A Plan for Missouri Trout Fishing

2017 Status Report

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Prepared by

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Introduction

A Plan for Missouri Trout Fishing was approved by the Missouri Conservation Commission on October 9, 2003. This plan was adopted to provide a vision and an outline for how Missouri's trout program should be managed over the next decade. The plan includes goals and objectives designed to shift the focus of Missouri's trout program in three very significant ways – to create successful fishing trips for more trout anglers, to spread the harvest of trout out more equitably among all trout anglers, and to provide additional trout fishing opportunities for Missouri anglers.

The plan was written to guide the trout program for a ten year period. A five year status update was written in 2008 by Mike Kruse, Chris Vitello, James Civiello and Dean Harre. The 2008 update is available on the Fisheries Division Sharepoint site.

The purpose of this 2017 status report is to summarize progress made since the plan development.

Program Mission:

Provide anglers with diverse, quality trout fishing opportunities consistent with overall sound management of our state's aquatic life.

Goal 1: Maintain quality trout fishing opportunities in the trout parks, Lake Taneycomo, trout stream management areas, and urban winter trout management areas.

Objective 1.1: Refine our policy of managing fisheries based on habitat capability and social factors.

Discussion: The quality of trout habitat (biological, chemical and physical factors) determines the kind of trout population that a given area can support, while social factors such as angler access, proximity to highly-populated communities or other high use areas can determine what type of trout fishery is acceptable. The highest quality streams, with cold water temperatures and good habitat can be managed as self-sustaining trout fisheries capable of providing trophy trout. Lower quality habitat, while not suitable for wild trout, can be managed for "put-and-grow" fisheries where hatchery trout grow to larger sizes in the wild. Marginal or warm water habitat may be capable of supporting put-and-take or seasonal fisheries where hatchery trout provide immediate opportunities for catch or harvest. Consideration of any of these management scenarios, however, must also include social factors. For example, managing for a wild trout stream adjacent to a trout park, with its emigration of stocked hatchery fish and high public use, may not be biologically or socially acceptable. In trout parks themselves, a long tradition of put-and-take management should be maintained for the foreseeable future even though they have high quality habitat that could support wild trout fisheries. Continued research is needed to inventory and assess trout habitat and social factors of Missouri streams so that the most appropriate management for each reach of stream can be identified.

Status: Department staff have surveyed physical habitat in all of the streams managed by the Missouri Department of Conservation and a report entitled "A Survey of Missouri Trout Habitat Quality" was completed in March of 2007 (Siepker, 2007). In addition, a long-term summer water temperature monitoring program that began in 2002 continues in areas managed for

trout fishing. Staff have reviewed the results of this work as well as information gained from periodic fish population sampling and the results of the statewide trout angler survey (see objective 1.8), and have developed guidelines for trout stocking in Department- managed areas. In an effort to better distribute limited numbers of surplus broodstock, guidelines for their allocation and stocking have also been developed and implemented in A Plan for Allocation and Stocking Trout in Missouri (Appendix A).

Objective 1.2: Reduce the statewide daily limit on trout from 5 to 4 in the aggregate.

Discussion: Most trout harvest in Missouri occurs in trout parks, trout management areas, Lake Taneycomo and urban winter trout management areas. Reductions in the daily limit in these areas from 5 to 4 trout per day will distribute the harvest among more anglers. At the trout parks, the daily limit of four should improve angling success for many anglers. Lower daily limits already apply at special and wild trout management areas. Extending the daily limit reduction to all waters of the state will affect the remaining populations that do not exist in designated trout areas. Such populations are frequently small and often supported by natural reproduction and cannot support much harvest.

Status: Complete. The statewide daily limit for trout was reduced to four on March 1, 2005. In an effort to achieve the stated goal of greater distribution of harvest among more anglers, no changes in stocking rates or allocations, other than surplus broodstock, were made. As a result, angler acceptance of the reduced daily limit has generally been good.

Objective 1.3: Provide enhanced year-round fishing success in trout management areas.

Discussion: Catch rates in trout management areas are dependent on the frequency of stocking. To stabilize trout densities and fishing success, managers should implement the following management changes:

1) Spread available fish among more stocking trips; involve non-hatchery staff as needed to accommodate increased labor and transport requirements.
2) Stock in a manner that ensures adequate temporal and spatial distribution of trout and survival of stocked fish.
3) Refrain from pre-announced stocking dates.
4) Use brown trout for a portion of the rainbow trout allotment when surplus brown trout are available.
5) Reduce the daily limit from 5 trout to 4 to match changes recommended for trout parks and distribute the harvest among more anglers.

(Further changes are recommended in Objective 4.3).

Status: "Trout Management Areas" were reclassified as "White Ribbon Trout Areas" in March of 2005 (see objective 1.4). Progress towards full implementation of this objective includes:

1) Trout stockings on the Capps Creek, Current River, Eleven Point River, Hickory Creek, Little Piney Creek, Niangua River, Roaring River, Stone Mill and Roubidoux Creek White Ribbon areas are distributed over a wide area using well-distributed access points, nets or float stocking methods.

2) A stocking barge is being used to distribute trout throughout Lake Taneycomo below Fall Creek. A stocking raft has been developed to more evenly distribute trout on the Current River White Ribbon Area. Stocking of the Current River and Little Piney Creek White Ribbon Trout areas has been altered to avoid stocking in areas or at times of high summer water temperature as identified in the monitoring program described under objective 1.1.
3) A practice of not announcing stocking dates in advance has been maintained.
4) Brown trout are stocked in the Capps Creek, Niangua River, Hickory Creek and Roaring River White Ribbon Trout areas and are present in the Roubidoux Creek White Ribbon Area as a result of stocking in an adjacent reach of stream. Surplus brown trout will only be stocked in an effort to make up the stocking request by the biologist based on availability.
5) The daily limit and possession limit were reduced as a result of the statewide regulation change.

Objective 1.4: Review management of all special trout management areas.

Discussion: Since 1974, six special trout management areas have been established. Brown trout is the primary species managed in these waters, and survival and growth after stocking vary considerably. Such variation may be attributable to differences in physical habitat, thermal quality, stocking densities, hooking mortality, illegal harvest or other factors. In response, managers will implement the following:

1) Perform additional data collection to determine what factors affect survival and growth after stocking. Efforts to measure water temperature regimes and physical habitat are needed to evaluate current management.
2) Spread available fish among more stocking trips; involve non-hatchery staff as needed to accommodate increased labor and transport requirements.
3) Evaluate and make recommendations on increasing numbers and size of trout to be stocked in each area.
4) Evaluate whether the boundaries of special management areas should be changed.
5) Restrict tackle to artificial lures and flies only in special management areas and assess whether current regulations in these areas satisfy prevailing angling interests.

Status: In 2004, staff conducted a comprehensive review of all trout areas using information from water temperature monitoring, trout population surveys, evaluations of stocking efforts, angler surveys and other sources. As a result of this review, new trout management categories with new fishing regulations were approved and became effective on March 1, 2005. Areas formerly managed under the categories of Trout Management Area (TMA), Special Trout Management Area (STMA) or Wild Trout Management Area (WTMA) were re- categorized as either Blue Ribbon, Red Ribbon or White Ribbon Trout

Management areas according to the criteria described in A Plan for Allocation and Stocking Trout in Missouri (Appendix A). The trout populations in all of the following trout areas are periodically sampled and data is collected for future analysis.

Blue Ribbon Trout Areas: Highest quality streams or streams with self-sustaining wild trout populations; managed to provide maximum density of adult trout, great catch and release opportunities and a chance to harvest a trophy. Supplemental stocking is conducted in large streams. Fishing is restricted to artificial lures and flies only and gigging is not permitted. The daily limit is 1 trout of 18 inches or greater. Blue Ribbon areas include:

Barren Fork Creek (formerly WTMA) Blue Springs Creek (formerly WTMA) Crane Creek (formerly WTMA)
Current River from Montauk to Cedargrove Access (formerly STMA)* Eleven Point River from Greer Spring confluence to Turner's Mill North Access (formerly WTMA)*
Little Piney Creek from Phelps/Dent Co. line to Milldam Hollow (formerly WTMA)
Mill Creek (formerly WTMA)
North Fork of the White River from Rainbow Spring to Patrick Bridge (formerly WTMA/STMA)* Spring Creek (formerly WTMA)
* Receive supplemental stocking

Red Ribbon Trout Areas: High quality streams that may have thermal or habitat bottlenecks; good catch and release opportunities and a chance to harvest quality- size trout. Supplemental stocking is conducted. Variable gear restrictions with gigging permitted. The daily limit is two trout of 15 inches or greater. Red Ribbon Areas include:

Meramec River (formerly STMA)
North Fork of the White River from Patrick Bridge to Norfork Lake (formerly STMA)
Roubidoux Creek from elevated utility cable crossing to Gasconade River (formerly STMA)

White Ribbon Trout Areas: Year-round trout habitat managed to provide great catch and harvest of trout under statewide regulations with occasional chance to harvest a large trout. Supplemental stocking is conducted. No gear restrictions and gigging for "other fish" as defined in the Wildlife Code of Missouri is permitted. The daily limit is 4 trout with no length limit on rainbow trout and a 15-inch length limit on brown trout (if present). White Ribbon areas include:

Capps Creek (formerly TMA)
Current River from Cedargrove Access to Akers Ferry (formerly TMA) Eleven Point River from Turner's Mill North Access to Riverton (formerly TMA)
Hickory Creek (New)
Little Piney Creek from Milldam Hollow to Co. Rd. 7360 (formerly TMA) Niangua River (formerly STMA)
Roaring River (formerly TMA)
Roubidoux Creek from Roubidoux Spring to elevated utility cable crossing (formerly TMA)
Stone Mill Spring (formerly TMA)

Objective 1.5: Review management of all wild trout management areas.

Discussion: Natural fluctuations in population size are to be expected in trout populations maintained through natural reproduction. Variations in reproductive rate, survival and growth will determine the number and size of trout in a population. Stocking in wild trout management areas will be restricted to populations that have been depressed beyond the point of natural recovery. Only wild strains of trout (based on genetic analysis) will be stocked. Wild trout management areas should only be maintained in small streams that can continuously sustain three or more year classes of wild, naturally-reproduced trout. Existing wild trout management areas should be periodically reviewed to determine whether they continue to provide high quality fisheries through natural reproduction. Specifically, the North Fork of the White and Eleven Point rivers, because these are larger streams that offer other management options, will be adequately stocked to ensure quality fishing opportunities.

Populations of wild trout will be larger and more stable in streams with good instream and riparian habitat. While research on trout habitat needs in Ozark streams is currently underway, a number of habitat enhancement techniques for small streams are already available to managers and could be used to improve wild trout populations.

Status: See objective 1.4 for information on how a comprehensive review of trout management conducted in 2004 resulted in management and fishing regulation changes in areas formerly classified as Wild Trout Management areas.

In addition to these management and regulatory changes, habitat improvement projects have been implemented on Barren Fork Creek and Mill Creek, two streams formerly classified as Wild Trout Management Areas. In both streams, instream cover has been enhanced through the addition of overhead cover structures, boulders and hard points that have combined to create improved habitat for adult wild trout. At Crane Creek on Wire Road Conservation Area efforts continue to enhance riparian corridors resulting in increased stream shading and streambank stability.

Wild trout populations in all Blue Ribbon Trout areas are sampled periodically and recent data have been collected. All areas currently managed without stocking continue to support populations with three or more year classes of wild trout and no supplementary stocking appears necessary to maintain their populations. Declines in the number and sizes of trout in some areas are believed to be the result of a series of low precipitation years and associated reduced stream flows over much of the past decade. However, cooler summer temperatures in conjunction with consistent precipitation, from the fall of 2007 through the spring of 2012, provided stable flows and improved trout habitat in small streams of the central Ozarks. The department has also adopted a holistic view on the entire watershed health to improve water quality for trout and other species. As a result of these improved conditions, wild trout populations have greatly improved in the last decade.

Population data from the Eleven Point Rainbow Trout Strain Evaluation and input from anglers identified an opportunity to balance the Eleven Point Blue Ribbon fishery through additional stocking trips. Rainbow trout survival in the Eleven Point is limited to six months and as a result there was a significant decline in the fishery six months after the annual stocking of this area.

Future stockings in the Eleven Point Blue Ribbon trout area will be made semi-annually to provide a consistent and quality fishery throughout each year.

Objective 1.6: Review, clarify and simplify trout fishing regulations.

Discussion: A group of Department Fisheries, Protection and Resource Science personnel, with input from trout anglers, will examine the current fishing regulations and make recommendations for any changes that are needed to ensure their effectiveness, consistency and clarity.

Status: There is no formal effort to make regulation changes at this time. To the greatest extent possible, regulations within Blue, Red and White Ribbon areas have been made the same so that anglers can easily determine the appropriate regulations by the type of area they are fishing. In addition, adoption of a statewide length limit for all brown trout caught from streams provides a simple, consistent regulation that applies in all trout parks, White and Red Ribbon trout areas and in all other streams statewide.

Objective 1.7: Evaluate trout areas for accessibility for a wide range of users.

Discussion: Trout areas managed by the Department of Conservation should be evaluated to determine if additional access development is necessary to accommodate wading, boating, bank angling and anglers with mobility impairments.

Status: Evaluating and improving accessibility have been part of several recent projects. Improvements to Roaring River hatchery, the spring pool dam and nearby fishing areas have included the addition of accessible walkways and other improvements to provide smooth surfaces and barrier-free bank fishing opportunities for anglers of all abilities. At Montauk State Park, areas of eroding streambank have been stabilized and access for bank fishing and wading has been improved. At Bennett Spring, platforms to provide improved bank fishing access in Zones 2 and 3 have been completed, one of which is ADA accessible. The handicap fishing access at Maramec Spring was replaced. Additional projects have been completed such as retrofitting the fishing dock to meet ADA standards at Walker Lake in Kirkwood.

Objective 1.8: Conduct an angler survey focused on trout fishing and the trout program.

Discussion: Recent surveys of anglers fishing in Missouri trout parks have provided an excellent description of who these anglers are, and what is important to them. While occasional surveys have been conducted on a number of trout areas, a statewide survey of trout anglers has never been conducted. Such a survey would be a good way of reaching trout anglers and would provide important strategic information for the trout management program, and is proposed for fiscal year
2005.

Status: In 2004, a statewide mail survey of 7,851 trout anglers was conducted. Results of that survey have been compiled and a report entitled, “A Profile of Missouri Trout Anglers and an Assessment of their Attitudes, Preferences and Motivations “was completed (Kruse and Reitz 2006). A creel survey of Lake Taneycomo began January 2017 and is scheduled to conclude in

December 2018. This information will be used to evaluate angler expectations, current stocking rates and size of fish and make any adjustments that are needed.

Goal 2: Increase the number of trout available for stocking in coldwater streams and lakes.

Objective 2.1: Increase trout production at the Department's coldwater hatcheries by 20 percent.

Discussion: Opportunities for improving and securing trout production exist at all Department of Conservation hatcheries. Improvements could allow for a 10 percent emergency buffer within the system plus a 10 percent expansion to production capability that could be used for expanding the trout program. All of these potential improvements depend on funding availability and cooperation with our partners in the Department of Natural Resources, the James Foundation and the U. S. Army Corps of Engineers, and the ability to increase production while meeting existing and future water quality regulations. The Department plans to retain a consulting engineering firm with expertise in fish hatchery planning and design to evaluate the Department's trout hatcheries. The work is composed of three objectives:

1) Evaluate and make recommendations on increasing trout production in the Department's coldwater hatchery system by twenty percent with an emphasis on Shepherd of the Hills Hatchery.
2) Make recommendations on discharge water treatment and waste management (including fish cleaning stations) at all five hatchery facilities.
3) Produce a master plan for future development.

Status: To inventory the needs of Missouri's trout hatchery system and identify the best opportunities for improvement, a comprehensive study of the system was conducted in 2004 (FishPro 2004). From that study, a number of renovation needs and projects were identified and described for each trout hatchery. From this study a final report was created and given to each of the hatchery managers for future capital improvement projects.

A common theme from that study is that trout production in Missouri's coldwater hatchery system has been limited by the need for dissolved oxygen concentrations that are sufficient to support more intensive fish culture while maintaining adequate oxygen concentrations in waters discharged to receiving streams or impoundments. A target effluent dissolved oxygen concentration of 6 mg/l is used for Missouri coldwater hatcheries in the absence of specific dissolved oxygen criteria in the NPDES general permits.

The addition of Dissolved Oxygen Management and Degassing systems at Roaring River Hatchery, Montauk Hatchery, Bennett Spring Hatchery and Shepherd of the Hills Hatchery has enabled these intensive culture facilities to meet or exceed oxygen saturation concentrations in incoming water supplies, allowing staff to maintain a higher number of fish per existing rearing unit, thereby increasing production capacity. Given normal flows and water quality, minimal hatchery shutdowns, and the use of liquid oxygen (LOX) based dissolved oxygen technology at these facilities, it is likely we can achieve the 10% statewide expansion in production capacity to 1.32 million pounds annually above the historical statewide production of 1.2 million pounds. To date, many of the individual hatchery production capacities have far exceeded the 10% goal

with the renovations, but a system wide increase has not been seen due to ongoing construction and hatchery shutdowns to accommodate continued improvements. By taking a cumulative total of these new record production capacities the hatchery system has seen a theoretical 18% annual increase in pounds of fish raised with the LOX technology and raceway improvements. When all trout hatcheries are operating at full production potential the 20% increase is achievable.

Shepherd of the Hills Hatchery: This hatchery offers the greatest potential for increasing production. Potential improvements include:

1) Renovation of the existing brown trout rearing facility to expand production of catchable rainbow and brown trout and expand space for broodstock.

Status: The pre-construction, 1.5-acre pond utilized for rearing brown trout produced 80,000, 10-inch fish annually. This existing production space was renovated to include 12, 100-foot concrete final rearing raceways, 4, 100-foot intermediate raceways, a hatchery building designed to accommodate over 130,000 fish in early rearing stages and a fish ladder with broodstock collection and spawning area.

From production modeling, the renovated space is designed to produce 160,000 trout to a 10.5-inch size in 16 months. A new fish production well water supply, used during the first 9 months of a growth cycle, was provided to supplement the second use Table Rock Lake water supply to achieve desired growth rates. Oxygen injection technology was also included in the renovation. This renovation was completed in the fall of 2007.

The fish ladder and broodstock collection unit were successful in providing over 500 ripe female and male brown trout broodstock that provided three egg takes over a one month period in the fall of 2007, netting over 600,000 eggs for incubation. The ladder is not successful in flooding conditions as witnessed in 2008 and 2011 due to high water temperatures. However, ample numbers of brown trout ascend the ladder under normal conditions.

It has been verified that a single raceway in the new facility will produce the designed carrying capacity. However, a heavier than anticipated debris and parasite load in the water supply has prevented confirmation of the full production potential of the new facility. Assuming all of the raceways will produce the design carrying capacity, the renovation will increase production from 36,000 pounds in the pre-construction pond to 72,000 pounds in the new raceway facility.

A drum filtration system was installed to control the debris load entering the Brown Trout Facility. This system has been very effective in eliminating a sizable portion of the debris thus creating a cleaner environment. However, these drums do not filter parasitic organisms or pathogens. A UV treatment system would solve many issues still experienced at this facility. The UV system was coupled with the Drum Filter CI request but was not accomplished due to funding. A future request for a UV system will occur in the near future.

2) Repair or modify the existing water recirculation system. Currently, Shepherd of the Hills operates below the designed production capacity because the recirculation system is inefficient.

Status: A full hydraulic investigation of the Shepherd of the Hills facility was completed to quantify water usage and to diagnose the pressure loss in the system (FishPro, 2005), Resulting recommendations identified several possible means for enhancing water supply and flows to the system. To date, efforts have been made to conduct regular intake screen inspections and debris clearing to ensure unobstructed flow through the intake structure.

3) Install an additional hatchery water supply line from Table Rock Dam's new emergency spillway. This could provide additional cold water to the hatchery for approximately 8 or 9 months of the year, could be used to elevate water temperatures and enhance trout growth rates, and could provide an emergency water supply in the event of blockage to the existing water supply line. Congressional approval would be required for any increase in total withdrawal from Table Rock Lake.

Status: An 18-inch x 24-inch T-valve was installed at Shepherd of the Hills Hatchery during renovation to receive a future water supply line from a warmer, epilimnetic intake structure located in the new emergency spillway at Table Rock Dam. When fully operational, this water could be mixed seasonally with water from the existing hypolimnetic intake to improve water temperatures and dissolved oxygen concentrations in the hatchery water supply and as an emergency, back-up water supply. To complete this project, an additional water supply line must be constructed to join the intake structure with the T-valve at the hatchery.

The Auxiliary Pipeline Project was approved for FY08 and was met with serious challenges from the beginning due to its proximity to the earthen dam. The project was completed in 2016. This line can be used as an emergency backup or as another water source when the oxygen is low in the main line. Mixing cannot occur as originally thought due to the valve needing to be fully open or close.

Bennett Spring Hatchery: Bennett Spring is the third largest spring in the state with an average flow of 150 cfs, The hatchery uses approximately 30 cfs for fish production. The original hatchery rearing pools were constructed in the 1930's. Today the hatchery produces Rainbow trout which are primarily stocked within Bennett Spring Trout park.

Status: Bennett Spring has undergone some major renovations over the last 5 years. Construction of a new hatchery building was finished in 2011. A portion of the building was designed for indoor spawning practices. The building provides for an expansion of rearing capabilities by increasing egg incubation area and early rearing space. It also provides a laboratory area, small feed and chemical storage. Although not initially incorporated in the design, the production space was retro-fitted with oxygen injection to help increase production as well as reduce high nitrogen gas concentrations. Several improvements were made to the outside rearing space. Between March 2012 and

February 2013, all raceways at Bennett were upgraded from gravel bottoms to a concrete surface. This allows for raceways to be more thoroughly cleaned and easier movement of fish between pools. At this time, all expansion joints between raceways were sealed to prevent leakage and fish escapement. Lastly, a subdivision of raceways was made to increase the available intermediate rearing space. Raceways 8 and 9 were divided from two long, wide raceways into eight smaller raceways. This helped increase exchange rates and makes the space more manageable for different sizes of fish. Portions of these raceways were also incorporated into the hatchery building design which allows easy movement of fish from outside to inside the building.

Maramec Spring Hatchery: Maramec Spring has an average discharge of approximately 144 cfs, but only about 11 cfs are used in the current raceway system. Additional raceway pools could be constructed to use more of the natural spring flow and rear additional trout for stocking. Trout from Maramec Spring would be infected with parasitic copepods and might have limited utility outside of the Meramec River drainage. However, the increased production would allow Maramec Spring to raise all fish needed for stocking Maramec Spring Branch, instead of supplementing stocking with fish reared at other Department hatcheries. This would effectively create space at other hatcheries that could be used to rear additional trout for stocking other waters.

Status: Of the 7 Priority 1 line items requested, only two items were approved by The James Foundation. The Round Pool Improvements consisted of pouring a concrete floor to replace the existing gravel substrate and was completed in FY09. Self-cleaning screens were also added to the round pool for less staff maintenance and more reliable water flow into the pool. Raceways covers designed to keep production in place during a flood event were completed and installed by MDC in FY08. An alarm system which uses pool level and dissolved oxygen sensors to monitor the hatchery was installed in FY13. This allowed the hatchery to become more efficient and raise the same amount of fish with less staff. This new technology allows the management staff to remotely monitor the fish rearing pools and see in real time any changes in water quality parameters. A new weir gate structure and bridge were added to the spring pool in FY14. This improvement allows the staff to safely adjust the water levels in the spring pool during flood events. The spring pool dam was also rehabilitated with 6” of new rip rap added to the top of the dam. The new weir gate structure and dam modification will allow more water to be available for fish production in times of drought.

Montauk Hatchery: During floods, warm, turbid water enters raceways at these hatcheries. Such conditions can cause trout mortality and create safety concerns for staff. A recirculation system at Montauk will be completed in fiscal year 2004 to isolate rearing pools during floods. In addition, alternative water supply technologies are being investigated at Bennett Spring and Montauk along with other hatchery renovations.

Status: A total of four Priority 1 hatchery improvements have been completed to date. The installation of the oxygen management and degassing system provides oxygenated water to all the rearing systems improving water quality allowing more production per cubic foot of rearing space. The installations of the Mill Pool water recirculation and

auxiliary generator systems, in addition to the oxygen system have decreased the chances of a major fish loss during flood events. The installation of the Lake Pool water recirculation system has decreased the negative impact extreme drought has on fish production at this system. The installation of the domestic water supply to the Mill and Lake Pool systems has improved bio-security measures. Future projects such as the bulk feed tower, hatchery building renovation or replacement, Mill Pool renovation and repair, and the Lake Pool backup recirculation pump and generator systems will also enhance production by making all these rearing system more functional.

Roaring River Hatchery: Renovations at Roaring River hatchery that will secure water supplies and thereby maintain trout production are planned for fiscal years 2004 and 2005.

Status: Fish production in both numbers and weight has been dramatically increased. A record 538,000 fish were produced in 2012. Using available Federal Aid funds renovation projects were implemented at Roaring River hatchery to improve the water supply infrastructure, stabilize an existing rock-faced dam built by the Civilian Conservation Corps (CCC) and seal the existing concrete fish rearing raceways. Specific components of the water supply infrastructure upgrade included the installation of a pre-cast concrete weir wall, water supply box culvert and water supply control slide gates. Stabilization and repair of the spring pool dam included construction of an ADA-compliant walkway and fishing access used for toe stabilization, installation of rock-faced sheet piling and pressure grout around the entire interior perimeter of the spring pool, installation of new spillway gates and reconstruction of raceway drains. Liquid oxygen injection was added to all raceways and an alarm system was installed monitoring oxygen and raceway levels. Fish production raceways were sealed using a primer and sealant on 40 existing concrete raceways. The existing recirculation pumps were completely reconfigured. Two 3 MGD pumps now have separate intakes allowing the pumps to operate independently or in tandem. A variable frequency drive operates both pumps allowing both pumps to run at once. The drive can be dialed in to provide anywhere from 400 gallons a minute (GPM) to 4000 GPM or 5,760,000 gallons per day. Sensors in the spring pool and distribution boxes monitor water levels and the pumps automatically kick in to maintain levels. Projects still to be completed include renovation of the hatchery building. Paving of the driveways and roads need to be completed to control water during floods.

Neosho National Fish Hatchery: The Department has a long-standing and essential partnership with Neosho National Fish Hatchery, where a significant number of the trout needed to maintain the Missouri trout program are produced. Without this hatchery's production, any gains in Department production capabilities would be lost. The Department, and Missouri anglers, need to continue to show strong support for maintaining this facility.

Status: The Missouri Department of Conservation and Neosho National Fish Hatchery continue to support each other's programs, such as Stone Mill on Fort Lenard Wood, from fish production to public outreach programs.

Objective 2.2: Produce catchable-size rainbow trout that average 12.5 inches annually with a range of 10.0 to 14.0 inches and no more than 5% less than 10.0 inches.

Discussion: Missouri anglers have become accustomed to a large average size of trout stocked in put-and-take fisheries. Rainbow trout are often stocked at an average size of nearly 12 inches (with a range of 10 to 14 inches), making them some of the largest trout stocked by a state agency in the United States (Epifanio 2000). Large trout are expensive because they require more hatchery space, food and time to produce compared to smaller fish. Because our hatchery system is currently overloaded, it is sometimes necessary to reduce the size of trout stocked due to production limitations.

Status: We are currently following these guidelines in the trout parks and to the fullest extent possible in all managed waters except Lake Taneycomo. In 2016 and 2017, the average size fish stocked into the trout parks was 12.77 inches and 12.9 inches, respectively. The variation from 12.5 inch target was due to inventory loss during flood events in December 2015 and April 2017 and the need to adjust stocking rates.

Objective 2.3: Continue to provide assistance to private fish culturists.

Discussion: Significant opportunities are available for trout fishing on private land, supported by privately-produced trout. Technical assistance from the Department of Conservation helps ensure that these trout are of good quality, able to support high quality fisheries, and will not introduce diseases, parasites or ecological challenges to publicly-managed trout fisheries. The Department provides assistance with fish pathology, hatchery design, maintenance suggestions and broodstock selection. By helping private hatcheries provide a reliable supply of high-quality trout, the Department will have an alternative source of trout for stocking public waters in the event that a significant loss of fish occurs at one or more public hatcheries.

Status: Private fish hatcheries are now responsible for their own fish health inspections and coordinate interstate fish transfers with the USDA veterinarian. Technical assistance regarding fish health, hatchery design and maintenance is still provided when requested.

Objective 2.4: Evaluate the role of private and cooperative trout production.

Private Trout Production: Opportunities may exist for private producers to supply trout which are certified disease free for Missouri's trout program at a competitive cost.

Cooperative Trout Production: Determine if privately-owned spring branches could be cooperatively-managed by groups or individuals for trout production. Department hatcheries could provide fingerling trout that would be subsequently grown large enough for release into nearby trout management areas. Development of such a program could be guided by experiences with similar programs in other states.

Status: Currently, ten Winter Trout Areas are stocked with trout that are reared in private trout hatcheries. Cost of purchasing and stocking these trout is shared equally by the Department and local communities. Due to the popularity of the CAP program, additional winter trout areas continue to be and will be added in the future as city governments apply for the program.

Goal 3: Increase the amount of coldwater habitat available for public trout fishing.

Objective 3.1: Acquire, by purchase or easement from willing sellers, public access to an additional 10 miles of coldwater streams by fiscal year 2008.

Discussion: Acquiring additional public ownership and access should be a high priority of Department trout management efforts. Our ability to acquire stream frontage will depend on commitment of staff time, property availability, financial resources and knowledge of resource quality. Furthermore, Department decision-makers must understand the need for additional coldwater stream areas so they will support such acquisitions. Land availability will be difficult to predict, but on average, about 1-2% of rural properties change ownership each year. Applying this percentage to the remaining miles of coldwater stream in private ownership, we can expect, on average, 1-2 miles of stream, statewide, to become available for purchase each year. Because these are average estimates, we can also expect long periods of time with no acquisition opportunities, while at other times, several properties may be available at the same time.

The Department will place a high priority on committing the financial resources necessary to acquiring these streams, as well as assisting other agencies and organizations who might also acquire property or assist the Department in acquisitions. Efforts by private conservation organizations to develop special accounts or fund-raising efforts to acquire more public ownership of coldwater streams should be encouraged, and the Department will assist in such efforts.

An assessment of trout habitat in Missouri would help establish acquisition priorities by identifying streams with the best habitat and the best potential for providing public trout fishing. Such an assessment should include existing trout areas as well as other coldwater streams with potential to provide public trout fisheries. Acquisition resources are likely to be limited, so it is important to purchase the best trout habitat that becomes available.

Status: Since 2003, the Department has actively pursued a number of properties containing coldwater stream frontage. This is a Department Realty committee consideration; however we have taken a long term approach to acquire property from willing sellers. Efforts include staff investigation of 15 properties offered to the Department for sale since 2003. To date, four (4) acquisitions along cold water streams that hold a trout fishery have resulted from these efforts. They are listed below for your consideration and information.

Barren Fork Creek Blue Ribbon Trout Area: Approximately 160 acres containing about 0.5 mile of frontage on Barren Fork Creek was added to the Sunklands Conservation Area in 2005. The area was purchased by the Department.

Mill Creek Blue Ribbon Trout Area: Approximately 437 acres containing 1.26 miles of Mill Creek was purchased to establish the Bohigian Conservation Area in 2006. Acquisition was made possible through Department funds as well as partial funding by the Stream Stewardship Trust Fund, the Missouri Trout and Coldwater Fund of the Missouri Conservation Heritage Foundation, contributions by trout angling groups and a partial donation.

Crane Creek Blue Ribbon Trout Area: Approximately 25 acres containing about 0.47 miles of frontage on Crane Creek was added to the Wire Road Conservation Area in 2011. The area was purchased by the Department.

Crane Creek Blue Ribbon Trout Area – Approximately 185 acres containing about 3,500 feet or 0.66 miles of frontage on Crane Creek was added to the Wire Road Conservation Area in Stone County. This addition was purchased in October of 2016.

As written, we did not meet our goal of acquiring 10 additional miles of cold water stream by 2008. We have made progress toward that goal by purchasing land with coldwater stream frontage from willing sellers. Since 2003, we have acquired a total of 2.89 miles of additional coldwater stream frontage.

Objective 3.2: Implement a coldwater stream easement program.

Discussion: Opportunities to acquire coldwater stream easements should be pursued. Easements along riparian corridors ensure protection of the riparian habitat, provide public access, and give the department the right to enhance instream habitat and stock trout. Landowners receive payment for selling these rights to the department, but otherwise, retain ownership of the property. Costs of easements are determined by the length and width of the corridor and the appraised value of the property. Such a program has the potential to expand public access and management to a greater number of streams than acquisition alone and might be more attractive to some landowners than total sale of their property.

Status: Since the trout plan was written, the Department has acquired a number of easements on stream properties in Missouri. At this time, there are no easements on coldwater streams, but easements in other areas have established desirable precedents for future work on coldwater streams. The Department Land Conservation Strategy approved by the Conservation Commission in 2017 includes the use of easements as an option/alternative to fee title acquisition.

Goal 4: Enhance and diversify trout fishing opportunities.

Objective 4.1: Expand winter trout fishing opportunities to additional impoundments.

Discussion: Creation of new winter trout fisheries depends on increasing the production of trout by Department hatcheries, reallocating existing Department production or purchasing privately-produced trout.

Winter trout fishing opportunities are popular and have already been created in St. Louis and Kansas City area impoundments. Winter trout fisheries provide a readily-accessible fishing opportunity at a time of year when fishing for warmwater species is often poor. Winter trout fisheries also offer an opportunity to encourage fishing participation by new anglers.

To provide the greatest amount of fishing opportunity with a limited supply of trout, new winter trout fisheries should be managed with “delayed harvest” regulations and opportunities to

incorporate these regulations into existing winter trout fisheries should be explored. With this approach, trout are stocked in the fall, protected by catch-and-release fishing regulations until late winter, and allowed to be harvested in the spring. During the catch-and-release period, fishing is restricted to flies and artificial lures to limit hooking mortality. Trout are "recycled" with this approach--total catch is typically 2-3 times the number of trout stocked and anglers eventually harvest most of the trout stocked. Compared to typical put-and-take fisheries, far fewer trout must be stocked in delayed harvest fisheries to sustain good catch rates over an extended period of time.

The Department will create new urban winter trout fisheries only in lakes covered by Community Assistance Program (CAP) agreements. Local municipalities or organizations must contribute at least 50% of the cost to purchase privately-produced trout. A winter trout program agreement will normally cover a three-year period to facilitate planning for trout production. The agreement will specify the responsibilities of all parties involved, in addition to outlining measures to protect Missouri's trout populations from disease.

Additional guidelines to prioritize new fisheries and guide impoundment selection need to be developed before the program is expanded. Additionally, the name for these areas may need to be changed if fisheries in smaller communities are developed.

Status: Since 2003, winter trout fisheries have been created in impoundments in Columbia, Jackson, Jefferson City, Jennings, Kirksville, Mexico, St. Joseph, Sedalia, Fulton, Farmington, Union, Kearney, Raymore, Perry County. All of these fisheries have been established in impoundments managed under Community Assistance Program (CAP) agreements with each city using the cost share method described above. See appendix B for Winter Trout Area requirements.

We have expanded our Urban/Winter Trout Fishing Program and we are now up to 35 lakes/ponds across the state. A link to the list on the Department web page can be found at https://huntfish.mdc.mo.gov/fishing/species/trout/trout-where-fish/winter-trout-fishing-areas .

Objective 4.2: Increase emphasis on catch-and-release opportunities in the trout parks.

Discussion: Anglers have expressed a desire to have a catch-and-release daily tag to recognize and encourage the catch-and-release ethic and have requested catch-and-release areas at all trout parks.

1) Pilot a catch-and-release daily tag at Bennett Spring Trout Park for the 2005 season.
2) Consider establishing additional catch-and-release areas at the trout parks.

Status: Increased emphasis on catch-and-release has occurred in several ways in the trout parks:

1) Winter catch-and-release fishing was expanded from three days to four days per week at Bennett Spring, Montauk and Roaring River from the second Friday in November through the second Monday in February.

2) Maramec Spring Park is now open to daily catch-and-release fishing from the second Friday in November through the second Monday in February.
3) The statewide 15” minimum length limit on brown trout has permitted the establishment of a put-grow-and-take fishery within the trout parks and sublegal brown trout provide additional opportunities for catch-and-release fishing.
4) Instream habitat improvements in the Montauk and Roaring River catch-and- release area provide additional cover for trout and enhance habitat, aesthetics and angling opportunities.
5) A new “I Released A Lunker” patch was designed to recognize anglers who voluntarily release trout of 18 inches or larger. In addition, a new “Grand Slam” patch was created for anglers that release at least one lunker at each of Missouri’s four trout parks.

A “catch-and-release daily tag” that permitted anglers to practice catch-and- release only fishing was considered, but could not be offered at a reduced price without a loss of revenue needed to support the trout program. Such a tag also appears to be unnecessary because anglers may already practice catch-and-release fishing with the existing daily tag as long as they have not already harvested a daily limit. For these reasons, there are no plans to create a catch-and-release daily tag.

Because the trout parks are relatively short stretches of stream and are heavily fished by harvest-oriented anglers, areas suitable for designation as catch-and- release have been difficult to locate. However, both Montauk and Roaring River have sections of the spring branch dedicated to catch-and-release only.

Objective 4.3: Pilot a winter catch-and-release season at one or more trout management areas.

Discussion: Trout management areas are regularly stocked with hatchery trout, primarily rainbows. Currently, most stocking occurs from February through October. Little stocking or fishing occurs during the winter months and, because most trout are removed soon after stocking ends, angling success is often poor. However, conditions for trout growth and survival are excellent at this time. By restricting all fishing to catch-and-release from November through February, the trout management areas could sustain higher densities of trout, higher angler catch rates, and some growth of trout on natural food during the winter season. Because these areas are not currently stocked or fished much during the winter, this change would affect few harvest- oriented anglers. To enhance survival of trout, all fishing during this catch-and-release season should be restricted to flies and artificial lures and soft plastic, natural and scented baits should be prohibited. These rules would closely resemble the current catch-and-release season at the trout parks. Implementation of a catch-and-release season in the trout management areas could be done by re-scheduling some stockings to early November and would require no increases in hatchery production. Gear restrictions may not be popular in some waters that have important winter fisheries for other species.

Status: Both Stone Mill Spring Branch and the new White Ribbon Trout Area at Hickory Creek (see objective 4.5) have catch-and-release seasons from November 1 through the last day of February. The Winter Trout Area program also has a catch and release season from

November 1st to January 31st for select impoundments across the state. During the catch-and-release season, fishing is restricted to artificial lures and flies only.

Objective 4.4: Determine the feasibility of diversifying the size distribution of rainbow trout available for put-and-take stocking.

Discussion: As hatchery production capacity improves, the Department should determine the feasibility of producing a limited number of larger (e.g. 15-inch) rainbow trout available for put-and-take stocking. These fish should be distributed with normal stockings of catchable-size trout to create some diversity of size in the catch and the opportunity for anglers fishing outside of special trout management areas to occasionally catch a larger trout.

Another strategy for diversifying the size distribution of stocked rainbow trout would be wider distribution of excess broodstock throughout the trout management areas. Currently, most such fish are stocked in Lake Taneycomo or the trout parks. Distributing some of these trout to the trout management areas and urban winter trout management areas will provide anglers an opportunity to catch trophy-size rainbow trout in additional waters.

Status: Numerous improvements to the hatchery system are complete yet the feasibility of producing a limited number of larger hatchery trout is unlikely due to the ever rising price of fish feed. After 12 inches a trout's growth slows down and the conversion rate is much higher meaning it would take much more feed and time for the fish to reach 15-inch.

Surplus broodstock allocation was adjusted to distribute fish to a larger and more geographically diverse number of waters (see Objective 1.1). Hatchery staff annually determine the number of surplus broodstock available and will stock a percentage of them around the state determined by the Allocation and Stocking Plan (Appendix A).

Objective 4.5: Create at least one new year-round trout area.

Discussion: Much of Missouri's coldwater habitat is already managed for public trout fishing. Management potential of the remaining streams is limited by small size, lack of public access or both. However, a few additional coldwater streams could support enough trout to provide public trout fishing if they were stocked or the wild trout in them were protected with harvest restrictions. Biologists should identify these stream reaches and create a priority list of areas which could be managed for public trout fishing. Future land acquisitions or public access easements may be necessary in some areas to create additional trout fishing opportunities.

Status: In 2006, a White Ribbon Trout Area was established on Hickory Creek and the first stockings of rainbow trout were made. This area is managed under statewide regulations except from November 1 through the last day of February when all trout must be released and fishing is restricted to artificial lures and flies only. Public access to Hickory Creek is available in Morse Park.

Objective 4.6: Investigate the use of new strains or species of trout that may hold potential for improved management or diversified fisheries.

Discussion: Many species of salmonids have been introduced into Missouri since 1878. The rainbow trout is the only species that has established self-sustaining populations and has proven to be the easiest species to rear. Brown trout became a regular part of the trout program in 1974. Compared to rainbow trout, they have lower vulnerability to angling. Other species or strains of trout may have unique characteristics which could diversify and enhance trout angling.

Addition of new strains of trout to Missouri's trout program will require increased hatchery production space.

Status: A proposal to evaluate the performance of triploid brown trout has been developed and is in progress. Triploid trout are created using either heat or pressure shocking methods soon after eggs are fertilized. The resulting fish possess 50% more genetic material than normal (i.e. diploid) trout which results in sterility. The research project is comparing growth and survival of triploid and normal brown trout to determine if triploids offer any performance advantages in Missouri's trout program. Triploid brown trout eggs have been sent to Shepherd of the Hills hatchery from a Virginia hatchery for hatching and grow out. The triploids are a Crawford strain of brown trout. The triploids have been marked and stocked into Taneycomo, North Fork of the White, and the Current River.

Brook trout have been raised at Maramec Spring for use as a biofilter in a parasitic copepod study. The brook trout eggs were sent to Missouri from Utah and Virginia. Maramec Spring hatched and raised the brook trout for three years. Their sole purpose was for research and were not stocked in Missouri waters because of possible impacts to the native fish populations (see Objective 4.7). Brown trout have since been adopted for use as the biofilter. These browns are the Crawford strain from Virginia and have been stocked in the Meramec River. They have been marked with a polymer eye tag for survival and growth comparison to the Sheep Creek strain historically reared at Shepherd of the Hills.

The Eleven Point Trout Strain Evaluation compared the survival and growth of four alternative strains of rainbow trout to the current Missouri Rainbow trout hatchery strain in the Eleven Point Blue Ribbon Trout Area. Of the four strains the Fish Lake strain showed improved survival and is being considered for future stockings.

Objective 4.7: Minimize effects of new trout fisheries on cold water ecosystems.

Discussion: Springs and their branches give rise to cold water habitats that support an assemblage of native animals and plants different from other aquatic community types. Trout populations, maintained by natural reproduction or stocking, also occur in some of these cold water habitats. Although there is currently no indication that these trout populations negatively impact native aquatic species in Missouri, any potential impacts will be evaluated on a case by case and stream by stream basis.

Enhancing and diversifying trout fishing opportunities in Missouri presents a challenge for the Department's resource managers. Within the context of the trout plan, the goal of providing Missouri anglers with diverse, quality trout fishing opportunities dovetails with the

Department's strategic goal of retaining public support and recruiting new participants. The challenge lies in striking a balance between the Commission's strategic goal to "preserve and restore the state's biodiversity," while simultaneously meeting the equally significant strategic goal to "retain public support and recruit new participants."

Status: Negative effects of trout stocking on native aquatic life have not been documented in Missouri. Studies in other states have shown that introduced trout have occasionally reduced populations of some native aquatic animals, particularly amphibians. Both Eastern and Ozark hellbenders have declined throughout their ranges in the Ozarks, and traditional strongholds of these two sub-species are often in cold reaches of streams that also hold trout. It is possible that trout populations may be one of many factors contributing to the decline of hellbenders, but the available information and data does not clearly substantiate the effects of trout relative to other factors. Declines in populations of hellbenders have been documented in stream reaches where trout are not stocked. Given the degree of uncertainty regarding the reasons for the decline of hellbenders, the Department has agreed to work in partnership with other agencies and researchers to better understand the decline and evaluate the role, if any, that trout may have played. The Department has partnered with other agencies in funding research that contributes to the body of knowledge about hellbenders including the relationship between trout and other fishes to the hellbender population. Coldwater hatchery space and personnel are also being used to develop captive breeding techniques for hellbenders. Such techniques will likely be needed to restore hellbenders to habitats where they no longer occur...

Stocking of trout by private individuals or groups is regulated by the Wildlife Code and is not permitted in areas where “the stocking of trout is likely to jeopardize any wildlife designated as a state or federal threatened or endangered species.” Other conditions must also be satisfied before a “Licensed Trout Fishing Area Permit” may be purchased by the applicant (see: 3 CSR 10-9.645 of the Wildlife Code).

Goal 5: Enhance funding of the trout program.

Objective 5.1: Require a trout permit for fishing in designated trout waters.

Discussion: Since 1962, a trout permit or stamp has been required to possess trout outside of a trout park. A trout permit has never been required for simply fishing in an area managed for trout because native sport fish are usually present, occasionally in substantial enough numbers to attract anglers not fishing for trout. Such anglers may catch trout incidental to their pursuit of other species, and can simply release the trout if they do not have a trout permit. Furthermore, on some floatable streams, a day’s fishing may include areas managed for trout and other areas where trout are not present.

However, fishing in some waters is so overwhelmingly dependent upon trout stocking that requiring a trout permit for fishing, not just possessing, seems justified. Anglers fishing an urban trout area in the winter, in upper Lake Taneycomo or one of the trout parks during the winter catch-and-release season are very unlikely to catch a native sport fish. Fishing success at these areas depends almost entirely on trout stocking, and most anglers select these areas because trout are present. Therefore, it is appropriate to ask such anglers to help pay for the costs of

raising and stocking trout through the purchase of a trout permit. It is likely that we will increase the number of such areas in the future, so such a policy will become even more important.

Status: Proposed expansions to trout permit requirements described in this objective received careful consideration by Department staff. Two main expansions to permit requirements were considered:

1) Require a trout permit for fishing, not just possessing trout, when fishing in Winter Trout Areas. As proposed, this change would have required all persons fishing in an impoundment stocked with trout, and designated as a Winter Trout Area, to possess a trout permit while fishing during the winter. Expanding the requirement to include all fishing was viewed as consistent with the trout program's tradition of requiring anglers to support the costs of trout rearing and stocking and further justified by the observation that anglers catch few fish other than trout in these areas during the winter. However, concern was also raised that such a permit requirement might create a barrier to participation for some anglers. Such a barrier is counter to the Department's desire to create easily-accessible, close to home fishing that encourages angling participation in Winter Trout Areas. In the end, these concerns outweighed the initial justifications for such a change.
2) Require a trout permit for fishing, not just possessing trout, for all anglers fishing upstream of the U.S. Highway 65 bridge in Lake Taneycomo. Lake Taneycomo is primarily a trout fishery, and upstream from the U.S. Highway 65 bridge, there are few game fish other than trout. Angling surveys indicate that nearly 100% of the fish that anglers catch in this area are trout (Kruse 2003). These facts are consistent with the proposed permit requirement described in objective 5.1 and that requirement was approved effective March 1, 2005. Acceptance of this requirement has generally been good, however some objections were expressed regarding the need for youth to purchase trout permits in order to fish in this area (see objective 5.2).

Objective 5.2: Continually review the price of trout permits and daily trout tags for adults to raise the cost of permits as required to support quality trout fishing opportunities in Missouri.

Discussion: Normal inflationary pressures will increase costs of the trout program and require that we periodically examine the fee structure of trout tags and permits. Diversifying and enhancing trout fishing opportunities will require additional revenue and may result in increased cost to anglers for trout fishing.

Status: A review was conducted and a recommendation to increase the costs of daily trout tags and trout permits was presented to the Conservation Commission in 2008 to offset the rising cost of trout production. The Commission did not adopt the increase because of the economic recession at the time and fear of losing support of the trout program. In addition, a proposal to establish a youth price for the trout permit was also presented. Such a lower cost for youth who purchase a trout permit was in response to suggestions received as a result of the new trout permit requirement for fishing in upper Lake Taneycomo and is consistent with a broader Department philosophy to offer reduced costs for those permits that youth are required to purchase (i.e. deer and turkey hunting permits, trapping permits and trout permits). The current

permit prices for trout fishing are; Adult Daily tag $3.00 – Youth Daily tag - $2.00. Annual Adult Trout permit $7.00 – Annual Youth trout permit - $3.50.

Objective 5.3: Build partnerships with private conservation groups to help support the trout program.

Discussion: Private conservation groups have a history of providing advocacy, volunteer labor and financial resources to help protect and enhance trout fisheries in Missouri. Such groups have a vested interest in supporting the trout program and have proven to be motivated partners with the Department and other resource management agencies. Private contributions can enhance the Department's resources, permitting more land acquisitions, more capital improvements, additional habitat enhancements, etc. The Department should recognize the contributions of these groups and provide direction to their efforts to preserve, protect and enhance coldwater resources. Furthermore, the Department should participate in the implementation of the Missouri Trout and Coldwater Fund within the Missouri Conservation Heritage Foundation.

Status: Since 2003, the Missouri Conservation Heritage Foundation's Trout and Coldwater Fund has been established, has received contributions from fishing groups and individuals, and has provided funds for several Department projects. The Department has supported the Fund by providing a representative on the project selection committee and submitting potential projects to the committee for funding. Funding has been received for bank stabilization projects and instream habitat improvements at Montauk trout park. In addition, the Fund provided significant financial contributions to the purchase of the Bohigian Conservation Area on the Mill Creek Blue Ribbon Trout Area.

The Missouri Conservation Heritage Foundation has also partnered with the Department through the Stream Stewardship Trust Fund to build fishing platforms at Bennett Spring through a capital campaign. This fund also provided a significant portion of the purchase price of the Bohigian Conservation Area.

Private conservation groups have assisted the Department in many ways including:

1) Providing volunteer angler instructors for angler recruitment and retention programs
2) Hosting a "Kids Fishing Day" each November at the Winter Trout Area in Columbia
3) Providing volunteer labor for constructing instream habitat structures on the Barren Fork Blue Ribbon Trout Area and the Mill Creek Blue Ribbon Trout Area
4) Assisting with Kid's Fishing Days at the four trout parks and the Family Fishing Fair at Shepherd of the Hills Hatchery.
5) Tree Plantings
6) Wader wash station maintenance
7) Stream Clean up and water quality monitoring

Goal 6: Provide special trout fishing opportunities designed to increase recruitment of new anglers.

Objective 6.1: Integrate Fisheries Division's strategic plan for angler recruitment into the trout program.

Discussion: A strategic plan to enhance Department of Conservation efforts to improve angler recruitment is being developed. When completed, this plan should be integrated into the trout program to insure coordination and enhance effectiveness of agency efforts. Where appropriate, private conservation groups may wish to become partners in recruiting new anglers.

Status: Strategic planning to encourage angler participation and recruitment has led to the development of a four class statewide program called Discover Nature - Fishing (DNF). This program helps Missourians gain the skills and confidence to go fishing on their own, and targets children ages 8-15 and families. The development of trained fishing volunteers to assist as class instructors will allow the program to grow and the ability to offer more classes throughout the year. Partnering with local fishing organizations to serve as mentors for DNF participants is encouraged.

Objective 6.2: Increase the number and improve the geographic distribution of impoundments managed for winter trout fishing.

Discussion: Winter trout fisheries provide easily-accessible, close-to-home, fishing opportunities for novice anglers. Increasing the availability of such fisheries will provide opportunities for new anglers to have successful fishing trips (see Objective 4.1). Furthermore, such impoundments also provide opportunities for the same anglers to fish for warmwater species at other times. Year- round management of such impoundments will sustain fishing opportunities and fishing interest of new anglers.

Status: As described in objective 4.1, since 2003, winter trout fisheries have been created in impoundments in Columbia, Jackson, Jefferson City, Jennings, Kirksville, Mexico, St. Joseph, Sedalia, Fulton, Farmington, Union, Kearney, Raymore, Perry County. To encourage use of these fisheries by new anglers and keep barriers to participation as low as possible, additional permit requirements originally recommended for these areas in the Trout Plan were not adopted (see objective 5.1).

Objective 6.3: Create additional youth-only trout fishing opportunities at trout parks, trout management, urban winter trout management and other Department areas.

Discussion: Kids Fishing Days have become popular events at the four trout parks and a few trout management areas. Special opportunities have recently been established for young people to hunt deer, turkey and waterfowl in special weekend seasons that precede the general open seasons. Additional youth fishing opportunities exist in other areas of the trout program. For instance, a youth-only trout fishing event at the trout parks could be developed during the period between the end of the winter catch-and-release season and the March 1 opening day of the regular season. Similarly, the first weekend in November could be reserved for youth-only fishing in the urban winter trout management areas. Like the other youth-only seasons, these would provide an opportunity for adults to focus their efforts on teaching young anglers and provide an opportunity for youth to experience a successful trout fishing trip without competition from adults. This opportunity could be provided with little or no additional stocking

required. Reduced daily limits could be implemented during these seasons to reduce harvest pressure and the need for stocking. However, youth-only events will increase management and enforcement costs, and might detract from the excitement of the traditional March 1 opening day in the trout parks. Youth-only events should be evaluated to determine if they bring more young anglers to trout fishing. Since the inception of the special "youth" daily trout tag in 1999, about 17-18% of the total tag sales have been to anglers age 15 years or younger (Table 9). Sales of "youth tags" should be monitored to see if the creation of youth-only events is associated with changes in sales of "youth tags" during the subsequent March 1 through October 31 season. Any such efforts must be coordinated with our partners (the Department of Natural Resources, the James Foundation, municipalities, etc.). Opportunities may exist to develop a catch-and-release pond fishery in conjunction with renovation of Shepherd of the Hills Hatchery.

Status: An annual Kids Fishing Day is now held in May at all the trout parks, and a second Kids Fishing Day is held in August each year at Roaring River and Montauk. These events continue to be popular and well attended (Table 2). In addition, staff at Shepherd of the Hills Hatchery hosts an annual Family Fishing Fair. Total attendance in 2008 was 632 people.

Sales of youth daily tags at the four trout parks continue to comprise about 17-18% of the total number of tags sold (Table 1).

Special youth-only seasons have not been enacted due to the concerns expressed in Objective 6.3 about increased costs.

In an effort to provide increased opportunity for school-age youth to attend the opening day of trout season at the trout parks, the Department considered changing the opening day of trout season from March 1 to a Saturday near March 1. A question was included in the 2004 statewide trout angler survey to gauge public support for such a change. Respondents favored keeping the opening day on March 1 rather than changing it to a Saturday.

Objective 6.4: Encourage special fishing opportunities for physically and developmentally-challenged anglers.

Discussion: Missouri trout areas provide excellent opportunities to enhance the quality of life for physically and developmentally-challenged citizens. Such anglers may find trout fishing to be a rewarding, life-long activity.

Status: Evaluating and improving accessibility have been part of several recent projects (see Objective 1.7). Maramec Spring Trout Park in coordination with the Missouri chapter of American Fisheries Society holds an annual Disabled angler clinic at the trout park. Montauk Hatchery also supplies trout for a disabled angler clinic on the Roubidoux Creek. Roaring River Trout Park has a fishing area that can be reserved upon request of the hatchery manager for special events.

Goal 7: Improve communication with resource users and agency partners.

Objective 7.1: Maintain frequent contact with trout angling groups and agency partners.

Discussion: Regular contact with angling groups is essential for maintaining agency credibility and obtaining public consent and support for management activities (Behnke 1987). The Department should identify a trout plan coordinator who, along with Fisheries, Resource Science and Protection staff, will maintain regular contact with organized trout angling groups. In addition, regular contact should be maintained with agency partners regarding trout waters of mutual interest.

Status: Many Department staff are involved in trout management, culture and research efforts, enforcement of trout fishing regulations and creation of trout fishing information. Contact with the trout angling public varies from daily informal contact with anglers who are fishing to formal presentations to large groups. In addition, one employee has been assigned the duties of trout plan coordinator which include:

1) Maintaining familiarity with trout management, culture and research efforts and following progress made on trout plan implementation.
2) Frequent meetings with trout angling groups to inform them of trout-related efforts and listen to their concerns
3) Serving as a point of contact for inquiries about the trout program
4) Attending Trout and Coldwater Fund selection committee meetings
5) Representing the Department at meetings, symposia and conferences
6) Annual public meetings at the Trout Parks

Each trout park has a Trout Park Stream Management Team (TPSMT) made up of MDC staff and partner agency staff. Regular meetings are held to share information and management issues at the trout parks. These teams have developed long term plans and goals of the trout park. Through a coordinated effort they make strides to improve the park for the public. The new handicap accessible fishing platforms are examples of this successful teamwork.

Objective 7.2: Provide information about trout fishing opportunities, trout management and regulation enforcement.

Discussion: The Department manages trout fisheries for the use and enjoyment of the public. Fishing opportunities created by this management should be made known to trout anglers and permit vendors through various print, electronic media, seminars and instructional materials. The Missouri Trout Map should be kept current with changes in the trout program. Trout fishing information should be available on the Department's website and inquiries about trout fishing that are received from the internet should be answered promptly. Staff should provide information and interviews to outdoor writers and other journalists that wish to promote Missouri trout fishing through newspapers, magazines, books, television, videos and radio. Protection Division will pilot a program of volunteers to assist with public education and information while providing an enhanced Department presence.

Status: Efforts to improve communication with trout anglers and provide information about the trout program include:

1) Revision of the Missouri Trout Map
2) Creation of uniform regulations signs for Blue, Red and White Ribbon Trout Areas
3) Creation of a trout fishing section on the Department's web site that includes maps of trout areas and information about regulations, permits, trout identification, etc.
4) A system of hatchery waysides was designed and installed at each trout hatchery to provide a self-guided tour to visitors that includes information about trout culture, trout management and the Missouri trout program.
5) "Trout Fishing Lake Taneycomo" pamphlet is currently available at the Shepherd of the Hills Conservation Center. A new informative hatchery video is also available at the Conservation Center.
6) A "St. Louis Area Winter Trout Program" brochure and table top display was developed.

Goal 8: Provide substantial enforcement effort by Protection Division personnel on all managed trout waters.

Objective 8.1: Maintain frequent routine patrols of trout management areas, using both high profile and low profile patrol techniques. Trout regulation enforcement will be a special area of emphasis for Protection Division, and will be reflected in region and individual work plans in applicable parts of the state.

Discussion: Frequent patrols will maximize the benefits of strategies outlined in this plan, such as new regulations and increased trout stocking. Many participants in the focus group meetings strongly supported this objective.

Status: Protection Division staff has remained vigilant in their trout enforcement efforts in order to foster compliance with the Wildlife Code of Missouri. Agents across the state have employed various methods/tactics of enforcement to curtail potential trout related violations and to apprehend those who are knowingly and willing violating our established trout fishing regulations. These enforcement methods included: routine compliance checks conducted by foot, boat and vehicle; saturation group patrols; low-profile plain clothes patrols; high-profile uniformed agent-presence patrols; and special surveillance patrols utilizing cover (i.e.: Protection covert van, brush, unmarked vehicles, etc.). Agents have physically monitored our Red, White, and Blue Ribbon trout areas, trout parks (i.e., Montauk, Maramec Spring, Roaring River, Bennett Springs.) and Winter Trout Areas

During FY16, approximately 44 trout enforcement group saturation patrols were conducted on the aforementioned locations and approximately 209 citations were issued along with numerous written and verbal warnings. Some of the most common violations encountered were: fishing without a permit, over-limit of trout, no trout permit, illegal bait, possession of trout in closed season and littering. As an example, in the Ozark Region, 1310 staff hours and 24 days of group patrols were conducted in the trout parks and an additional 1120 staff hours and 20 days of group patrols were conducted in other trout areas. Agents in several of the regions

that have trout focus areas are incorporating a specific number of routine patrols and group patrols into their annual goals and objectives.

Objective 8.2: Utilize personnel from other districts, regions, and divisions to assist with special patrols during high activity periods.

Discussion: Assistance will be needed to ensure the success of special patrols during high activity periods.

Status: Protection staff reported that during high activity periods they actively solicited and utilized Agents from across the state (e.g., other regions and districts), as well as using personnel from other divisions (Fisheries, Forestry, Private Land, O & E, etc.), Department volunteers (i.e.: Southwest Protection Volunteers) and even other outside agencies (i.e., Missouri State Water Patrol, Dallas County Sheriff's Department, Missouri Department of Natural Resources Park Ranger, etc.).

A balanced approach combining law enforcement and outreach/education in cooperation with other divisions, volunteers, agencies and the public has proven to be very effective in ensuring compliance with our trout fishing regulations across Missouri. Continued cooperative efforts will be necessary in ensuring compliance with pertinent rules and regulations in the future.

Summary

Much progress towards goals of "A Plan for Missouri Trout Fishing" has been accomplished in the last 14 years after approval by the Missouri Conservation Commission. Key progress includes:

1) A comprehensive review of trout management and a re-structuring of management designations following a system of Blue, Red and White Ribbon Trout Areas;
2) Completion of *A Plan for Allocation and Stocking of Trout in Missouri* (2009)
3) Trout habitat and population assessment, resulting in stocking needs, regulation changes and habitat improvement needs.
4) Approval for a system-wide study of hatchery renovation needs, Conservation Commission acceptance of the study's conclusions, authorization for a series of renovation projects and completion of many projects to date;
5) Increased the average size of trout stocked;
6) Acquisition of key tracts along the Barren Fork Creek and Mill Creek Blue Ribbon Trout areas
7) Creation of a new White Ribbon Trout Area on Hickory Creek
8) Expansion of the winter catch-and-release season in the trout parks and establishment of a winter catch-and-release season on Hickory Creek.
9) Multiple completed renovation projects at Shepherd of the Hills, Roaring River, Montauk, Maramec Spring Hatchery and Bennett Spring Hatchery
10) Expansion of the winter/urban trout fishing opportunities on 35 lakes and ponds across the state.

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Table 1. Sales comparison of daily trout tags for youth and adults at Missouri's four trout parks, 1999-2017

TAG TYPE	*YEAR*				
	1999	**2000**	**2001**	**2002**	**2003**
DAILY ADULT TROUT TAGS ($3)					
Bennett Spring	150,528	152,024	155,522	152,003	144,218
Maramec Spring	53,592	51,761	47,868	42,427	43,677
Montauk	75,280	74,723	74,081	69,987	70,163
Roaring River	95,465	92,272	90,100	89,656	85,620
Total Daily Adult Trout Tags	374,865	370,780	367,571	354,073	343,678
DAILY YOUTH TROUT TAGS ($2)					
Bennett Spring	28,435	29,342	28,120	27,075	26,004
Maramec Spring	10,492	10,158	9,185	7,751	7,954
Montauk	14,788	15,055	15,026	14,060	14,724
Roaring River	27,434	26,042	25,651	24,046	23,005
Total Daily Youth Trout Tags	81,149	80,597	77,463	72,932	71,687
TOTAL DAILY TAGS SOLD	**456,014**	**451,377**	**445,463**	**427,005**	**415,365**

TAG TYPE	**YEAR**				
	2004	**2005**	**2006**	**2007**	**2008**
DAILY ADULT TROUT TAGS ($3)					
Bennett Spring	135,188	131,479	133,500	136,356	127,426
Maramec Spring	42,304	46,322	48,794	54,715	49,143
Montauk	69,396	71,546	75,019	79,921	77,083
Roaring River	82,506	82,031	84,278	90,498	88,045
Total Daily Adult Trout Tags	329,394	331,378	341,591	361,490	341,697
DAILY YOUTH TROUT TAGS ($2)					
Bennett Spring	24,258	23,103	24,260	24,347	22,607
Maramec Spring	7,877	8,652	9,114	10,079	9,126
Montauk	13,909	14,921	15,434	15,633	15,068
Roaring River	22,557	22,069	23,378	24,574	23,645
Total Daily Youth Trout Tags	68,601	68,745	72,186	74,633	70,446
TOTAL DAILY TAGS SOLD	**397,995**	**400,123**	**413,777**	**436,123**	**412,143**

TAG TYPE	**YEAR**				
	2009	**2010**	**2011**	**2012**	**2013**
DAILY ADULT TROUT TAGS ($3)					
Bennett Spring	128,203	127,427	114,419	114,704	108,525
Maramec Spring	48,796	46,041	29,950	41,948	40,607
Montauk	80,626	80,828	76,663	79,803	76,788
Roaring River	85,097	83,689	79,180	75,689	77,012
Total Daily Adult Trout Tags	342,722	337,985	310,212	312,114	302,932
DAILY YOUTH TROUT TAGS ($2)					
Bennett Spring	22,192	22,415	20,260	20,139	18,949

Maramec Spring	8,852	8,134	6,893	7,163	6,666
Montauk	15,157	14,619	14,189	14,823	14,832
Roaring River	22,638	21,761	20,665	21,201	20,830
Total Daily Youth Trout Tags	68,839	66,929	62,00	63,326	61,277
TOTAL DAILY TAGS SOLD	**411,561**	**404,914**	**372,219**	**375,470**	**364,209**

TAG TYPE	**YEAR**				
	2014	**2015**	**2016**	**2017**	
DAILY ADULT TROUT TAGS ($3)					
Bennett Spring	113,867	113,634	119,420	115,565	
Maramec Spring	44,838	44,875	41,668	41014	
Montauk	81,733	83,788	82,271	76844	
Roaring River	86,500	86,897	92,235	86549	
Total Daily Adult Trout Tags	329,938	329,194	335,594	319972	
DAILY YOUTH TROUT TAGS ($2)					
Bennett Spring	19,393	18,994	20,277	19661	
Maramec Spring	7,132	6,953	6,597	6476	
Montauk	15,462	15,385	14,602	14435	
Roaring River	23,108	21,406	23,437	22071	
Total Daily Youth Trout Tags	65,095	62,738	64,913	62643	
TOTAL DAILY TAGS SOLD	**392,033**	**391,932**	**400,507**	**382,615**	

Table 2. Kids Fishing Day Attendance.

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Bennett	769	833	1268	893	695	794	648	993	481	885	1027
Maramec	1847	1715	1893	1578	1310	893	753	1019	962	949	919
Montauk (spring)	685	874	854	791	702	584	611	642	459	535	586
Montauk (fall)	0	176	141	173	233	227	240	278	257	302	274
Roaring River (spring)	1428	1618	1763	1509	1400	1018	1267	1174	1217	1107	1062
Roaring River (fall)	1214	1056	1265	1265	1414	858	958	904	888	970	1005
TOTAL	**5943**	**622**	**4184**	**6209**	**5754**	**4364**	**4477**	**5010**	**4264**	**4748**	**4873**

	2010	2011	2012	2013	2014	2015	2016	2017
Bennett	794	648	993	481	885	1027	857	633*
Maramec	893	753	1019	962	949	919	788	485
Montauk (spring)	584	611	642	459	535	586	404	Cancel*
Montauk (fall)	227	240	278	257	302	274	198	359
Roaring River (spring)	1018	1267	1174	1217	1107	1062	1270	649*
Roaring River (fall)	858	958	904	888	970	1005	826	1006
TOTAL	**4364**	**4477**	**5010**	**4264**	**4748**	**4873**	**4343**	**3132**

*Events at Bennett, Montauk and Roaring River were all impacted by flood events.

Appendix A

A Plan for

Allocation and Stocking of Trout in Missouri

July 2009

Prepared by
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Background and Current Practices

This plan is intended to partially fulfill Goal 1 (Objectives 1, 3 and 4), Goal 4 (Objective 1) and Goal 6 (Objective 2) of *A Plan for Missouri Trout Fishing* (2003).

The following paragraphs are excerpted from *A Plan for Missouri Trout Fishing* and provide a background and basis for this document.

> *Trout fishing is a popular activity in Missouri, accounting for about 14 percent of all angling effort. Trout habitat, however, is limited and only about 145 miles of cold streams and Lake Taneycomo are currently managed as year-round trout fisheries.*
>
> *Most of Missouri's trout fishing is provided by stocking hatchery-reared trout. Approximately 2 million trout are reared in five Department of Conservation hatcheries, Neosho National Fish Hatchery and occasionally at other federal hatcheries.*

This document is intended to provide a consistent framework and overall guidance for trout stocking conducted by the Missouri Department of Conservation (MDC). Managers should utilize, in a consistent, efficient and equitable manner, these stocking rates to distribute the limited number of trout available for stocking in Missouri. The result will be improved trout fishing for Missouri's anglers, furthering our goal of providing … *the highest quality trout fishing experience that can be offered*.

Clearly, fisheries managers must weigh a variety of factors when developing or refining stocking requests under this plan. In most cases, we will not be stocking at levels as high as the calculated maximum rate. The "more is better" approach should be avoided, and requests should be based on good knowledge of factors such as existing trout populations, habitat quality, carrying capacity, condition of fish within the population and fishing pressure. Managers must be willing to adjust stocking rates as any of these factors change, as the average size of fish stocked increases or as more refined information becomes available. Therefore, this should be considered a dynamic document, subject to further consideration and modification as additional and pertinent information becomes available.

Missouri's current trout program consists of four trout parks, Lake Taneycomo, twenty-nine winter trout fishing areas in urban lakes and ponds, nine blue ribbon trout areas, three red ribbon trout areas and nine white ribbon trout areas. The trout parks are managed with the multiple objectives of providing consistently high success and catch rates in easily-accessible fishing areas in publicly-accessible parks.

Catchable-size rainbow trout, typically averaging 12.5 inches, are stocked nightly at each trout park during the March 1 through October 31 fishing season, at a rate of 2.25 trout per anticipated tag sold. Typically, there are nearly one million rainbow trout stocked at the four trout parks annually. **This plan contains no recommendation to change the current stocking formula for the trout parks during the March 1 through October 31 fishing season.** The four trout parks also host a winter catch-and-release season from the second Friday in November through the second Monday in February. Currently, trout are stocked during the winter catch and release season at three of the four trout parks. However, stocking rates are not consistent among the parks or from year to year.

Excluding the four trout parks, more than 800,000 brown and rainbow trout are stocked in Missouri streams and impoundments (including Lake Taneycomo) each year. Stocking rates vary, and there has been no standard formula or framework for determining stocking rates for these waters.

Lake Taneycomo is Missouri's only tailwater trout fishery and is the largest body of cold-water habitat in Missouri (2,080 acres). Lake Taneycomo is currently stocked at a rate of 700,000 rainbow trout and 10,000 brown trout annually, producing acceptable angler catch rates, trout growth rates and trout condition factors. This stocking rate reflects a reduction compared to historic stocking rates of the 1980s which reached a maximum of 1.68 million trout annually. These higher stocking rates during the 1980s were thought to be contributing factors in the decline of the Lake Taneycomo trout fishery during that period. As a result, stocking rates were reduced to the current level and a stocking schedule that matches the annual variation in fishing pressure has been adopted. **This plan contains no recommendation to change the current stocking rate for Lake Taneycomo**.

Twenty-nine urban lakes and ponds are stocked during the cool months to provide trout fishing opportunities, generally in cities and towns where there are no other trout fishing opportunities nearby. Winter trout fishing areas are managed as put-and-take or delayed harvest fisheries. Those areas managed as delayed harvest fisheries implement "catch-and-release" regulations for the first part of the winter season, then, are opened to harvest under statewide regulations. The delayed harvest winter trout fishing areas maintain higher catch rates after stocking, yet still provide harvest opportunities. Generally, put-and-take winter trout fishing areas are stocked at a higher rate than delayed harvest fisheries. Currently, put-and-take winter trout fishing areas are stocked at rates ranging from 182 trout per acre to 1,600 trout per acre, and delayed harvest winter trout fishing areas are stocked at rates ranging from 351 trout per acre to 400 trout per acre.

The most diverse trout fishing opportunities in Missouri are provided by the "ribbon" trout areas located on Ozark streams. **Blue** ribbon trout areas include parts of large, cold-water streams with excellent trout habitat and smaller streams that support naturally reproducing rainbow trout populations. Harvest is limited to maintain the maximum density of adult trout, create excellent catch-and-release fishing and provide the occasional chance to harvest a trophy. Blue ribbon trout areas on the Current and North Fork of the White rivers are stocked with brown trout. The blue ribbon area on the Eleven Point River is stocked with rainbow trout only. **Red** ribbon trout areas have high-quality trout habitat stocked primarily with brown trout. They provide good catch-and-release fishing and a chance to harvest quality-size trout. **White** ribbon trout areas are cold-water streams capable of supporting a trout population year 'round. All receive periodic stockings of rainbow trout, and some also receive brown trout. They provide great opportunities for catching and harvesting trout and the occasional chance to harvest a large trout.

Current stocking rates vary across the ribbon trout areas. Most of these rates were originally based on historic practices or local knowledge of individual water bodies. In some cases, stocking rates were further refined using habitat information, information derived from angler surveys or the results of electrofishing surveys and related fish population data.

Recommendations

Trout will be allocated to individual waters based on consideration of pertinent factors including: capability to support trout either year 'round or throughout the winter in small impoundments, stream or impoundment surface area, angling pressure and public access, and in the case of ribbon trout areas, the status of any self-sustaining trout populations and adult trout habitat rating information. The following recommendations should be followed to guide future trout stocking in Missouri:

1) **With the exception of small impoundments stocked for the winter program, trout should not be stocked into any waters where physical habitat (e.g., flow, water temperature, water quality) or public access is considered limiting.**

2) **Small blue ribbon trout areas that support three or more year classes of naturally- reproduced trout and have trout populations large enough to support existing or anticipated fishing pressure should not be stocked**.

3) **The maximum stocking rate will be 300 trout per acre for Bennett Spring, Montauk and Roaring River; and 400 trout per acre for Maramec, during the winter catch and release season at the trout parks. Additionally, 70 percent of the trout stocked during the winter catch and release season will be included as part of the total number of trout stocked for opening day on March 1**. These recommended maximum stocking rates are consistent with those that are being recommended for impounded, "delayed harvest" winter trout fishing areas, except that they are slightly reduced due to the standing crop of trout present at Bennett Spring, Montauk and Roaring River trout parks. The recommended maximum stocking rate for Maramec is consistent with impounded, "delayed harvest" winter trout fishing areas due to the fact that Maramec is open to fishing during the winter catch and release season seven days per week compared to the four days per week at the other three trout parks. Additionally, Maramec is also open to bait fishing throughout its entirety during the regular season, which likely results in a lower standing crop of trout due to higher rates of harvest and hooking mortality, compared to the other parks where flies and/or artificial lures only may be used in designated areas. For example, sampling data from Bennett Spring indicate that, on average, zones that allow only flies (zone 1) and flies/artificial lures (zone 2) contain 81 percent more trout than the "bait" fishing zone (zone 3) at the end of the regular season.

4) **The maximum stocking rate will be 700 trout per acre for put-and-take winter trout fishing areas and 400 trout per acre for delayed harvest winter trout fishing areas.** These recommended maximum stocking rates have supported acceptable catch rates and angler satisfaction in the past (K. Meneau, personal communications).

5) **Allocate trout stocking in ribbon areas according to a formula that includes habitat suitability and angling pressure.** A better understanding of the physical habitat characteristics of Missouri's trout streams within the ribbon trout areas has recently (2006 – 2007) been achieved by the visual classification and rating of adult trout habitat. The visual classification system used was originally derived from the Habitat Suitability Index Models and Instream Flow Suitability Curves for both rainbow and brown trout (Raleigh et al. 1984; 1986). Using information from these publications, a rating system was developed for Missouri pool and riffle-run habitats. This system included a ranking protocol for three important habitat features. In pool habitat, features included low velocity resting areas, bottom obscurence and depth and velocity. Feeding stations, bottom obscurence and variation in depth and velocity were considered for riffle-run habitats. Mike Siepker, MDC Resource Science Division, has completed a related report entitled "A Survey of Missouri's Trout Habitat Quality" summarizing this effort and its results.

   Two formulae have been developed to assist managers in determining minimum and maximum stocking rates for ribbon trout areas. Although both formulae are based on the concept of carrying capacity, the resulting minimum and maximum calculated stocking rates are intended to be guidelines on acceptable stocking rates for individual ribbon trout areas, not target rates or recommended objectives. The minimum calculated stocking rate was developed to produce an estimated number of trout to stock annually to bring the total trout population of a given area back to carrying capacity at a single point in time post-stocking, while compensating for total annual mortality resulting from both angling and natural causes. The maximum calculated stocking rate was developed to produce an estimated number of trout to stock annually to compensate for total annual mortality and maintain carrying capacity in a given area throughout the year. Therefore, managers with areas that have high annual mortality due to high angler effort or exploitation rates could use stocking rates that are closer to the maximum. It is also likely that to justify maximum stocking rates, managers will need to know angler effort and exploitation rates or other factors relating to total mortality. It is also likely that more stocking trips will be needed over the course of the year when the maximum rates are used. For each area, stocking trout to reach or maintain carrying capacity may depend on the timing of stocking trips, the number of stocking trips and the duration between stocking trips. Exceeding the calculated maximum stocking rate should be a rare exception and considered on a case-by-case basis in consultation with hatchery staff and Fisheries Division administrators and must be adequately justified. Such justifications should reflect habitat suitability, but should be based primarily on exceptionally high fishing pressure and efforts to maintain acceptable angler catch rates. Similarly, stocking requests below the recommended minimum should be justified and approved on a case- by-case basis.

   Both stocking formulae have been developed into a functional Microsoft Excel® spreadsheet file "Trout Stocking Allocation Calculation_CJF.xlsx". One formula is used for blue ribbon and red ribbon trout areas where habitat ranking data is more heavily weighted and lower angler effort relative multipliers are used in calculating stocking rates. This formula is intended to be more applicable in managing "put-grow-and-take" fisheries, such as blue ribbon and red ribbon trout areas. The second formula is used for white ribbon trout areas where habitat ranking data is less heavily weighted and higher angler effort relative multipliers may be selected. The white ribbon trout area formula is intended to be more applicable in managing "put-and-take" fisheries.

A trout manager could derive an annual stocking request for one of Missouri's ribbon trout areas using the concept of carrying capacity (60 pounds per acre) as a starting point, then enter additional information pertaining to species of trout to stock, size of trout to stock, estimated survival rate, habitat quality ranking data, warm water temperature considerations, angler effort and numbers of trout previously stocked. It should also be noted that the estimated carrying capacity of 60 pounds per acre only takes trout (rainbow trout and brown trout) into consideration, not total carrying capacity of the stream which would include the entire fish community.

For comparison, Pennsylvania streams are stocked at a maximum rate of 475 trout/acre/year (Pennsylvania Bureau of Fisheries 1997). Yearling rainbow trout were stocked at annual rates up to 150 per acre in large fertile trout streams in Michigan (Michigan Department of Natural Resources 1977), and age 1+ rainbow trout were stocked at maximum annual rates of 120 fish per acre in streams and rivers in Quebec (Qubec Ministore du Loisir 1988). In Wisconsin, yearling (legal; 7 to 9 inches) trout are stocked at rates between 25 and 300 per acre, varying as a function of both habitat quality and angling pressure (A. Kaas, Wisconsin Department of Natural Resources, personal communication). In Wyoming, trout streams sustain standing stocks at or near productive capacity; 45% of stream trout stocks exceed 60 pounds per acre, 20% exceed 120 pounds per acre and only 10 % of stream trout populations sustain more than 200 pounds per acre (Wiley 2006). Platts and McHenry (1988), studying streams in seven western ecoregions, found standing stocks ≤ 60 pounds (trout and char) per acre were most common (55 to 96% of observations) for streams across all seven ecoregions, suggesting that streams sustain trout to carrying capacity. Similarly, in Missouri carrying capacity for trout (primarily brown trout) was estimated to be 60 pounds per acre on the Meramec River (A. Austin, personal communication).

6) **Allocate surplus rainbow trout broodstock and other large rainbow trout among the trout parks, Lake Taneycomo, White Ribbon trout areas and winter trout fishing areas.** Presently Bennett Spring, Montauk, Roaring River and Shepherd of the Hills hatcheries maintain rainbow trout broodstock. Each year a portion of the retained broodstock ages out of optimum gamete production and is replaced with younger stock. In addition, some younger, prospective-broodstock candidates that are retained and raised to sexual maturity are present in excess of what is needed for gamete production. The total number of retired and excess broodstock available for reassignment to sportfish use varies from hatchery to hatchery and year to year, yielding a potential annual range of approximately 1,000 to 2,000 surplus rainbow trout broodstock for the cold-water hatchery system as a whole. Sizes of these fish range from 1.5 to 2 pounds for young excess males to 3 to 5+ pounds for older trout retired from service. In the past nearly all surplus broodstock were stocked into Lake Taneycomo and the trout parks. This arrangement has been logical in that it has minimized transportation effort, and the recipient fisheries are intensively managed and fished. More recently, surplus broodstock have been stocked into Lake Taneycomo and the four trout parks in reduced numbers, while adding surplus broodstock to both winter trout fishing areas and white ribbon trout areas. The impetus for the wider distribution of surplus broodstock is Objective 4.4 of A Plan for Missouri Trout Fishing (2003)…Determine the feasibility of diversifying the size distribution of rainbow trout available for put-and-take stocking. The total number of surplus broodstock is now allocated so that: trout parks receive 55%; Lake Taneycomo receives 20%; white ribbon trout areas receive 12.5%;

and winter trout fishing areas (St. Louis and Kansas City) receive 12.5%. The broodstock subcommittee has developed a functional Microsoft Excel® spreadsheet, file "Trout Broodstock Allocation Calculation 10_08.xls", to assist hatchery managers in allocating surplus broodstock for white ribbon trout areas based on the current year's surplus numbers.

Anticipated Impacts and Implications

Excluding the four trout parks (Bennett Spring, Maramec, Montauk and Roaring River), approximately 854,995 rainbow and brown trout were stocked by MDC in Missouri waters during 2008. If the number of trout stocked in the trout parks in 2008 (937,728) is added to the accumulated maximum stocking rates of the ribbon areas (876,078), the total number of trout stocked would be 1,813,806. While it is unlikely that the maximum stocking rates will be used in all cases, this yields a 21,083 (2.5%) increase over 2008 numbers stocked outside of the trout parks and represents only a 1.2% overall increase in trout stocking. This increase is well below the 10% increase in production capacity described in Goal 2, Objective 2.1 of *A Plan for Missouri Trout Fishing* (2003) that could be used to expand the trout program once the remaining anticipated hatchery renovations are complete and to address the need to establish a 10% emergency buffer. Some cold-water hatchery renovations have already been completed and more are underway; actual increases in production capacity are yet to be determined.

Appendix B. Winter Trout Lakes Guidelines

Attribute	Recommendation
Size	Minimum = 3 acres; Maximum = 15 acres
Depth	Minimum = 8' at deepest point; Maximum = none
Clarity	Winter secchi reading > 30'
Access	~50%-75% of shoreline accessible to anglers, few trees/shurbs, ADA access should be considered, but not required. Good stocking truck access (gravel minimum) is important.
Aeration	Unless substantial periods of thick ice for safe ice fishing is suspected, strongly consider an aeration system to keep lake free of ice. The lure of trout may tempt anglers to access unsafe ice. In lieu of aeration or thick ice, not allowing any access onto ice (area regulation) is a good potential alternative.
Flooding	Minimal risk of flooding from warm water streams. Flooding reduces residency of trout in lakes.
Agent Support	Support from Protection Division and local prosecutors is critical. Secure this support prior to proposals being finalized.
Regulations	Seasonal (November 1 – January 31) Catch-and-Release with natural bait limitations

Other things to consider:

- Distance from other trout opportunities
- Distance from potential users
- Potential to recruit new anglers