

Beaver Tailwater Management Plan 2012-2017

Based on Fisheries Science, Public Input from Facilitated Meetings, and a Mail Survey of Beaver Tailwater Anglers



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Plan Mission Statement

Maintain and enhance the recreational fishing experience on Beaver Tailwater by improving angler access, enhancing physical habitat for fish, and providing more quality trout fishing opportunities while maintaining satisfactory angler catch rates. Critical to the success of this plan are continued stakeholder involvement and communication. This plan will be implemented through an open public process that adapts to changing conditions.

Purpose of the Plan

The purpose of this plan is to establish specific goals and objectives, which will guide the management of Beaver Tailwater for the next five years. These goals and objectives are designed to address, as extensively as possible, the desires and expectations of the public as they pertain to the management of the Beaver Tailwater trout fishery. The deliverable elements of the plan are based on scientific fisheries principles and are intended to maintain and enhance recreational fishing opportunities on Beaver Tailwater.

Background

Beaver Dam was built by the U.S. Army Corps of Engineers for the purposes of flood control and hydroelectric power generation and was the last project to be constructed on the upper White River. Commercial power generation began in May 1965 although the project was not officially completed until 1966. The resulting Beaver Tailwater (BVTW) flows approximately 7.5 miles through northwest Arkansas before entering Table Rock Lake. Hypolimnetic discharge from Beaver Dam created cold-water habitat that was unsuitable for native, warm-water species (e.g., smallmouth bass *Micropterus dolomieu*). Discharge capacity for each of the dam's two turbines is normally 112 cms (3,950 cfs) with a total maximum discharge through both turbines of about 257 cms (9,085 cfs). Leakage from the dam and discharge from the facility's house generator provide a base flow of approximately 1.8 cms (63 cfs). Although not as problematic in BVTW as in other Arkansas tailwaters, dissolved oxygen concentrations in BVTW are monitored closely during critical periods, in accordance with the White River Dissolved Oxygen Committee's Operational Action Plan. In instances where dissolved oxygen levels fall below 6 ppm and 4 ppm during generation, vacuum breaker vents on the turbines can be blocked open and maximum generation rates can be modified in attempts to improve dissolved oxygen levels in the tailwater.

To mitigate for the loss of the warm-water fishery, the Arkansas Game and Fish Commission (AGFC) began stocking rainbow trout *Oncorhynchus mykiss* into BVTW in 1966. Brown trout *Salmo trutta* were first stocked in 1985 to increase the diversity of trout species available to anglers. Cutthroat trout *O. clarkii* and brook trout *Salvelinus*

fontinalis were introduced in 1989 and 1994, respectively, to further improve the quality of anglers' trout fishing experiences. From 1984 until 2010, approximately 2.8 million trout, 85% of which have been rainbow trout, were stocked into BVTW (Table 1). Intensive stocking is necessary because of limited natural reproduction in BVTW (Pender and Kwak 2002).

Prior to 2005, catchable size (11") rainbow trout were the most abundant size group observed on BVTW. During the 2002 and 2003 annual population samples, the rainbow trout population was dominated by catchable size fish and none of the rainbow trout collected either year exceeded 16" (Williams et al. 2003, Williams et al. 2005). Angler catches of large rainbow trout were also low prior to 2005. Only 14% of rainbow trout caught by anglers during the 1998-2001 creel survey were greater than 12"; less than 1% of rainbow trout caught were greater than 16". The brown trout population was also dominated by stock-size fish (8"). Only 9% of brown trout caught by anglers during the 1998-2001 creel survey were over 12". Numerous complaints were also received by AGFC personnel from anglers about excessive captures of small brown trout.

In January 2004, the AGFC approved the Arkansas Trout Management Plan, which identified key issues concerning the management of trout resources in the state and developed goals, objectives, and strategies to address those issues. Beaver Tailwater was the first trout resource to be a part of the strategic planning process and an individual management plan for the BVTW fishery was developed in 2005. During facilitated public workshops, stakeholders were given the opportunity to express their issues and concerns regarding trout fishing on the Beaver Tailwater. Those concerns were open to all aspects of the fishery, to include stocking, habitat, angler access, enforcement, and regulations. However, the majority of stakeholder concerns pertained to the quality of the trout population. In particular, the public expressed a desire to see an increase in the numbers of large rainbow trout and brown trout they caught from BVTW.

In response to those concerns, AGFC biologists implemented new regulations and management strategies in 2006, which included a 13"-16" protected slot limit and revised stocking rates for both rainbow trout and brown trout. Based on the available scientific literature at the time, those strategies were considered the best options with which to try and improve the size distributions of the trout populations. Prior to 2006, rainbow trout were regulated by a five fish/day creel limit with no length restrictions; brown trout were regulated with a 16" minimum length limit and 2 fish/day creel limit. The protected slot limit allows harvest of trout smaller and larger than the specified range, but protects trout within the range from harvest. In theory, released trout then have the opportunity to grow and contribute to the fishery at larger sizes. Stocking rates of rainbow trout and brown trout were also decreased (by 25% and 75%, respectively) to try and reduce competition for limited resources (a typical problem in trout populations). In areas where too many trout are stocked, competition for limited amounts of food has been found to have negative effects on growth rates. The catch-and-release area was also changed to a "no bait fishing" zone in 2006 in an attempt to reduce angler conflict and allow for assessment of hooking mortality.

The mission of the AGFC Trout Management Program is to provide a quality trout fishery through science-based management. Effective management of any fishery requires current information on the biology of the fish and other aquatic organisms, on the physical environment in which these organisms live, and on the people who use or are dependent upon these resources. Therefore, several strategies included in the 2006-2010 BVTW Management Plan were geared towards monitoring and evaluating the trout fishery and its response to the new regulations. Those strategies included assessing relative abundance through annual electrofishing samples, quantifying rainbow trout and brown trout growth and mortality rates with a mark-recapture study, and quantifying angling effort, catch rates, harvest rates, and angler satisfaction through a creel survey. Two public workshops were conducted in the spring of 2011. The objectives of those workshops were to identify the public's current issues and concerns regarding trout fishing in the BVTW and to solicit their suggestions and/or advice concerning actions that should be taken regarding trout management during the next management plan period. In spring 2011, a follow-up mail survey was sent to anglers who were interviewed during the 2008-2010 BVTW creel survey. In the mail survey questionnaire, anglers were asked a series of questions regarding the reasons they trout fish, their attitudes towards various aspects of the fishery (including potential trout fishing regulations-changes, adequacy of enforcement, habitat, etc.), and their opinions of how the fishery has/has not changed with regards to catch rates and size structures over the last 5 years.

Current Status of the Beaver Tailwater Trout Fishery

Angling Effort

Angling effort, the amount of time anglers spent fishing during the creel surveys, is used to establish annual and seasonal stocking rates on Arkansas tailwaters. Effort estimates have remained consistent on BVTW since the 1998-2001 creel survey (Figure 1). Anglers fished an average of 85,629 hours per year from 1998-2001 and 81,164 hours per year from 2008-2010 (Williams et al. 2003b; Kitterman et al. 2011b). Fishing effort typically varies seasonally on Arkansas Tailwaters, with angling effort being highest in the summer months (June through August) and lowest in the winter (December through February) (Oliver 1984; Todd et al. 1999). That pattern was observed during the 2008-2010 creel survey (Figure 2). The current stocking rates for BVTW are based on the effort results from the 1998-2001 creel survey. Since the effort estimates from 2008-2010 were similar to the previous creel survey, we will continue to stock approximately 96,000 rainbow trout per year and will not make any adjustments to seasonal stocking rates during the next management plan period.

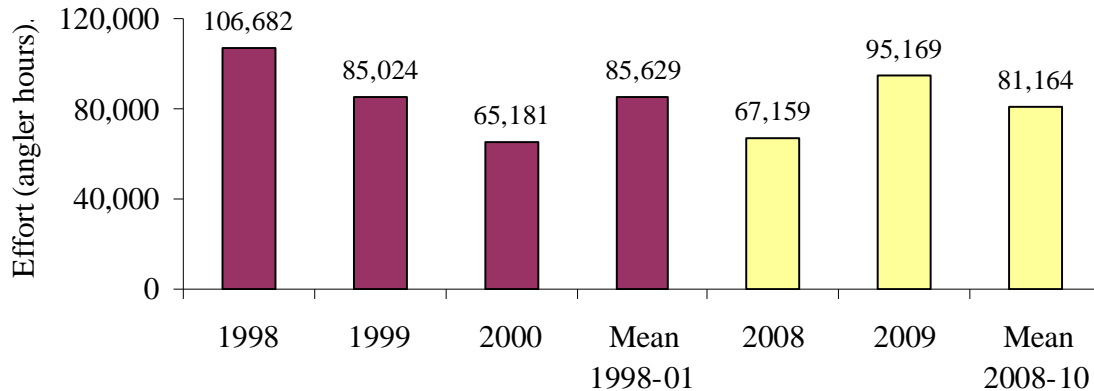


Figure 1. Annual angling effort during the 1998-2001 and 2008-2010 Beaver Tailwater Creel Surveys.

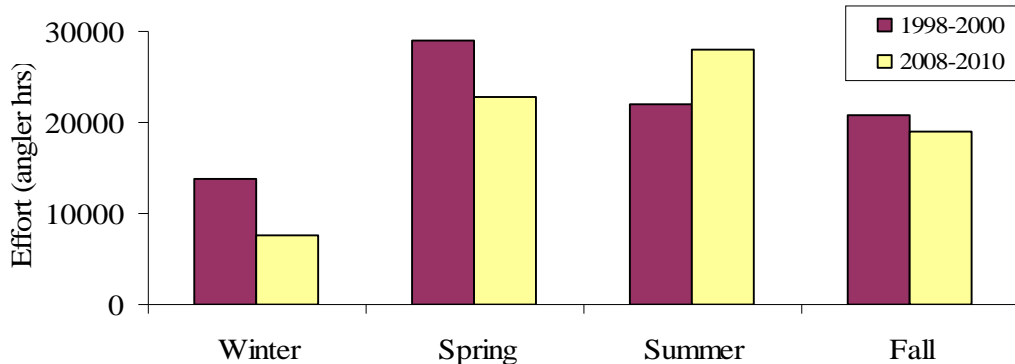


Figure 2.—Mean fishing effort each season during the 1998-2001 and 2008-2010 Beaver Tailwater Creel Surveys.

Rainbow Trout

Results from annual electrofishing samples conducted from 2006-2010 indicate that the size structure of the rainbow trout population has improved since 2006. The rainbow trout fishery continues to be dominated by stock-size fish; 70% of the rainbow trout collected during the 2010 sample were between 11” and 13”; Kitterman et al. 2011a). Although the mean lengths have not increased significantly (less than 1” difference) since 2006, the relative abundances of trout greater than 13” have increased (from 17 trout/hr in 2006 to 42 trout/hr in 2010; Figure 3). Further, the proportions of rainbow trout in and above the slot limit increased from 14% and 0% in 2006 to 28% and 2% in 2010 (Williams et al. 2007; Kitterman et al. 2011a). While developing the management plan, we considered the argument that the lower end of the slot limit should either increase (from 13” to 14”) or be eliminated altogether because of the perception that few, “harvestable” size rainbow trout (11”-13”) were available. However, these results suggest that there are plenty of harvestable size trout available to anglers and that a change to the slot limit based on that argument is not necessary. We will continue to assess any changes to the rainbow trout population relative abundance and size structure by conducting annual electrofishing samples from 2011-2017.

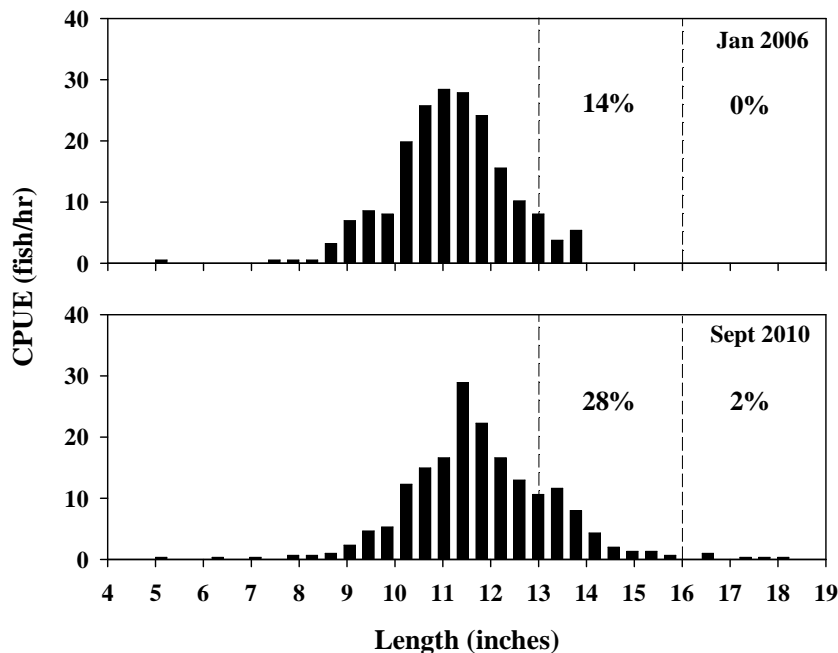


Figure 3.— Overall length-frequency distribution of rainbow trout collected in electrofishing samples on Beaver Tailwater in 2006 and 2010. Dashed lines indicate the protected slot limit of 13”-16”. The proportions of all rainbow trout collected that were in and above the slot limit both years are included on the graph.

Two of the most important questions that needed to be answered following the implementation of new regulations in 2006 were how the changes would affect angler catch rates and whether the quality of the fish that anglers caught would improve. Angler

catch rates (i.e., the number of fish people catch in an hour of fishing time) provide managers with a measure of fishing success as well as the relative abundance (i.e., numbers) and total catch and harvest of fish in a given area.

Angler catch rates of rainbow trout were higher (1.3 fish/hr) during the 1998-2000 survey than during the 2008-2010 survey (0.9 fish/hr; Figure 4). Considering that twice as many fish were stocked on average during the 1998-2000 creel survey (193,510/year vs. 96,378/year), the reduction in the overall catch rates was not surprising. Despite comparatively lower catch rates for rainbow trout, they have been brought in line with the management plan goal of being within 0.8-1.0 fish/hr, which is the range considered satisfactory to most Arkansas trout anglers. Surprisingly, 64% of anglers who returned the mail survey thought the catch rates for rainbow trout had increased or stayed the same over the last 5 years, despite the creel results indicating they actually dropped. These results, that catch rates are within the target range, also support our decision to maintain the current stocking rates of rainbow trout over the next few years).



Figure 4.—Mean rainbow trout catch rates by zone during the 1998-2001 and 2008-2010 Beaver Tailwater Creel Surveys.

Total catch and harvest of rainbow trout during the 2008-2010 creel survey were estimated by multiplying angler effort by catch rates. Anglers caught an average of 71,939 rainbow trout each year, of which 23,469 (33%) were harvested and the remaining 48,470 (67%) were released. Mean annual harvest of rainbow trout during both creel surveys was approximately the same (27,454 trout in 1998-2001 versus 23,469 trout in 2008-2010; Figure 5), but mean total catch during the 2008-2010 survey was much lower than during the 1998-2001 survey (decreased from 107,485 trout to 71,939 trout). The large difference in stocking numbers (and not effort) between the two creel surveys is the most likely explanation for the difference in catch rates and total catch. These results suggest that we improved stocking efficiency (number caught/number stocked) by decreasing stocking rates. These results indicate that there is a high amount of catch and release occurring on the tailwater.

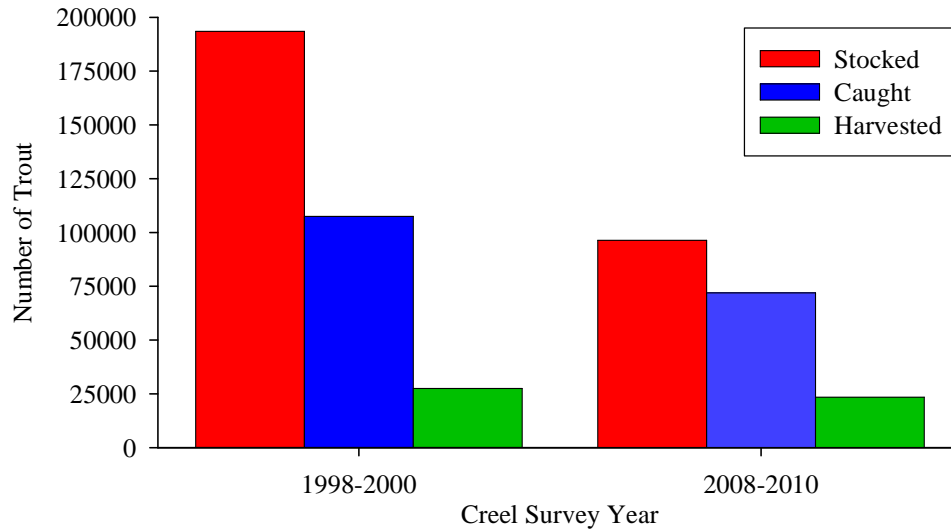


Figure 5.— Mean number of rainbow trout stocked, caught, and harvested annually during the 1998-2001 and 2008-2010 Beaver Tailwater Creel Surveys.

Although catch rates and total catch of rainbow trout were lower than during the previous creel survey, anglers caught a greater percentage of large rainbow trout. That trend was evident in results of both the creel and mail surveys. Large rainbow trout (greater than 13”) made up relatively small proportions of the annual angler catch during the 1998-2000 survey; only 14% of the rainbow trout caught by anglers during that survey were greater than 12”. From 2008-2010, rainbow trout greater than 13” made up 24% of the rainbow total catch. Additionally, most (65%) anglers who returned the mail survey thought that rainbow trout sizes had increased or stayed the same over the last 5 years. These angler catches of large rainbow trout are consistent with what we observed during the annual electrofishing samples: more large rainbow trout are present in the tailwater.

Most rainbow trout caught (76%) and harvested (93%) during the 2008-2010 survey were less than 13” (Figure 6). Only 1% of rainbow trout harvested were greater than 16”. Therefore, more restrictive regulations for large rainbow trout are unnecessary.

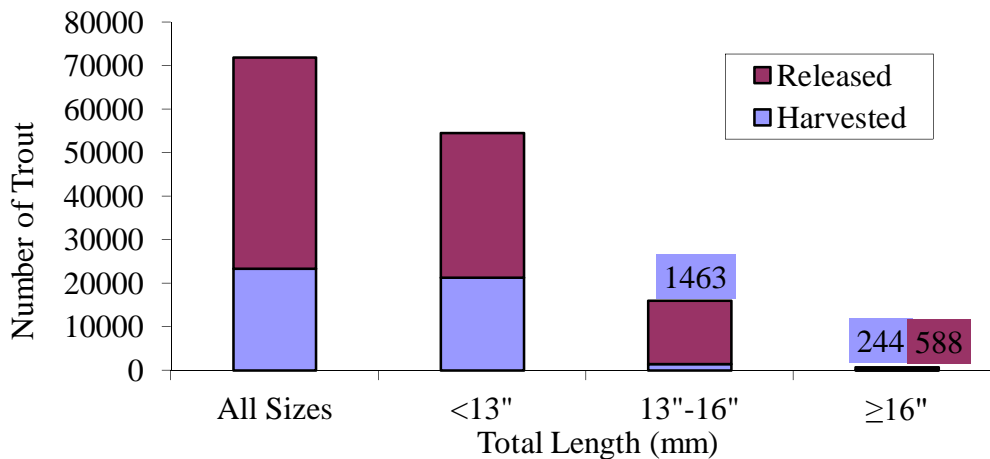


Figure 6.— Mean number of rainbow trout caught, harvested, and released overall and by size class during the 2008-2010 Beaver Tailwater creel survey.

During the growth and mortality study we observed low annual survival rates (1-4% annually; Figure 7) and slow growth of catchable size rainbow trout. A low percentage (~33%) of rainbow trout were harvested during the creel survey relative to the number caught; therefore, we suspect they instead died of natural causes (such as predation or disease) or hooking-related injuries. During the evaluation, it took anywhere from 0.3 to 1.1 years for an 11 inch stock-size rainbow trout to reach 13 inches and 0.9 to 2.8 years to reach 16 inches (Figure 8). This evidence of slow growth exhibited by rainbow trout is consistent with results from previous work conducted on the BVTW by AGFC.

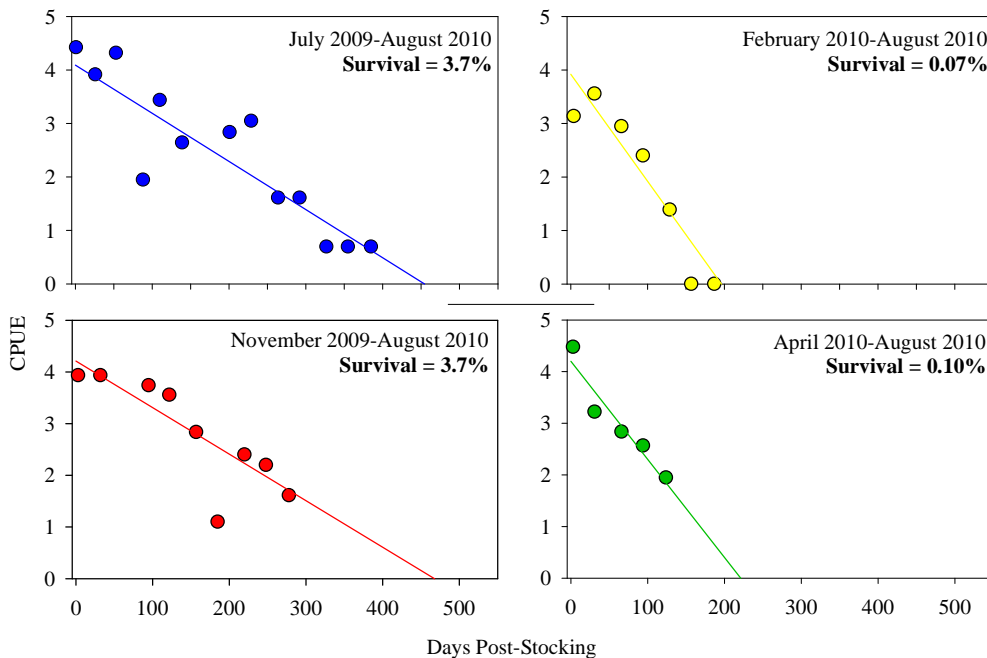


Figure 7.—Electrofishing CPUE of four tagged cohorts from July 2009 through August 2010. Solid colored lines represent the mortality rate (i.e., the rate at which rainbow trout “left the system”).

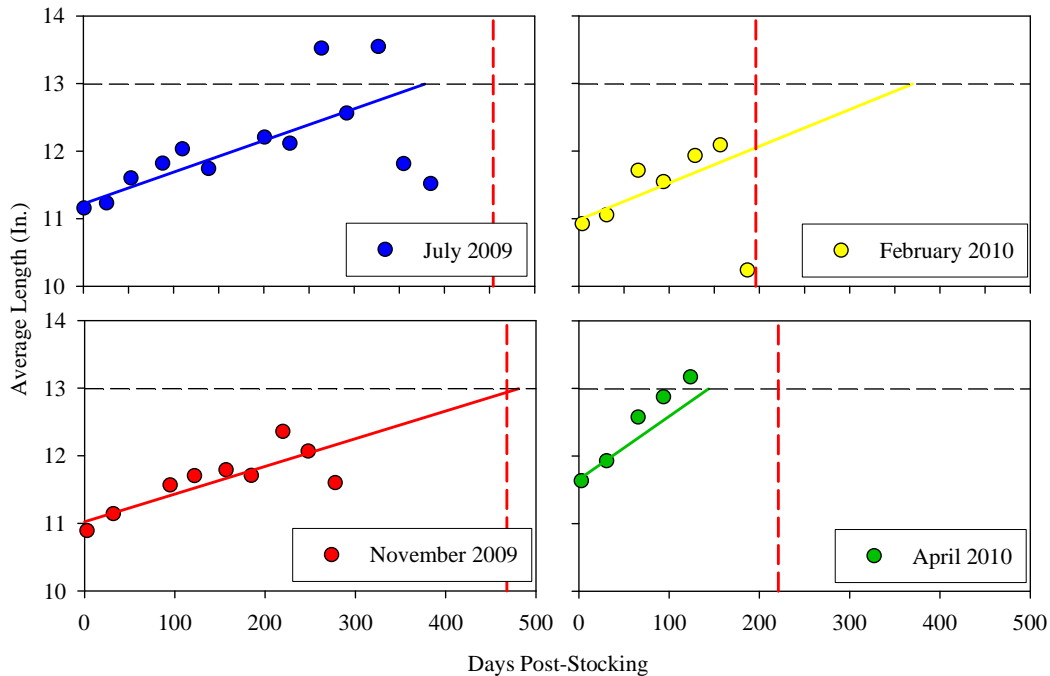


Figure 8.—Average lengths of each tagged cohort on each sampling date (colored circles) from July 2009 through August 2010. Solid colored lines represent the rates at which rainbow trout grew during the study. The black dashed line indicates the lower end of the 13”-16” protected slot limit and the red dashed line represents the rate at which mortality of each cohort was predicted to be 100%.

Although we could establish any number of regulations to limit the lengths and numbers of rainbow trout kept, that would only protect fish from the “known” sources of mortality (such as angler harvest). Several anglers expressed concerns about hooking mortality and growth rates during the public workshops in Spring 2011 and a number of anglers commented about hooking mortality in the “comments” section of the mail survey. During the next management plan period, we will continue to monitor growth and survival rates of catchable size rainbow trout and will investigate several ways to improve growth and survival rates of stocked rainbow trout (e.g., by stocking fingerlings instead of catchables; stocking different strains). We will also attempt to evaluate hooking mortality rates of rainbow trout that are caught and released in Beaver Tailwater. In light of some evidence that circle hooks decrease hooking mortality associated with bait fishing, the Trout Program will also conduct a circle hook evaluation.

There is a fair amount of uncertainty associated with determining what factors are most responsible for the improvements in the overall size structure of the rainbow trout population since 2006. It is possible that any combination of factors, including reduced stocking rates, the slot limit, or higher than normal water levels in 2008 and 2009, could have resulted in the higher numbers of large rainbow trout in the fishery. Although we have seen marked improvements in the rainbow trout fishery since 2006, this uncertainty serves as the basis for our recommendation to continue to manage the rainbow trout fishery according to the regulations package outlined in the 2006-2010 management plan (i.e., slot limit, annual stocking rate of 96,000/year).

Brown Trout

Results from annual electrofishing samples conducted from 2006-2010 indicate that the size structure of the brown trout population is much different than when the new regulations were implemented in 2006. Although the relative abundances of brown trout have decreased since 2006, the mean lengths have increased by approximately 4". Additionally, greater proportions of brown trout are now at least 13" (24% in 2006 versus 43% and 91% in 2009 and 2010; Figure 9). We will continue to assess any changes to the brown trout population relative abundance and size structure through annual electrofishing samples from 2011-2016.

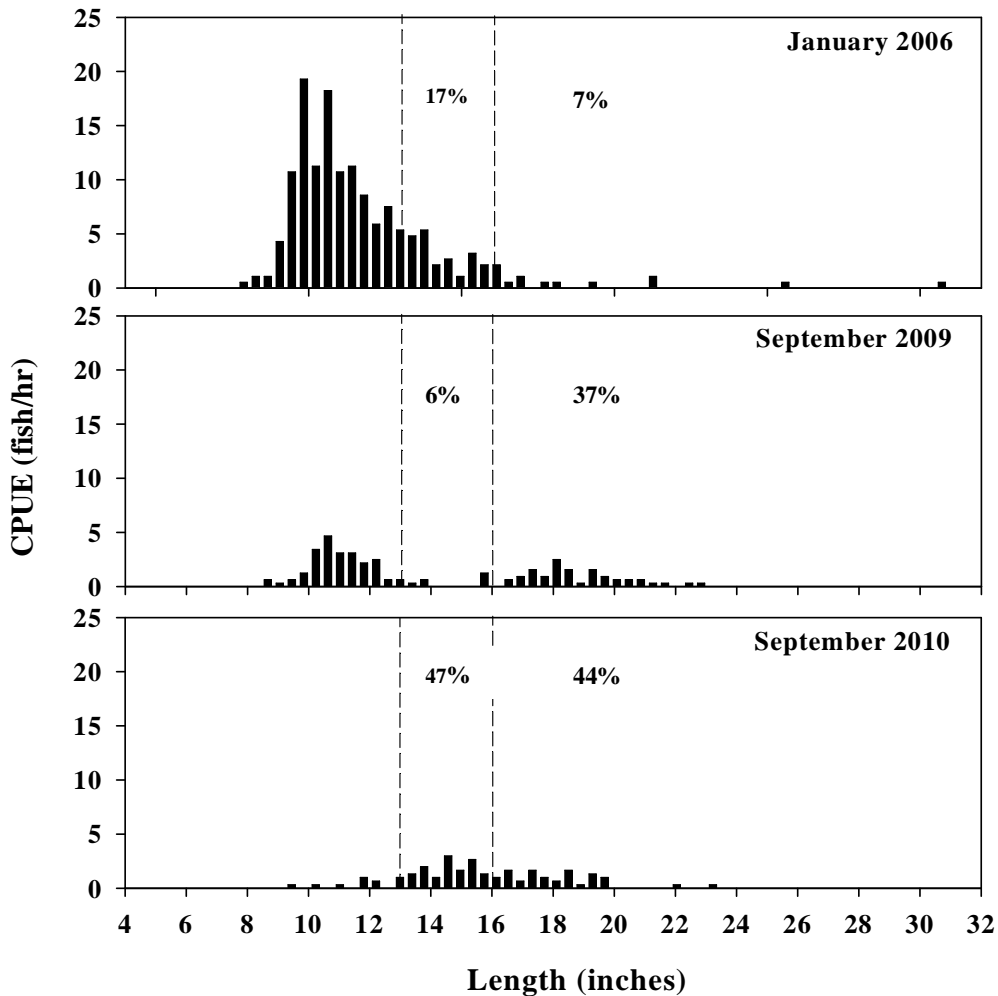


Figure 9.— Overall length-frequency distribution of brown trout collected during electrofishing samples on Beaver Tailwater in 2006, 2009, and 2010. Dashed lines indicate the protected slot limit of 13"-16".

Angler catch rates of brown trout have been greatly reduced since the previous creel survey (from 0.24 fish/hr to 0.02 fish/hr; Figure 10). From 1998-2000, brown trout were

stocked at a rate of 13,963 fish/yr, compared with an average of 2,500 trout per year after 2006. Thus, lower catch rates were expected following the reduction in stocking numbers in 2006. However, such a large difference was unexpected. During the development of the new management plan, the TMP heard concerns about the quantity of brown trout in the tailwater. Poor catch rates were also evident from the mail survey. Forty-three percent of anglers did not know how catch rates for brown trout have changed over the last 5 years; however, more anglers thought the catch rates have decreased (21%) instead of increased (9%). In light of these results, and in response to those concerns, the TMP will increase the stocking rate of brown trout to 5,000 per year in an attempt to increase angler catch rates of brown trout during the next management plan period.

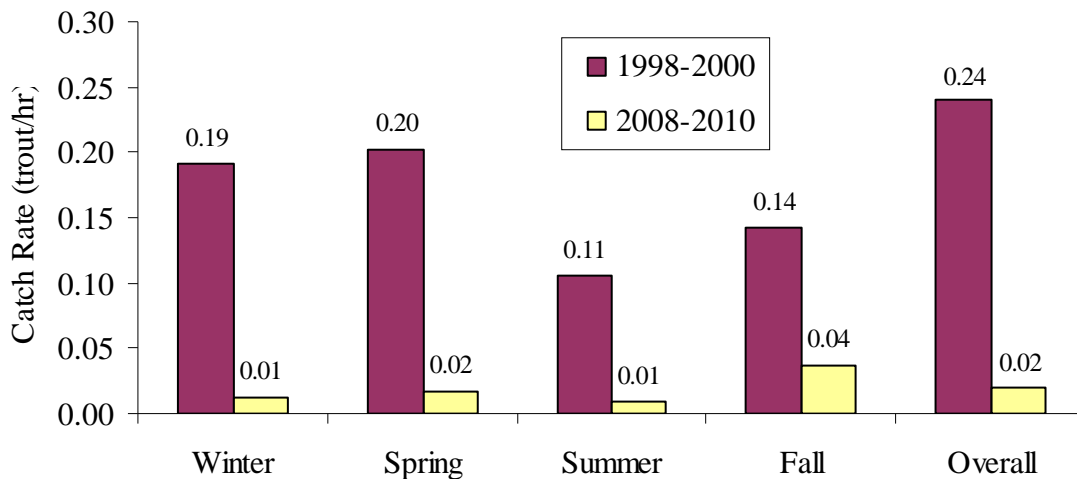


Figure 10.—Mean brown trout catch rates by season during the 1998-2001 and 2008-2010 Beaver Tailwater Creel Surveys.

During the 2008-2010 BVTW creel survey, anglers caught an average of 1,548 brown trout/yr, of which 219 (14%) were harvested and the remaining 1,329 (86%) were released. Mean annual harvest of brown trout during the 2008-2010 survey was higher than during the 1998-2001 survey, (58 in 1998-2001 versus 219 in 2008-2010;), but mean *total catch* was *much* lower than during the 1998-2001 survey (decreased from 20,739 to 1,548; Figure 11). From 2008-2010, anglers harvested 9% of brown trout caught that were less than 13” and 42% of all brown trout caught that were over 16”. Prior to 2006, anglers were not permitted to harvest any brown trout less than 16”. Since 91% of brown trout in the population were less than 12” (1998-2000 creel), that meant few brown trout were even available for harvest. It appears that some folks are taking advantage of being able to harvest small brown trout, leading to a higher percentage of brown trout harvested overall (14% vs. 0.3%).

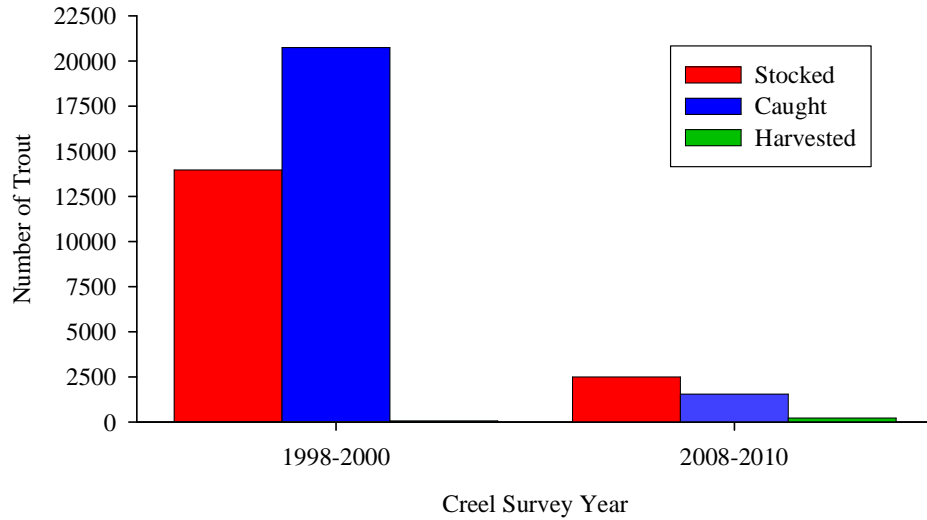


Figure 11.— Mean number of brown trout stocked, caught, and harvested annually during the 1998-2001 and 2008-2010 Beaver Tailwater Creel Surveys.

Although catch rates and total catch of brown trout were lower during the 2008-2010 survey than during the 1998-2001 survey, anglers caught a greater percentage of large brown trout. Large brown trout (>12”) made up relatively small proportions of the annual angler catch during the 1998-2000 survey; only 9% of brown trout caught during that survey were greater than 12”. From 2008-2010, brown trout greater than 13” made up 50% of the brown trout total catch (Figure 12). This is also consistent with annual electrofishing survey results; large brown trout make up a greater proportion of the population now than they did in 2006. Although, 58% of people from the mail survey indicated they don’t know how brown trout sizes have changed over the last 5 years, 34% thought they have increased or stayed the same in length.

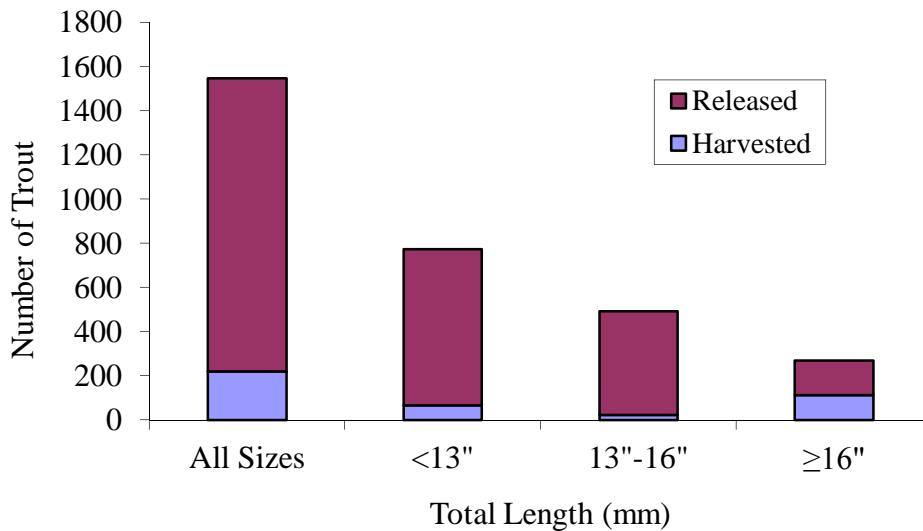


Figure 12.—Mean number of brown trout caught, harvested, and released overall and by size class during the 2008-2010 Beaver Tailwater Creel Survey.

Annual survival of brown trout was much higher than that of rainbow trout (42% vs. 1-4%; Figure 13). Brown trout also grew at a much faster rate (5-6 inches/year) than rainbow trout, which is also consistent with previous studies conducted by AGFC (Figure 14). Brown trout that were stocked at approximately 6” reached the lower end of the slot limit in just over one year (~13 months) and started to grow out of the slot limit by day 710 (~23 months). Low catch and harvest rates of brown trout are the most likely reason that these fish survive longer in the fishery than rainbow trout. Like rainbow trout, we will continue to monitor growth and mortality rates of brown trout through annual samples and a growth and mortality sample to be initiated in 2014. That data will be used to determine whether increased stocking densities of brown trout have any negative effects on brown trout growth.

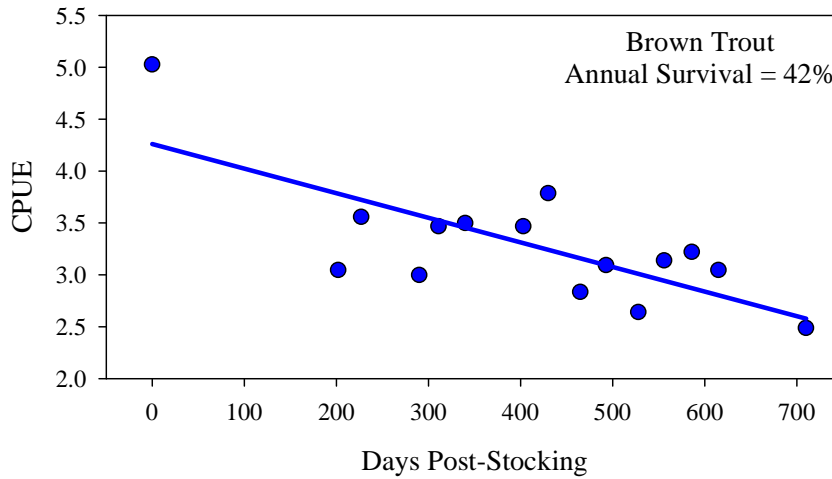


Figure 13.— Electrofishing CPUE of adipose clipped brown trout from July 2009 through August 2010. The solid colored line represents the mortality rate (i.e., the rate at which brown trout “left the system”).

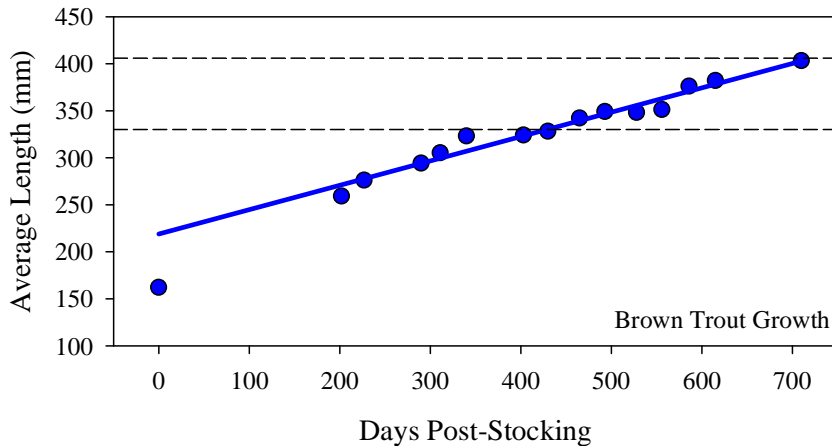


Figure 14.— Average length of adipose clipped brown trout on each sampling date (colored circles) from July 2009 through August 2010. The solid colored line represents the rates at which brown trout grew during the study. The black dashed lines indicate the lower and upper ends of the 13”-16” protected slot limit.

While developing the upcoming management plan, we considered several arguments that would have restricted the harvest of large brown trout: 1) that the slot limit should increase from 13"-16" to 15"-18"; 2) that brown trout should be regulated by an 18 inch minimum length limit; and 3) that brown trout should be regulated as catch-and-release only. However, based on the research we have conducted over the last 5 years, we will be keeping the 13"-16" slot limit and 5 fish/day creel limit for brown trout. Some folks are concerned that few brown trout have the opportunity to make it to larger sizes, reducing the potential for catching trophy browns. However, growth rates of brown trout were very fast (5"-6" per year) and few brown trout were harvested during the creel survey. Therefore, we feel that any changes to the current regulations are unnecessary at this time.

Justification for Proposed Regulation Changes

We will also be proposing two changes in tackle usage that will not only simplify the regulations at BVTW, but will bring them more in line with regulations on other Arkansas tailwaters. The first regulation change would allow the use of barbed, single-point hooks while bait fishing. The available literature suggests that mortality rates are not significantly different between barbed and barbless baited hooks. The second change would allow the use of treble-hooked artificial lures within the Special Regulations Area; it would require all hooking points to be barbless. This recommendation is based on an extensive review of available literature on the issue of hooking mortality. This research indicates that although hooking mortality with barbed, treble-hooked lures may be 2-3% higher than that with single-barbless lures, the difference is not significant at the population level.

Focus of the 2012-2017 BVTW Management Plan

The top two concerns identified at the March 2011 public workshop were directly related to addressing what anglers perceive to be a high level of illegal activity on the tailwater- a need for more enforcement and a need for more adequate/understandable signage. Non-compliance in recreational fisheries, especially illegal harvest, can have significant effects on the number of fish harvested (Gigliotti and Taylor 1990). Surprisingly, the mail survey respondents felt differently about those issues at BVTW. Sixty-one percent of mail survey respondents agreed or strongly agreed that the level of enforcement on BVTW by AGFC Wildlife Officers was adequate. About 71% thought the regulations pertaining to trout fishing at BVTW are clear and understandable. Despite the general opinions expressed in the mail survey, we understand and agree with workshop participants that there are some improvements that can be made in those areas. Therefore, you will see outlined in this management plan a number of objectives and strategies aimed at promoting angler compliance with regulations. Specifically, we hope to do so through education more clear and understandable signage, and focused enforcement.

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Beaver Tailwater Management Plan Goals:

People Goals

- 1. Develop an open and transparent management environment by improving communication with stakeholders and providing information to the public in a timely manner.**
- 2. Maintain a high level of angler compliance with regulations to aid in achievement of management objectives.**
- 3. Improve angling and boating access by maximizing use at existing facilities and creating additional access and facilities as needed.**

Habitat Goals

- 4. Achieve water quality sufficient to support survival, growth, and reproduction of trout in the Beaver Tailwater.**
- 5. Protect and enhance instream and riparian habitat on Beaver Tailwater to support healthy fisheries.**

Fish Goals

- 6. Provide a diverse recreational trout fishing experience that addresses the full range of angler desires and expectations within the biological and physical capacities of the tailwater.**

People Goals, Objectives, and Strategies

- GOAL 1. Develop an open and transparent management environment by improving communication with stakeholders and partner agencies and providing information to the public in a timely manner.**
- Objective 1.1 Hold at least one stakeholder meeting annually to provide stakeholders with current scientific information and the status of implementation projects for the Beaver Tailwater.**
- Strategy 1.1.1. Plan and host an annual informational meeting with stakeholders concerned about Beaver Tailwater.
- Who: Trout Management Program and District 1 Fisheries
When: Annually, beginning 2012
- Objective 1.2 Maintain the informational page on the AGFC website that includes the posting of recent Beaver Tailwater reports and other information relating to Beaver Tailwater.**
- Strategy 1.2.1. Maintain an informational website dedicated to the Beaver Tailwater.
- Who: Trout Management Program, District 1 Fisheries, and Education and Information Division
When: Update as needed.
- Objective 1.3 Disseminate information pertaining to research and management on Beaver Tailwater to the public using popular media outlets.**
- Strategy 1.3.1 Publish articles pertaining to research and management on Beaver Tailwater in popular media outlets.
- Who: Trout Management Program
When: As possible
- Objective 1.4 Facilitate communications between anglers and U.S. Army Corps of Engineers (COE) and Southwest Power Administration (SWPA) regarding their facilities and operations at Beaver Tailwater.**

- Strategy 1.4.1 Ensure that the COE phone numbers in the AGFC Fishing and Trout Fishing Guidebooks are more conspicuous so anglers have access to current generation conditions.
- Who: Trout Management Program in cooperation with the Education and Information Division
When: To be completed by January 2012
- Strategy 1.4.2 Provide conspicuous links to COE and SWPA websites that provide anglers with information about generation schedules.
- Who: Trout Management Program in cooperation with the Education and Information Division
When: To be completed by January 2012
- Strategy 1.4.3 Provide respective COE employees at the Beaver Lake Project Office (Rogers, AR) with memos that summarize any and all concerns obtained from stakeholders at public meetings and/or through creel/mail surveys regarding their facilities and services (i.e., need for more campgrounds; more shower facilities; water release information/generation issues, etc.).
- Who: Trout Management Program
When: As needed
- Objective 1.5 Provide anglers of all ages with educational opportunities that will enhance their understanding of trout fishing, trout biology and management, and their role in the White River ecosystem.**
- Strategy 1.5.1 Conduct fishing seminars/clinics (e.g., Trout Fishing 101; Beginning Fly-Tying) for anglers of all ages that provide them with basic instructions on proper fishing techniques, handling, and release of trout.
- Who: Education and Information Division and/or Aquatic Resources Education Program (Fisheries Division)
When: Upon request
- Strategy 1.5.2 Determine whether the Parker Bend Access is an area suitable to be designated as a Watchable Wildlife viewing area. If so, add Parker Bend to the Watchable Wildlife viewing area database on AGFC.com.
- Who: Education and Information Division
When: As soon as possible

Strategy 1.5.3 | If Parker Bend access is designated as a Watchable Wildlife site, develop wayside exhibit panels that would address trout management, trout fishing techniques, habitat requirements, life-cycle, and their role in the White River ecosystem.

Who: Education and Information Division in cooperation with Trout Management Program

When: As soon as possible

Strategy 1.5.4. Incorporate informational kiosks describing the management strategies used at Beaver Tailwater at several access areas (i.e., Dam Access; Parker Bend Access).

Who: Trout Management Program in cooperation with Education and Information Division

When: As soon as possible

GOAL 2. Maintain a high level of angler compliance with regulations to aid in achievement of management objectives.

Objective 2.1 Maintain/establish adequate signage that promotes compliance with regulations on Beaver Tailwater.

Strategy 2.1.1. Ensure that all access areas, including the special regulation areas, are clearly marked.

Who: Ecological and Engineering Services Division in cooperation with Trout Management Program and District 1 Fisheries

When: At all times

Strategy 2.1.2. Establish more clear and understandable signage at access points on Beaver Tailwater. (see Appendix A for examples of proposed signage)

Who: Ecological and Engineering Services Division in cooperation with Trout Management Program and District 1 Fisheries

When: To be completed by January 2013.

Strategy 2.1.3 Establish bilingual signage at several access points.

Who: Ecological and Engineering Services Division in cooperation with Trout Management Program and District 1 Fisheries

When: To be completed by January 2013.

Strategy 2.1.4. Ensure that the Poaching Hotline number is posted on all regulations signs at Beaver Tailwater to encourage anglers to report violations.

Who: Trout Management Program and District 1 Fisheries in cooperation with Ecological and Engineering Services Division.

When: To be completed by January 2013.

Strategy 2.1.5. Assess the level of angler compliance with regulations using results from the creel survey to be conducted in 2014.

Who: Trout Management Program

When: To be completed by 2015

Objective 2.2 Work with Enforcement Division to ensure angler compliance with angling regulations

Strategy 2.2.1. The Enforcement Division will maintain a visible presence on the Beaver Tailwater utilizing Wildlife Officers from other counties during their slow time as appropriate.

Who: Enforcement Division

When: When possible

Strategy 2.2.2. Conduct high visibility river patrols.

Who: Enforcement Division

When: When possible

Strategy 2.2.3 Conduct afternoon patrols as often as possible.

Who: Enforcement Division

When: When possible

Strategy 2.2.4 Conduct patrols on weekends/holidays as often as possible.

Who: Enforcement Division

When: When possible

Strategy 2.2.5 Wildlife Officers will make every effort to respond to all violations on Beaver Tailwater that are reported through the Poaching Hotline phone number.

Who: Enforcement Division
When: At all times

GOAL 3. Improve angling and boating access by maximizing use at existing facilities and creating additional access and facilities as needed.

Objective 3.1. Create additional access or improve existing access for anglers and boaters as needed.

Strategy 3.1.1. Use all comments and concerns regarding access needs that are provided by anglers (e.g., during annual public meetings, the 2014 creel survey, and the 2015 mail survey) to assess whether additional access areas should be created or whether existing access areas need improvements.

Who: District 1 Fisheries and Trout Management Program
When: Annually, beginning 2012

Strategy 3.1.2 If/when it is determined that additional access areas are needed or that current access areas need improvements, identify, prioritize, and plan future access projects.

Who: District 1 Fisheries and Trout Management Program in cooperation with Ecological and Engineering Services Division
When: As needed

Objective 3.2 Develop plans to improve existing facilities along the Beaver Tailwater.

Strategy 3.2.1 Ensure weekly trash pick-up by contractor is continued.

Who: Ecological and Engineering Services Division
When: At all times

Strategy 3.2.2 Explore the costs associated with providing a portable restroom facility at Bertrand Access.

- Who: District 1 Fisheries and Ecological and Engineering Services Division
- When: To be completed by 2012
- Strategy 3.2.3 Evaluate the need to provide a portable restroom facility at Houseman Access now that access is improved for bank fishing.
- Who: District 1 Fisheries, Trout Management Program, and Ecological and Engineering Services Division
- When: Upon completion of evaluation
- Strategy 3.2.4 Explore cost-share options with local organizations and clubs to construct and install fishing line disposal containers at all access points.
- Who: Trout Management Program and District 1 Partners
- When: To be completed by 2013

Habitat Goals, Objectives, and Strategies

GOAL 4 Achieve water quality sufficient to support survival, growth, and reproduction of trout in the Beaver Tailwater

Objective 4.1 Maintain a minimum dissolved oxygen level of 6.0 parts per million (ppm) in the Beaver Tailwater as required by Regulation 2 of the Arkansas Pollution Control and Ecology Commission.

Strategy 4.1.1 Coordinate actions with the COE, Arkansas Department of Environmental Quality (ADEQ), and SWPA as outlined in the White River Dissolved Oxygen Committee's Operational Action Plan.

Who: Trout Management Program
When: As needed annually during low dissolved oxygen season

Strategy 4.1.2 Monitor daily water quality in terms of temperature and dissolved oxygen during critical periods.

Who: Trout Management Program
When: As needed annually during low dissolved oxygen season

Strategy 4.1.3 Document fish kills on Beaver Tailwater associated with low dissolved oxygen or high water temperatures.

Who: Trout Management Program and District 1 Fisheries
When: As needed

Objective 4.2 Prevent the spread of invasive species to and from the Beaver Tailwater.

Strategy 4.2.1 Maintain presence of informational signs on invasive species at all access points on the Beaver Tailwater.

Who: Trout Management Program and Ecological and Engineering Services Division
When: At all times

Strategy 4.2.2 Develop and implement internal protocol for cleaning/disinfection of equipment and boats to reduce potential of spreading invasive species to and from Beaver Tailwater during field sampling and other management activities.

Who: Trout Management Program
When: To be completed by 2012

Strategy 4.2.3 Adhere to internal protocol to reduce potential of spreading invasive species to and from Beaver Tailwater during field sampling and other management activities.

Who: Trout Management Program and District 1 Fisheries
When: At all times, following development of protocol

Strategy 4.2.4 Provide information to the public through the AGFC website, Trout Fishing Guidebook, and other means regarding the presence of invasive species in Beaver Tailwater, potential impacts of invasive species on trout populations, and proper techniques for cleaning angling equipment.

Who: Trout Management Program and Education and Information Division
When: As needed

GOAL 5. Protect and enhance instream and riparian habitat on Beaver Tailwater to support healthy fisheries.

Objective 5.1 Create an instream habitat protection and enhancement plan for Beaver Tailwater, which will be used to identify, prioritize, and plan future instream habitat projects. Plan will be designed by AGFC personnel and funded through cooperative partnerships. The plan and future instream habitat projects should take into account the influence of Beaver Dam and its fluctuating and potentially high water release as well as the impact of the water level in Table Rock Lake on physical habitat in Beaver Tailwater.

Strategy 5.1.1 Determine the level of resolution and habitat variables needed in an inventory and assessment of physical habitat.

Who: Trout Habitat Program and Trout Management Program
When: To be completed by 2013

Strategy 5.1.2 Assess the personnel and equipment resources needed to complete the inventory and assessment.

Who: Trout Habitat Program and Trout Management Program
When: To be completed by 2013

Strategy 5.1.3 Conduct the inventory and assessment of fish habitat in Beaver Tailwater.

Who: Trout Habitat Program
When: To be completed by 2014

Strategy 5.1.4 Upon completion of the assessment, create a prioritized list of areas needing instream habitat improvement incorporating the presence of access areas and distribution of anglers.

Who: Trout Habitat Program and Trout Management Program
When: To be completed by 2014

Strategy 5.1.5 Develop maps, diagrams, and cost estimates for high priority projects and seek funding internally and through cooperative partnerships.

Who: Trout Habitat Program
When: To be completed by 2015

Objective 5.2 **Create a riparian habitat protection and enhancement plan for Beaver Tailwater, which will be used to identify, prioritize, and plan future riparian habitat projects. Plan will be designed by AGFC personnel and funded in cooperation with riparian landowners and partner agencies. The plan and future riparian habitat projects should take into account the influence of Beaver Dam and its fluctuating and potentially high water release as well as the impact of the water level in Table Rock Lake on riparian habitat in Beaver Tailwater.**

Strategy 5.2.1 Determine the level of resolution and appropriate techniques for assessing riparian stability on the Beaver Tailwater.

Who: Trout Habitat Program and Trout Management Program
When: To be completed by 2013

Strategy 5.2.2 Assess the personnel and equipment resources needed to complete the assessment.

Who: Trout Habitat Program and Trout Management Program
When: To be completed by 2013

Strategy 5.2.3 Conduct the inventory and assessment of streambank stability on the Beaver Tailwater.

Who: Trout Habitat Program
When: To be completed by 2014

Strategy 5.2.4 Upon completion of the assessment, create a map and prioritized list of areas needing streambank stabilization. Determine whether each area is publically or privately owned.

Who: Trout Habitat Program and Trout Management Program
When: To be completed by 2014

Strategy 5.2.5 Develop diagrams and cost estimates for high priority areas on the list and seek funding internally and/or from partner agencies if project is on publically owned land. If the bank stabilization project would be on land that is privately owned, work with the landowner to educate them on the importance of proper riparian management. Assist landowner with acquisition of appropriate permits and selection of a contractor.

Who: Trout Habitat Program
When: To be completed by 2015

Strategy 5.2.6

Develop, publish, and distribute an informational pamphlet that details the benefits of maintaining riparian buffers. Upon completion, AGFC personnel will distribute the pamphlets to landowners, developers, real estate agents, county extension agents, etc.

Who: Trout Habitat Program
When: To be completed by 2013

Fish Goals, Objectives, and Strategies

GOAL 6. Provide a diverse recreational trout fishing experience that addresses the full range of angler desires and expectations within the biological and physical capacities of the tailwater.

Objective 6.1. By 2016, achieve a rainbow trout population in Beaver Tailwater characterized by the following criteria:

- **Electrofishing catch rate of ≥ 25 fish/hr for fish 13 to 16 inches in total length (TL)**
- **Electrofishing catch rate of ≥ 5 fish/hr for fish ≥ 16 inches in TL**

Strategy 6.1.1 Regulate the rainbow trout fishery in the entire tailwater, from Beaver Dam to Houseman Access with the following regulations package:

- 13 to 16 inch protected slot limit for all trout. All trout between 13 and 16 inches must be released immediately; possession will not be allowed;
- Daily bag (creel) limit of 5 trout; only one trout may be over 16 inches;
- Anglers may use no more than one fishing rod or pole and must attend it at all times;
- Tackle on the entire tailwater will be regulated as follows:
 - Single- and multiple-point, barbed hooks will be allowed unless fishing with bait or inside the Special Regulations Area. Bait fishing will be allowed only with single hooking points.;
- Maintain the boundaries of the Special Regulations Area; continue to manage the area as a “no bait fishing” zone. Only artificial lures and flies may be used. All hooking points must be barbless.

Who: Fisheries Division

When: For duration of current management plan

Strategy 6.1.2. Maintain the annual rainbow trout stocking rate of 96,000 catchables (mean length = 11 in.).

Who: Fisheries Division in cooperation with U.S. Fish and Wildlife Service

When: Annually

- Strategy 6.1.3 Assess rainbow trout population relative abundance and size structure through annual electrofishing samples.
- Who: Trout Management Program and District 1 Fisheries
When: Annually
- Strategy 6.1.4 Quantify rainbow trout mortality rates with mark-recapture study.
- Who: Trout Management Program
When: To be completed by 2015
- Strategy 6.1.5. Quantify rainbow trout growth rates with mark-recapture study.
- Who: Trout Management Program
When: To be completed by 2015
- Strategy 6.1.6 Evaluate growth and mortality rates of both domestic and “wilder” strain rainbow trout fingerlings stocked into Beaver Tailwater.
- Who: Trout Management Program
When: To begin as soon as possible and to be completed by 2015
- Strategy 6.1.7 While conducting Strategy 6.1.6, substitute a small portion of the catchable size (11”) rainbow trout stocked annually with an equivalent biomass of fingerling size (3-4”) rainbow trout (split evenly between domestic and “wilder” strain fingerlings).
For example: Of the 96,000 catchable size trout we stock annually, ~1,500 (~528 lbs.) of those trout would be replaced with ~24,000 fingerling size trout (also ~528 lbs.). The number of catchable size trout scheduled to be stocked at the same time fingerlings are stocked will not be affected.
- Who: Trout Management Program
When: As needed
- Strategy 6.1.8 Evaluate hooking mortality rates of rainbow trout that are caught and released in Beaver Tailwater.
- Who: Trout Management Program
When: To be completed by 2015
- Strategy 6.1.9 Conduct a hook-and-line study to investigate use of circle hooks as a method to decrease hooking mortality.
- Who: Trout Management Program
When: To be completed by 2015

Strategy 6.1.10 Explore cost-share options with organizations to distribute sample packs of circle hooks to anglers.

Who: Trout Management Program

When: Upon completion of Strategy 6.1.9

Strategy 6.1.11 Incorporate information on the use of circle hooks when fishing with bait into Strategy 1.5.1.

Who: Education and Information Division and/or Aquatic Resources Education Program (Fisheries Division)

When: Upon request

Objective 6.2. Maintain a mean angler catch rate of 0.8 – 1.0 fish/hour for stocked rainbow trout while maximizing stocking efficiency

Strategy 6.2.1. Stock approximately 96,000 catchable rainbow trout annually.

Who: Fisheries Division in cooperation with U.S. Fish and Wildlife Service

When: Annually

Strategy 6.2.2. Quantify angling effort, catch rates, harvest rates, and angler satisfaction with rainbow trout fishing through a creel survey to be initiated in 2014.

Who: Trout Management Program

When: To be completed by 2015

Strategy 6.2.3. Quantify exploitation rate of stocked rainbow trout with a tagging study to be conducted concurrently with creel survey.

Who: Trout Management Program

When: To be completed by 2015

Strategy 6.2.4 Quantify angler satisfaction with, motivations for, and attitudes towards rainbow trout fishing through a mail survey to be initiated in 2015.

Who: Trout Management Program

When: To be completed by 2016

Strategy 6.2.5. Use creel survey and angler distribution data from 2014-2015 Beaver Tailwater Creel survey to match rainbow trout stocking and distribution to temporal and spatial patterns of angling pressure.

Who: Trout Management Program
When: To be completed by 2016

Objective 6.3. By 2016, achieve a brown trout population in Beaver Tailwater characterized by the following criteria:

- **Electrofishing catch rate of ≈ 55 fish/hr**
- **Electrofishing catch rate of ≈ 20 fish/hr for fish 13-16 inches**
- **Electrofishing catch rate of ≈ 10 fish/hr for fish ≥ 16 inches TL**

Strategy 6.3.1 Regulate brown trout fishery in the entire tailwater, from Beaver Dam to Houseman Access according to the regulations package outlined in Strategy 6.1.1.

Who: Fisheries Division
When: For duration of current management plan

Strategy 6.3.2. Stock brown trout at a rate of 5,000 fingerlings (mean length = 6 inches) annually.

Who: Fisheries Division in cooperation with U.S. Fish and Wildlife Service
When: Annually

Strategy 6.3.3. Assess brown trout population relative abundance and size structure through annual electrofishing samples.

Who: Trout Management Program and District 1 Fisheries
When: Annually

Strategy 6.3.4 Continue to mark/tag all brown trout that are stocked into Beaver Tailwater in order to obtain long-term estimates of age and growth rates.

Who: Trout Management Program and District 1 Fisheries
When: Annually

- Strategy 6.3.5. Quantify angling effort, catch rates, harvest rates, and angler satisfaction with brown trout fishing through a creel survey to be initiated in 2014.
- Who: Trout Management Program
When: To be completed by 2015
- Strategy 6.3.6. Quantify exploitation rate of stocked brown trout; to be conducted concurrently with creel survey.
- Who: Trout Management Program
When: To be completed by 2015
- Strategy 6.3.7. Quantify angler satisfaction with, motivations for, and attitudes towards brown trout fishing through a mail survey to be initiated in 2015.
- Who: Trout Management Program
When: To be completed by 2016

Objective 6.4 Monitor abundance of forage species to include sculpin *Cottus spp.* and benthic macroinvertebrates.

- Strategy 6.4.1. Develop annual sampling protocol to quantify and monitor abundance of forage species in Beaver Tailwater.
- Who: Trout Management Program
When: To be completed by 2013
- Strategy 6.4.2. Implement annual sampling protocol to quantify and monitor abundance of forage species in Beaver Tailwater.
- Who: Trout Management Program
When: To be initiated by 2013

**APPENDIX A
CURRENT SIGNAGE ON BVTW AT ACCESS POINTS**



PROPOSED ALTERNATE FOR ALL NON-SPECIAL REGS ACCESSES:



BEAVER TAILWATER

ILLEGAL TO POSSESS TROUT IN SLOT LIMIT
RELEASE TROUT 13 TO 16 INCHES IN LENGTH IMMEDIATELY

DAILY CREEL LIMIT (5), ONLY ONE CAN BE OVER 16 INCHES.

BAIT ANGLERS MUST USE SINGLE BARBLESS HOOKS.
BAIT INCLUDES NATURAL AND SCENTED BAITS

BAIT USE PROHIBITED IN SPECIAL REGULATIONS AREA.

ONLY ONE FISHING ROD MAY BE USED / ATTEND AT ALL TIMES

SEE FISHING GUIDEBOOK FOR FURTHER DETAILS.

REPORT VIOLATIONS USING THE WILDLIFE HOTLINE: **1-800-482-9262**

FISHING LICENSE AND TROUT PERMIT REQUIRED

CURRENT SIGNAGE FOR SPECIAL REGULATIONS AREA:



**PROPOSED ALTERNATE
WHEN ENTERING SPECIAL REGULATIONS AREA:
(TO BE POSTED AT ACCESS POINTS AND ON RIVER BANKS)**



**NOW ENTERING
BEAVER TAILWATER
SPECIAL REGULATIONS AREA**

ARTIFICIAL LURES WITH SINGLE, BARBLESS HOOKS ONLY

**NATURAL AND SCENTED BAIT USE PROHIBITED IN THIS AREA
(NO POWERBAIT, CORN, WORMS, SALMON EGGS, ETC.)**

**ILLEGAL TO POSSESS TROUT IN SLOT LIMIT
RELEASE TROUT 13 TO 16 INCHES IN LENGTH IMMEDIATELY**

DAILY CREEL LIMIT (5), ONLY ONE CAN BE OVER 16 INCHES

ONLY ONE FISHING ROD MAY BE USED / ATTEND AT ALL TIMES

SEE FISHING GUIDEBOOK FOR FURTHER DETAILS

REPORT VIOLATIONS USING THE WILDLIFE HOTLINE: **1-800-482-9262**

FISHING LICENSE AND TROUT PERMIT REQUIRED

****ON THE BACK OF THIS SIGN, "NOW LEAVING SPECIAL REGULATIONS
AREA" WILL BE POSTED.**