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Annual Performance Report

2014-15

Connecticut Inland Fisheries

Farmington River Management

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Department of Energy and Environmental Protection
Bureau of Natural Resources
Inland Fisheries Division

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Job 5: Farmington River Management

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Cover photo: Large, wild brown trout sampled from the West Branch Farmington River (Staff photo).

Summary

Annual electrofish sampling was abbreviated this year due to constraints with seasonal staffing. The estimated density of trout in the TMA (num/mile) during population sampling in 2014 was higher than in any prior year, within the Year-round TMA. The proportion of wild brown trout (vs. stocked trout) declined in the Year-round TMA. These findings may have been biased by the reduced sampling efforts and lack of data from additional standard sample sites within the Year-round TMA. The Seasonal TMA sections were not sampled this year.

Weather conditions resulted in high flows during May and June which negatively impacted fishing in sections of the river below the Still River. Cooler than normal summer air temperatures resulted in water temperatures that were favorable to trout growth for the majority of the summer. Subsequently infrequent late summer rains caused fall flows to decline to a point where spawning sites for brown trout in early-October were negatively impacted. However, for the second year in a row, fall air temperatures were warmer than normal and delayed the beginning of the brown trout spawning by about two to three weeks. By that time rains and water releases from lake draw-downs upstream within the drainage, provided adequate flows for spawning to occur.

Background

The Farmington River is a federally designated Wild and Scenic River (14 miles) and regionally recognized trout fishery. Cold, hypolimnetic water releases from Goodwin Dam create a unique tailwater fishery that supports a sizeable trout population throughout the year. In 1988, a Trout Management Area (TMA) was designated for a 1.8 mile section of the river. Year-round catch-and-release trout fishing regulations were instituted to capitalize on this unique fishery resource. Since it's original inception, the TMA has been expanded twice to accommodate angler demand and to reduce congestion. While the trout fishery has historically been supported by hatchery stockings, during the last 15 years, a wild Brown Trout population has become established within the year-round catch-and-release TMA. In 1994, a Seasonal TMA (catch-and-release regulations in effect for only part of the year) was established in a downstream section of the river in Avon, Burlington and Unionville. Over the intervening years a variety of trout regulations have been used to manage different sections of the river including: catch-and-release, length and creel limits, as well as terminal tackle limitations (barbless hooks). Current work has focused on evaluating the effects of recently enacted, streamlined trout fishing regulations in the river above Unionville. The entire 22 miles of the upper river from Goodwin Dam to Rte 177 in Unionville can now be fished year round. This includes the 5.3 mile year-round TMA (Fig. 1- section with regulation #2) where no harvest is permitted.

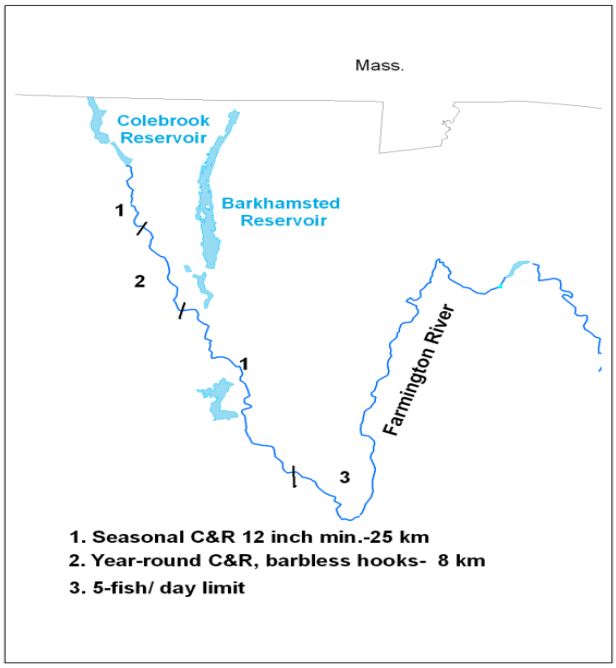

Figure 1 .Regulations that went into effect on the Farmington River in 2012.

Approach

In the past as resources permitted, angler surveys were conducted using a stratified roving creel design (see Stream Angler Survey, Study 1, Job 2). Standard trout stockings (numbers, species, sizes) specific to each area of the river are done each spring, summer and fall. Fin clipping and/or elastomer tagging are used to mark and later identify specific groups of stocked trout. Trout population sampling is conducted in late summer using site-specific, standardized electrofishing protocols (Hagstrom et al. 2010). When conducting standardized sampling, Brown Trout that have over-wintered (> 1 year) are preferentially collected to serve as brood stock for the development and maintenance of the Survivor Brown Trout strain (see sidebar on pg.7); fish of wild origin are selected whenever possible. In order to meet minimum egg production numbers, some recently stocked fish (5-6 months in the river) can also be taken for brood stock when necessary. To develop an index of

natural spawning success, counts of redds (trout nests) are conducted at selected trout spawning areas along the Farmington River each fall, as resources permit.

Key Findings

Flows and water temperatures

Observation of anglers has shown that, stream flows strongly influence fly anglers ability or willingness to fish the Farmington River. Fly anglers practice different techniques with terminal tackle under different flow regimes. The preferred flows for dry fly fishing (Figures 2 and 3) differ for those for nymph/streamer fly fishing, for two sections of the Farmington River. These terminal tackle categories are based on observed behavior of fly angler's across a range of flow regimes and are specific to each river section. Flows in the Farmington River were conducive to fly fishing in all river sections early in the year. The section of the Farmington River above the Still River was fishable throughout most of the year (Fig. 2), but spring rains raised river level, downstream of the Still River confluence, to unfishable levels for most of May and June (Fig 3).

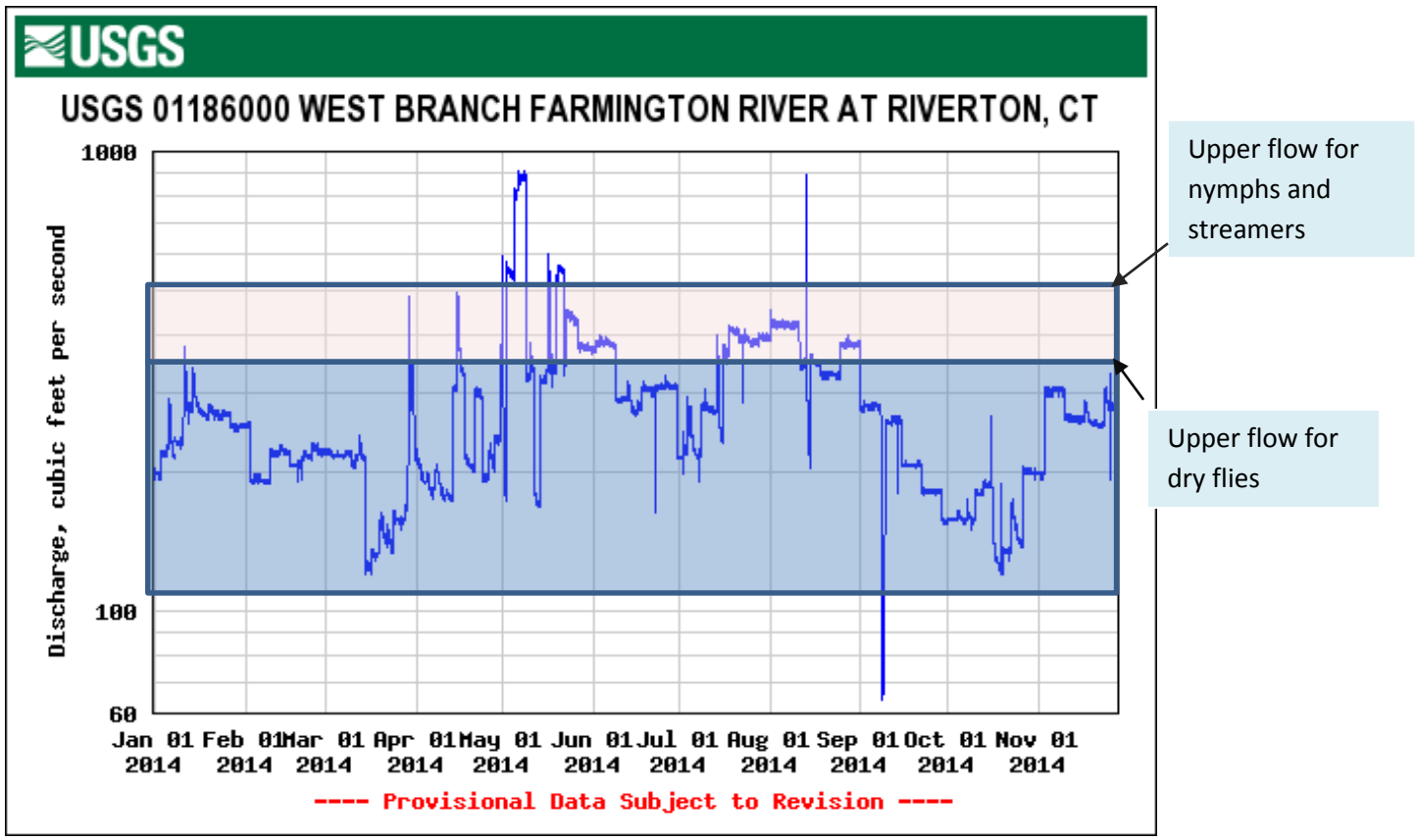

Figure 2. River flows above the Still River confluence and the relationship to fly angler's likelihood to fish certain types of terminal tackle. The blue box represent the range of flows where fly anglers predominantly use dry flies.

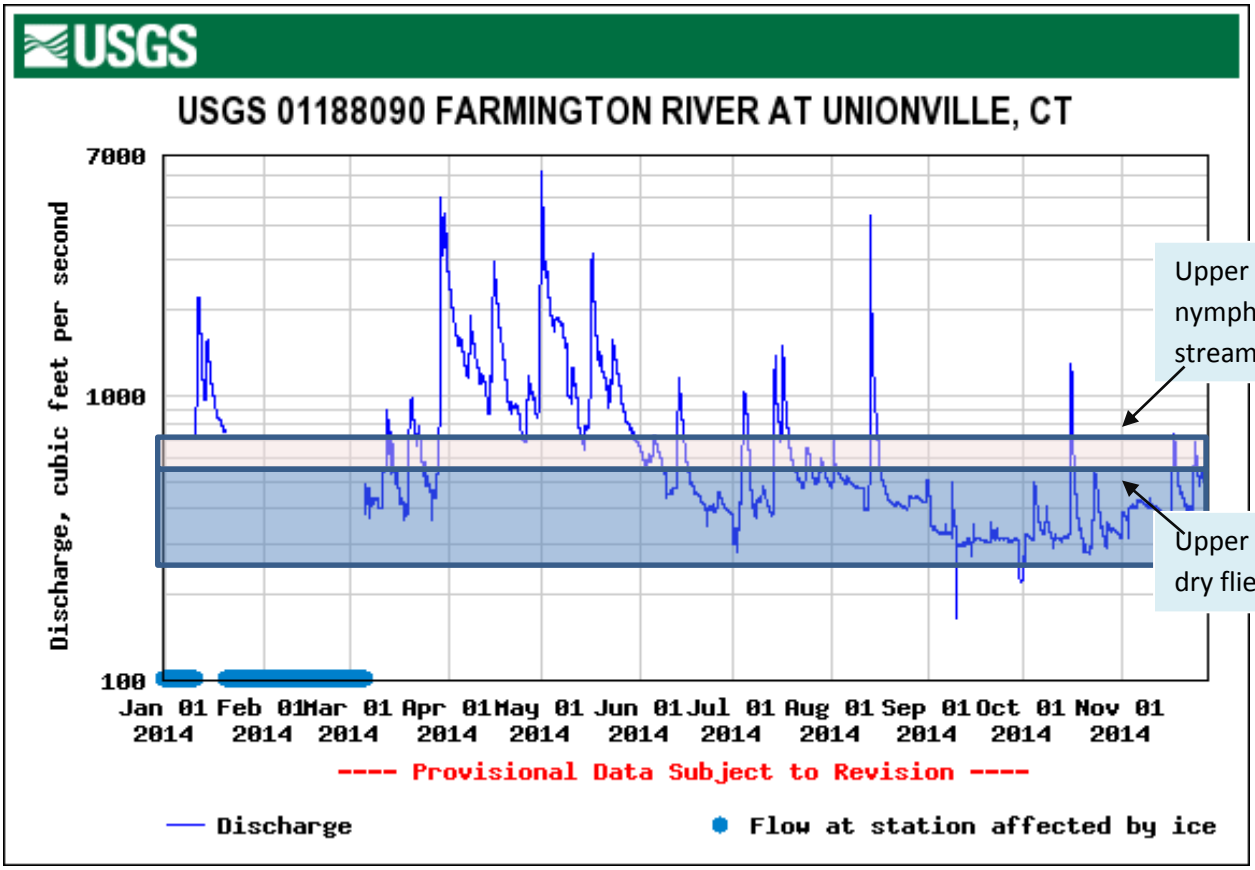

Figure 3. River flows below the Still River confluence and relationship to fly angler's likelihood to fish certain types of terminal tackle. The blue box represent the range of flows where fly anglers predominantly use dry flies. Many fly anglers do not participate in the fishery when flows are above 700 cfs in this area of the river. Note the long period in April and May when flows were above preferred fish flows.

Cooler than normal summer air temperatures resulted in water temperatures that were favorable for trout feeding and growth during most of the summer (Fig. 4). Bioenergetics studies show that trout maximize growth rates when water temperature averages 60-62°F (Elliot and Elliot, 1995). Conversely, trout lose weight/condition at temperatures above 70°F. The average water temperature for the West Branch Farmington River for June through August 2014 was 62°F. Trout were actively feeding and growing until late August. This was approximately a 3 week longer growth period than in most years.

wo stream electrofishing crews, several live carts and a tank truck to transport Survivor broodstock back to the hatchery. A full sampling crew can be 16-20 people per day.

Annual trout population sampling

Fish population sampling was conducted on September 13th, 2014 to determine if the new regulations (instituted in 2012, Appendix 1, see Hagstrom et al. 2012) have resulted in changes to the trout population, species composition, density or size structure. Due to staffing limitations in 2014 it was only possible to schedule one day of sampling (in most years 2-3 days are required). Survivor Brown Trout brood stock collection was given the highest priority. Collection of annual trout population indices for the year-round TMA was secondary.

Usually, five long term sample sites are done within the Year-round TMA and two sites in river sections of the seasonal TMA (one upstream and one downstream of the Year-round TMA). In 2014, two long term sampling sites within the Year-round TMA, and one brood stock-only collection site were surveyed. This reduced sampling effort may have affected some of the results when compared to years where more sites were normally sampled.

Over 120 brood stock were collected for the Survivor Brown Trout strain spawning program. In the Year-round TMA, a total of 507 trout were captured and processed (Appendix 2). Of these, 38% of all the trout handled were wild brown trout. While the percentage of wild fish has trended upward over recent years (to ~50%), this was the first considerable percentage drop. The numbers of wild brown trout young-of-year were considerably lower than the last few years. Since this size of fish is not consistently represented in the data it is unclear if this indicates a reduced year class or spawning failure from the fall 2013 spawn or merely a sampling bias. The strong 2012 cohort of wild brown trout has grown to 13-14 inch (330-356 mm) range and should expand the numbers of large, wild trout in the near future (App. 3).

Large trout (>16 inches; 406 mm) made up 15% of this year's sample which is consistent with recent years (average 15.5% $\pm$ 0.9% between 2009-2014). The largest individual was a 23 inch (584 mm) wild Brown Trout.

The standing crop of trout within the Year-round TMA was estimated to be 133 lbs/acres. Prior to this year the standing crop has held fairly constant at about 100lbs/acre (average 2005-2013 100.5lbs/acre).

Of the Brown Trout taken for brood stock (~120) for the Survivor Brown Trout program, 95 fish (Appendix 6) ripened enough to be used for spawning before December. In order to ensure a high degree of genetic mixing there was careful crossing of the three different age cohorts of survivor Brown Trout (2008-2011) with each other and with wild Brown Trout (Appendix 7). Of the 49 spawning pairings, 47% used at least one wild parent. This is a lower percentage of wild adults than in the last few years. Survival and eye-up of these eggs was excellent with an average eye-up of 90% and over 92,000 eyed eggs produced. A small number of fish were unsuitable for spawning this year or did not reach sexual maturity in time to be used. All fish were returned to the WB Farmington River TMA in early December.

Flows and trout spawning

While flows were low in September and Early October, the unseasonably warm air temperatures kept water temperatures higher than normal in September. This delayed the start of brown trout spawning until late October. By this time, rains had increased flows to a level sufficient to cover historic Brown Trout spawning areas in the river.

Of concern was a high flow event that resulted from heavy rains in mid-December. This event increased river flows/levels very rapidly, by over 500cfs in the upper river and by over 3000 cfs at Unionville, in less than 24 hours.

Survivor Brown Trout Program

The concept of the Survivor program is to use fish that survive in the river (both stocked and wild) to produce the next generation of fish to be stocked. The rational is that the environment selects the fish with the best adapted genes to survive and this breeding program conserves and reinforces those genes. Since 1993 trout from the Farmington River have been used for Survivor strain broodstock. The eggs from these trout are raised to produce fish for stocking the Trout Management Area. They are stocked two years after the fish are spawned and their eggs taken. The young survivor brown trout are marked with a small colored tag called an elastomer tag (see circled area in picture below) behind the eye to distinguish how old they are and when they were stocked. The initial results from this program were a doubling of survival rates of stocked browns to adult size. These fish holdover far better than standard trout produced at our state run hatcheries. Survivor trout can be easily identified by their missing/clipped adipose fin (fleshy fin normally located just in front of the tail on the back) and the elastomer tags.

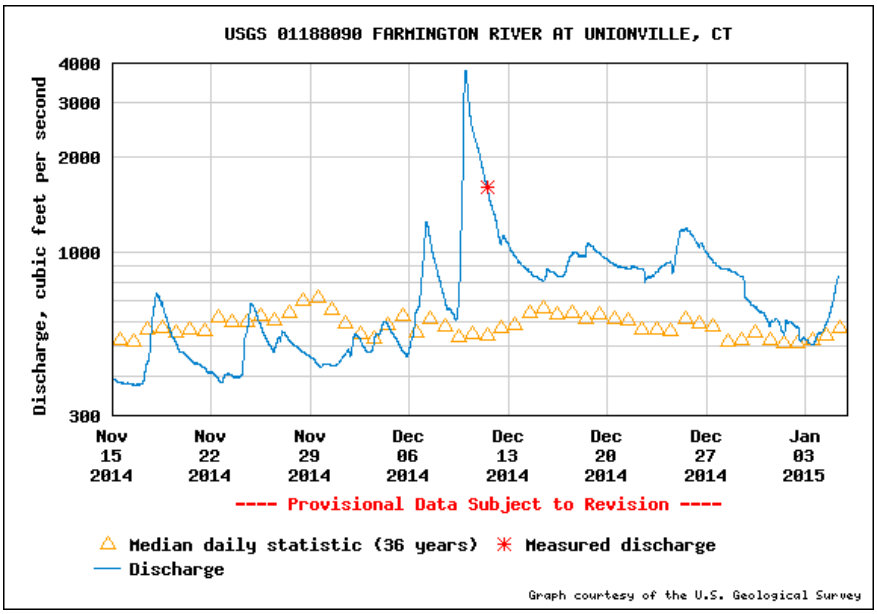

Figure 5. 2014 Farmington River flows during the Brown Trout spawning period (Nov.-Jan.)

While in some years the IFD has had to augment river flows during spawning season due to low flows or droughts, no such additions to flow were required from the Fisheries Pool this year (See Text Box).

Why DEEP can augment the Farmington River's Flow.

Farmington River flows are the result a complex set of business and government regulated agreements. The Colebrook Dam was built by the Army Corps of Engineer and MDC and the Goodwin Dam by MDC. The dams are operated for multiple uses: flood control and hydro-electric production at two upstream locations; Colebrook Dam (Colebrook) and Goodwin Dam (Hartland) and further downstream at the Rainbow Dam (Windsor)

The Water Master at MDC must balance all of these requirements when determining daily releases. As part of this process a pre-determined limited volume of water (the Fisheries Pool) was designated for use by the DEEP-IFD to augment flows when necessary to improve river conditions. This is not a large volume of water (3 billion gallons) compared to the total reservoir capacity and is only replenished if the reservoir reaches full pool height in the winter/spring. It is used only when needed such as during drought conditions.

Discussion

Annual trout population sampling

Overall trout population structure and numbers have shown gradual increases in size and numbers, especially among wild brown trout (Appendix 2). Based on sampling data, the density of trout in the Year-round TMA was one of the highest seen in 25+ years. The estimated standing crop for 2014 was 135 lbs/acre, an increase of 35lbs/acre over the average standing crop calculated for the last 9 years (approx. 100lbs/acre). While this maybe in part attributable to extra growth and possibly better survival resulting from the cool summer water temperatures (Fig 4) it is also possible that it is a sampling artifact resulting from only sampling two of the four standard areas.

While the percent of wild trout incorporated into this year's hatchery spawn was lower than in the past, a good mixing of year-classes and sources was achieved. The long-term improvement of the Survivor program is dependent on ensuring genetic diversity through careful crossing of fish between age classes and by reinforcing the wild trout genetic components in this strain (Appendix 5).

Flows and water temperatures

Past analysis of flow changes versus year class strengths (Hagstrom et al. 2010) showed that sudden large flow changes in excess of 500 cfs negatively impacted spawning success/cohort size. Redds placed at optimum locations during lower flows were subjected to cutting/erosion effects at the higher flows. This displaces or destroys eggs. This type of rapid high flow change occurred this fall, but there were several weeks of spawning activity, into early January, that may mitigate any effect from this rain event. It will be several years before we can assess how much the mid-December storm event impacted the success of the 2014 wild brown trout spawn and the resulting cohort size.

Recommendations

- Continue adherence to ensuring the genetic diversity of broodstock (both wild and hatchery raised fish) selected for the continuation of the Survivor program.

Expenditures

Total expenditures for this segment amounted to $?? of which $?? was federally funded and $?? was state funded.

Category	Federal Funds	State Funds
Personnel	$??	$??
Operations & Equipment	$??	

References

Elliot, J.M. and J.A. Elliot. 1995. The effect of the rate of temperature increase on the critical thermal maximum for parr of Atlantic salmon and brown trout. Journal of Fish Biology 47:917-919.

Hagstrom, N. T, R. D. Orciari, T. Barry, J. P. Davis, and M. Humphreys. 2010. Cold Water Management: Trout Management Areas. Federal Aid to Sport Fish Restoration. F-57-R-29, Study 1 Job 3. Final Report. Connecticut Department of Environmental Protection. Pg.86.

Hyatt, W. A. 1986. An angler survey and economic study of the Farmington River fishery resource. Final Project Report. Connecticut Department of Environmental Protection, 68pp.

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Appendices

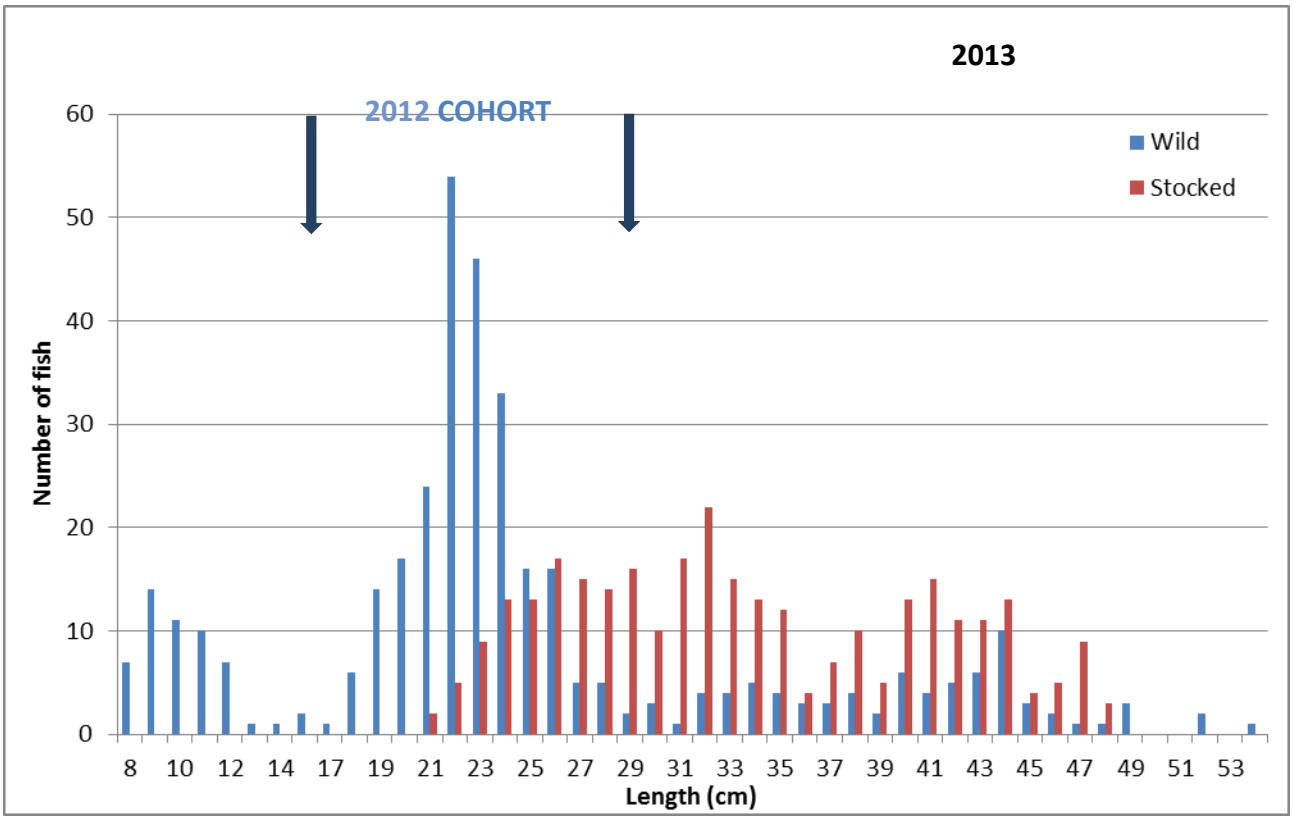
Appendix 1. Past and current regulations on the Farmington River with designation of angler survey zones and lengths.

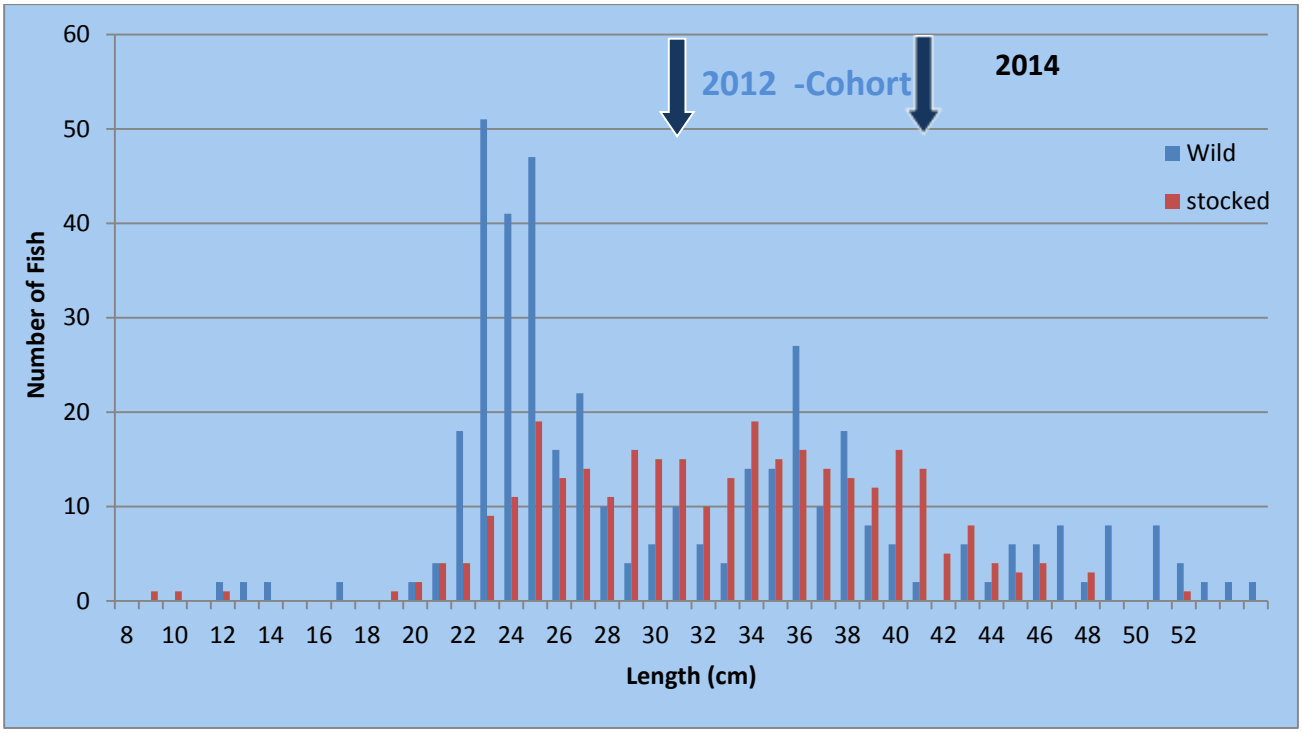
River Section	Angler Survey Zone	Pre 2012 Regulations	Approx River Miles	Regulation to be proposed for Jan. 2010	Approx River Miles
Goodwin Dam downstream to the West Branch TMA	Zone 1- 3.6 mile	12"MLL, 2/day	5.8 miles	Seasonal TMA 12"MLL, 2/day 9/1-OD: C&R	3.6 miles
	Zone 2- 2.8 miles			TMA C & R only (Abutments below Whittemore pool to Route 219 Bridge)	
West Branch TMA	Zone 3- 2.5 miles	TMA C & R only (Power line in park to Route 219 Bridge)	3 miles		5.3 miles
Route 219 - Route 44 (Satan's Kingdom)	Zone 4 8.0 miles	12"MLL, 2/day	8 miles	Seasonal TMA 12"MLL, 2/day 9/1-OD: C&R	13.4 miles
Route 44 (Satin's Kingdom) downstream to Lower Collinsville Dam		12"MLL, 2/day			
Lower Collinsville Dam downstream to Route 4 Bridge in Unionville	Zone 5 5.4 miles	Seasonal TMA 12"MLL, 2/day 9/1-OD: C&R	4.3 miles		
Route 4 to Route 177 Bridge		12"MLL, 2/day	1 mile		

Appendix 2. Single-pass electrofishing catch rates (trout/km) during late summer in standard sections of the year-round catch and release area of the West Branch Farmington River TMA, 2000-2014.

Year	*Stocked Brown Trout Size class (cm)*				*Wild Brown Trout Size class (cm)*				*Rainbow Trout Size class (cm)*			*Brook Trout*	***Total Trout***
	<28	*28-33*	*34-40*	*>40*	*<28*	*28-33*	*34-40*	*>40*	*<34*	*34-40*	*>40*	*All Sizes*	
1988	*24*	*27*	*7*	*0*	*0*	*	*		*1*	*0*	*0*	*6*	***65***
1989	*46*	*38*	*15*	*0*	*2*	*	*		*10*	*0*	*0*	*14*	***126***
1990	*9*	*34*	*10*	*0*	*7*	*	*		*7*	*0*	*0*	*3*	***70***
1991	*42*	*66*	*31*	*0*	*8*	*	*		*37*	*0*	*0*	*4*	***188***
1992	*46*	*24*	*14*	*0*	*5*	*	*		*10*	*0*	*0*	*4*	***103***
1993	*64*	*57*	*27*	*0*	*7*	*	*		*21*	*0*	*0*	*5*	***181***
1994	*27*	*36*	*16*	*0*	*30*	*1*	*2*	*1*	*15*	*4*	*0*	*3*	***135***
1995	*99*	*92*	*13*	*2*	*10*	*3*	*3*	*0*	*8*	*4*	*0*	*3*	***238***
1996	*71*	*58*	*6*	*2*	*14*	*1*	*1*	*0*	*63*	*0*	*0*	*1*	***218***
1997	*225*	*96*	*6*	*1*	*24*	*3*	*1*	*2*	*30*	*4*	*2*	*4*	***398***
1998	*18*	*236*	*22*	*2*	*30*	*5*	*4*	*2*	*13*	*7*	*1*	*5*	***346***
1999	*9*	*53*	*44*	*6*	*21*	*7*	*2*	*2*	*39*	*17*	*1*	*1*	***202***
2000	*21*	*67*	*31*	*5*	*20*	*5*	*7*	*4*	*29*	*14*	*0*	*3*	***206***
2001	*79*	*198*	*29*	*6*	*91*	*7*	*3*	*4*	*12*	*16*	*2*	*2*	***449***
2002	*52*	*106*	*106*	*13*	*84*	*15*	*17*	*4*	*4*	*2*	*1*	*3*	***407***
2003	*75*	*138*	*12*	*12*	*36*	*20*	*11*	*9*	*21*	*4*	*0*	*7*	***345***
2004	*32*	*5*	*31*	*17*	*54*	*18*	*6*	*12*	*17*	*13*	*2*	*7*	***264***
2005	*21*	*91*	*75*	*33*	*74*	*17*	*13*	*8*	*25*	*21*	*3*	*3*	***382***
2006	*29*	*45*	*42*	*44*	*68*	*19*	*10*	*9*	*15*	*10*	*1*	*5*	***299***
2007	*27*	*76*	*40*	*51*	*27*	*14*	*13*	*11*	*13*	*5*	*3*	*5*	***284***
2008	*19*	*34*	*54*	*54*	*34*	*4*	*9*	*13*	*5*	*10*	*3*	*2*	***242***
2009	*69*	*90*	*31*	*43*	*112*	*4*	*4*	*15*	*20*	*6*	*3*	*2*	***399***
2010	*43*	*43*	*49*	*52*	*129*	*15*	*10*	*5*	*13*	*13*	*3*	*5*	***380***
2011	*Not sampled due to flooding*												
2012	43	63	27	47	113	15	14	13	10	13	3	10	**371**
2013	30	36	25	25	115	8	10	15	9	9	2	4	**288**
2014	**58**	**58**	**70**	**44**	**98**	**26**	**21**	**21**	**13**	**21**	**1**	**7**	**438**
Avg.	**48**	**78**	**31**	**24**	**57**	**10**	**7**	**7**	**20**	**10**	**2**	**4**	**298**
S.D.	**50**	**59**	**25**	**20**	**39**	**6**	**5**	**5**	**14**	**6**	**1**	**2**	**78**

*wild trout were not recorded separately from stocked fish during these samples.





Appendix 3. Number of Brown Trout by centimeter (cm) class for wild and stocked fish in the West Branch Farmington River TMA during the fall 2013 and 2014 population sample.

Appendix 4. Composition of brood stock used for survivor Brown Trout production fall 2014.

Elastomer Tag	Female	Male	Year Cohort was spawned	Size at Stocking
Right Orange	1		2008	Yearling*
Right Red	1	3	2009	Yearling
Left Red	1	1	2009	Large adults
Left Green	1	0	2010	Large adult
Adipose Clip	19	12	Unknown	Unknown
Left Yellow	2	0	2011	Large adults
Left Orange	18	13	2012	Large adult
Wild	7	20		
Total:	49	49		

*Yearlings are age-1 and 8-11 inches at stocking and large adults are age-2 and14-16 inches at stocking.

Appendix 5. Spawning pair crosses by mark type and numbers of pairing for Survivor Brown Trout production fall 2014. Marks (elastomer tags) and clips indicate year of stocking and strain.

Female	Male	# of Pairs
Adipose clip	**Wild**	6
Wild	**Left orange**	2
Wild	**Wild**	4
Wild	**Adipose clip**	1
Left green	**Wild**	1
Left orange	**Adipose clip**	5
Left orange	**Left orange**	1
Left orange	**Right red**	3
Left Yellow	**Left orange**	1
Left Yellow	**Wild**	1
Left orange	**Left red**	1
Adipose clip	**Adipose clip**	5
Adipose clip	**Left orange**	8
Left orange	**Wild**	8
Left Red	**Adipose**	1
Right red	**Left orange**	1
	Total pairs	49