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Connecticut Inland Fisheries

Wild Trout Research and Management



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



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Study 1: Coldwater Fisheries Program
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Job 4: Wild Trout Research and Management

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Cover photo: 20-inch wild Brown Trout sampled from Salmon Creek in Salisbury.

Summary

- *Annual sampling at standard sites on 26 streams showed that eight (47%) historic wild Brook Trout populations remained very low compared to historic levels, or showed new declines, while nine (53%) remained strong or showed improvement. Six (26%) historic wild Brown Trout populations remained low or declined, while 17 (74%) were stable or showed improvement. It appears that an increasing number of wild trout populations are showing some signs of recovery from earlier widespread declines during the past 10 years, perhaps due to recent favorable conditions. However, recovery is slow, not universal, and is contingent upon several consecutive years of favorable conditions.*
- *In the spring of 2014, approximately 439,000 Brown Trout fry were stocked into 28 streams. All 15 streams evaluated for stocked fry survival produced moderate to excellent results.*
- *Temperature loggers showed that water temperatures generally remained cool during the summer of 2014. Flows remained average to above average in the western side of the State. For western, CT conditions for trout survival were generally better than average during the summer of 2013 as well, and Connecticut's wild trout populations have had two consecutive years to recover from earlier declines. However drought conditions were prevalent in the eastern side of the State during late summer of 2014, and flows were less than ideal in many streams.*
- *Beginning in October 2012 and during each subsequent year in the fall, approximately 2,500 - 3,000 Survivor Brown Trout fingerlings have been stocked into a test section of the upper portion of the Shepaug River. Sampling in summer 2013 and 2014 showed that the fingerlings are helping to fill vacant carrying capacity for trout by supplementing recent weak year classes. For the first time in spring 2014, brown trout fry were also stocked in a different section of the river, and initial assessment was very encouraging. Assessment of the performance of these fry and fingerlings will help determine the potential for active management of the trout fishery.*
- *In 2012, an angler survey was conducted on three sections of the Mill River-Fairfield tailwater in order to assess the potential and impacts of expanding wild trout management. After review and discussion it was decided to recommend expansion of the WTMA downstream through the adjacent Put-and-Take section, and change the Seasonal TMA to a Year-Round TMA. In 2014, new regulations were formulated, and are proceeding through the review and implementation process.*

Background

Wild Brook Trout and Brown Trout populations are important renewable resources that add quality and diversity to Connecticut fisheries. Twenty-seven years of stream sampling data has shown that there are more miles of stream in Connecticut that support wild trout populations than there are miles stocked with hatchery trout. Wild trout are esteemed because of their excellent physical appearance, bright coloration, and culinary superiority. Wild trout also have high intrinsic value because many anglers recognize them as natural products of healthy stream ecosystems. Since the success of the initial WTMA established on the Tankerhoosen River in 1994, an additional 35 WTMA's have been created and assessed (Humphreys et al. 2011). WTMA's are divided into two categories. "Natural" WTMA's regularly produce good numbers of young-of-year wild trout and therefore are not stocked with juvenile trout. "Enhanced" WTMA's do not regularly produce strong year classes and therefore receive supplementary stockings of juvenile Brown Trout. Wild trout populations in an additional 10 unmanaged reference streams are assessed as controls. Wild trout populations (especially Brook Trout) at many long-term sample sites have declined alarmingly over the last decade despite protective regulations. Declines have likely resulted from a combination of floods, droughts, warm water temperatures, and in some streams, possibly increased angling or competition with Brown Trout.

Approach

- Trout are sampled in selected WTMA's and other streams with backpack electrofishing units in smaller streams, or with a stream shocker in larger streams from late-June to mid-September.
- Fry and fingerling Brown Trout are stocked to supplement or take the place of missing natural reproduction in Enhanced WTMA's and other streams. Stream reaches with wild brook trout populations are not fry stocked.
- Onset temperature data loggers are deployed in selected streams in the spring and recovered and downloaded in the fall.
- Roving angler surveys with a stratified, random design (Malvestuto et al. 1978) are conducted on selected streams from February or March through December to determine angler opinions, effort, catch, harvest, and catch rates for trout and other fish species.
- Wild Brook Trout are occasionally transplanted from suitable donor streams into vacant



Electrofishing a deep pool in the Blackberry River with a stream-shocker unit.

coldwater habitat where natural populations were apparently extirpated and suitable habitat was never re-colonized.

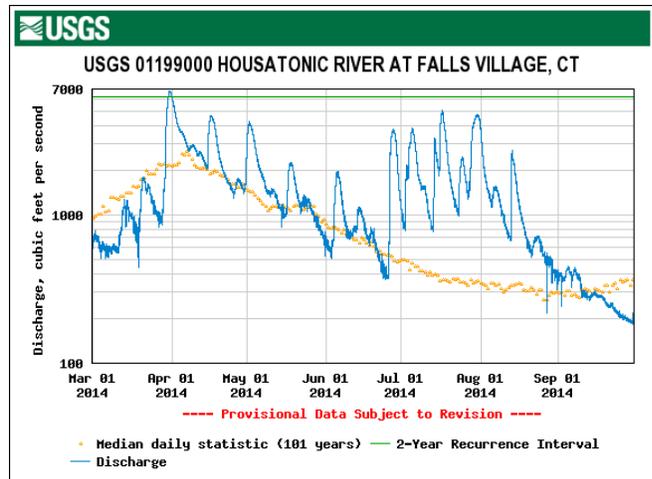
- Current regulations are assessed and appropriate changes or additions are recommended.

Key Findings and Discussion

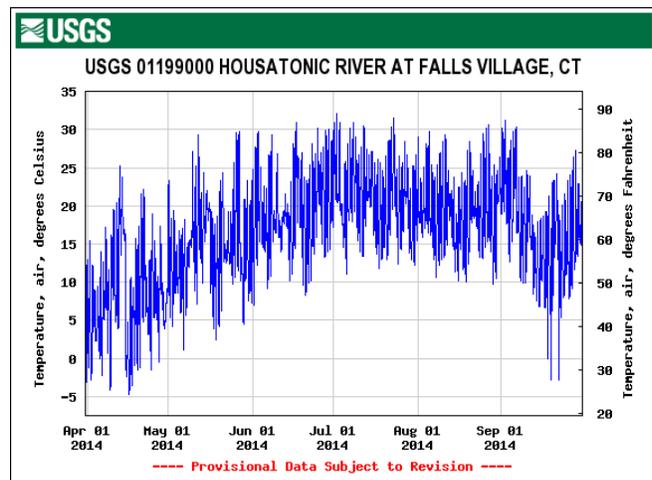
Stream trout survival, growth, and reproduction are closely tied to seasonal stream water temperatures and flows. In western Connecticut, the spring and summer of 2014 remained unusually cool with regular heavy rains which kept stream flows unusually high into early September. Portions of eastern Connecticut had less rain (isolated micro-droughts in portions of the Thames and CT River basins; see Job 1: Monitoring Fish Populations in Streams) but temperatures were cooler than usual. High flows disrupted stocked and wild trout fry survival in some streams. However, cool summer air and water temperatures generally provided better than average conditions for trout.

Summer Water Temperatures During 2014

- In conjunction with other jobs (Housatonic River and Stream Monitoring) temperature loggers were deployed in the spring and recovered in the fall from 104 sites. During the summer of 2014, air temperatures in some parts of the State never reached 90°F, and consequently water temperatures never spiked to levels typically seen during summer heat waves. The highest summer temperatures in many streams occurred on July 2. For reference, the short-term lethal temperature threshold (mean critical thermal maximum) for wild Brook Trout and wild Brown Trout is approximately 84°F.
 - No streams monitored, including the Housatonic, Shepaug, and Bantam rivers, exceeded 81°F during the summer of 2014.



Discharge (CFS) in the Housatonic River, March through September, 2014. Yellow line is 101-year average; thin green line is two-year-frequency flood level.



Air temperature (°F) at the Housatonic River, April through September, 2014.

- Two loggers set in the Lower Macedonia Brook Class 1 Natural WTMA showed that this stream warmed up approximately 2 °F as it passed through a 0.5-mile reach with no overhead canopy. This stream is one of the warmest Natural WTMA's, and may be subject to negative effects from warm temperatures during some years.
- Water temperatures in Pond Brook in Newtown, where fry-stocking was initiated in 2011, briefly reached 78.6°F on July 2, but generally remained in the 60s and low 70s during the summer of 2014. This temperature profile was very suitable for supporting survival and growth of stocked Brown Trout fry, as demonstrated in electrofishing sampling conducted in late summer.
- Water temperatures in Cobble Brook in Kent, where fry-stocking was initiated in 2011, briefly reached 78.4°F on July 2, but remained in the 60s and low 70s during most of the summer. This temperature profile has proven adequate to support survival and growth of stocked Brown Trout fry, as demonstrated in electrofishing sampling conducted in late summer.
- Powerhouse Brook, a cold spring-fed fry-stocked tributary to the Bulls Bridge TBMA, remained below 71°F during the entire summer of 2014. In 2013, Powerhouse Brook had reached 86°F during an emergency draining of the Bulls Bridge power canal. This flush of warm water caused a near-total kill of wild and fry-stocked trout in this stream, as well as temporarily eliminating the most important thermal refuge for trout in the Bulls Bridge TBMA.



25 inch wild Brown Trout sampled in 2012.

Wild Trout Population Sampling

- In 2014, abundance of wild trout was assessed in 17 of 19 **WTMA's** and WTMA sections that are not stocked with fry, and nine of 10 unmanaged **reference streams** in order to monitor the alarming statewide decline in most wild Brook Trout and wild Brown Trout populations observed during the previous 10 years.
 - Sixty sites on 26 streams were sampled to assess short-term and long-term trends. Eight (47%) historic wild brook trout populations remained very low compared to historic levels, or showed new declines, while nine (53%) remained strong or showed improvement. Six (26%) historic wild brown trout populations remained low or declined, while 17 (74%) were stable or showed improvement. A more thorough analysis will be presented in the 2016 final segment report.
 - Sampling in Deep Brook in 2013 revealed a near-total kill of trout due to an unknown

contaminant emanating from the storm drainage system for the old Newtown State Hospital campus. Sampling in 2014 showed some early signs of recovery of the wild Brown Trout population.

- Sampling downstream of the Mill River WTMA in the Open (Put-and-Take) adult-stocked section and in the Seasonal adult-stocked TMA in 2014 revealed continued strong numbers of wild young-of-year Brown Trout as well as significant numbers of older wild Brown Trout and a few wild Brook Trout.
- Cool temperatures and adequate flows during the spring and summer of 2014 were generally conducive to recovery of naturally reproducing wild trout populations in the western part of the State, however flows in eastern Connecticut were significantly lower than ideal.

Enhanced Trout Population Sampling

- In spring 2014, approximately 439,000 Brown Trout fry were spread through a total of 70 miles of appropriate habitat in 17 regularly stocked streams where success was documented in the past, and in 11 new streams where fry stocking was more recently initiated. Strains available were Seeforellen (404,000) and Survivor (35,000). Cortland fry were not stocked in 2013 or 2014. Evaluations of fry stocking efforts were conducted at 28 sites on a representative sub-set of 15 of 28 streams. Wild trout fingerling densities in the Tankerhoosen River WTMA (21-year average: 1,069 fingerlings/mile, range: 403 - 2,506/mile) can be used as a "gold standard" benchmark for comparison.
 - Fry survival was good in nine streams, while survival in six others was somewhat reduced, possibly due to high flow events in the spring shortly after stocking.
 - Fry survived exceptionally well at one of the more recently initiated fry stocking efforts, Pond Brook in Newtown (up to 4,236/mile).
 - Fry survived exceptionally well (4,346/mile) at a new experimental stocking site on the Shepaug River.
 - In Powerhouse Brook in 2013, most trout were killed by an emergency warmwater hydro-power canal release on the hottest day of the summer. Sampling showed that fry stocking in 2014 reestablished the trout population in this nursery stream (2,622/mile).
- Fry stocking was suspended in 2011 in one nursery stream (Little River- Redding) to assess the contribution from natural reproduction. From 2011 to 2013, numbers of wild-spawned Brown Trout fry had shown extreme fluctuations (0 – 1,820/mile), apparently due to the



Young-of-year wild-spawned rainbow trout from a Housatonic River tributary in 2010.

varying abundance of spawners the previous year. In 2014, a moderate number of wild-spawned Brown Trout fry (404/mile) were present.

Additional Trout Population Sampling

- Of nine tributaries to the Housatonic River where wild rainbows were observed in 2010, only one, Kent Falls Brook, contained wild rainbow trout in 2014; 19 small young-of-year were collected. No wild rainbows were collected from the mainstem Housatonic or thermal refuges in 2014.
- As in 2013, approximately 12% of Brown Trout sampled in the mainstem Housatonic River and its thermal refuges, and Tenmile River in 2014 were determined to be of wild or fry-stocked origin, indicating that tributary fry stocking is contributing to the quality and diversity of the Housatonic River fishery. Thirty-five percent of the largest browns captured (over 18 inches), including the two largest fish (20-21 inches), were wild or fry-stocked, suggesting special value to the TMA fisheries by contributing disproportionately to the highest quality fish.
- The Shepaug River was sampled at seven of eight standard sample sites, totaling 0.73 miles, to assess the effects of the new higher minimum flows and to evaluate the potential for trout management. A total of 398 trout were netted, 387 (97%) of which were wild or stocked as juveniles. Of these, Brown Trout made up 98% of the total, while wild Brook Trout made up 2%. Wild trout were netted at all 2014 sample locations; staff resources was not available to sample the downstream-most standard site in Roxbury, where promising numbers of wild yearling brown trout were sampled in 2013. A total of 237 young-of-year Brown Trout were sampled, the majority of which (192, 81%) were from one site where the first experimental fry stocking was initiated in spring 2014. One hundred twenty-five were age-1 and 21 were age-2 or older. Six wild brown trout sampled were over 18 inches, up to 21 inches. This age distribution reflects the new contributions from stocked fry and fingerlings. In accordance with the Inland Fisheries Division's Shepaug River Assessment Plan, 2,500 – 3,000 Survivor-strain Brown Trout fingerlings have been stocked each year since 2012 in a two-mile experimental



20-inch three-year-old wild-spawned rainbow trout from the strong 2010 year class sampled from a Housatonic tributary in 2013.



Wild young-of-year brook trout and brown trout from the Shepaug River.

section of the upper Shepaug River in Washington Depot. These fish were not marked, but were sometimes identifiable in later samples by apparent hatchery fin wear. Thus it was clear that they contributed to the abundance of yearlings collected in 2013 and 2014. In October 2014, this section was again stocked with Survivor fingerlings (2,600). These fingerlings help to fill carrying capacity for trout by supplementing the recent weak natural year classes. This river continues to show promise with regard to trout management, including wild trout management.

Angler Surveys

- No angler surveys were conducted for the Wild Trout Job in 2014.

Conclusions

- Annual sampling of standard sites on a broad spectrum of managed and unmanaged wild Brook Trout, Brown Trout, and mixed trout species streams for 14 or more years has revealed the inherent volatility and vulnerability of Connecticut trout populations to stochastic events. Factors including water temperature, flow volume, and angling, influence wild trout abundance by affecting mortality, growth, migration, spawning stock condition, egg deposition, and egg incubation success. Predictions by increasing numbers of climatologists suggest gradual long-term shifts in average temperatures, rainfall, and magnitude and frequency of weather events. If these changes progress as some predict, the current data set will help to establish not only a benchmark of current conditions, but also a measure of inherent annual variability, and varying vulnerability of stream trout resources. This data set may also help guide and justify stream habitat protection and restoration efforts.
- Wild trout management continues to be an efficient means of increasing the cost effectiveness of Connecticut's trout program and increasing the quantity, quality, diversity, and duration of trout fishing opportunities (see Humphreys et al. 2011 for further analysis and discussion). Because the DEEP's trout hatcheries have minimal ability to produce more adult trout, few opportunities remain for increasing trout fishing by stocking adult trout. In contrast, Enhanced (fry stocking) and Natural wild trout management could be increased at low cost.
- Spring Brown Trout fry stocking is regularly successful at producing high densities of recruited fall fingerlings, as well as sizes and numbers of semi-wild, fish in subsequent years that offer attractive year-round fishing opportunities. The costs of producing and stocking fry in the spring are relatively low, and the potential exists for expansion with little sacrifice of production resources.

- The regulation review process is moving forward for the proposed regulation changes on the Mill River in Fairfield. Effects of management changes on this stream could serve as a valuable reference for future initiatives.
- As a result of the mandated increase in minimum flows in the Shepaug River in 2009, the potential for trout management in this rejuvenated river appears large, but remains somewhat undefined. Wild Brown Trout reproduction is sporadic but sometimes substantial. Temperatures in lower reaches still commonly exceed those most suitable for trout, however temperatures and flows in upper reaches now remain suitable, and several thermal refuges are available at tributaries to the lower reaches.



Male (top) and female (bottom) native brook trout in spawning colors. (Photo by Yoichiro Kanno)

Recommendations

1) Fry stocking has shown success by filling empty carrying capacity in streams, and providing high densities of wild-looking Brown Trout that are caught by anglers and highly regarded (Humphreys et al. 2011). This cost-effective effort to enhance sport fishing opportunities can be improved by pursuit of a few simple targets:



18-inch Seeforellen brown trout stocked 4 years earlier as a 1-inch fry.

- Maximizing the production of the Survivor strain should be encouraged as opportunities arise. Production of some fry from other sources of wild or stream-raised broodstock is a feasible option, and should be pursued as availability of resources permits.
- Currently, the three state-run trout hatcheries are operating at or above the upper limit of their production capabilities. The total production of fry for the Enhanced fry stocking program has fluctuated from year to year (264,000–460,000/year since 2003). The entire annual production has always been efficiently allocated and used in appropriate stream habitat to enhance public trout fishing opportunities. The total number of fry produced annually should be maintained at the highest level that does not significantly impact hatchery operations, or displace other valuable production. The potential for increased fry production and stocking should be explored and evaluated as an integral part of the future re-write of the statewide Trout Management Plan which is currently more than 25 years old.
- As resource allow, continue sampling at standard sites to better understand the causes of wild trout population changes.

2) Upon implementation of the new regulations (hopefully in 2016) to the Mill River (Fairfield) tailwater fishery, the impacts of these changes to the trout populations and to the fisheries should be assessed.

3) The Shepaug River continues to show promise with regard to trout management. Continuation of experimental stocking efforts, and sampling of fish populations and water temperatures are needed to complete a full assessment. An angler survey on this river may be justified in order to characterize the current fishery and help guide future management decisions.

Expenditures

Total Cost:	\$89,550
Federal Share:	\$67,162
State Share:	\$22,388

References

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