

**Management Plan for the
Normandy Tailwater Trout Fishery
(2019-2024)**



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TABLE OF CONTENTS

	Page
1. FOREWORD	1
2. MANAGEMENT GOAL AND OBJECTIVES	1
3. BACKGROUND	1
3.1 Normandy Reservoir.....	1
3.2 Normandy Tailwater	2
3.2.1 Angler Characteristics	2
3.2.2 Regulations and Monitoring.....	3
3.2.3 Stocking.....	3
3.2.4 Access	3
4. MANAGEMENT STRATEGIES	4
4.1 Regulations and Monitoring	4
4.2 Stocking	5
4.3 Access	5
4.4 Public Outreach and Education	6
4.5 Evaluation	7
5. FIGURES.....	8
6. REFERENCES	10
7. APPENDIX.....	11

1. FOREWORD

Meeting Tennessee's trout management challenges requires that the Tennessee Wildlife Resources Agency (TWRA) have a comprehensive management plan capable of addressing current needs, while also anticipating areas where future needs may arise. The statewide plan provides guidance for the management of Tennessee's trout fisheries given the current status of wild trout resources and hatchery trout production. Normandy Tailwater Management Plan seeks to identify specific means of addressing relevant portions of the Statewide Trout Management Plan. Sections of the Statewide Plan that are cited in this document are included in the appendix. The entire Statewide Trout Management Plan can be found at www.tnwildlife.org.

2. MANAGEMENT GOAL AND OBJECTIVES

TWRA seeks to maintain a seasonal put-and-take trout fishery in Normandy Tailwater. Concurrently, TWRA will strive to optimize angler use of stocked trout, expand angling opportunities, and effectively and interactively communicate with trout anglers.

3. BACKGROUND

3.1 NORMANDY RESERVOIR

Completed by the Tennessee Valley Authority (TVA) in 1976, Normandy Reservoir is a tributary impoundment of the upper Duck River located at Duck River Mile (DRM) 249. Normandy Dam functions primarily as a flood control structure and is not a hydroelectric facility. Secondary and tertiary functions are for municipal water supply (Tullahoma and Shelbyville), and for recreation. The resulting reservoir encompasses 3,230 acres in Bedford and Coffee counties. During normal summer pool, Normandy Reservoir has a mean surface elevation of 875 feet, inundates approximately 17 river miles, and has a shoreline length of approximately 72 miles. The watershed is characterized as primarily forested, with agriculture and pastureland minimal components. Residential influences to the reservoir include Manchester and parts of Tullahoma. Primary tributaries to Normandy Reservoir include Carroll Creek, Crumpton Creek, and Riley Creek. The reservoir is classified as eutrophic, and stratifies at approximately 20 feet during August and September (Sammons and Bettoli 1999). Aquatic vegetation is minimal, with water willow and rushes the most prevalent. Fish assemblage is typical of a Tennessee warm-water reservoir, except for introduced Walleye.

3.2 NORMANDY TAILWATER

In response to habitat loss associated with the construction of Normandy Dam in 1976, the U.S. Fish and Wildlife Service (USFWS) and the TWRA have cooperated in the mitigation process by stocking trout into the tailwater of Normandy Reservoir. Since Normandy Tailwater is only suitable for trout 8 months of the year, the managed portion of the river is based on suitable public access. The actively managed section of Normandy Tailwater includes five current stocking sites (Figure 1): Normandy Dam (DRM 249); Normandy Town Bridge (DRM 248); Cortner Mill (DRM 245); Dement Bridge (DRM 243); and 3 Forks Bridge (DRM 240).

Unlike most tributary impoundments, TVA's Normandy Reservoir is not a hydroelectric-generating facility. Large daily fluctuations in flow do not typically occur in Normandy Tailwater. The flow regime is dictated primarily by water supply demands, flood control, and downstream aquatic diversity. The guaranteed yearly minimum flow rate from Normandy Dam is 40 cubic feet per second (cfs). TVA installed oxygen diffuser lines in the reservoir forebay in 1996 to increase dissolved oxygen and decrease metals/precipitates concentrations in the tailwater. Additionally, dissolved oxygen levels in Normandy Tailwater vary between 4 mg/l to 5 mg/l, dependent on time of year.

Due to the limnology of Normandy Reservoir and design of the dam, Normandy Tailwater water temperatures throughout the tailwater often exceed trout preferences during summer. The tailwater can reach 82°F; however, water temperatures in the low 70s °F are common. Optimal water temperatures for Rainbow Trout range from 54-68°F. Growth ceases at 73°F and can become lethal above 77°F (Raleigh et al. 1984). Previous sampling efforts observed minimal trout holdover (Cleveland et. al 1999), despite anecdotal angler accounts. As a result, TWRA currently manages Normandy Tailwater as an 8-month put-and-take trout fishery.

3.2.1 Angler Characteristics

Based on the most recent creel survey of Normandy Tailwater (Bettoli 2001), over half of the anglers (55%) fishing the tailwater were from the adjacent Bedford and Coffee counties. Distribution of anglers hailing from these two counties was approximately equal. Anglers from Rutherford county (adjacent to Bedford county) were the next most prevalent, although they only accounted for 13% of the total anglers. The remaining Normandy Tailwater anglers resided in twenty-five other Tennessee counties, and comprised the remaining 29% of anglers. Three percent of anglers were from out-of-state. The most common technique used by Normandy Tailwater trout anglers was still-fishing with bait (66%; Bettoli 2001). Other methods utilized by surveyed trout anglers included spinfishing with artificial lures (26%), and flyfishing (8%).

Catch rates were similar (0.84 trout/hour) from creel surveys in 1995 and 2000 conducted from May to September (Bettoli 1996 and 2001). Comparing the results of his 1995 and 2000 creel survey, Bettoli (2001) noted a 14% increase in fishing pressure. In 2000, angler trip length was 2.23 hours, down

slightly from 2.56 hours in 1995. However, anglers in 2000 made an estimated 9,000 trips, an increase of 25.6% since 1995. Monthly angler pressure was highest during the first month (May) during the 1995 and 2000 surveys, and declined each subsequent month.

3.2.2 Regulations and Monitoring

The tailwater is managed with statewide trout regulations: daily creel limit of seven trout per day, no size limit. Water quality monitoring (water temperature / dissolved oxygen / metal concentrations) during the critical months of June to October is conducted by TVA. Annual electrofishing samples were stopped in 2004 after repeated sampling efforts observed no holdover trout, likely from high water temperatures.

3.2.3 Stocking

Various trout stocking strategies and frequencies have been employed in the past (Figure 2). From 1990-1996, 37% of trout stocked in the tailwater were 3-4 inches in length. Also, some trout were held at Normandy Hatchery through the winter for weekly stockings and to increase their size. This practice was stopped as a result of time constraints for other hatchery operations. The stocking of Brown Trout was initiated in 1992, and occurred intermittently until 2003. Brown Trout stocking stopped in 2004 because of poor return rates. Currently, Rainbow Trout (~9 inches) are the only species stocked. The 2008 Normandy Tailwater management plan (Pipas 2008) called for 35,000 Rainbow Trout annually, but hatchery limitations reduced stocking rates. Since 2009, TWRA has stocked an average of 23,000 Rainbow Trout annually.

Initially, trout stocking occurred either March through November or sometimes year-round until 2001. Bettoli (2001) recommended curtailing stocking after the 4th of July due to warm water temperatures and low angling pressure. From 2002-2007, stocking occurred from March to July and again in October to December. Since 2008, stocking has generally occurred monthly from November to June (with some exceptions due to weather conditions).

3.2.4 Access

Access to Normandy Tailwater is well developed (Figure 1). The dam and Normandy Town Bridge access provides anglers with excellent bank, wade, and float opportunities. Currently, Cortner Mill is operated as an event center, and the landowner reserves the right to post “No Trespassing” if they are busy. Still, most weekdays (and some weekends) are open to public fishing. Public access at Dement Bridge and 3 Forks Bridge was recently renovated by TVA, but remains limited to wade fishing and canoe access only.

4. MANAGEMENT STRATEGIES

4.1 REGULATIONS AND MONITORING

Given environmental conditions, the statewide regulation of seven trout per day with no bait or size restrictions is sufficient as a baseline. The unique features of the tailwater offer the opportunity for alternative management strategies.

Information such as catch rates, harvest rates, fishing pressure, and return rates can be obtained by creel surveys. The last creel survey (Bettoli 2001) provided the critical information that directed the last management plan (Pipas 2008). Previous creel surveys occurred from April-October and it is recommended to conduct future creel surveys in conjunction with stocking (November-June). A creel survey should be conducted every 5 -10 years (OUTREACH, Goal 1, Strategy 2; HATCHERY SUPPORTED FISHERIES, Goal 1, Strategy 5). Managers should conduct a creel survey during winter 2019-2020 and before any changes are implemented.

If stakeholder input is positive and robust, a delayed harvest zone (DHZ) should be considered to diversify angling experiences, utilize fewer fish, and allow stocked fish to grow larger (OUTREACH, Goal 1, Strategies 1 and 5; ANGLING OPPORTUNITIES, Goal 1, Strategies 2 and 4). The reach between Normandy Dam Bridge and Normandy Town Bridge is particularly suited for a DHZ because it is entirely accessible through public land and other public options are available to harvest-oriented anglers in the tailwater. Harvest should be permitted to resume as water temperatures increase and correspond with other DHZs in the state (March 1). March electrofishing surveys should resume in spring 2019 to evaluate the over-wintering growth and survival of the fishery. Sampling should continue in the future in order to monitor the effectiveness of changes to the fishery.

Fishery managers noted that few—if any—trout held over through August and September (Cleveland et. al 1999). However, electrofishing surveys were conducted in February and trout were stocked in November or December (when water temperatures permitted survival). Based on summer water temperatures in the tailwater, it is unlikely that any appreciable number of trout would hold over. Understanding the scope of holdover potential would provide managers with insight towards the feasibility of stocking larger fish, temper angler expectations (OUTREACH, Goal 1, Strategy 1), and optimize hatchery trout (HATCHERY SUPPORTED FISHERIES, Goal 1, Strategy 2). It is recommended to conduct some fall electrofishing surveys before stocking resumes in November. This would provide managers with a robust assessment of holdover potential given that tributaries or underwater springs could provide thermal refuge.

4.2 STOCKING

Stocking rates are determined by angler use, water quality, and habitat. Catch rates in the 1995 and 2000 creel surveys were both 0.84 trout/hour, but both surveys included late summer when water temperatures were high, and fishing pressure was low (Bettoli 2001). Catch rates exceeding 0.7 trout/hour are considered to be quality (McMichael and Kaya 1991; Wiley et al. 1993). It is recommended that managers stock enough fish to maintain a catch rate of 0.7 to 1.0 trout/hour as determined by a creel survey to maximize efficiency of stocked trout (HATCHERY SUPPORTED FISHERIES, Goal 1, Strategy 2).

Understanding the duration a stocked trout persists in the fishery is imperative to managers. A cohort of trout marked with an adipose fin clip would provide an identifiable marker to be tracked over time. Managers can use catch-curve analysis of cohort abundance at regular intervals (monthly or bi-monthly) to estimate mortality rates. Estimating the mortality rate would assist in determining stocking frequency and monthly stocking rates (HATCHERY SUPPORTED FISHERIES, Goal 1, Strategy 2). Managers should conduct this tagging study during winter 2019-2020 and before any changes are implemented.

Based upon an economic survey of Normandy Tailwater (Williams and Bettoli 2003), the net value estimate for an angler was \$42.47. This value would be increased by 13% if managers stocked more fish (\$47.57). However, the net value estimate would increase 45% if larger trout were stocked (\$61.10). Accordingly, anglers may have a better experience if larger fish were available to catch. If hatchery production and angler interest allows, some stocked fish should be larger while still maintaining the total allocated weight of stocked fish (HATCHERY SUPPORTED FISHERIES, Goal 3, Strategy 2). Larger fish would expand opportunities and interest (ANGLING OPPORTUNITIES, Goal 3, Strategy 3).

Occasionally, hatcheries will have large trout available from special programs, bumper-crop production, retired brood fish, or hatchery-based water quality problems which require immediate stocking. The addition of these fish, as well as social media coverage, could attract additional anglers (ANGLING OPPORTUNITIES, Goal 1, Strategy 5; OUTREACH, Goal 1, Strategy 4).

4.3 ACCESS

Although access areas of Normandy Tailwater are well-developed, some improvements could be made. Access consists of a mixture of federal, state, and private ownership. Future work should endeavor to maintain existing sites, purchase new sites, and cooperate with private landowners.

The access directly downstream of Normandy Dam provides unique opportunities. Two parking lots are located immediately below the dam; both of which have handicap parking and handicap access. The lower of the two lots is equipped with a concrete casting area that meets American Disabilities Act standards to accommodate physically-limited angling and fishing events (ANGLING

OPPORTUNITIES, Goal 1, Strategy 1). Additionally, there are three picnic tables and a gravel path along the river allowing direct access for the first quarter mile of tailwater.

Regular maintenance of the old Normandy Hatchery trail (DRM 246.8 to 248.5) would expand opportunities for anglers wanting to have a more remote angling experience and to the suggested DHZ. This reach can be accessed from either parking at the dam or Normandy Town Bridge (Figure 1) and is open to the public by foot travel only. Clearing paths that spur from the main trail at prime fishing areas (e.g., shoals) is needed. An additional stocking site could be added at the end of a restricted access road behind Normandy Hatchery (DRM 247.5) that intersects the halfway point of the hatchery trail. This area behind the hatchery should be highlighted as an area for special events for non-profits such as the Boy Scouts or Project Healing Waters (ANGLING OPPORTUNITIES, Goal 3, Strategy 3). With enough advanced notice, parking could be accommodated and additional trout could be allocated (ANGLING OPPORTUNITIES, Goal 3, Strategy 2).

Public access at Normandy Town Bridge consists of two parcels on the right bank descending on either side of the bridge. The downstream parcel would benefit from improvement such as graveling the access road and parking area. Additionally, steps down to the river from the parking area would improve opportunities for canoe/kayak anglers. Partnering with angler groups and non-profits would help foster local interest and reduce labor costs (OUTREACH, Goal 1, Strategy 4).

It is important for managers to continue to communicate with the Cortner Mill landowner to ensure the private access remains open to public use and reallocate fish if closed (ANGLING OPPORTUNITIES, Goal 2, Strategies 1 and 8). Land acquisition by TWRA or local municipalities at Cortner Mill or across from the mill would permit downstream float trips and reduce landowner conflicts.

4.4 PUBLIC OUTREACH AND EDUCATION

Normandy Tailwater is unique because it is not part of a hydropower project. Stable flows are common throughout much of the year except when TVA is maintaining reservoir pool elevations. Therefore, for much of the year the tailwater is wadeable and readily accessible. Many anglers will fish here when other tailwaters are not wadeable due to generation or spilling. This attribute should be emphasized through social media posts, TWRA publications, and direct communication with fishing clubs (OUTREACH, Goal 1, Strategies 1 and 4).

Current regulation signs would assist law enforcement and help new anglers to quickly identify access points (OUTREACH, Goal 2, Strategy 5). Aquatic nuisance species (ANS) signs at access sites would help TWRA educate anglers on potential biosecurity threats to the resource (BIOSECURITY, Goal 1, Strategy 1).

Strategic use of social media and fishing license data may increase tailwater use as a regional rather than local fishery. The last creel survey indicated the majority (55%) of anglers were from adjoining Bedford and Coffee counties. Targeted email blasts to more populated surrounding

counties (i.e., Davidson, Rutherford, and Maury) could attract more anglers to this resource and its unique opportunities (e.g., physically limited access; OUTREACH, Goal 1, Strategy 4).

4.5 EVALUATION

Annual electrofishing samples (spring and some fall) through 2023 would provide feedback on the current state of the fishery as well as monitor effects of potential changes proposed in this plan. Management decisions will be based on information gathered from a creel survey, electrofishing surveys, and water quality data. At the conclusion of this management plan (2023), managers can decide if annual electrofishing surveys are still informative and if objectives should be adjusted.

5. FIGURES

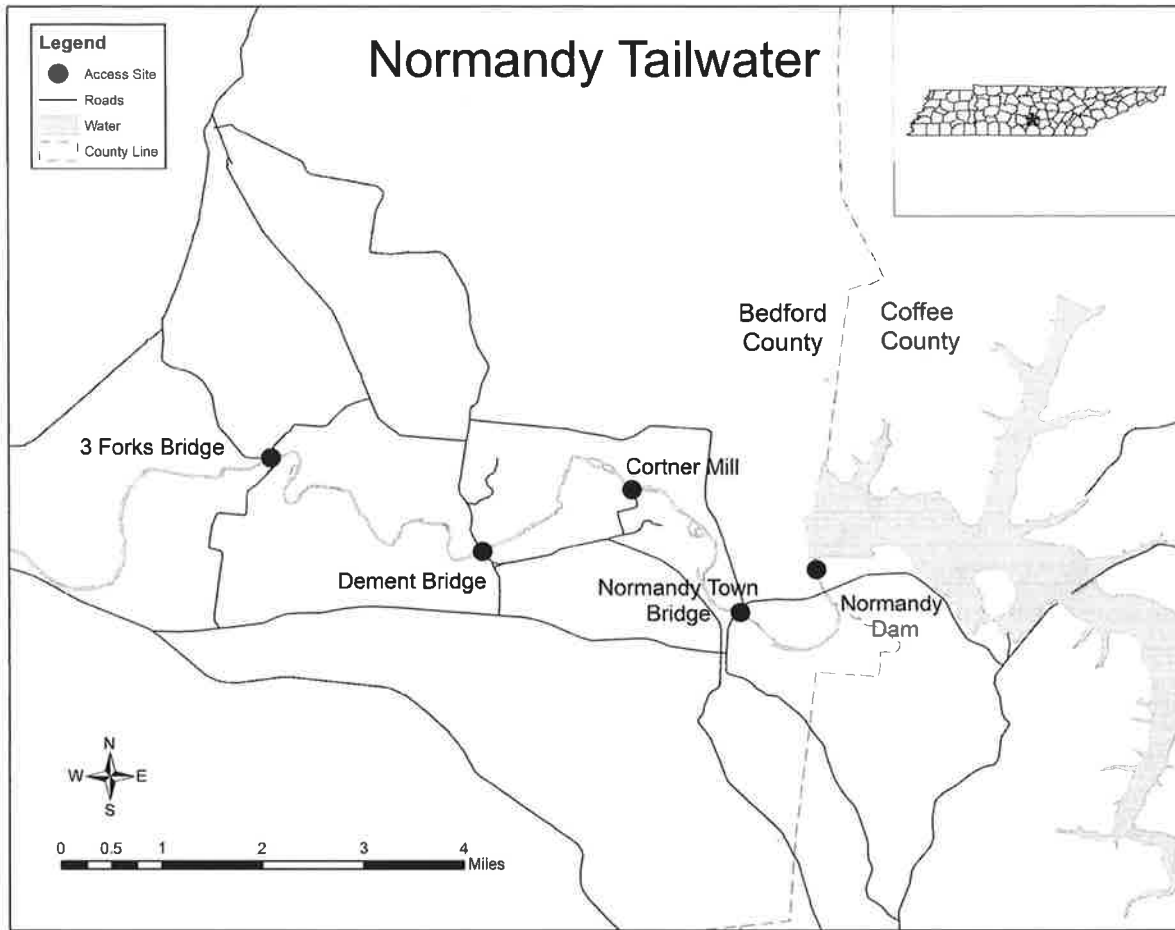


Figure 1.—Map of Normandy Tailwater fishery and public access/stocking points on Duck River, Tennessee.

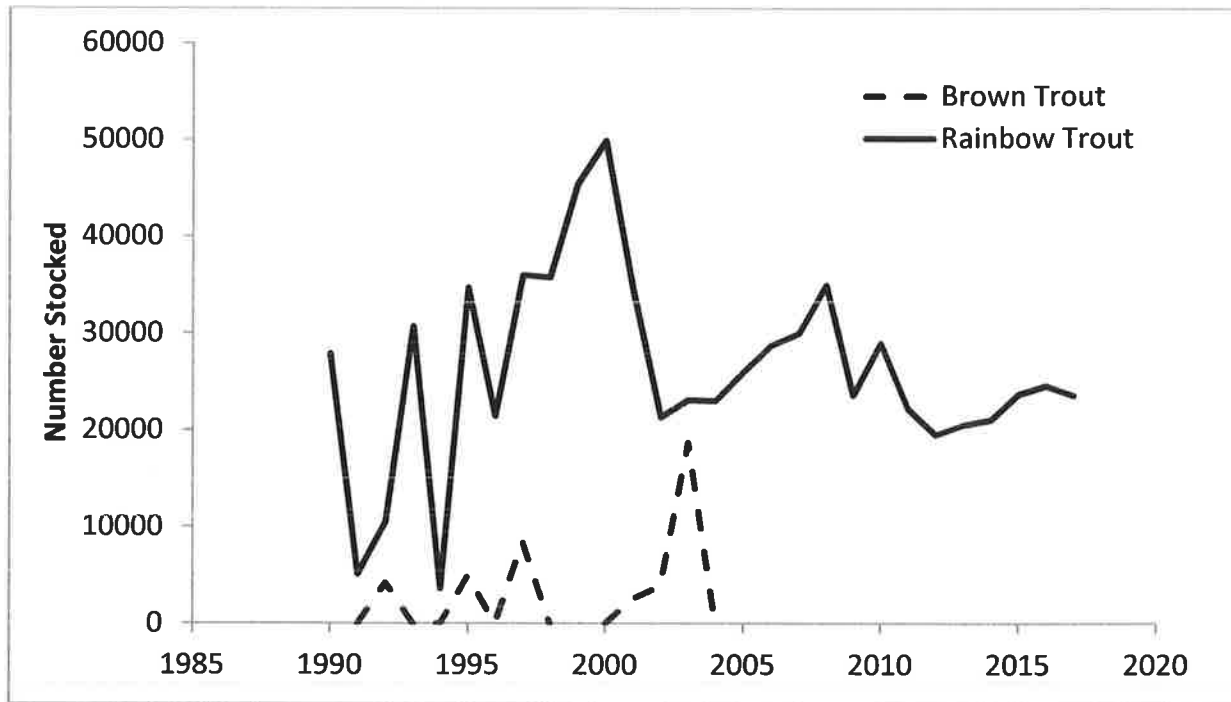


Figure 2.—Total stocking rates of Rainbow and Brown Trout in Normandy Tailwater on Duck River, Tennessee.

6. REFERENCES

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7. APPENDIX

Referenced Management Goals

*The complete Statewide Trout Management Plan 2017-2027 can be located online:
<https://www.tn.gov/content/dam/tn/twra/documents/Tennessee-Trout-Management-Plan-2017-2027.pdf>

BIOSECURITY

GOAL 1. Proactively address threats from introduced species and pathogens.

1. Educate anglers and the public at large about exotic species and pathogens that threaten Tennessee trout fisheries and how their spread can be controlled. Use news releases, the Agency website and social media pages, *Tennessee Wildlife* magazine, stakeholder meetings (e.g., Trout Unlimited), Trout in the Classroom projects, and other outreach formats to accomplish this task. Provide periodic updates regarding the status of any existing invasions and means for controlling them.

HATCHERY-SUPPORTED FISHERIES

GOAL 1. Optimize use of hatchery trout.

2. Avoid excessive stocking rates by determining the minimum number of trout that can be stocked while still providing good fishing. This has been addressed on some tailwaters (e.g., South Holston and Wilbur), but more work (e.g., research, angler use surveys, or trial and error) is needed on other hatchery-supported waters (e.g., reservoirs and winter trout program fisheries) to determine optimum stocking rates.

5. Develop tailwater trout fisheries management plans where these are currently lacking (e.g., Cherokee, Ft. Patrick Henry, and Boone) in accordance with TWRA's Strategic Plan (TWRA 2014); include objectives for optimizing stocking rates based on monitoring data and angler use/harvest information.

GOAL 3. Improve the quality of stocked trout.

2. Dedicate a portion of hatchery production to large trout (≥ 14 inches) to be included in selected hatchery-supported fisheries (see also ANGLING OPPORTUNITIES Goal 1, Strategy 5.). The 2012 statewide angler survey (Schexnayder et al. 2014) indicated that a majority (55-57%) of trout anglers would be willing to pay 5-20\$ more for the opportunity to catch larger (14-inch and 16-inch) stocked trout. Flintville Hatchery is currently including two to four 15-18" Rainbow Trout with each winter stocking event.

3. Identify stocking events in DH areas, kids' events, and selected hatchery-supported streams that would benefit from the inclusion of some larger (≥ 14 inch) trout (e.g., ENFH surplus brood fish) in the allocation.

ANGLING OPPORTUNITIES

GOAL 1. Maintain a variety of trout fisheries.

1. Accommodate physically-limited anglers where possible, such as at the new ADA-compliant Dillard Ponds seasonal trout fishery (a Region 4 cooperative effort with the USFS and TU) and at Green Cove Pond (Region 3). Other ADA-accessible trout fisheries include Paint Creek (USFS), the Norris tailwater (Clear Creek and Miller's Island; TVA) and the South Holston tailwater (Osceola Island; TVA).
2. Further expand the number of DH areas and winter trout program waters where sufficient trout can be allocated (e.g., through attainment of HATCHERY-SUPPORTED FISHERIES Goals 1 and 2). Two DH areas (Piney River and the Hiwassee tailwater) and 14 winter program locations have been added since 2006.
4. Establish or explore the utility of new regulations, such as a catch-and-release areas, to diversify angling experiences.
5. Stock large trout (≥ 14 inch fish) in selected hatchery-supported streams. The weight of each particular lot of stocked fish would remain the same, but would necessarily include fewer fish. Catch rates may be reduced, but many anglers would prefer the opportunity to catch larger fish. Consider using reduced creel limits for these streams if necessary.

GOAL 2. Increase access to trout fisheries.

1. Work with landowners on existing hatchery-supported streams to keep these areas open to the public. Inform them of laws exempting them from liability.
8. Re-allocate fish to alternative locations (new or existing) if public access to a hatchery-supported stream is eliminated or substantially reduced by adjacent landowners (also helps attain HATCHERY-SUPPORTED FISHERIES Goal 1). A recent example is Cassi Creek (Region 4), which received Camp Creek's allocation in 2016 after anglers complained that landowners there were no longer permitting public access.

GOAL 3. Expand trout fishing opportunities for children.

2. Require that event organizers notify TWRA a year in advance to plan trout allocation.
3. Create new youth fishing events using existing fisheries in selected hatchery-supported streams, at winter trout program events, or in DH areas by setting aside the first day after stocking for kids only (similar to TWRA's youth hunting programs/ seasons).

OUTREACH

GOAL 1. Effectively and interactively communicate with all trout anglers.

1. Attend various stakeholder group meetings (e.g., TU chapters and local sportsmen's organizations) to communicate the current status of trout fisheries, discuss current issues and policies, and gauge interest in or support for various management options.
2. Continue collecting trout angler preference and satisfaction data via telephone and creel surveys (including reservoirs, DH areas, and winter trout events); incorporate this information where appropriate into management strategies and policy.
4. Make TWRA's annual trout fishery reports and other related information available through links on the Agency and regional websites and social media pages.
5. Conduct local public meetings to discuss important or potentially controversial trout management issues and strategies (e.g., regulation changes).

GOAL 2. Increase awareness of trout fishing opportunities in Tennessee.

5. Develop and post signs identifying stocked streams and providing stocking schedules. For example, a sign might read "Stocked Trout Stream, Fishing Permitted—Laws Will Be Enforced, Stocked Monthly March-May".