S. Environmental Protection Agency 104(b) (3) grant.

**Cold water temperature regimes (2 locations):** As part of the review of water quality standards in 2010 it was determined a gap in understanding fish community and water temperature regimes existed, especially for cold water streams. As a result, WPLR in cooperation with IFD set Onset Water Temp Pro temperature probes out in 11 sites known to have significant population of slimy sculpin, a coldwater stenotherm, and/or eastern brook trout. The intent of this project is to collect data over a period of five consecutive years. This data will be used to inform the WQS revision process. A separate report for this data is available on the DEEP website at, [http://www.ct.gov/dep/cwp/view.asp?a=2719&q=487892&depNav\\_GID=1654](http://www.ct.gov/dep/cwp/view.asp?a=2719&q=487892&depNav_GID=1654)



**Supporting data (57 locations):** All species data from these locations may provide additional samples from waterbodies with an established station, may provide data from a site location without previous data, may be a re-sample of an IFD stream survey project site (1988-1994), or may be useful for a variety of other situations. In general these locations are extra to scheduled work plans and are fit in as time and conditions permit.

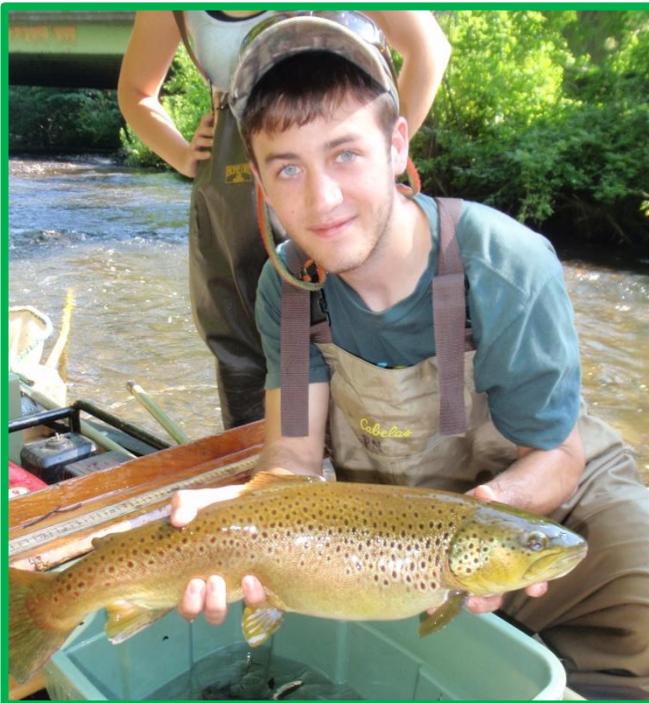


## **Fish community data and assessment of aquatic life use support:**

**Fish Community Biological Condition Gradient**<sup>1</sup>**work:** Funding supplied to Tetra-Tech via US EPA Region 1 enabled initiation of a project to develop a fuzzy set model calibrated to Connecticut which would predict the Biological Condition Gradient (BCG) tier assignment based on the fish community present. To accomplish this task a regional meeting was held at DEEP on 11/8 and 11/9 2010. A second set of follow-up conference calls were held during fall 2011. At this point a status report to date recommends additional funding to increase the probability that the fuzzy set model will reliably predict the BCG tier assigned by fisheries biologists.

The objectives of the fish BCG project are:

1. to develop the BCG for Connecticut, using fish community data (one or more may be necessary due to natural fish distribution patterns); and
2. To integrate with the existing BCG calibrated for macroinvertebrate communities of high gradient streams.



The BCG provides a powerful approach for an operational monitoring and assessment program, for communicating resource condition to the public and for management decisions to protect or remediate water resources (Figure 4). The BCG and the calibrated decision system allow practical and operational implementation of multiple aquatic life uses in a state's water quality criteria and standards. Adoption of the BCG as an assessment tool in the context of multiple Aquatic Life Uses (Tiered Uses) yields the technical tools for protecting the state's highest quality waters, as well as developing realistic restoration goals for impaired waters.

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<sup>1</sup> Davies, Susan P., and Susan K. Jackson. 2006. The Biological Condition Gradient: A Descriptive Model for Interpreting Change in Aquatic Ecosystems. *Ecological Applications* 16:1251–1266.

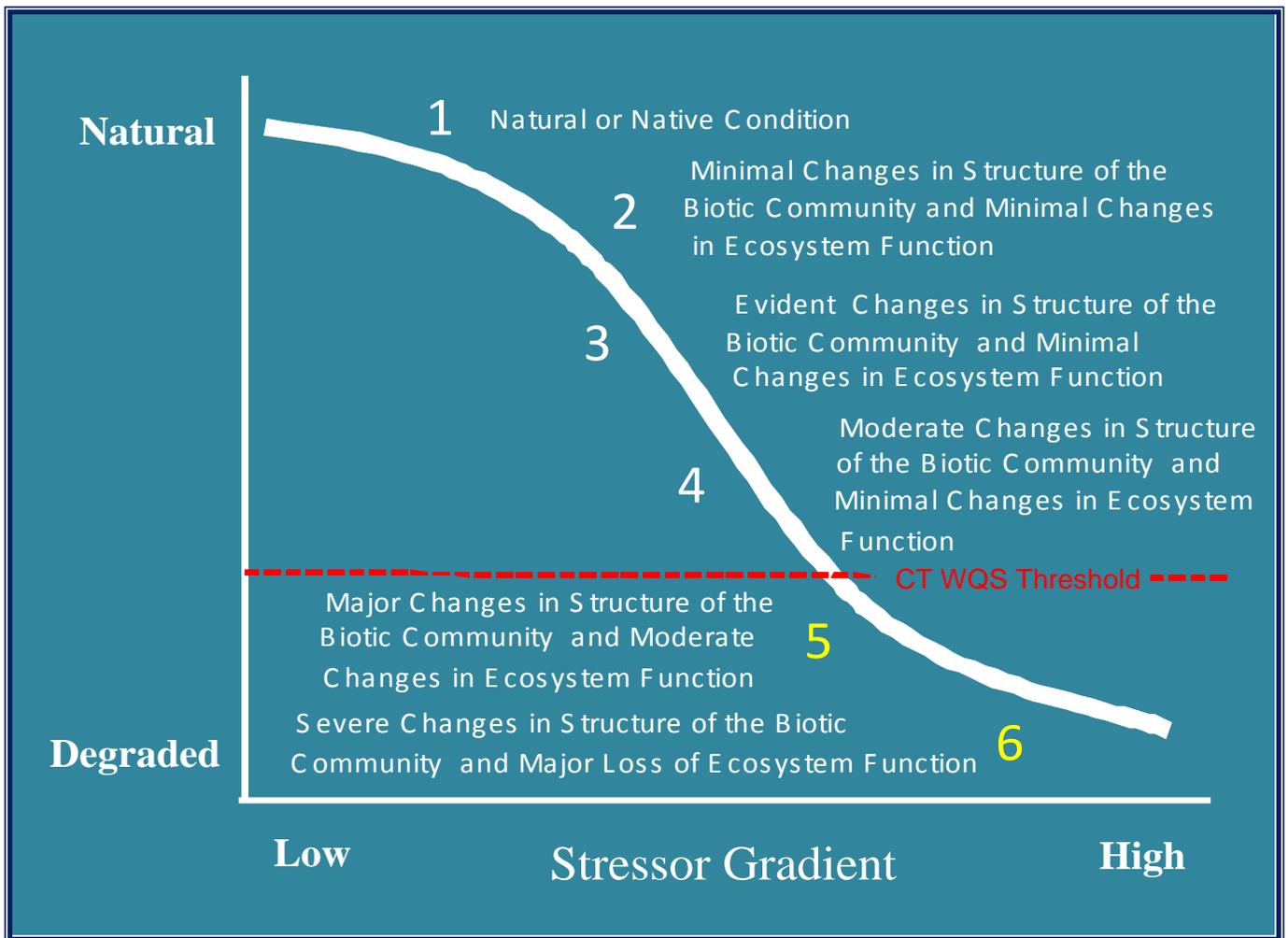
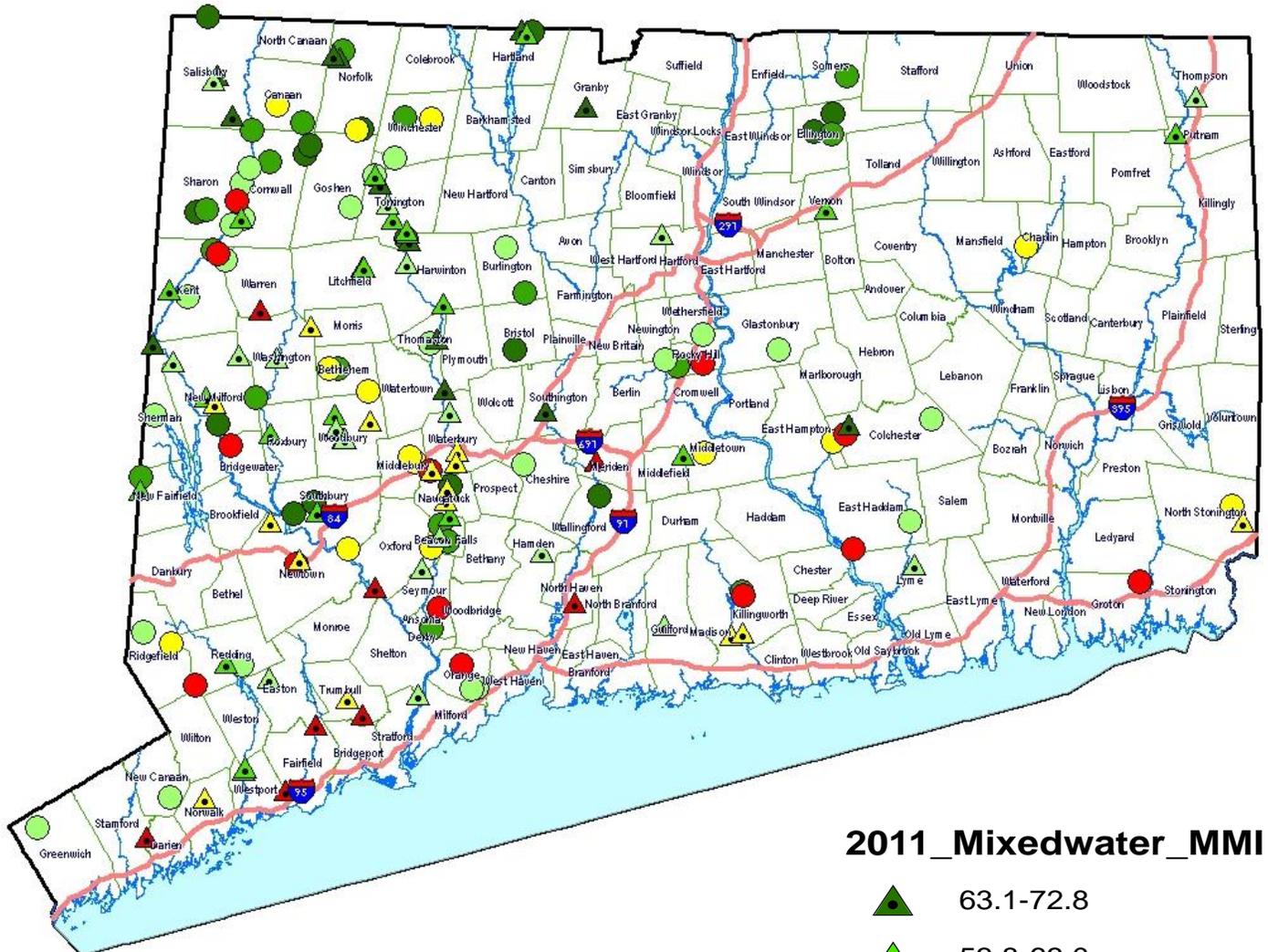


Figure 4. The Biological Condition model as adapted for Connecticut water quality standards.

**Connecticut’s Multi-Metric Fish Community Indices:** Historical fish community assessment by DEEP has been a combination of Best Professional Judgment and the application of 2 fish community indexes of Biological Integrity from Vermont Department of Environmental Conservation. Just prior to the 2009 sampling season, 2 multi-metric fish community indices specific to Connecticut’s fish fauna and landscape were finalized and published in Ecological Indicators<sup>2</sup>. These indices should provide a valuable fish community assessment tool to augment traditional macroinvertebrate data for a more comprehensive assessment of Federal Clean Water Act “Aquatic Life Use Support” assessments. Work remains to determine appropriate implementation strategy. The cold water MMI focuses on small coldwater systems (those with watershed areas < 15 km<sup>2</sup>) while the mixed water MMI focuses on medium to large cool water systems (those with watershed areas >15km<sup>2</sup>). There may be some overlap at those sites with watershed areas between 15km<sup>2</sup> and 40 km<sup>2</sup> (Figure 5 and Table 4).

<sup>2</sup> Kanno, Y., J.C. Vokoun, and M. Beauchene. 2010. Development of dual fish multi-metric indices of biological condition for streams with characteristic thermal gradients and low species richness. Ecological Indicators 10:565-571.



**2011\_Mixedwater\_MMI**

- 63.1-72.8
- 53.8-63.0
- 46.6-53.7
- 35.8-46.5
- 27.1-35.7

**2011\_Coldwater\_MMI**

- 67.8-80.5
- 58.1-67.7
- 51.7-58.0
- 41.6-51.6
- 13.7-41.2

Figure 5. Multimetric index (MMI) scores for both mixedwater (triangles) and cold water (circles) where appropriate for fish community data collected during the 2011 index period. The MMI is its own tool and is separate from BCG model scores.

Table 4. Multi-metric scores for each fish community sample collected during 2011. The coldwater MMI is most appropriate for sites with and upstream watershed area of < 15km<sup>2</sup> and the mixedwater MMI for sites with upstream watershed area of > 40km<sup>2</sup>. Both MMI scores are calculated for transition sites, those with upstream watershed area between 15 km<sup>2</sup> and 40 km<sup>2</sup>. Scores with “\*\*\*” contained fewer than 20 individuals in the sample reach and may not be valid. Stream names printed as all capital letters indicate a former IFD stream survey project (1988-1994) site location. *The scores provided in Table 4 are for informational purposes only. Interpretation and application of the scores in relation to water quality standards is in progress and have not been finalized.*

WPLR station id	Stream Name	Sample ID	date	FISHERIES NUMBER	landmark	Municipality	Basin id	Width (m)	Length (m)	YLat	XLong	Upstream area (SQKM)	CW MMI	MW MMI
2481	Aspetuck R	25066	6/20/2011	23222	Valley Road pull-off and trail head	Easton	7202	10	200	41.2771	-73.3275	33.7	<b>40.2</b>	<b>51.1</b>
3	Bantam R	25200	7/8/2011	23258	Smokey Hollow Road	Morris	6705	18	150	41.68836	-73.2668	132.1		<b>40.3</b>
915	Bantam R	25260	7/20/2011	23292	Confluence with West Branch Bantam River	Litchfield	6705	10	150	41.75885	-73.1841	27.3	<b>67.3</b>	<b>59.6</b>
4	Beacon Hill BK	25949	7/27/2011	23308	Andrasko Road	Beacon Falls	6918	9	155	41.46845	-73.0501	26.5	<b>77.6</b>	<b>56.2</b>
1236	Beaver BK	25068	6/22/2011	23622	bridge at 55-123 Beaver Brook Road	Lyme	4803	8	102	41.41005	-72.3289	21.6	<b>33.3</b>	<b>51.7</b>
5051	Beaver BK	25134	6/24/2011	23628	DS of Gate 1 Parallel to Beaver Rd	Ansonia	6900	4	100	41.35917	-73.0647	4.2	<b>33.1</b>	
2678	Beaver BK	25133	6/24/2011	23627	at mouth	Ansonia	6900	4	158	41.33507	-73.0766	9.5	<b>62.4</b>	
710	Blackberry R	25124	6/22/2011	23227	Jacquier Farm Complex	North Canaan	6100	11	200	42.00647	-73.2343	38.3	<b>58.9</b>	<b>65.9</b>
6276	Blackberry R	25207	7/11/2011	23265	to route 44 US North Brook	Norfolk	6100	10	125	42.00253	-73.2247	31.4	<b>79.6</b>	<b>69.0</b>
5084	BONNEY BK	25129	6/22/2011	23229	Above Rte 7	Cornwall	6000	5	128	41.81333	-73.3733	3.6	<b>56.7</b>	
5086	BRADFORD BK	25005	6/1/2011	23602	Parallel to Bradford Rd 1 KM US Rte 43	Cornwall	6200	4	112	41.88889	-73.2767	3.0	<b>75.1</b>	
6397	Broad BK**	26445	6/20/2011	23001	off Sykes Road just south of SSF	Ellington		0	50	41.93669	-72.4506	3.8	<b>74.3</b>	
2342	Brown BK	25305	7/21/2011	23296	Route 63	Canaan	6201	6	128	41.9267	-73.2799	14.4	<b>61.8</b>	
2711	Bunnell BK	25009	6/2/2011	23605	at recreation area at vineyard rd and clear brook rd	Burlington	4311	10	165	41.78067	-72.963	8.3	<b>54.2</b>	
1239	Burnhams BK	25067	6/22/2011	23621	Mouth	East Haddam	4800	4	89	41.46031	-72.3343	3.1	<b>53.4</b>	
1981	Carse BK	25953	8/17/2011	23335	route 7 and mouth	Sharon	6009	8	100	41.85517	-73.3755	14.0	<b>55.9</b>	
1998	Chatfield Hollow BK	25140	6/30/2011	23008	covered bridge in state park	Killingworth	5105	12	143	41.37422	-72.593	16.6	<b>41.1</b>	<b>13.7</b>
2334	Chatfield Hollow BK	25142	6/30/2011	23010	Mouth on River Road	Madison	5105	12	150	41.3314	-72.595	29.2	<b>46.6</b>	<b>38.6</b>

1160	Cobble BK	25056	6/15/2011	23214	500 m ds of rte 341	Kent	6013	4	125	41.72167	-73.4572	5.7	<b>53.3</b>	
2664	Coginchaug R	25153	7/5/2011	23024	DS rte 157 at #740 Wadsworth Street	Middletown	4607	11	148	41.5394	-72.6858	64.3		<b>59.6</b>
32	Cooper Pond BK	25157	7/6/2011	23027	plaza entrance bridge	Ridgefield	7300	1	115	41.26768	-73.4422	6.3	<b>38.6</b>	
2304	Day Pond BK	25377	8/23/2011	23642	mouth	Colchester	4700	3	100	41.56234	-72.4338	3.4	<b>36.8</b>	
43	Deep BK	25945	7/26/2011	23305	bridge crossing at former stp outfall	Newtown	6019	8	179	41.40959	-73.2855	13.8	<b>41.7</b>	
6502	dividend BK	26450	7/7/2011	23031	100 m upstream brook street crossing	Rocky Hill		0	50	41.64556	-72.655	6.0	<b>40.0</b>	
58	East Aspetuck R	25057	6/15/2011	23215	Wellsville Road	New Milford	6502	16	146	41.59794	-73.4152	65.4		<b>46.2</b>
2673	East Aspetuck R	25199	7/8/2011	23259	DS of trib on east side adjacent to rte 202 DS of Spruce Lane	New Milford	6502	8	190	41.6546	-73.3785	49.1		<b>49.2</b>
1155	East BR Byram R	25138	6/29/2011	2305	John Street	Greenwich	7410	5	100	41.09948	-73.6832	4.4	<b>55.7</b>	
54	East BR Naugatuck R	25236	7/14/2011	23279	Franklin Drive	Torrington	6905	9	160	41.79773	-73.1158	36.6	<b>69.8</b>	<b>59.5</b>
5184	East BR Naugatuck R	25946	7/26/2011	23327	Between East Main and Wall Street	Torrington	6905	8	107	41.80194	-73.1189	33.2	<b>64.6</b>	<b>57.2</b>
6278	East BR Naugatuck R	25223	7/12/2011	23269	Camp Wahnee Road	Torrington	6905	5	125	41.88531	-73.1365	11.5	<b>54.6</b>	
5932	East Spring BK	25043	6/10/2011		Nonewaug Road and Porter Hill road	Bethlehem	6801	6	127	41.61214	-73.1761	15.1	<b>51.2</b>	<b>59.2</b>
1947	Eightmile BK	25241	7/18/2011	23287	Route 34	Oxford	6023	6	150	41.38425	-73.1642	45.2		<b>29.6</b>
488	Eightmile R	25190	6/29/2011	23248	Prospect Street	Southington	5201	12	200	41.59084	-72.9009	38.2	<b>54.0</b>	<b>68.0</b>
395	Factory BK	25195	7/7/2011	23255	Salmonkill Road	Salisbury	6005	8	230	41.97509	-73.4212	23.7	<b>55.1</b>	<b>49.8</b>
70	Farmill R	25240	7/18/2011	23286	Route 110	Stratford	6025	21	165	41.25909	-73.0979	39.1	<b>62.4</b>	<b>53.2</b>
77	Five Mile R	25139	6/29/2011	23007	Old Norwalk Road	New Canaan	7401	10	120	41.13647	-73.4793	16.1	<b>54.3</b>	<b>24.2</b>
2306	Flat BK	25070	6/22/2011	23624	Route 16	East Hampton	4700	8	125	41.55439	-72.4523	6.6	<b>45.1</b>	
2309	Flat BK	25004	6/1/2011	23601	Lower Barrack Road	Canaan	6200	6	135	41.94587	-73.32	7.9	<b>49.5</b>	
81	French R	25390	8/26/2011	23654	Route 12	Thompson	3300	10	300	41.95477	-71.884	283.0		<b>50.4</b>
84	Fulling Mill BK	25060	6/16/2011	23219	North Main Street	Naugatuck	6915	9	135	41.50212	-73.0471	13.9	<b>71.0</b>	
84	Fulling Mill BK	25382	8/24/2011	23646	North Main Street	Naugatuck	6915	9	135	41.50212	-73.0471	13.9	<b>78.5</b>	
5248	GEROW BK	25310	7/28/2011	23634	100 M DS of Quaker Rd	New Fairfield	8103	2	84	41.49528	-73.5303	148.9		<b>59.1</b>
6268	Goat BK	25035	6/8/2011	23619	Tucker Hill Road at Chase Rd	Middlebury	6916	3	100	41.53577	-73.11	1.1	<b>47.2</b>	
6503	Goff BK, Tributary to	26451	7/7/2011	23028	Parallel to I-91 and silas dean highway	Rocky Hill		0	65	41.67879	-72.6544	2.7	<b>56.4</b>	
6282	Great BK	25313	7/28/2011	23637	Mill Street	New Milford	6000	8	148	41.57325	-73.4094	10.2	<b>73.3</b>	
606	Green Fall R	25147	7/1/2011	23016	confluence with Wyassup Bk US Clarks Fall Rd.	North Stonington	1002	5	101	41.45677	-71.8169	27.0	<b>67.8</b>	<b>72.8</b>
1442	Guinea BK	25125	6/22/2011	23225	mouth above and below River	Sharon	6011	12	130	41.81442	-73.3769	23.2	<b>77.8</b>	<b>58.1</b>

					Road									
5271	Guinea BK	25014	6/6/2011	23609	US West Wood Road #2 at second crossing from RTE 4	Sharon	6011	3	100	41.82	-73.4453	9.2	<b>70.2</b>	
2288	Guinea BK	25013	6/6/2011	23610	USGS gage first West Woods Road #2 crossing from Rte 4	Sharon	6011	8	125	41.82399	-73.4301	2.2	<b>64.2</b>	
2515	Gulf Stream	25307	7/27/2011	23631	Wells Road	Somers	4203	2	75	41.9816	-72.4285	8.7	<b>63.4</b>	
92	Gulf Stream	25219	7/12/2011	23268	Park Ave at Mouth	Torrington	6900	5	105	41.79089	-73.1177	10.9	<b>71.5</b>	
1444	Gunn BK	25126	6/22/2011	23223	Mouth	Cornwall	6000	6	100	41.80596	-73.3903	5.9	<b>53.3</b>	
6185	Haleys BK	25150	7/1/2011	23019	Packer Road in gorge area across from South Norfolk lumber company	Groton	2105	4	153	41.38712	-71.9768	15.8	<b>28.6</b>	<b>43.0</b>
2394	Hall Meadow BK	25220	7/12/2011	23270		Norfolk	6901	6	145	41.9173	-73.1949	10.9	<b>45.1</b>	
5710	HALL MEADOW BK, tributary to	25221	7/12/2011	23271	100 M US Parker Hill Rd	Norfolk	6901	1	63	41.91889	-73.1881	4.0	<b>70.5</b>	
96	Hammonasset R	25144	6/30/2011	23012	Summer Hill Road	Madison	5106	21	150	41.32782	-72.6116	58.1		<b>41.8</b>
98	Hancock BK	25197	7/8/2011	23261	Bridge in Waterville Park	Waterbury	6911	12	148	41.58855	-73.0503	39.9	<b>66.7</b>	<b>49.5</b>
101	Harbor BK	25151	7/5/2011	23021	Coe Road	Meriden	5206	8	123	41.53135	-72.8218	31.4	<b>38.4</b>	<b>35.9</b>
6263	Hart BK	25007	6/1/2011	23604		Goshen	6902	1	75	41.86438	-73.1669	13.3	<b>56.6</b>	
1441	Hatch BK	25128	6/22/2011	23230	Route 7	Sharon	6000	3	120	41.83343	-73.3834	3.7	<b>40.3</b>	
2297	Hemlock Valley BK	25069	6/22/2011	23623	Bone Mill Road	East Haddam	4016	8	103	41.42835	-72.4226	7.7	<b>38.4</b>	
102	Hemp Swamp BK	25135	6/24/2011	23629	Emissions testing Road	Beacon Falls	6900	4	150	41.42937	-73.0766	4.1	<b>47.6</b>	
104	Hockanum BK	25384	8/25/2011	23652	Bethany Road	Beacon Falls	6900	7	104	41.43729	-73.051	12.3	<b>61.3</b>	
123	Hop BK	25061	6/16/2011	23218	RR bridge Naug Glass	Naugatuck	6916	15	110	41.49868	-73.0537	45.1		<b>40.2</b>
1042	Hop BK	25032	6/8/2011	23616	In Hop Brook Flood control area	Waterbury	6916	12	122	41.52139	-73.0778	26.4	<b>66.7</b>	<b>46.4</b>
5308	Hop BK	25034	6/8/2011	23617	Parallel to Regan Rd across from # 284	Middlebury	6916	11	125	41.53028	-73.1028	17.8	<b>47.4</b>	<b>60.3</b>
1156	Hubbard BK	25255	7/19/2011	23288	Route 20 on MDC property	Hartland	4307	14	150	42.03562	-72.9384	94.7		<b>69.3</b>
2728	Hurricane BK**	25257	7/19/2011	23290	Hurricane Brook road	Hartland	4308	3	158	42.033	-72.9208	4.3	<b>74.7</b>	
742	Indian Meadow BK	25203	7/11/2011	23262	Route 44 crossing and end of Loomis Street	Winchester	4302	6	150	41.93048	-73.079	11.5	<b>51.6</b>	
2340	Indian R	25017	6/7/2011	23613	Old Tavern Road	Orange	5306	2	113	41.2651	-73.0129	6.6	<b>55.0</b>	
5338	IVY MOUNTAIN BK	25938	6/6/2011	23202	100 M US Pie Hill Rd	Goshen	6705	8	150	41.82695	-73.205	15.4	<b>57.1</b>	<b>44.3</b>
2312	Jakes BK	25006	6/1/2011	23603	Route 272	Torrington	6902	8	104	41.86461	-73.1679	5.2	<b>52.8</b>	
953	Kent Falls BK	25951	8/2/2011	23322	Mouth to covered bridge in state park	Kent	6012	8	150	41.7769	-73.4192	15.2	<b>63.1</b>	<b>62.4</b>
6271	Kent Falls BK	25055	6/15/2011	23213	top of falls and Dugan road	Kent	6012	12	148	41.7726	-73.4122	15.2	<b>38.8</b>	<b>37.4</b>
6272	Kent Falls BK	25054	6/15/2011	23212		Kent	6012	8	168	41.76398	-73.3997	5.6	<b>57.6</b>	

1519	Kettletown BK	25132	6/23/2011	23626	Mouth	Southbury	6021	8	100	41.42704	-73.206	12.6	<b>42.7</b>	
6400	Kimballs BK**	26447	6/28/2011	23002	upstream of Route 83	Ellington		0	50	41.914	-72.453	4.3	<b>67.3</b>	
5355	LAKE WARAMAUG BK	25252	7/15/2011	23282	150 M US North Shore Rd	Warren	6502	9	100	41.70694	-73.3456	20.5	<b>55.8</b>	<b>32.1</b>
1469	Leadmine BK	25262	7/20/2011	23294	enter near #781 south road, 400 m from south road bridge	Thomaston	6908	15	140	41.71643	-73.0604	41.8		<b>59.3</b>
1333	Little BK	26449	7/7/2011	23029	Cobey Road	Rocky Hill	4600	0	67	41.64968	-72.714	3.0	<b>56.1</b>	
1062	Little R	25391	8/26/2011	23655	US of Route 44 crossing	Putnam	3708	15	110	41.91204	-71.9163	101.4		<b>56.7</b>
155	Little R	26036	9/18/2011	23366	Route 67	Oxford	6920	16	145	41.40581	-73.0926	37.4	<b>59.1</b>	<b>53.3</b>
5990	Little R	26037	8/22/2011	23351	In front of Greenbush Rd. bridge	Redding	7201	11	150	41.29191	-73.3692	15.4	<b>56.7</b>	<b>41.8</b>
2648	Long Hill BK	25154	7/5/2011	23023	at Dunkin Donuts near the inlet to long hill pond at South Main Street and Norfolk	Middletown	4013	3	105	41.54084	-72.653	7.6	<b>46.3</b>	
689	Long Meadow Pond BK	25059	6/16/2011	23217	Elm Street	Naugatuck	6917	8	135	41.48636	-73.0556	21.9	<b>69.2</b>	<b>46.2</b>
689	Long Meadow Pond BK	25388	8/25/2011	23651	Elm Street	Naugatuck	6917	8	135	41.48636	-73.0556	21.9	<b>73.2</b>	<b>58.2</b>
1467	Macedonia BK	25950	8/2/2011	23317	Appalachian Trail Foot Bridge	Kent	6015	19	210	41.72978	-73.4884	45.4		<b>58.4</b>
159	Mad R	25239	7/18/2011	23285	mouth (Washington St.)	Waterbury	6914	14	153	41.54393	-73.0384	67.2		<b>38.3</b>
1035	Meetinghouse BK	25152	7/5/2011	23022	100 meters US confluence w/Quinnipiac River	Wallingford	5200	5	108	41.49126	-72.816	11.1	<b>69.9</b>	
701	Mill BK	25015	6/6/2011	23611	first Cream Hill Road crossing from mouth	Cornwall	6008	7	129	41.88042	-73.331	8.1	<b>64.5</b>	
951	Mill BK	25127	6/22/2011	23228	To 2nd road crossing barrier to fish migration	Cornwall	6008	10	121	41.87197	-73.3634	14.8	<b>55.4</b>	
923	Mill R	25218	7/12/2011	23274	Tuttle Road	Hamden	5302	20	300	41.4259	-72.9056	57.0		<b>47.7</b>
2295	Mott Hill BK	25309	7/27/2011	23633	at Private Drive for houses # 107-109	Glastonbury	4008	4	156	41.66152	-72.5365	7.3	<b>56.2</b>	
6401	Muddy BK	26448	6/28/2011	23004	50 m north of Muddy brook road	Ellington		0	50	41.917	-72.481	3.5	<b>69.1</b>	
997	Muddy R	25217	7/12/2011	23273	Old Maple Street (DS of RR bridge)	North Haven	5208	11	150	41.36679	-72.8543	52.3		<b>27.1</b>
191	Naugatuck R	25379	8/24/2011	2348	Frost Bridge Echo Lake Rd and Route 262	Watertown	6900	10	300	41.61593	-73.0579	353.0		<b>70.5</b>
192	Naugatuck R	25383	8/25/2011	23649	Fire Station	Beacon Falls	6900	10	300	41.44348	-73.0642	674.3		<b>50.4</b>
204	Naugatuck R	25389	8/25/2011	23650	South Leonard Street	Waterbury	6900	10	300	41.53043	-73.0402	535.7		<b>37.7</b>
216	Naugatuck R	25237	7/14/2011	23278	Palmer Bridge Street	Torrington	6900	24	125	41.78911	-73.1145	136.9		<b>69.1</b>
223	Naugatuck R	25235	7/14/2011	23277	Route 118	Harwinton	6900	35	211	41.76306	-73.1173	147.0		<b>51.1</b>
725	Naugatuck R	25380	8/24/2011	23647	Route 222 (6) Crossing	Thomaston	6900	10	300	41.67429	-73.0695	262.6		<b>67.1</b>
230	Nonewaug R	25041	6/10/2011	(blank)	Route 47 (Washington Road)	Woodbury	6802	18	195	41.55753	-73.2122	55.1		<b>53.5</b>

2676	Nonewaug R	25042	6/10/2011	(blank)	USGS gage adjacent to route 6	Woodbury	6802	12	150	41.57831	-73.1745	30.1	<b>51.2</b>	<b>46.5</b>
233	Noroton R	25137	6/29/2011	23006	St. John's Cemetery	Stamford	7403	10	111	41.08984	-73.5152	24.8	<b>18.6</b>	<b>27.4</b>
2741	North BR Park R	25378	8/23/2011	23644	Sunny Reach Drive	Bloomfield	4404	10	300	41.797	-72.72	61.6		<b>50.2</b>
5482	NORTH BK	25208	7/11/2011	23266	Parallel to Ashpotag Rd 500 M US Rte 44	Norfolk	6100	2	135	42.00972	-73.2181	4.5	<b>65.6</b>	
6274	Northfield BK	25131	6/23/2011	23625	Marine and Center Street	Thomaston	6909	9	88	41.66929	-73.0802	17.2	<b>76.0</b>	<b>58.1</b>
6274	Northfield BK	25381	8/24/2011	23645	Marine and Center Street	Thomaston	6909	9	88	41.66929	-73.0802	17.2	<b>57.2</b>	<b>71.6</b>
235	Norwalk R	25156	7/6/2011	23026	Cooper Pond Brook Confluence at Branchville RR	Ridgefield	7300	4	147	41.26747	-73.4414	15.8	<b>13.7</b>	<b>41.6</b>
236	Norwalk R	25155	7/6/2011	23025	Perry Avenue	Norwalk	7300	18	208	41.13587	-73.426	71.5		<b>39.9</b>
6279	Ocain BK	25306	7/21/2011	23297	Route 63	Canaan	6200	7	150	41.90005	-73.269	10.6	<b>70.4</b>	
1748	PENDLETON HILL BK	25149	7/1/2011	23018	PENDLETON HILL BROOK NEAR CLARKS FALLS	North Stonington	1001	6	147	41.47482	-71.8342	13.6	<b>49.4</b>	
269	Pequonnock R	25039	6/9/2011	(blank)	Unity Park	Trumbull	7105	10	107	41.2343	-73.1838	57.2		<b>28.8</b>
2344	Pequonock R	25040	6/9/2011	(blank)	Park Road trail head (upstream of Belden Brook and No Name Trib)	Trumbull	7105	14	80	41.2534	-73.2059	32.5	<b>70.4</b>	<b>43.3</b>
279	Pomperaug R	25198	7/8/2011	23260	Transylvania Brook	Southbury	6800	18	158	41.47171	-73.256	195.8		<b>55.2</b>
1523	Pond BK	25954	8/23/2011	23353	Bridge at State Boat Launch	Newtown	6018	14	210	41.45969	-73.3275	36.0	<b>63.5</b>	<b>46.4</b>
1853	Pond Meadow BK	25141	6/30/2011	23009	at hiking trail crossing	Killingworth	5105	9	125	41.37768	-72.5946	15.0	<b>60.8</b>	
284	Pootatuck R	25944	7/25/2011	23304	Route 84 West overpass	Newtown	6020	12	84	41.41621	-73.2824	53.8		<b>41.0</b>
5545	PURCHASE BK	25337	7/29/2011	23639	Parallel to Little York Rd 100 M US parking lot	Southbury	6000	2	50	41.46861	-73.2911	4.0	<b>74.5</b>	
627	Quaker BK	25311	7/28/2011	23635	Wesylan Outdoor adventure school ropes course	New Fairfield	8101	5	112	41.51021	-73.529	13.2	<b>64.4</b>	
6266	Race BK	25019	6/7/2011	23615		Orange	5307	7	105	41.29204	-73.03	11.0	<b>41.5</b>	
6273	Reed BK	25130	6/22/2011	23231		Canaan	6000	6	120	41.91647	-73.36	1.1	<b>63.1</b>	
237	Ridgefield BK	25065	6/20/2011	23220	Route 35 near old pierce road	Ridgefield	7300	8	110	41.31581	-73.4793	9.9	<b>49.9</b>	
2299	Rugg BK	25202	7/11/2011	23263	at #224 Old Waterbury Turnpike	Winchester	4302	6	150	41.93276	-73.1214	6.4	<b>64.8</b>	
780	Sages Ravine BK	25242	7/7/2011	23257	upstream route 41	Salisbury	6001	6	200	42.04953	-73.4301	9.2	<b>80.5</b>	
314	Salmon Creek	25194	7/7/2011	23254	Route 112	Salisbury	6007	12	138	41.93374	-73.3908	78.4		<b>67.9</b>
316	Salmon R	25376	8/23/2011	23643	RR bridge	Colchester	4700	10	350	41.5742	-72.4294	213.7		<b>66.9</b>
1281	Sasco BK	25016	6/7/2011	23612	Wakeman Lane	Fairfield	7109	6	116	41.14567	-73.3012	21.7	<b>58.3</b>	<b>27.2</b>
319	Saugatuck R	25226	7/13/2011	23040	Route 107 & Route 53 Junction	Redding	7200	13	175	41.29447	-73.3948	52.8		<b>58.0</b>
320	Saugatuck R	25224	7/13/2011	23038	DS end of Fly Fishing Only Area (1 Ford Rd)	Westport	7200	22	80	41.16932	-73.367	197.4		<b>59.9</b>
6281	sawmill BK	25312	7/28/2011	23636	DS Spring Lake confluence	Sherman	6401	3	77	41.58251	-73.5077	6.2	<b>53.1</b>	

6504	sawmill BK	26452	7/7/2011	23030	behind 20 tedwin farms road	Rocky Hill		0	40	41.643	-72.694	3.1	<b>60.6</b>	
6267	Shattuck BK	25033	6/8/2011	23618	upstream confluence with Hop Brook	Middlebury	6916	4	106	41.52019	-73.0792	5.4	<b>39.5</b>	
5599	Shepaug R	26039	8/25/2011	23361	At Hodge Park	Roxbury	6700	26	200	41.56306	-73.3278	339.6		<b>58.6</b>
6317	Shepaug R	26040	8/25/2011	23360	Washington Volunteer Fire Department	Washington	6700	25	180	41.65209	-73.3192	269.3		<b>60.6</b>
6147	Sherman BK	25146	7/1/2011	23020	Harbor Road	Colchester	3903	5	127	41.5792	-72.3	8.2	<b>53.6</b>	
1952	Silver BK	25018	6/7/2011	23614	#46 Old Tavern Road	Orange	5306	5	117	41.2665	-73.0049	7.2	<b>58.1</b>	
2255	South Mountain BK	25012	6/2/2011	23606	East Road	Bristol	4315	4	125	41.66209	-72.947	2.8	<b>75.4</b>	
2772	Sprain BK	25191	6/30/2011	23251	Route 47 adjacent to Papermill Road	Woodbury	6803	8	175	41.5696	-73.2259	28.4	<b>56.3</b>	<b>53.8</b>
328	Spruce BK	25136	6/24/2011	23630	RR Bridge (cold spring road)	Naugatuck	6900	9	119	41.4562	-73.0626	5.4	<b>67.7</b>	
1010	Spruce Swamp Creek	25196	7/7/2011	23256	Behind Well station DS of Route 44	Salisbury	6006	8	148	41.98141	-73.4165	27.3	<b>56.4</b>	<b>68.6</b>
2331	Stonehouse BK	25392	8/26/2011	23653	DS Palmer Road	Chaplin	3204	6	110	41.7812	-72.1509	16.4	<b>56.4</b>	<b>43.1</b>
345	Tankerhoosen R	25308	7/27/2011	23632	Tunnel Road	Vernon	4503	7	148	41.8272	-72.464	28.2	<b>62.4</b>	<b>63.1</b>
348	Ten Mile R	25216	7/12/2011	23272	Route 70	Cheshire	5202	6	100	41.52667	-72.9331	15.1	<b>57.3</b>	<b>73.0</b>
346	Ten Mile R	25952	8/5/2011	23330	Mouth	sherman	6300	25	200	41.66638	-73.5119	541.0		<b>66.6</b>
628	Titicus R	25064	6/20/2011	23221	Sherwood Road	Ridgefield	8104	5	128	41.32866	-73.5218	14.8	<b>52.9</b>	
1951	Town Farm BK (Clatter Valley)	25339	7/29/2011	23641	Clatter Valley Road	New Milford	6000	3	100	41.54772	-73.3889	9.8	<b>40.9</b>	
597	Transylvania BK	25336	7/29/2011	23638	Whale Road	Southbury	6806	5	113	41.48264	-73.2595	17.8	<b>70.3</b>	<b>58.0</b>
1452	Valley BK	25256	7/19/2011	23289	Route 20 on MDC property	Hartland	4306	6	150	42.03152	-72.9318	38.6	<b>60.1</b>	<b>61.8</b>
6283	Walker BK	25338	7/29/2011	23640	Walker Brook Road South	Roxbury	6700	6	168	41.60437	-73.3507	10.6	<b>61.0</b>	
919	Weekepeemee BK	25254	7/15/2011	23284	Wood Creek Road	Bethlehem	6804	7	95	41.63883	-73.2224	18.0	<b>62.8</b>	<b>54.8</b>
1468	Weekepeemee BK	25192	6/30/2011	23249	Jacks Bridge Road at USGS gage	Woodbury	6804	12	208	41.55753	-73.2155	68.7		<b>62.2</b>
1975	Weekepeemee BK	25044	6/10/2011	(blank)	Route 132	Woodbury	6804	12	45	41.58564	-73.2292	32.0	<b>59.3</b>	<b>56.3</b>
363	West Aspetuck R	25058	6/15/2011	23216	Aspetuck Road	New Milford	6500	13	100	41.60456	-73.429	45.4		<b>61.8</b>
1170	West BR Bantam R	25261	7/20/2011	23293	behind school	Litchfield	6703	6	150	41.75797	-73.1861	22.1	<b>69.4</b>	<b>68.6</b>
1812	west BR Naugatuck R	25238	7/14/2011	23280	confluence with East Branch	Torrington	6904	16	128	41.798	-73.1177	88.0		<b>59.8</b>
2679	west BR Naugatuck R	25234	7/13/2011	23276	Adjacent to Rte 272 upstream Drakville Trailer Park	Torrington	6904	18	173	41.85607	-73.1602	49.4		<b>64.0</b>
6285	west BR naugatuck R	25947	7/26/2011	23328	about 0.25 miles DS rte 4	Torrington	6904	18	87	41.81394	-73.1401	84.2		<b>60.4</b>
6286	west BR Naugatuck R	25948	7/26/2011	23329	below FCA	Torrington	6904	14	108	41.86629	-73.167	31.0	<b>70.8</b>	<b>57.9</b>
6284	west BR	25939	6/6/2011	23203	end of brass mill dam road	Torrington		15	135	41.83208	-73.1473	63.2		<b>46.9</b>

	Naugatuck R													
1433	West BR Salmon BK	25258	7/19/2011	23291	At Holcomb Farm USGS monitoring well at the site	Granby	4319	9	175	41.94639	-72.8392	32.1	<b>60.4</b>	<b>72.3</b>
1288	West BR Saugatuck R	25225	7/13/2011	23039	Glendenning Parking Lot	Westport	7203	4	85	41.17179	-73.3643	30.9	<b>24.4</b>	<b>55.6</b>
365	West R	25145	6/30/2011	23013	South of Route 80	Guilford	5110	13	148	41.33994	-72.7154	27.4	<b>54.9</b>	<b>51.0</b>
6264	Wildcat BK	25010	6/2/2011	23607		Burlington	4314	6	100	41.72791	-72.9326	5.8	<b>61.5</b>	
5768	WOMENSHEN UCK BK	26038	8/24/2011	23358	US Station Rd	New Milford	6016	8	150	41.64583	-73.48	24.2	<b>54.4</b>	<b>49.1</b>
933	Wood Creek	25253	7/15/2011	23283	Paddy Hollow Road	Bethlehem	6804	4	128	41.63868	-73.2362	8.8	<b>50.8</b>	
605	Wyassup BK	25148	7/1/2011	23017	upstream of Clarks Falls Road	North Stonington	1001	5	125	41.45664	-71.8172	29.7	<b>52.0</b>	<b>44.1</b>

