

Management Plan for the Wilbur Tailwater Trout Fishery 2015-2020



Prepared by:

Jim W. Habera
Rick D. Bivens
Bart D. Carter

Tennessee Wildlife Resources Agency

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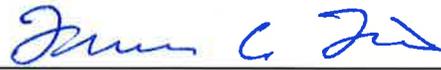
Jim W. Habera, Rick D. Bivens, and Bart D. Carter
Tennessee Wildlife Resources Agency

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Approved by:



Bobby Wilson, Assistant Director



Frank Fiss, Chief of Fisheries



John Gregory, Region IV Manager



Bart Carter, Region IV Fisheries Manager



Wilbur Tailwater Trout Fishery Management Plan (2015-2020)

I. Management Goal and Strategies

The Tennessee Wildlife Resources Agency's (TWRA's) management goal for the Wilbur tailwater (Watauga River) is to maintain a quality trout fishery throughout the tailwater capable of providing a variety of opportunities to the anglers who enjoy this resource.

TWRA's primary strategies for attaining the management goal for the Wilbur tailwater will be to emphasize the excellent wild brown trout *Salmo trutta* fishery while continuing to provide put-and-grow and put-and-take fisheries for rainbow trout *Oncorhynchus mykiss*. The existing Quality Zone (QZ) offers a management opportunity for providing anglers with higher catch rates for larger trout through special regulations. Efforts will continue during 2015-2020 to ensure that the QZ is contributing to the accomplishment of the Wilbur tailwater management goal.

II. Background



The Watauga River flows northwest from the mountains of northwestern North Carolina into Carter County, Tennessee and is impounded near Hampton, forming The Tennessee Valley Authority's (TVA) Watauga Reservoir (6,432

acres). Most of the reservoir's 468 mi.² watershed is forested and much of the Tennessee portion lies within the Cherokee National Forest. Wilbur Dam is located about 3 mi. downstream of Watauga Dam and impounds a small reservoir (~72 acres). Wilbur Dam's four turbines are capable of releasing a total flow of 2,680 ft³/s (cfs) and one turbine has a much higher capacity

(1,766 cfs) than the other three, offering more discharge options than at other Tennessee hydroelectric facilities (Bettoli 1999). Turbine venting has helped Watauga Dam discharges meet TVA's target DO concentration of 6.0 mg/L (6 parts per million) and maintain at least 4.0 mg/L in most years when the target is not attained (Bettoli 2003). Minimum flow for Watauga Dam (measured from Wilbur) is 107 cfs and is maintained by turbine pulsing (Scott et al. 1996). The Wilbur tailwater flows ~16 mi. from Wilbur Dam through Carter Washington counties before joining Boone Reservoir. Surface area of the tailwater at base flow is 334 acres (Bettoli 1999).

The Wilbur tailwater section between Elizabethton and Boone Reservoir (10 mi.) has a long history of degradation (Bivens 1988), but water quality improvements by TVA (Scott et al. 1996) and TWRA's stocking program combined to create one of the best trout fisheries in the state by the 1990's. Bettoli (1999) estimated that the capacity of the Watauga River to overwinter trout (122 kg/ha) was second only to the South Holston tailwater. However, the trout fishery in the 10-mi. tailwater section downstream of Elizabethton was severely damaged by toxic runoff associated with a fire at the North American Corporation in February 2000 (Habera et al. 2001). Restoration efforts began immediately and the primary goal of TWRA's initial (2004-2008) management plan for the Wilbur tailwater (Habera et al. 2003a) focused on restoring the trout fishery within the affected area. These efforts were successfully completed by 2005 (Habera et al. 2006).

Currently, put-and-take and put-and-grow fisheries are provided throughout the tailwater by annually stocking fingerling and adult rainbow trout and brown trout. There is also substantial natural reproduction, particularly by brown trout (Banks and Bettoli 2000; Holbrook and Bettoli 2006). These wild browns are genetically similar to the Plymouth Rock strain currently stocked in the Wilbur tailwater (Habera et al. 2003b). Brown trout stocking was discontinued in the upper 8-mi. portion of the tailwater (Hwy. 19 E to Wilbur Dam) in 2009 to manage for a wild brown trout fishery in that area (Habera et al. 2009). Brook trout stocking was also discontinued in 2009 after

an eight-year trial (2001-2008). An average of 63,000 brook trout (typically 5 – 11 in.) was stocked annually during that time, but they performed poorly as the result of extremely low survival (0.1 – 4.4% over 100 d), slow growth—particularly during summer (0.16 in. or 4 mm per month), and excessive predation by brown trout (Damer and Bettoli 2008; Habera et al. 2009).



TWRA established a 2.7-mi. Quality Zone (QZ) in 1989 (Figure 1) with special angling regulations consisting of a 14-in. minimum size limit and two-fish creel limit, with only artificial lures permitted. The original QZ extended from Smalling Bridge downstream to the Hwy. 400 Bridge. The lower QZ boundary was adjusted upstream to the CSX Railroad Bridge (0.1 mi.) in 2003 to accommodate bait anglers at the new access area (Figure 1). A new parking area and trail connector opened on the Watauga Bluffs State Natural Area in

2015 will make the QZ much more accessible to shore-based anglers.

The first intensive study of the Wilbur tailwater trout fishery, conducted by Bettoli (1999), included an estimation of overwintering trout population biomass, assessments of survival and growth of stocked trout, and a creel survey. Standing crop (65% brown trout) was estimated to be 109 lbs./acre (122 kg/ha) – second only to the South Fork of the Holston River in Tennessee. Bettoli (1999) also found that the density of trout ≥ 14 in. was higher in the QZ than elsewhere in the river, but recognized that limited access to the QZ at that time could also have been a contributing factor. Bettoli (1999) reported good 200-d survival (17-27%) of stocked adult rainbow trout and a return (harvest) rate of 27%, which is intermediate among Tennessee tailwaters. However, these

fish grew relatively slowly (0.20-0.28 in./month), as did stocked brown trout (46% survival), and condition of both species declined significantly after stocking (Bettoli 1999). Fingerling rainbows stocked in June survived well and had better growth (0.55 in./month), although this rate was generally lower than that for the Norris and South Holston tailwaters (Bettoli 1999). Growth and condition of trout in the Wilbur tailwater, along with its relatively low basic productivity, led Bettoli (1999) to consider trout stocking rates excessive at that time.

III. Current Status

Trout Abundance



TWRA monitors the Watauga tailwater trout fishery at 12 boat electrofishing stations (Figure 1) in March each year to provide an assessment of the overwintering trout populations before stocking begins. These stations are sampled (600 s each) during the day at a

flow of approximately 2,400 cfs. Electrofishing catch rates are based on trout ≥ 7 in., as this is the minimum size considered fully recruited to the sampling gear and technique. No monitoring data were obtained in 2008, 2009, or 2012 as adequate flows could not be provided in by TVA because of maintenance issues at the dam or the need to maintain water levels in Watauga Reservoir.

Mean electrofishing catch rates throughout the tailwater for all trout ≥ 7 in. were relatively stable during 2001 – 2007, but have increased somewhat since 2009, ranging from about 167-214 fish/h (Figure 2). The 2014 catch rate (214 fish/h) is the highest obtained to date for the Wilbur tailwater and is exceeded among other Region IV tailwater trout fisheries by only the South Holston

(which produced over 400 fish/h in 2014). The mean electrofishing catch rate for trout ≥ 14 in. has also generally increased since 2009 and was at the highest level observed to date in 2014 (27 fish/h; Figure 2). Currently, trout ≥ 14 in. are more abundant in the Norris (90 fish/h), South Holston (51 fish/h), and Ft. Patrick Henry (44 fish/h) tailwaters. The abundance of the largest trout (≥ 18 in.), as indexed by the electrofishing catch rates, peaked in 2011 at 7.5 fish/h, but has declined since then to 3 fish/h (Figure 2). All other Region IV tailwater trout fisheries except Cherokee produced higher catch rates for trout ≥ 18 in. in 2014 (range, 6 – 13.5 fish/h), and this ranking also holds if long-term averages are considered.

Management plan objectives for the Wilbur tailwater during 2009-2014 (Habera et al. 2009) included maintaining mean electrofishing catch rates throughout the tailwater of 130 fish/h (trout ≥ 7 in.), 14 fish/h (trout ≥ 14 in.), and 3.3 fish/h (trout ≥ 18 in.). All of these objectives were met at the end of the management plan term. Additionally, a mean electrofishing catch rate of 130 fish/h (≥ 7 in.) was set as the objective for maintaining the wild brown trout fishery in the upper portion of the tailwater (Stations 1-7). This objective was also met, as the mean catch rate for brown trout ≥ 7 in. in the upper tailwater was 229 fish/h in 2014 (Figure 3) and averaged 190 fish/h during 2009-2014.

A supplemental monitoring station was added within the QZ in 2010 to better evaluate the effectiveness of the special regulations there (Station 10.5; Figure 1). Recently, mean catch rates for trout ≥ 14 in. in the QZ (Stations 10, 10.5, and 11) were somewhat higher than corresponding catch rates at the other 10 stations in 2011 and 2013, but not in 2010 and 2014 (Figure 4). Additionally, there was substantial overlap of the 90% confidence limits for both areas in most years (Figure 4) because of substantial catch rate variability among the QZ sites related to habitat quality. While not conclusive, these data do not indicate that the special regulations in the QZ (14-in. minimum size limit, two-fish creel limit, artificial lures only) are consistently enhancing the abundance of larger trout in that area.

Stocking

Annual stocking rates recommended by the previous Wilbur tailwater management plan (Habera et al. 2009) for 2009-2014 were 40,000 adult (9-13 inch) rainbow trout, 50,000 fingerling (~4-inch) rainbow trout, and 15,000 6-8-inch brown trout (downstream of the Hwy. 19 E Bridge). These were typically followed (Figure 5), except that additional fish were stocked in 2013 (brown trout) and 2014 (fingerling rainbows).



The abundance of brown trout in the upper tailwater (upstream of Hwy. 19 E Bridge) has increased after stocking of browns was discontinued there in 2009 (Figure 3) and this can now be considered a well-established wild trout fishery. It would be worthwhile to determine if a wild brown trout population could also be developed in the lower tailwater as well by discontinuing stocking of browns there as well. This population could be maintained by brown trout spawning in the lower tailwater, immigration of browns from the expanding upstream population, or a combination of these. Holbrook and Bettoli (2006) identified eight potential brown trout spawning areas downstream of Hwy. 19 E, but captured age-0 browns at only one site near Station 12 (Figure 1). Consequently, they recommended that brown trout stocking continue in the lower reaches of the Wilbur tailwater because of limited reproductive success. However, Holbrook and Bettoli (2006) also noted that age-0 brown trout catch rates were low in the lower reaches of the South Holston tailwater at that time as well. Currently, the lower South Holston tailwater supports an exceptionally abundant wild brown trout population without stocking (258 fish/h for stations 9-12). With stocking, the lower Wilbur tailwater (sites 8-12) have produced a mean brown trout catch rate of 58 fish/h (≥ 7 inches) since 2010 (Figure 3). If that moderate abundance can be

maintained through natural reproduction, then the 15-20 thousand browns stocked there annually could be more effectively used elsewhere.

Angler Use

Three creel / angler use surveys were conducted on the Wilbur tailwater for TWRA during 1998 – 2006 (Bettoli 1999; 2003; 2007, Table 1), while a roving creel survey conducted by Agency personnel was completed during calendar year 2013 (Black 2014, Table 1). Pressure during 2013

Table 1. Results for Wilbur tailwater creel surveys (1998-2013).

Year	Pressure (h)	Mean trip length (h)	Trips	Catch rate (fish/h)	Harvest rate (fish/h)
1998 ^a	65,188	3.17	20,564	1.40	0.32
2002 ^a	97,524	5.20	18,754	1.59	0.16
2006 ^a	66,988	5.85	11,451	1.16	0.18
2013	62,004	3.88	15,963	1.67	0.23

^aData are for March-October (28 March-6 November in 1998).

(62,004 h) was relatively similar to the previous survey in 2006 (66,988 h), which covered March-October (Bettoli 2007). Trips (15,963), catch (104,097; 99% trout), and harvest (14,689; 97% trout) in 2013 were slightly higher compared with 2006, considering that 85% of pressure, trips, and catch (and 88% of harvest) occurred during March-October 2013. The average trout catch rate was 1.67 fish/h during 2013, with an average catch per trip of over 6 fish. Catch rates over 0.7 fish/h are generally considered representative of good fishing (McMichael and Kaya 1991; Wiley et al. 1993). Average harvest was low again in 2013 (0.23 fish/h; 0.89 fish/trip) and has been near 1 fish/ trip during all previous surveys.

Characteristics of Wilbur tailwater anglers did not change substantially from 2006 to 2013. Nonresidents (mostly from North Carolina) continued to represent 30% of the anglers fishing the

tailwater. Among resident Tennessee anglers, 94% were from Carter, Washington and Sullivan counties. Anglers were overwhelmingly positive about TWRA's management of this fishery in 2006 (Bettoli 2007) and this support continued in 2013. A majority (98%) of Wilbur tailwater anglers surveyed in 2013 rated TWRA's management of this fishery as good or excellent. Additionally, 67% supported the existing QZ regulations and only 29% supported replacing the QZ with a river-wide protected length range (PLR or "slot limit") with no bait restrictions—such as those on the Norris and South Holston tailwaters. Anglers were also asked if tailwater users in boats (floating or motoring) ever negatively affected their fishing experience and 89% responded that they did not.

IV. Management Objectives and Recommendations

The following objectives and management actions to achieve them are recommended during 2015-2020 to fulfill the management goal for Wilbur tailwater trout fishery.

Objective 1: *Manage for a wild brown trout fishery throughout the tailwater*

Brown trout were dominant in the upper half of the Wilbur tailwater in 2014 (Hwy. 19 E Bridge upstream to Wilbur Dam; Stations 1-7), representing 76% of the catch ≥ 7 in. (Habera et al. 2015). Stocking was discontinued there in 2009 and monitoring data since then indicate that natural reproduction has established an excellent wild brown trout population. The mean electrofishing catch rate for brown trout ≥ 7 in. at Stations 1-7 was 229 fish/h in 2014 (Figure 3) and averaged 190 fish/h during 2010-2014, substantially exceeding the previous management plan objective of 130 fish/h.

Browns were also well represented in the lower portion of the tailwater in 2014 (Stations 8-12), where they were 39% of the catch ≥ 7 in. (Habera et al. 2015). Electrofishing catch rates have averaged 58 fish/h in this area since 2010. Interestingly, recent variations in brown trout stocking rates have not produced expected changes in subsequent brown trout catch rates. For example,

even though an additional 39,000 browns were stocked in 2013 (Figure 3), mean electrofishing catch rate declined 30% from 2013 to 2014 (Figure 5). Additionally, only 5,000 brown trout were stocked in 2010 (a 67% reduction from 2009; Figure 5), yet the catch rate for 2011 increased 16% (Figure 3). This suggests that stocking may now provide few benefits and that it may be possible to manage for a self-sustaining brown trout fishery throughout the tailwater—as has successfully been done in the South Holston tailwater. Accordingly, it is recommended that all brown trout stocking be discontinued in the Wilbur tailwater beginning in 2016 (20,000 brown trout have been allocated for stocking during 2015). The objective for 2016-2020 will be to maintain the long-term (1999-2012) mean electrofishing catch rate for brown trout at stations 8-12 (40 fish/h \geq 7 in.).

Objective 2: *Maintain rainbow trout stocking rates*

Put-and-take and put-and-grow fisheries for rainbow trout in the Wilbur tailwater will be maintained by stocking adult and fingerling rainbow trout at the following rates during 2015-2020:

- 40,000 adult (9-13 inch) rainbow trout annually
- 50,000 fingerling (~4-inch) rainbow trout annually

Electrofishing catch rates for rainbow trout \geq 7 in. throughout the tailwater have been relatively stable since 2002 (mean, 46 fish/h), even with reduction of the fingerling stocking rate to 50,000/year in 2004 (Figure 2).

Objective 3: *Consider changing the QZ angling regulations to a 14 – 20 in. protected length range*

The QZ remains an important part of the management strategy for the Wilbur tailwater, as it addresses the overall goal of providing a variety of trout angling opportunities and anglers continue to support it. The purpose of the QZ and the special regulations that apply there is to provide anglers with the opportunity to experience higher catch rates for larger trout (\geq 14 in.). Bettoli (1999) evaluated the QZ just prior to the 2000 fish kill and concluded that a combination of limited

access and special regulations had produced a “high-quality trout fishery” there. Recently, however, electrofishing catch rates in the QZ have not clearly or consistently indicated higher abundances of trout ≥ 14 in. For example, mean QZ (Stations 10, 10.5, and 11) catch rates for fish ≥ 14 in. were somewhat higher than corresponding mean catch rates at the other 10 stations in 2011 and 2013, but not in 2010 and 2014 (Figure 4; Habera et al. 2015).

Given the structure of the trout fishery in the QZ (67% rainbow trout in 2014), the past ineffectiveness of minimum size limits for rainbow trout in Region IV tailwaters, and the success of alternative special regulations in the Norris tailwater, a change in the QZ regulations could be beneficial. The Norris tailwater is primarily a rainbow trout fishery (65% rainbow trout in 2014) and has been subject to a 14 – 20 in. PLR (no bait restrictions) since 2008. Mean electrofishing catch rates for trout in the PLR increased from under 4 fish/h in 2008 to 81 fish/h in 2014 (Habera et al. 2015). Additionally, the mean catch rate for all trout ≥ 14 in. increased from 7 fish/h to 90 fish/h during 2008-2014 (Habera et al. 2015). These increased catch rates for larger trout resulted from a shift in trout population size structures, not an overall increase in trout abundance. Positive results might also be possible within the Wilbur tailwater QZ as well using a similar PLR.

It is recommended that Wilbur tailwater anglers be asked during the next creel survey in 2016 if they would support changing to a 14 – 20 in. PLR (no bait restrictions) within the QZ. The effectiveness of the Norris tailwater PLR and its potential application in the Wilbur tailwater QZ can also be communicated at outreach meetings with various user groups (e.g., Trout Unlimited). A PLR regulation could then be proposed for the QZ during the latter part of this management plan term (2015-2020) if angler preference information suggests it would be acceptable. In addition to supporting the management plan goal, establishment of a PLR in the QZ might also help achieve Objective 1 by providing spawning-size brown trout with some protection from harvest.

Evaluation

Annual sampling at the 12 long-term monitoring stations on the Wilbur tailwater will continue during 2015-2020. Sampling at the supplemental site (Station 10.5) in the QZ will also continue each year to help evaluate catch rates for larger trout in that area compared to the rest of the tailwater. Following completion of the 2020 sampling efforts, an assessment of management objective accomplishments will be made and strategies will be adjusted, if necessary, to meet the Wilbur tailwater management goal.

V. References

- Banks, S. M., and P. W. Bettoli. 2000. Reproductive potential of brown trout in Tennessee tailwaters. Fisheries Report No. 00-19. Tennessee Wildlife Resources Agency, Nashville, Tennessee.
- Bettoli, P. W. 1999. Creel survey and population dynamics of salmonids stocked into the Watauga River below Wilbur Dam. Fisheries Report No. 99-41. Tennessee Wildlife Resources Agency, Nashville, Tennessee.
- Bettoli, P. W. 2003. Survey of the trout fishery in the Watauga River: March – October 2002. Fisheries Report No. 03-05. Tennessee Wildlife Resources Agency, Nashville, Tennessee.
- Bettoli, P. W. 2007. Surveys of the trout fisheries in the Watauga River and South Fork of the Holston River. Fisheries Report No. 07-07. Tennessee Wildlife Resources Agency, Nashville, Tennessee.
- Bivens, R. D. 1988. Region IV stream fishery data collection report: 1986-1987. Tennessee Wildlife Resources Agency, Nashville, Tennessee.
- Black, W. P. 2014. Tennessee Statewide Creel Survey: 2013 Results. Final report, Tennessee Wildlife Resources Agency, Nashville, Tennessee.
- Damer, J., and P. W. Bettoli. 2008. The fate of brook trout stocked in the Watauga River below Wilbur Dam. Fisheries Report No. 08-03. Tennessee Wildlife Resources Agency, Nashville, Tennessee.
- Habera, J. W., R. D. Bivens, B. D. Carter, and C. E. Williams. 2001. Region IV trout fisheries report: 2000. Fisheries Report No. 01-03. Tennessee Wildlife Resources Agency, Nashville, Tennessee.
- Habera, J. W., R. D. Bivens, B. D. Carter, and C. E. Williams. 2003a. Management plan for the Wilbur Tailwater trout fishery 2004-2008. Tennessee Wildlife Resources Agency, Nashville, Tennessee.

- Habera, J. W., R. D. Bivens, B. D. Carter, and C. E. Williams. 2003b. Region IV trout fisheries report: 2002. Fisheries Report No. 03-03. Tennessee Wildlife Resources Agency, Nashville, Tennessee.
- Habera, J. W., R. D. Bivens, B. D. Carter, and C. E. Williams. 2006. Region IV trout fisheries report: 2005. Fisheries Report No. 06-01. Tennessee Wildlife Resources Agency, Nashville, Tennessee.
- Habera, J. W., R. D. Bivens, and B. D. Carter. 2009. Management plan for the Wilbur tailwater trout fishery 2009-2014. Tennessee Wildlife Resources Agency, Nashville, Tennessee.
- Habera, J. W., R. D. Bivens, B. D. Carter, and C. E. Williams. 2015. Region IV trout fisheries report: 2014. Fisheries Report No. 15-01. Tennessee Wildlife Resources Agency, Nashville, Tennessee.
- Holbrook, C., and P. W. Bettoli. 2006. Spawning habitat, length at maturity, and fecundity of brown trout in Tennessee tailwaters. Fisheries Report No. 06-11. Tennessee Wildlife Resources Agency, Nashville, Tennessee.
- McMichael, G. A., and C. M. Kaya. 1991. Relations among stream temperature, angling success for rainbow and brown trout, and fishermen satisfaction. *North American Journal of Fisheries Management* 11:190-199.
- Scott, E. M., K. D. Gardner, D. S. Baxter, and B. L. Yeager. 1996. Biological and water quality responses in tributary tailwaters to dissolved oxygen and minimum flow improvements. Tennessee Valley Authority, Water Management Services, Norris, Tennessee.
- Wiley, R. W., R. A. Whaley, J. B. Satake, and M. Fowden. 1993. Assessment of stocking hatchery trout: a Wyoming perspective. *North American Journal of Fisheries Management* 13:160-170.

Wilbur Tailwater

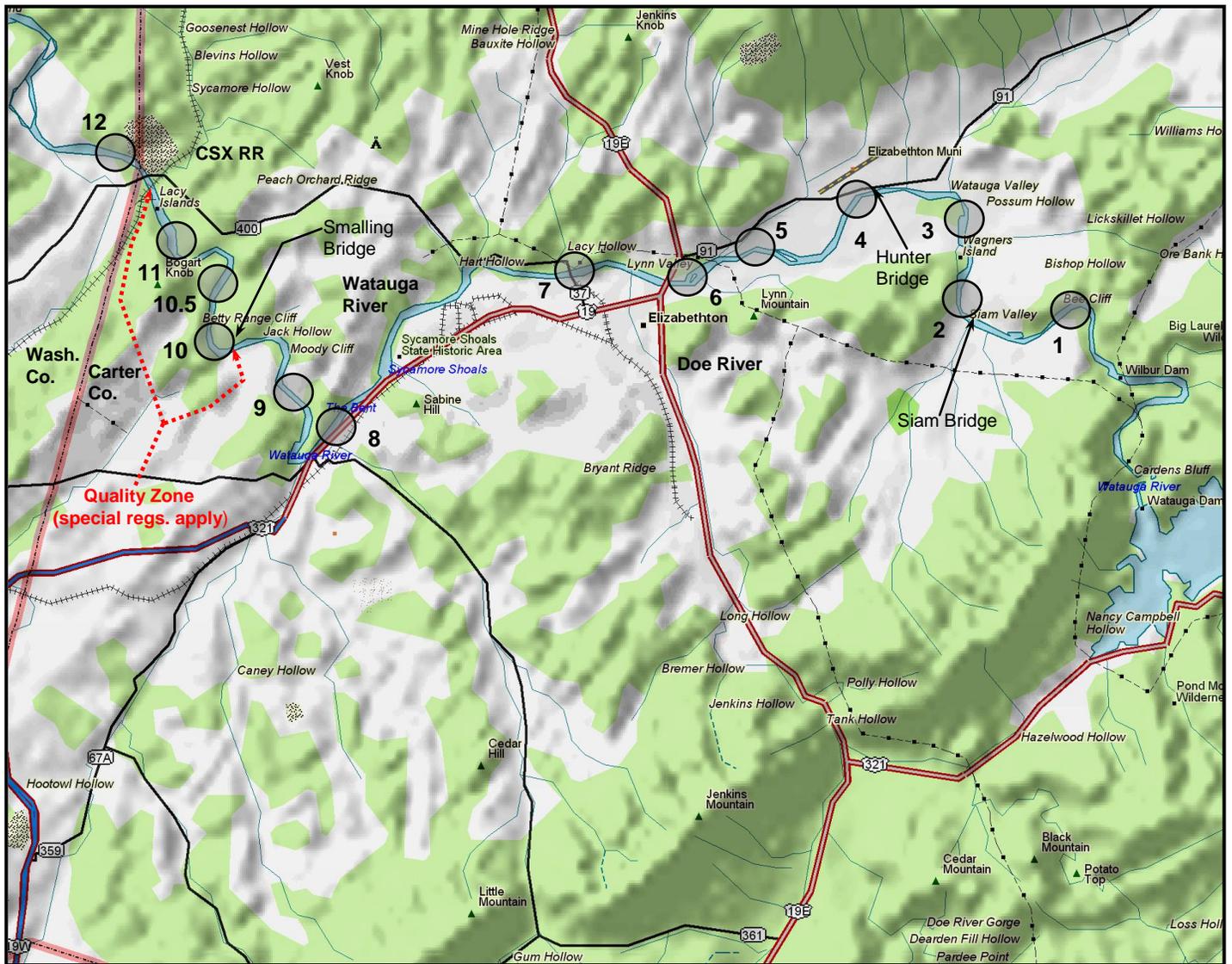


Figure 1. Locations of the Wilbur tailwater (Watauga River) monitoring stations. Station 10.5 was added in 2010 to help evaluate the Quality Zone (also includes Stations 10 and 11).

Wilbur Tailwater Electrofishing Catch Rates – All Sites

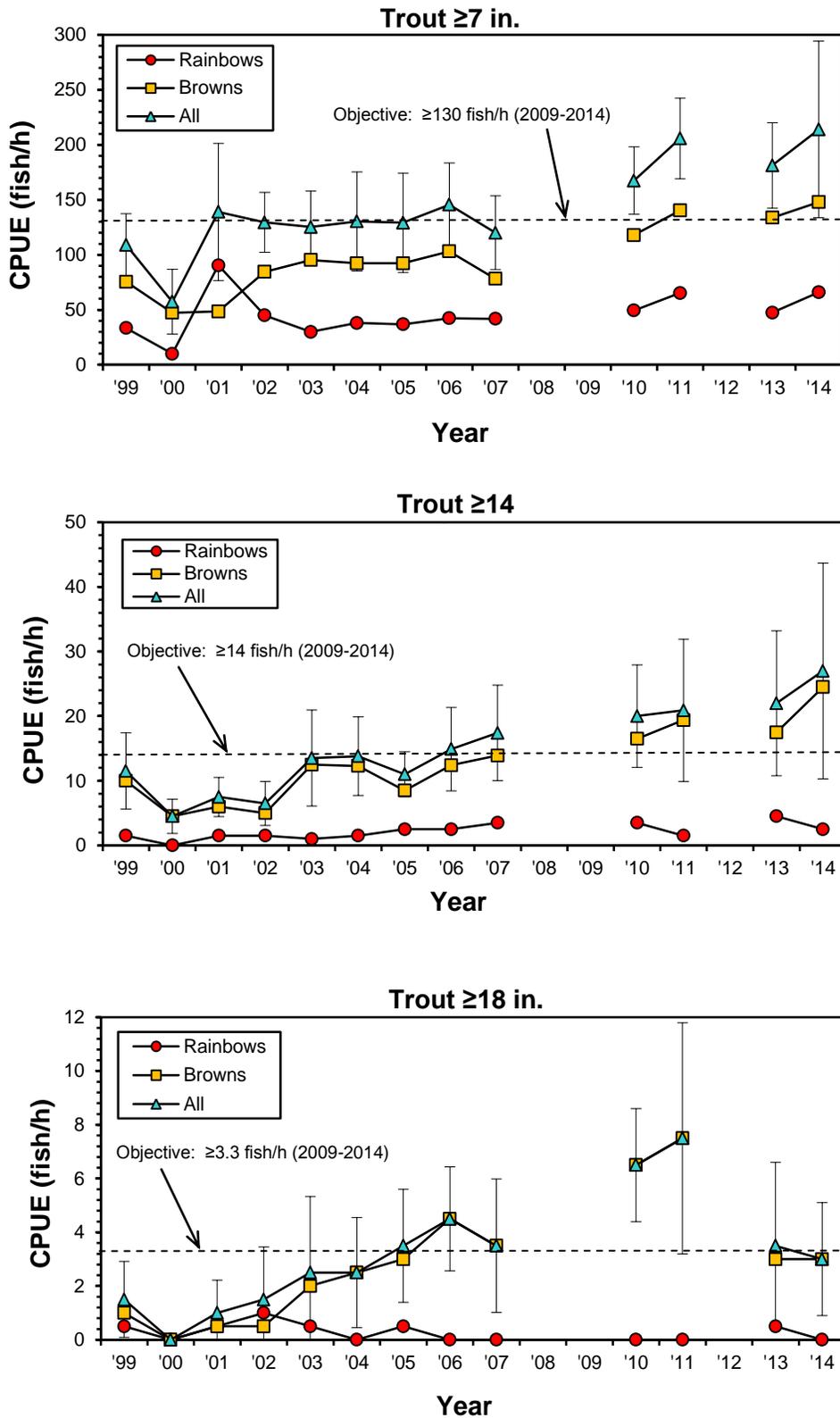


Figure 2. Mean electrofishing catch rates for all monitoring stations on the Wilbur tailwater. Bars indicate 90% confidence intervals.

Brown Trout Electrofishing Catch Rates— Upper and Lower Wilbur Tailwater

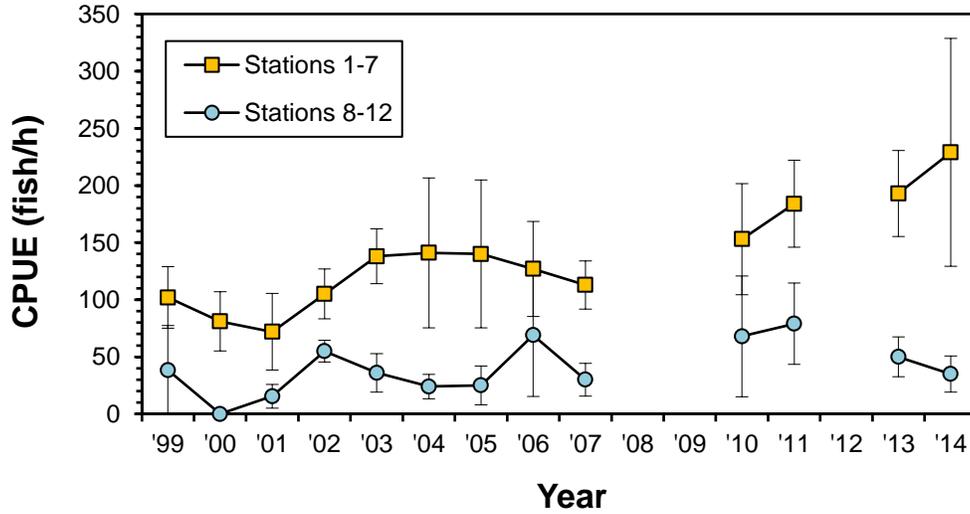


Figure 3. Mean electrofishing catch rates for brown trout (≥ 7 in.) in the upper (Stations 1-7) and lower (Stations 8-12) portions of the Wilbur tailwater. Bars indicate 90% confidence intervals.

Wilbur Tailwater Quality Zone (QZ) Electrofishing Catch Rates

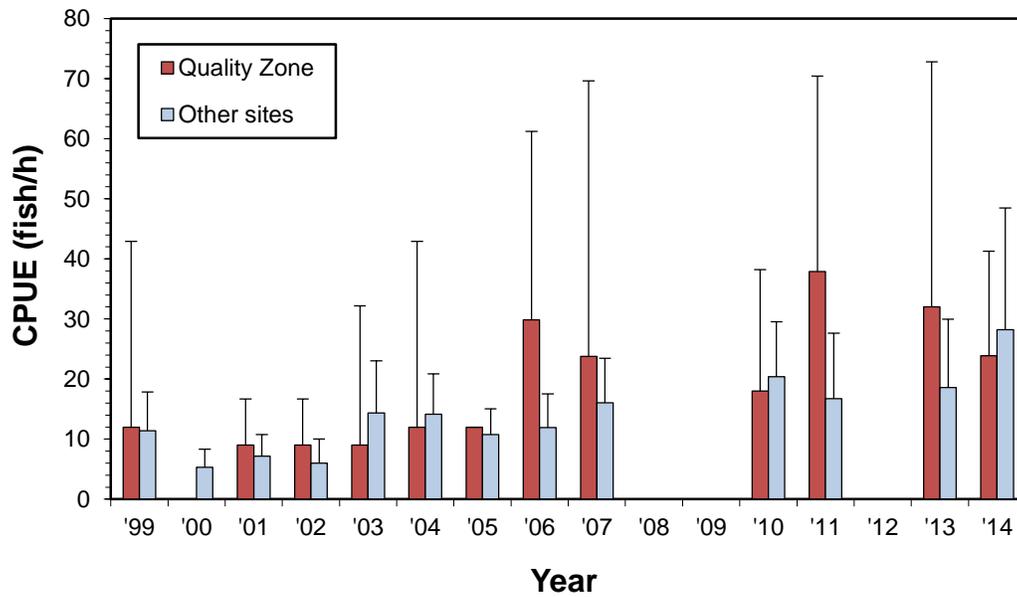


Figure 4. Comparison of mean electrofishing catch rates for all trout ≥ 14 in. in the Quality Zone (QZ) with stations outside the QZ in the Wilbur tailwater. Bars indicate 90% confidence intervals.

Wilbur Tailwater Trout Stocking Rates

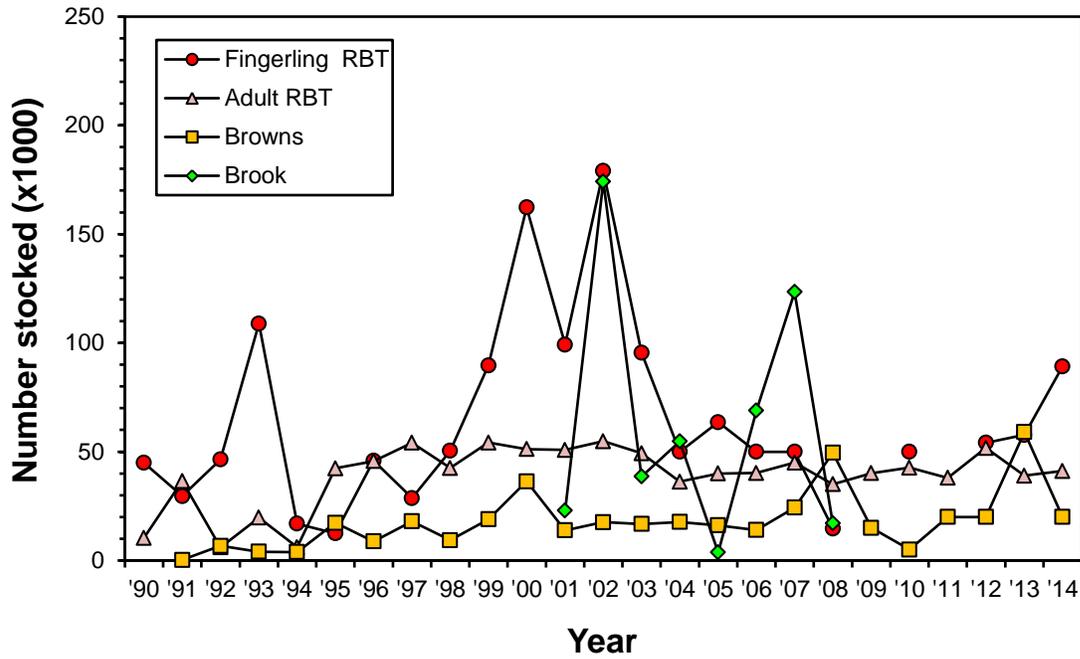


Figure 5. Trout stocking rates for the Wilbur tailwater. Currently, 50,000 fingerling rainbows, 40,000 adult rainbows, and 15,000 brown trout (above Hwy. 19 E Bridge) are allocated annually. Supplemental fish were stocked in 2013 (browns) and 2014 (fingerling rainbows).