

Iowa Department of Natural Resources
A Plan for Iowa Trout Management



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PLAN DEVELOPMENT

This plan was informed by the long history of trout management in Iowa. Discussions with Iowa DNR trout program staff, as well as trout fisheries professionals in Minnesota, Missouri, and Wisconsin guided the development of this plan. Trout angler opinions, habits, and demographics measured as part of the Iowa Trout Angler Survey informed plan goals, as did angler suggestions and feedback gathered over recent years through meetings, phone, email, creel survey, social media, and direct personal interactions with staff. The authors consulted historic Iowa DNR planning documents and interviewed retired program personnel. Authors also incorporated comments from Fisheries Bureau's leadership team before final approval in January 2020.

EXECUTIVE SUMMARY

Karst geological features of northeast Iowa create coldwater streams that support unique aquatic species including trout. Brook Trout are native to the region and Brown and Rainbow Trout are now common due to intensive stocking and management programs that have been refined over the past 140 years. Trout fishing is increasingly popular in streams of northeast Iowa, as well as the most populated communities of Iowa where trout are seasonally stocked into ponds. Trout fishery management over the past 50 years has focused on expanding fisheries through stocking, development of public access, habitat and watershed improvement, fish culture refinements, and diversifying fishing opportunities.

This document reviews Iowa trout management strategies past and present, and provides specific objectives and guidance for the following plan action goals to sustain and improve Iowa trout fishing opportunities for the next 25 years:

Goal 1: Maintain populations of native Brook Trout in the nine streams where they currently are known to exist.

Goal 2: Develop native Brook Trout populations in at least ten streams where they were not known to previously exist.

Goal 3: Maintain quality trout fishing opportunities in catchable-stocked streams and community trout fisheries that result in trout angler satisfaction of at least 7 out of 10 as measured by the Iowa Trout Angler Survey.

Goal 4: Evaluate management of all Iowa trout fisheries.

Goal 5: Expand trout fishing access in Iowa.

Goal 6: Evaluate Brown Trout fingerling stockings.

Goal 7: Develop a coldwater research program to assist trout management and hatchery staff with science-based fisheries decisions.

Goal 8: Complete trout program improvements to increase coldwater hatchery production and efficiency, and improve management capabilities of Iowa's two trout management teams.

Goal 9: Incorporate ten more trout fishing locations into the Community Fishing Program.

Goal 10: Rehabilitate ten miles of public stream corridor.

Goal 11: Improve trout program communications with resource users, landowners, and program partners.

Goal 12: Partner with Law Enforcement to identify areas that would benefit from targeted enforcement efforts along trout streams.

Goal 13: Limit threats posed by introduced exotic species and pathogens.

Goal 14: Introduce students in ten new classrooms to conservation education over the next 25 years.

This plan will generally be implemented as part of annual work plans. In some cases, supplemental funding will be needed to advance particular goals and objectives. In many cases, partnerships with other government agencies and non-governmental organizations will be necessary to advance trout management. At 5, 10, 15 and 20 years after the plan is approved, program staff will provide a progress update to Fisheries Bureau leadership. Recommended adjustments to the plan's goals and objectives will also be reviewed at that time based on achievements, challenges, and changes to trout fishing and trout populations.

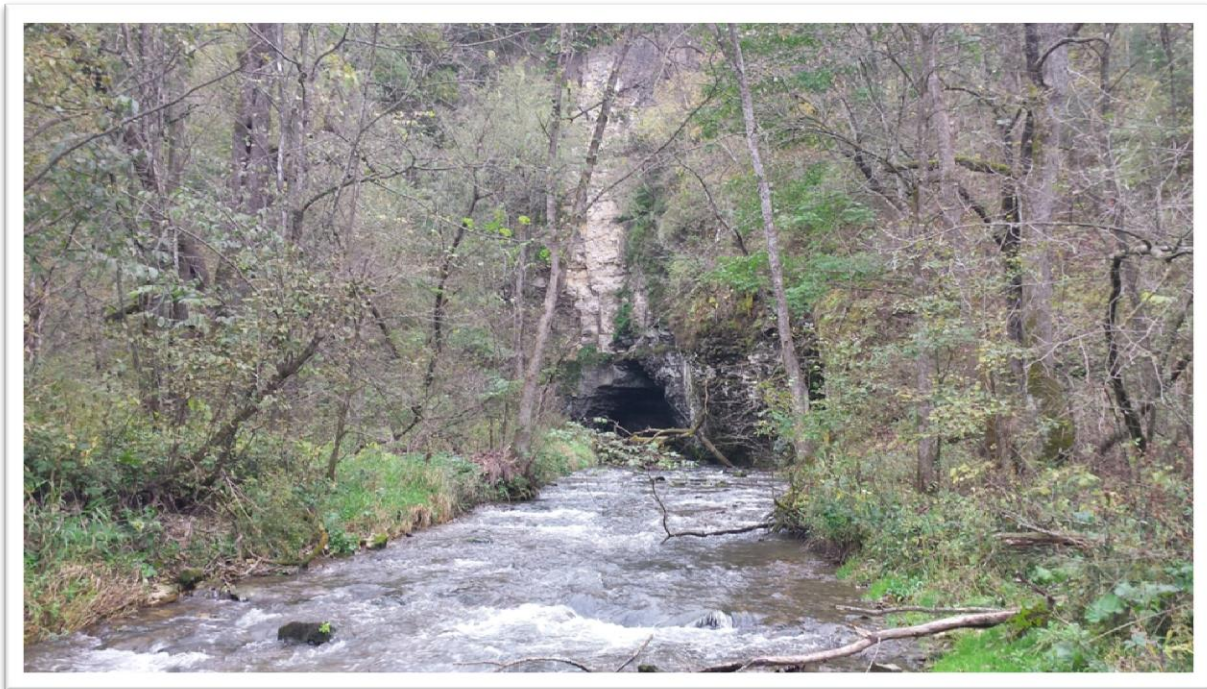


Photo 1: Spring branch on Coldwater Creek WMA (Winneshiek County).

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Photo 2: Casey Springs on Sindelar Wildlife Access, managed by the Winneshiek County Conservation Board (Winneshiek County).

INTRODUCTION

Iowa is known for its rolling hills and rich, deep prairie soils that support some of the most productive farms in North America. Northeast Iowa, however, is unique with abundant rock outcroppings, many narrow valleys with cool fast-flowing streams, woodlands, and few glacial deposits. In the Driftless Region of Iowa, the influence of glacial drift and loess is minimal, resulting in a landscape that is heavily influenced by bedrock (Figure 1; Prior 1976). This limestone and dolomite bedrock has been dissolved over time by surface and groundwater, creating sinkholes and underground crevices, joints, and fractures in a landscape commonly referred to as karst. These rock conduits direct groundwater towards the surface creating seeps and springs.



Figure 1: The Driftless Region covers parts of Iowa, Minnesota, Wisconsin, and Illinois. Provided by the Driftless Area Restoration Effort.

The influence of karst on northeast Iowa's streams is appreciable, creating suitable habitat conditions for trout. Seeps and springs supply many surface waters with an abundance of groundwater, moderating water temperatures year round. As a result, the streams of northeast Iowa are home to many plant and animal species unique to that area of the state. Today, over 474 miles of Iowa streams are officially recognized as coldwater under the state's water quality standards (Iowa Department of Natural Resources 2015).

Historically, the Driftless Region of Iowa supported native populations of Brook Trout *Salvelinus fontinalis* in tributaries of the Upper Iowa River and a few other streams (State of Iowa 1876; Aitken 1936, 1940). Trout management in Iowa began as early as 1875 with the first documented stocking of 800 Brook Trout in a spring branch near Anamosa, Iowa. Soon after, the first attempts to improve trout habitat in Iowa streams occurred in the early 1900's on Glovers Creek, Coldwater Creek, and the Maquoketa River (Anonymous circa 1930's; Aitken 1935). Since then, the popularity of trout fishing in Iowa has continued to increase along with the need to manage stocked and wild populations of trout.

The first plan for Iowa's trout program was printed in 1983 by the Fisheries Section of the Iowa Conservation Commission (Paragamian 1983). The plan highlighted the need for put-and-take stocking and the importance of acquiring additional public trout stream access. Few coldwater streams in public ownership was of primary concern, and the report provided a priority list for future acquisition activities. At that time, easements were not considered a good use of fish and wildlife funds since many landowners allowed public fishing without any formal agreement. Today, this portion of the plan could be considered a success. Many streams on the 1983 priority list now have large sections held in public trust by the Iowa Department of Natural Resources (DNR) or other conservation partners. To supplement access gained through acquisitions, the Iowa DNR also developed a successful Water Quality and Angler Access Program (AAP) that works cooperatively with private landowners to permanently protect their stream corridor and allow public fishing access via water quality and angler access easements. Today, over 120 miles of trout streams flow through public lands and over 16 miles have public access protected by permanent AAP easements on privately held property. About 23 miles

of trout water remain open to public fishing through informal handshake agreements between the Iowa DNR and private landowners.

The 1983 trout plan also highlighted trout stocking, especially the put-and-take component of trout management as “the first, and by far the most important” stating that “increased emphasis on other stockings would be unacceptable” since 99% of trout fishing activity at that time was associated with the put-and-take program (Paragamian 1983). The put-and-take program stocks “catchable” (10-12 inches long) size fish. Forty-six streams were stocked as put-and-take fisheries in 1983. At the same time, the put-and-grow program was stocking fingerling trout into 60 streams to provide additional fisheries with “stream-reared” trout. Paragamian (1983) noted that about 40% of the total length of trout waters was managed as put-and-grow, but the streams only accounted for about 3% of angler effort. Put-and-grow streams remain a small part of the Iowa trout program, with only 9% of today’s angler effort occurring on these streams (Steuck and Kopaska 2019), compared to 3% in 1983 (Paragamian 1983). Put-and-take or catchable-stocked fisheries (streams and community fisheries) remain an important part of the trout program accounting for 87% of total trips taken in 2016 (Steuck and Kopaska 2019).

Today, the Iowa trout program includes stocking catchable Rainbow Trout *Oncorhynchus mykiss* and Brook Trout in 50 streams, stocking fingerling Rainbow, Brown *Salmo trutta*, or Brook Trout in 12 streams, restoration stockings of fingerling Brook Trout, and stocking catchable Rainbow and Brook Trout in 18 urban fisheries as part of the Iowa Community Fishing Program. The program also offers anglers streams managed under diverse regulations, ranging from simple statewide regulations to catch and release with artificial lures only for all trout. In 2016, about 340,000 catchable-size trout and 170,000 fingerling trout were stocked into Iowa’s coldwater streams. Trout program staff maintain a stocking calendar that announces when about 50% of the catchable stream stockings occur; all community trout stockings are announced before stocking. The trout program continues to provide anglers with a variety of opportunities to pursue trout.

Trout angling in Iowa is more popular than ever. In 2016, a record 46,604 trout stamps were sold to anglers, with 5,033 of those purchased by nonresident anglers from 49 states and six foreign countries (Figure 2). This is not surprising, considering trout are the fourth most popular freshwater fish nationwide with only Black Bass, panfish, and catfish/bullheads more popular among anglers (U.S. Dept. of Interior and U.S. Dept. of Commerce 2018). A 2007 statewide survey of Iowa anglers also showed increasing interest in trout with 8% of anglers saying they most often fished

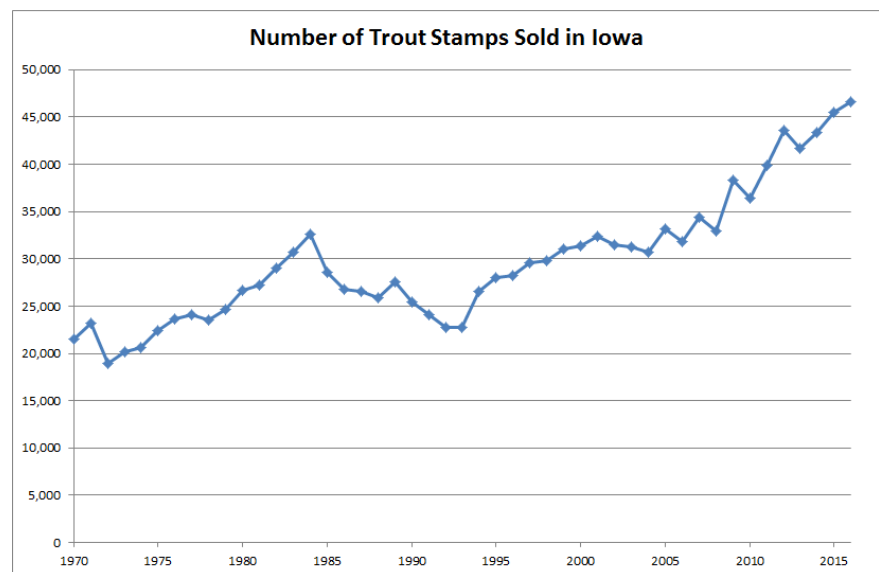


Figure 2: The number of trout stamps sold in Iowa from 1970 to 2016.

specifically for trout, a percentage surprisingly equal to the number that most often fished specifically for Walleye (9%), a species intensively managed throughout the state (Responsive Management 2008). Iowa trout anglers fished an estimated 489,455 days, making a total of 720,611 trips to individual trout fisheries in 2016 (Steuck and Kopaska 2019), up from 386,054 trips in 1980 (Paragamian 1983). The expanding interest in Iowa trout fishing has provided an economic boost to the state. Using estimated angler trip expenditures of \$36 (U.S. Dept. of Interior and U.S. Dept of Commerce 2016), direct expenditures of Iowa trout anglers were estimated at about \$26 million during 2016. Other surveys found that trout fishing annually provides over \$1 billion of total economic impact to the Driftless Region as a whole (Northstar Economics 2008; Anderson 2016).

Educating anglers on trout fishing opportunities in Iowa is another important responsibility of trout program staff. To provide anglers with the latest information on trout fishing opportunities, program staff routinely share content with Iowa DNR communications staff for the trout fishing webpage found at: <https://www.iowadnr.gov/Fishing/Trout-Fishing>. This page gives visitors an overview of the trout program, a directory of trout streams with detailed information for each, maps of areas open to public fishing, recent numbers of trout stocked, regulation information, the latest fishing reports, and contact information for local trout program staff. In addition to electronic maps, the trout program also prints a paper *Iowa Trout Fishing Guide* that includes much of the same information found on the website, but includes an overview map of Iowa trout country. Other county-specific printed maps have been developed through partnerships among conservation and tourism groups for Winneshiek, Allamakee, Clayton, and Fayette counties. Trout program staff routinely provide presentations to outside groups, develop press releases and magazine articles, and provide scientific presentations highlighting Iowa trout efforts. One member of the trout program also serves as Iowa's representative on the North Central Division of the American Fisheries Society Salmonid Technical Committee.

Increasing interest in Iowa trout fishing and changing angler attitudes highlight the importance of updating the Iowa trout management plan to better reflect today's anglers and coldwater conservation challenges. With so many anglers using limited coldwater resources managed with constrained budgets, it is imperative that this plan provide sound guidance for efficient and effective coldwater resource management. Building on past trout management and current programs and practices, this document provides a roadmap for Iowa trout management over the next 25 years.

HISTORY OF THE IOWA TROUT PROGRAM

Trout and trout fishing, along with efforts to expand and promote trout fishing, have a long and active history in Iowa. Trout are now widely distributed across Iowa as a result of fish culture and stocking efforts of the Iowa DNR. Wild self-sustaining populations of trout are now present in more than 50 streams across nine counties of northeast Iowa following decades of fish management aimed at increasing abundance and availability of the popular sport fish.

Given how ubiquitous trout are in Iowa today, it is noteworthy that there is some uncertainty among experts about the presence and distribution of trout in Iowa at the time of European settlement (early 1800's). There are unscientific first person accounts of trout by Europeans first settling northeast Iowa (Alexander 1882; Bailey 1913; Faldet 2009). One of the earliest accounts from an 1836 issue of the Du Buque Visitor read "every stream is filled with them; and among them may be found the pike, the pickerel, the catfish, the trout, and many other varieties." (Du Buque Visitor 1836). Henry Rice, a local trader, was brought brook trout by the Winnebago, and "he was not long in finding out where they could be caught". He was probably the first white man to fish for trout in Trout Run near present-day Decorah (Decorah Republican 1894). Further, a manuscript written by frontier doctor Fredrick Andros

describes traveling in 1845 to Siewers Spring near Decorah to trout fish (Faldet, unpublished writings). Later in 1854, Elisabeth Koren, an early Decorah area settler, wrote about receiving trout as a gift (Koren 1955). Based on early accounts, it seems likely that trout did exist in Iowa streams at the time of settlement.

The first scientific fish collections occurred in Iowa during the late 1800's at a historical point well past the time of settlement, and trout stocking had been employed for several decades by this time. Meek (1892) did not observe trout in the Upper Iowa River but noted it was formally a trout stream. Information about the distribution of native trout is further muddled by mass conversion to farmland of native prairie and forest lands before collections of native fish assemblage data occurred. More recent work examined faunal remains in Native American archaeological sites (Kelly, unpublished data; Theler 2000, 2017). No trout remains have been found in any of the cultural units excavated to date; however, well preserved remains of other fishes are commonly found at these sites. The mid-Holocene warm-dry period at ca. 8,000 to 5,000 years ago may have caused many Brook Trout populations to perish unless large springs allowed the trout to persist (James Theler, personal communication). Alternatively, some believe Native Americans considered Brook Trout sacred so they would not eat them (Karas 1997). No physical evidence (e.g., bone, DNA) exists at this time confirming that trout inhabited Iowa prior to European settlement.

The presence of wild Brook Trout in the Driftless Region of Wisconsin and Minnesota that borders Iowa is well-supported. Perhaps the earliest regional account of a "speckled trout" occurred in 1832 on the Kickapoo River, Crawford County, Wisconsin (J. Theler, personal communication). When Scott Township, Crawford County, WI, was surveyed in 1843, the streams were described as clear, cold and soft, running over pebbly bottoms, and full of mountain trout while streams in Richland County, WI were said to be full of speckled trout (Union Publishing Company 1884). Today, available evidence suggests Brook Trout were native to the Driftless regions of Iowa, Wisconsin, and Minnesota.

The first fishing regulations in Iowa, enacted in 1862, pertained to gear restrictions and seasons for trout fishing (Iowa General Assembly 1862; Harlan et al. 1987), which strongly support the presence of native trout populations more than a decade earlier than the first recorded stocking by the State of Iowa. Brook Trout are not considered native to any part of the United States located west or south of Iowa, which further supports Iowa as the edge of the range for the species. We may never know for certain if trout are part of Iowa's native fauna, but interest in the species is likely to remain high well into the future regardless of historical distribution.

Stocking records from biennial reports of the Iowa Fish Commissioner show that stocking of Brook Trout occurred in Iowa in an official capacity as early as 1875 (State of Iowa 1876). Trout were common among the species distributed from the first Iowa fish hatchery built near Anamosa in 1874 by B.F. Shaw. Stocking records from 1876 and 1877 report that more than 80,000 Brook Trout were distributed across Iowa, followed by more than 66,000 Brook Trout during 1879 (State of Iowa 1878, 1880). It is probable that early stockings of trout in Iowa did not all originate from native Iowa populations, with early records suggesting a mixture of potentially native stocks as well as Brook Trout originating from Wisconsin. During 1875, the Anamosa Hatchery obtained Brook Trout from H. Ruble of North McGregor, Iowa that were reportedly "natives from area streams" (Vance Polton, Iowa DNR, personal communication November 2018). Brook Trout produced at Anamosa in 1877 originated from the farm of H. Dousman in Wisconsin (State of Iowa 1876). The Dousman Fish Hatchery was a privately operated fish hatchery in Waukesha County, Wisconsin about 55 miles east of Madison. Brook Trout eggs received at the Anamosa Hatchery during 1884 and 1885 included Brook Trout from Plymouth

Rock, Massachusetts and Northville, Michigan. The Anamosa State Fish Hatchery was short-lived with a period of operation from 1874 to 1887 before production of most species other than trout shifted to the new Spirit Lake Fish Hatchery in 1880.

Early stockings of Brook Trout from Anamosa State Fish Hatchery resulted in several first person accounts of quality fishing recorded in biennial reports. For example, S.G. Van Anda of Manchester wrote to B.F. Shaw during April 1879 that, "We are catching some fine, beautiful brook trout in Spring Branch. I think you put them in from Delaware Station two years ago. I have seen them caught from eleven to sixteen inches long" (State of Iowa 1880). The Spirit Lake Hatchery had difficulty raising fish during the early years, and trout were never raised there to any great extent (Vance Polton, Iowa DNR, personal communication November 2018). Few trout for stocking were produced by the State of Iowa from 1889 until 1918 when trout culture activity in Iowa was transferred back to northeast Iowa at Lansing (Cooper 1949). During this period of limited state trout production, fish were obtained from federal hatcheries, including the Manchester Federal Fish Hatchery in Manchester, Iowa. Trout production at Lansing was eventually shifted to Backbone Fish Hatchery; Lansing closed in 1974 (Vance Polton, Iowa DNR, personal communication November 2018). When trout production commenced at Lansing in 1918 there had already been more than 40 years of largely unsuccessful trout stocking in Iowa outside of the Driftless Region. This led trout stocking efforts for the next 60 years to be focused on northeast Iowa.

In Winneshiek County, 30-acre Twin Springs Park was purchased by the Decorah Park Commission in 1924. In 1931, construction began on three ponds and eight raceways that would later become the Twin Springs Rearing Station; work was completed by 1933. The Iowa Conservation Commission purchased the 8-acre Twin Springs rearing station property from the Decorah Park Commission in 1934. The facility produced about 50,000 catchable Rainbow and Brown Trout per year through 1973 when fish production ceased. Management of the area was transferred back to the Decorah Park Commission in 1976. The Twin Springs station was closed because trout could be reared more efficiently at the other regional hatcheries (i.e., Decorah, Big Spring, and Manchester). South of Decorah, the Siewers Spring Hatchery was completed in 1935 as a Smallmouth Bass station and remains in operation today as a trout hatchery.

The newly constructed Backbone Fish Hatchery near Strawberry Point was dedicated in 1926, becoming the primary State of Iowa trout hatchery facility until 1976 when hatchery production was shifted to the Manchester Fish Hatchery where it remains to this day. Trout stocking records retained by Manchester Fisheries Management date back to 1943 and show production and stocking of more than 59,000 catchable-size (9 to 13 inches) trout to nine counties in that year. Post World War II production of catchable-size trout increased to about 150,000 to 200,000 fish annually from 1945 to 1962. Production of catchable trout increased to over 200,000 fish in 1963 after Big Spring Hatchery was acquired by the State of Iowa in 1961. Production exceeded 300,000 fish by 1971. The number of catchable trout stocked ranged between 300,000 and 380,000 fish in most years from 1972 to 2018, peaking in 2008 with more than 410,000 catchable trout stocked.

Brook Trout were a common part of early fish stockings in Iowa, but disappeared from state stocking records by 1956. From 1977 to 1979, fingerling Brook Trout were stocked in North Cedar and South Fork of Big Mill as part of a Brook Trout stocking effort. The stocking effort was unsuccessful and Brook Trout remained largely absent from the trout program until 1993 and 1994 when fingerling and catchable Brook Trout stockings resumed in earnest. Brook Trout used for fingerling and catchable trout production that began in 1993 were acquired as eggs from the St. Croix Falls fish hatchery in

Wisconsin (Dave Marolf, Iowa DNR retired, personal communication, January 2019). These St. Croix Falls Brook Trout were also used to develop production brood trout domesticated at the Manchester Hatchery and used for Iowa Brook Trout production through 2019. The St. Croix strain of Brook Trout originated from a Nashua, New Hampshire strain (Dan Rosauer, Iowa DNR, personal communication, January 2019). Starting in the fall of 1996, Iowa DNR also began experimenting with producing Brook Trout through “stream-side” acquisition of eggs at South Pine Creek in Winneshiek County. South Pine Brook Trout production has never exceeded about 3,000 fish in a year and more typically ranged from 500 to 1000 fish in a year given the limited supply of eggs available from the wild population.

Rainbow Trout are recorded in Iowa fish stocking reports beginning in 1882. The Federal Hatchery at Manchester produced Rainbow Trout as early as 1897, suggesting an early incorporation into the trout program. In 1987, the Manchester Fish Hatchery started developing a winter spawning Rainbow Trout by importing “Shasta” Rainbow Trout eggs from Ennis National Fish Hatchery (Ennis, Montana). These fish supported the catchable trout program during the 1990’s and 2000’s (Dave Marolf, Iowa DNR retired, personal communication, January 2019).

Stocking records show extensive stocking of Brown Trout occurred as early as 1943, with modest production of Loch Leven origin Brown Trout fry being reported by Backbone Hatchery as early as 1928. About 20,000 Brown Trout eggs were imported directly from Scotland to Iowa in 1884, suggesting Brown Trout have been included in the Iowa trout program for more than 135 years. The “Manchester” domestic Brown Trout was a highly desirable hatchery fish (John Richmond, Iowa DNR retired, personal communication, January 2019) and a couple hundred brood fish from Backbone Hatchery were transferred to Manchester in the 1970’s to establish the domestic brood Brown Trout used in Iowa (Dave Marolf personal communication, January 2019). Several documents refer to the Manchester domestic Brown Trout as Walhalla/Crawford strain, but no direct documentation of this lineage was found. The Iowa domestic Brown Trout brought from Backbone Hatchery was probably crossed with Plymouth Rock (Wyoming) strain fish during the 1970’s (Dave Marolf and John Richmond personal communication, January 2019). Domestic (hatchery) Brown Trout were removed from the Iowa trout program in 2006 because of fish culture challenges and increased interest in creating and promoting wild Brown Trout fisheries. Since 2006, only fingerling Brown Trout produced from the wild population of French Creek (Allamakee County) have been used in Iowa.

Stocking of catchable trout, primarily Rainbow Trout, has been an intrinsic component of the Iowa trout program for about 100 years given the public demand for trout fishing and resources unable to naturally sustain the harvest demand. Fisheries managers in Iowa have long recognized that stocking catchable trout is a strategy to supplement natural trout production by providing a fish with “instant” recreational and food value at the time of stocking. Catchable trout stocking provides Iowa anglers with fishing opportunities and high success rates in locations with good public access and accommodations. Fingerling and fry trout stocking have occurred in Iowa for more than 135 years with mixed success that included many failures resulting from stocking in locations with inadequate coldwater habitat or stocking of inferior strains of trout. Over time, trout managers have refined methods to produce and stock fingerling trout in Iowa. This has improved success and led to the proliferation of wild trout populations.

Early trout management in Iowa, as well as fisheries management in general, relied mostly on indiscriminate fish stocking. The first trained fisheries scientists were hired in Iowa during the 1930’s. Soon after in 1935, the Iowa Conservation Commission was formed commencing a period of growth and change. The 1930’s marked an important shift in Iowa fish management away from reliance solely

on fish stocking to a more holistic and scientific approach of land management, conservation, water and habitat improvement, and targeted stocking (Conover 1987).

Habitat and watershed management have a long history of use in the Iowa trout program. Extensive scientific inventories of Iowa streams were completed in the early 1930's to identify resources capable of sustaining trout year-round. It became general policy of the Iowa DNR to stock only streams with water temperature and water quality sufficient to sustain trout year-round (Cooper 1949). This was a notable move away from the indiscriminate stocking strategy that dominated early trout management. During the same "period of learning" the first Cooperative Wildlife Research Unit in the nation was established in 1932 at the Iowa State College, known today as Iowa State University. The 1930's "dust bowl" period brought national attention to conservation and led to Federal policy that formed the Natural Resource Conservation Service, known as the Soil Conservation Service in 1935. This period coincided with the Great Depression and public works projects of the Civilian Conservation Corps (CCC) that served the dual purpose of providing jobs to the unemployed and expanding public works projects with conservation benefits. In some cases, CCC projects were detrimental to trout management (e.g., dam construction), but many practices including vegetation plantings, grade control structures, and the general movement for soil and water conservation had a long-term positive impact.

The Iowa Conservation Commission installed and experimented with stream improvement techniques including log and crib deflectors and rip-rap as early as 1935 on Coldwater Creek, Winneshiek County (Aitken 1935). Detailed stream surveys conducted by Iowa Conservation Commission employee Tom Moen in the early 1940's provide first person accounts of stream deflectors and trout habitat structures in Iowa trout streams, highlighting early efforts to improve desirable trout species using habitat improvement. Post World War II is recognized as a time of relative prosperity and stability that served as a supportive platform for growth in fish and game management and funding for conservation that is reflected in milestones that included the publishing of Aldo Leopold's "A Sand County Almanac" (1949), passage of the Dingell-Johnson Act (1950), the all-time peak of Iowa hunting license sales at 372,429 (1955), sale of the first Iowa "Trout Stamp" (1961), Iowa fishing license sales peaking at 558,708 (1976), and the adoption of the Wallop-Breaux amendment (1984).

Trout managers in the Driftless Region of Iowa, Minnesota, and Wisconsin are recognized as innovators in stream restoration with early efforts of the 1930's to 2000's focused primarily on improving abundance and size of trout. More recent efforts focused on overall stream function, stream form, and ecosystem health. From 2002 to 2009, Iowa DNR staff were involved with stream bank stabilization (soil conservation) and trout habitat improvement (bank hides, boulders, other structures) practices along more than 12.7 miles of Iowa trout streams. This was a time of accelerated trout habitat improvements spurred by ample funding sources and know how, along with widespread availability of tools including large earth moving equipment needed to complete projects.

Stream work involving Iowa DNR Fisheries slowed to a more modest pace from 2010-2017 with about 3.8 miles of completed projects. A variety of factors contributed to the slowing of trout habitat work, including completion of projects with the most need, recession in conservation programs, and reduced funding sources for some project types. Iowa trout fishery managers have been consistently and acutely aware of the relationship between watershed quality and trout population quality for the past 140 years, as reflected in frequent references to the subject in historic documents. It is less obvious how fisheries managers historically "worked" on water quality outside of advocacy, trout program promotion, technical guidance, and resource quality monitoring.

Iowa trout fishing has gone through times of no regulation, intense regulation, minimal regulation, and increasing regulation during the past 160 years. The early 1900's fisheries management strategy was largely one of more stocking, more regulations, and more wardens (Conover 1987). This strategy was unscientific, often politically motivated, and unsuccessful. The 1930's marked a shift towards scientific investigation and away from socially or politically motivated regulations that did not improve fishing resources. A culmination of this movement was the adoption of a year-round trout fishing season in 1955 that remains in place today. Iowa has maintained fairly simple and lenient trout regulations during the past four decades, with most fisheries managed under a five-fish daily bag with no size restrictions or gear restrictions, and no closed season.

The 1970's and 1980's brought an era of increasing interest in "catch-and-release" trout fishing and restrictive regulations that came in large part from the competitive bass fishing industry. The Bass Anglers Sportsman's Society, formed in 1968, launched the "don't kill your catch" campaign in 1971 before holding the first catch and release bass tournament 1972. Along with other organized fishing groups, Trout Unlimited, formed in 1959, started promoting catch and release angling as a way to protect fisheries. Partially in response to this growing movement and interest from some anglers, the Iowa DNR began enacting more restrictive trout regulations beginning in 1978 on South Fork Mill Creek (catch and release only and artificial only), North Cedar Creek (catch and release only on Brook Trout and artificial only), and Bloody Run Creek (14-inch minimum length limit and artificial only).

Iowa DNR fisheries managers were also interested in adding more restrictive regulations on some streams to add diversity to the trout program that relied almost exclusively on "Put and Take" fisheries at the time (Dave Moeller, Iowa DNR retired, personal communication, January 2019). Special regulations could potentially provide opportunities to catch more or bigger fish as well as fisheries with less intensive fishing pressure (Dave Moeller, Iowa DNR retired, personal communication, January 2019). Additional restrictive regulations were placed or changed during 1980 (Spring Branch Creek and French Creek), 1981 (South Fork Big Mill and North Cedar), 1982 (Spring Branch), 1985 (South Fork Big Mill), 1990 (Swiss Valley), 1991 (Ensign and Hewett Creek), 1992 (Swiss Valley), 1994 (Spring Branch and South Pine Creek), 1997 (French Creek), and 2000 (Waterloo Creek). Restrictive regulations enacted to improve Brook Trout populations at North Cedar and South Fork Mill creeks during 1978 were removed in 1981 and 1985 because they were not effective at boosting populations. Swiss Valley (the Preserve) was managed with a catch and release and artificial only regulation during 1990 and 1991 with a goal of increasing "holdover trout", but the regulation was discontinued because there was extensive movement of stocked trout out of Swiss Valley over the long term and observed fishing activity in the regulated area was low. No additional restrictive trout regulations have been added for almost twenty years because populations of trout have been increasing in unregulated, as well as regulated streams, while angler use has been steady to declining on streams with restrictive regulations (Steuck and Kopaska 2019). The main reason for declining use of restrictive regulation streams may be that quality trout fishing and "stream-reared" or "wild trout" can now be found in many streams regardless of if the stream is managed under restrictive regulations or the statewide regulation.

Trout management under 2018 regulations provide diverse angling opportunities for anglers and include:

Season: Continuous

Length Limits: None, except a 14-inch minimum length limit for all trout in Spring Branch Creek (Delaware), from the spring source to County Hwy. D5X as posted, and on Brown Trout only in portions of Bloody Run Creek (Clayton) where posted.

Daily Bag and Possession: All waters- combined daily 5 and possession of 10.

Catch and Release Only: All trout must be immediately released alive from the posted portions of Hewett and Ensign Creeks (Clayton), McCloud Run (Linn), South Pine Creek (Winneshek) and Waterloo Creek (Allamakee); and Brown Trout caught from French Creek (Allamakee).

Artificial Lure Only: Only artificial lures can be used in the posted areas of Bloody Run Creek, Ensign Creek and Hewett Creek (Ensign Hollow), French Creek, McCloud Run, South Pine Creek, Spring Branch Creek, and Waterloo Creek.

Proliferation of wild (reproducing and long term self-sustaining) populations of trout in northeast Iowa during the 1990s, 2000s, and 2010s is one of the most significant developments in the history of the Iowa trout program. Historical trout documents abound with references to the lack of reproducing populations such as “the only [Iowa] stream that gave real indications of natural reproduction was French Creek” (Iowa Conservation Commission 1953) or “Northeastern Iowa streams simply do not have the habitat in sufficient quality or quantity that is required to sustain a natural population of recruiting trout” (Ackerman 1968) and “some natural reproduction of Brown Trout occurs, but it is generally very limited by poor water quality caused mainly by extensive soil erosion” (Harlan et al. 1987).

Wild populations of trout were very rare in Iowa just 25 years ago despite extensive fingerling and adult trout stocking for more than 100 years. Best available data suggests that during the early 1990s there were less than 10 streams with wild trout in northeast Iowa. It was rare to find naturally reproduced trout in stream surveys completed in the mid-1990s, but today it is expected and commonplace to find natural reproduction of trout in all coldwater streams with good to excellent water quality and aquatic habitat.

The Iowa trout program has been shaped by limited but important coldwater research projects. In 1995, Iowa Brook Trout genetic samples were assessed alongside Wisconsin samples to determine Driftless populations that were wild, healthy, and candidates for preservation. Results suggested that Brook Trout from South Pine Creek experienced an extreme bottleneck resulting in low genetic diversity. Study authors recommended they be managed as a “relict” population and preserved if possible, but not transferred to other locations or used for hatchery propagation (Fields and Philipp 1998).

In 1996, a joint management and hatchery initiative began to experimentally introduce wild Brook Trout fingerlings of South Pine Creek origin into other coldwater streams (Iowa DNR 1996). The primary goal of the initiative was to introduce the unique South Pine genetic stock into other coldwater streams to prevent a catastrophic loss. Unfortunately, a reduction in mature Brook Trout in South Pine Creek by the early 2000s was thought to have been caused by the repeated use of South Pine Creek as an egg source for restoration efforts. The earlier genetic evaluation further complicated matters by recommending South Pine Brook Trout be managed as a relict population and not transferred to other streams (Fields and Philipp 1998). As a result, Brook Trout eggs collected from Wisconsin’s Ash Creek were requested for stockings in 2006, 2009, and 2010. During those three years, Ash Creek strain

Brook Trout were stocked into Middle Bear Creek, Pine Creek near Sattre, and North Cedar Creek. Those streams now have self-sustaining wild populations of Brook Trout that are genetically distinct from native Iowa Brook Trout. As of 2018, 44,070 Brook Trout of South Pine origin and 15,089 of Ash Creek origin have been stocked into 30 and 3 different streams, respectively, during restoration efforts.

In 1997, the survival of domestic fingerling Brown Trout was compared to fingerlings of French Creek origin. At the time, French Creek had developed a robust population of Brown Trout supported by natural reproduction and staff hoped to use those fish to expand natural reproduction to other streams. Adults were collected from French Creek and spawned at the Manchester Trout Hatchery before fingerlings were stocked with equal numbers of domestic fingerlings into seven streams over three years. Subsequent surveys revealed that Brown Trout of French Creek origin consistently survived better than domestic fingerlings (Iowa DNR unpublished data, circa 1999; Johnson and Rudacille 2007). Beginning in 2000, it was recommended that all Brown Trout fingerling stockings use fish of French Creek origin to increase opportunities for natural reproduction in streams.

Additional research by Johnson and Rudacille (2007) guided improvements in Iowa's Brown Trout hatchery production to meet expanded requests for French Creek Brown Trout. Options to increase Brown Trout fingerling production such as hormonal induction of spawning, holding female broodstock at the hatchery to improve egg production, and acquisition of additional broodstock from other streams were compared in the early 2000s. In the end, holding wild broodstock at the hatchery was recommended as the best way to improve production of Brown Trout fingerlings. Concurrent work also examined the genetic differences of Brown Trout populations sustained by natural reproduction in Big Mill Creek, French Creek, North Bear Creek, and Waterloo Creek. Substantial genetic differences existed among streams, although French Creek Brown Trout were found to be genetically the most divergent of all populations.

Records about reproduction improved beginning in 2002, and show 20 streams with wild trout populations after about five years of stocking fingerling Brown Trout derived from wild French Creek parents. In 2010, there were 34 streams with wild trout populations and by 2018 there were 52 streams with wild trout populations in Iowa. Currently, more than 75 streams in Iowa have wild fish when considering streams that are entirely self-sustaining along with those that have occasional natural reproduction. There are 88 populations or subpopulations of trout in these 75 streams because 11 streams have more than one reproducing species.

This proliferation of wild trout substantially influences current trout management strategies when compared to previous decades given changes in year-round availability and abundance of trout as well as management considerations for put-and-take trout versus wild populations. Most (77%) of the known reproducing populations or subpopulations of trout in Iowa are Brown Trout whereas 19% are Brook Trout and 3% Rainbow Trout. The increase in abundance of wild trout is well-documented, but the causes for this increase are not conclusive in Iowa or the Driftless Region as a whole. Improvements in stream surveying equipment and increased emphasis on fisheries monitoring through field survey starting in the 1970s contributed to the detection and documentation of reproducing populations (Dave Moeller and John Richmond, Iowa DNR retired, personal communication, January 2019). There are four likely mechanisms influencing the success of wild trout populations in northeast Iowa, but the overall relative contribution of each mechanism is unlikely to ever be known. They include: 1) using fingerling stocks derived from wild and local parents (French Creek origin Brown Trout and South Pine Creek origin Brook Trout); 2) changing climate conditions with increased overall annual rainfall producing a greater quantity of coldwater as springs and subsurface coldwater flow (Juckem et

al. 2008); 3) improved stream habitat resulting from more coldwater input (lower water temperatures), decreased presence of fine (silt) sediment in the bed load and as suspended material, and instream habitat improvement practices; 4) changed land-use practices that include less new expansion of agriculture and forestry into previously undisturbed areas, as well as reduced intensive grazing and reduced agricultural tillage that has improved infiltration of rainfall (Juckem et al. 2008). Wild trout have added great new angling opportunities to the coldwater fisheries of northeast Iowa, but catchable Rainbow Trout and the put-and-take stocking program remain an essential, and largely unchanged, component of trout fishing and management in Iowa.

Improving public access to trout waters has been an important fisheries management objective since at least the 1950s. Iowa was opened for settlement on June 1, 1833 and by 1850 Iowa was widely settled from the Mississippi to Missouri Rivers by Americans moving west from other states as reflected in census counts for Iowa: 1836 = 10,531 residents, 1844 = 82,500, 1850 = 192,214, and 1854 = 325,302 residents. Few lands in Iowa were set aside as public property during that time, and Iowa became a state of mostly privately owned lands. As a result, Iowa has a long history of strong personal property rights and trespass laws, including private ownership of stream corridors and land under and adjoining streams. Further, no trout streams were retained as State of Iowa property as part of the sovereign meandered stream designation during the 1800's (Iowa Administrative Code 571-13.3[455A, 461A]). There were few, if any, public-owned trout fisheries by 1900 except perhaps Spring Branch Creek on the grounds of the Federal Fish Hatchery and segments of streams in a few northeast Iowa cities. It is unclear how early settlers interacted with trout fisheries and fishing resources on private property. The dedication of Backbone Park in 1926 included acquisition of about one mile of trout stream associated with Richmond Spring and portions of the Maquoketa River.

In 1968, it was noted that the major portion of Iowa trout water was on private land and the Iowa Conservation Commission retained "very flexible" agreements with private landowners regarding trout stocking, but these agreements could be terminated at any time by the commission or by the landowner. Today, about 23 miles of trout streams remain open to public fishing under these agreements. Known today as handshake agreements, they're typically verbal agreements between the Iowa DNR and the landowner that allow the public to access the stream for fishing, the DNR to post signs stating the area is open to public fishing and place the stream's location on angler maps, and stock catchable or fingerling trout on the property. Cooperating landowners could sometimes receive financial or volunteer assistance from the Iowa DNR or angling groups for habitat improvement projects when involved in the handshake agreement program; those opportunities have decreased substantially as conservation funding has declined. Most importantly, the handshake agreements have never been formal agreements and could be ended at any time, providing an uncertain future for public access on the many miles of trout streams managed under these agreements.

During the 1970s about 2,800 acres of land in northeast Iowa associated with ten quality trout streams (South Bear, North Cedar, Sny Magill, Ram Hollow, Little Turkey, South Fork Mill, Big Mill, Coldwater, Bloody Run, and Trout Run) were purchased for public-use primarily using "open spaces" funds provided by the Iowa State Legislature. By 1982, there were more than 5,800 acres of public-owned land along 12 trout streams that were acquired primarily for public recreation as part of State Parks, State Forests, State Preserves, State Fish Hatcheries, or State Wildlife Management Areas. Even with those public property acquisitions, Iowa Conservation Commission documents from 1982 show that only about 13% of trout water was in public ownership at that time. The lack of public-owned trout fisheries led the Iowa Conservation Commission (project leads Dave Moeller and Martin Konrad) to pursue acquisition of more than 16,000 acres of land with more than 70 miles of quality trout streams

through initiatives that began in the early 1980s. The highest quality trout waters were identified by fisheries biologists, willing landowners along priority streams were identified, and funding was secured through extensive Federal grant writing as part of the Dingell-Johnson Act cost-share assistance program.

Acquisition of public lands associated with trout streams was a priority of several key leaders in the Iowa DNR, including Fisheries Bureau Chiefs and Fish and Wildlife Division Administrator Al Farris. For this reason, Fish and Wildlife Trust Fund dollars were often available to buy high value streams (Dave Moeller, Iowa DNR retired, personal communication, January 2019). Acquisition of public lands associated with trout streams provided multiple benefits including protection of environmentally sensitive natural resources, public fishing, and public hunting (Dave Moeller, Iowa DNR retired, personal communication, January 2019). The Iowa Natural Heritage Foundation, formed in 1979, provided a valuable partner for the Iowa DNR, supporting acquisition of many public properties with trout streams (Dave Moeller, Iowa DNR retired, personal communication, January 2019). From 1982 to 1993, the State of Iowa purchased 2,226 acres with 10.7 miles of priority trout streams as part of the acquisition project. The initiative to identify priority trout water and seek grant assistance from the Federal government was repeated in 1992 and marked the beginning of a second decade with a fishery management focus on expanding public trout water through fee title acquisition. The pace of acquisition was slow, primarily due to a general lack of interest in selling by landowners (Iowa DNR, D. Moeller, internal document). Acquisition of lands for public trout fishing in Iowa has been further challenged over recent decades by rising land costs coupled with decreased funding for fish and game management, and socio-political factors that negatively impact the public purchase and ownership of property in Iowa.

In 2010, the Fisheries Bureau of the Iowa DNR began to acquire permanent water quality improvement and angler access easements. Under this coldwater easement program, landowners could voluntarily offer their stream corridor for public fishing in perpetuity in exchange for a one-time financial compensation, or they could choose to donate all or part of the valuation of the easement. This shift away from fee title acquisition and towards “fishing easements” allowed staff to protect more miles of public trout fishing for less money while retaining land in private ownership. Limitations of the easement program include little, if any, control over land management outside the easement corridor and exclusion of other public recreational uses (hunting, trapping, wildlife viewing, foraging) in most cases. Since the program’s inception, the Iowa DNR has protected 16.3 miles of public trout stream fishing access through the easement program, while also protecting over 360 acres of stream corridor habitat. Today, about 26% of the 530 known miles of coldwater stream in Iowa are open for public fishing through publicly-owned properties, public angling easements, and handshake agreements.

CURRENT PROGRAMS

Fingerling Stocking Program

The Iowa fingerling trout stocking program includes what is commonly known as the put-and-grow program (Table 1). The primary goal of this program is to provide anglers with an opportunity to catch wild or stream-reared trout throughout suitable coldwater habitat in northeast Iowa. Many fingerling-stocked streams have challenging access and receive light fishing pressure when compared to catchable trout fisheries providing diversity to the trout program and opportunities for solitude and other aesthetics associated with limited access and low-use fisheries. Many of these streams are found entirely on private property and landowner permission is required to fish these streams.

What we now term the put-and-grow program appears to have originated in 1968 when 37 “marginal waters” were stocked with 13,050 fingerling Brown Trout. Follow-up assessments in 1969 showed generally low survival, but excellent growth (Ackerman 1969). Over the past 20 years, northeast Iowa has seen a dramatic increase in the miles of stream that support populations of trout fully sustained through natural reproduction. Over 75 streams now have some level of natural reproduction and provide anglers with an excellent opportunity to pursue stream-reared trout. As a result, put-and-grow stocking is no longer required to sustain trout fisheries in many systems that once required annual fingerling stockings. Management in those waters has transitioned from put-and-grow to wild trout management without stocking. In 1983, 60 streams received put-and-grow stockings and since then, that number has declined to 12 stocked streams in 2018.

Table 1. Iowa’s put-and-grow trout streams are found throughout northeast Iowa. A “W” in the fish species column represents a population of trout originating from natural reproduction in the stream, and “F” means the trout were stocked as fingerlings (2-inch long fish) to supplement wild populations. Streams considered put-and-grow in 2018 are listed. Since put-and-grow streams are found entirely on private property and permission is required to access them, only the general location (i.e., township, section, range) of each is provided.

Stream	County	Nearest Town	Brown Trout	Brook Trout	Location (township, range, section)
Teeple Creek	Allamakee	Waukon	F		T97N, R6W, S11, 14, 24
Williams Creek	Allamakee	Luana	W		T96N, R5W, S8,9,17
Yellow River*	Allamakee	Monona	F		T96N, R6W, S3 to T96N, R4W, S24
Miners Creek	Clayton	Guttenberg	F		T92N, R2W, S7, 18 and T92N, R3W, S12
Grimes Hollow	Delaware	Colesburg		F	T90N, R3W, S2
Little Turkey River	Delaware	Colesburg	F		T90N, R3W, S11, 14
Spring Falls	Delaware	Colesburg	W		T90N, R4W, S1, 2, 12
Little Maquoketa River	Dubuque	Epworth	F		T88N, R1W, S3, 4, 5
Ozark Springs	Jackson	Canton	F		T86N, R1E, S32
Tete Des Morts River	Jackson	St. Donatus	W		T87N, R3E, S4
Tributary to Lost Creek	Jackson	Bernard	F		T86N, R1E, S8
Tributary to Tete Des Morts River	Jackson	St. Donatus	W		T87N, R3E, S16, 17
Burr Oak Creek	Mitchell	Osage	W		T98N, R16W, S4, 5, 9, 10
East Pine Creek	Winneshiek	Burr Oak	F		T100N, R9W, S21, 22, 23
Middle Bear Creek	Winneshiek	Highlandville	W	W	T100N, R7W, S14, 15, 16
North Canoe Creek	Winneshiek	Decorah	F		T99N, R8W, S2, 11, 14, 15, 22
Pine Creek	Winneshiek	Bluffton	F		T99N, R9W, S3, 4, 10 and T100N, R9W, S28, 33, 34
Ten Mile Creek	Winneshiek	Decorah	F		T98N, R9W, S1, 2, 3

Catchable Stocking Program

The Iowa trout program relies heavily on stocking of catchable-size (10 to 12-inch) trout to provide trout fishing year-round in popular northeast Iowa streams and provide cool season opportunities in ponds located near high population centers across the state. Catchable trout stocking provides easy access and high success fishing opportunities, including the ability to support the harvest expectations of more than 45,000 Iowa trout anglers. Many Iowa anglers tend to be harvest oriented with about 59% harvesting at least half of the trout they catch (Steuck and Kopaska 2019).

From April through October, trout are stocked into 50 streams in northeast Iowa on a weekly or bi-weekly basis at a rate of about 100 to 500 fish per stocking visit. Stocking rate and stocking frequency is adjusted and determined by the relative use of each area and production budgets. Trout are spread throughout each stream using hauling tanks mounted in pickup trucks that are capable of hauling a maximum of 700 catchable-size fish per trip. Stream fisheries vary in length from less than a mile to

several miles long. Length, along with access for fishing and stocking largely determines the density and spacing of stocked fish. Catchable trout are expensive to produce (about \$2 per fish), so the DNR strives to maximize and diversify public access to stocked fish with an approximately 50:50 mixture of announced and unannounced stocking.

Catchable trout fisheries are predominately in small streams and ponds with excellent public access, further helping with the efficiency of stocking and fishing. Stocking is reduced or postponed during periods of poor fishing conditions, such as flooding or severely turbid water. Currently, about 340,000 catchable trout are stocked into Iowa trout streams each year. Most (80%) of these trout are Rainbow Trout, given fish culture advantages of the species (e.g., adapted to intensive rearing, easily raised on commercial fish food) and high recreational catchability. Over recent decades about 10-20% of catchable trout were Brook Trout, but stocking of catchable Brook Trout will be suspended starting in 2020 due to production issues associated with the species and management efforts to protect and expand wild populations of native strain Brook Trout. Brown Trout were an important part of the catchable trout program from the 1940s to 2000s, but were discontinued in 2006 due to production issues and efforts to increase and expand wild Brown Trout populations. Since 1943, the program has stocked at least 19.3 million catchable trout into Iowa waters.

About 60,000 catchable trout are now stocked each year into 18 ponds located in highly populated areas of Iowa (e.g., Des Moines, Cedar Rapids, Davenport, Waterloo) as part of the Community Fishing Program designed to promote fishing opportunities in urban areas of the state. Trout are stocked twice each year into most of these fisheries during October through April. These months align with cooler water temperatures across the state that allow for trout survival in warm water fisheries that would otherwise be uninhabitable by trout. This period is also outside of the primary stocking period for northeast Iowa streams. Usually, at least one of the stockings is an event, when the stocking is coupled with additional promotional activities that often include prizes, kid's activities, and concessions designed to attract families. Most community fisheries receive 1,000 to 2,000 catchable trout per stocking.

Community Trout Fisheries

The first documented urban trout stockings in Iowa occurred in 1936, when 4 small urban ponds in Waverly, Cedar Falls, and the Quad Cities (2) were stocked with trout; however, the program appears to have been discontinued after only one year of stocking. The program was revived when Mitchell Lake (now known as Harold Getty Lake) in Black Hawk County received 1,500 catchable trout in 1987. Urban trout stockings occurred at three locations (Cedar Falls/Waterloo, Dubuque, and Mason City) from the early 1990s until 2004 when a period of expanded stocking began following a successful experimental stocking of Banner Lake, located south of the Des Moines metro area. The urban trout program plan was officially drafted in 2005 before expanding stockings to nine urban fisheries in 2006. The program was expanded again in 2018 to 18 urban fisheries that are stocked twice per year (once in autumn and again in spring) as part of the program now referred to as the Community Trout Fishing Program (Table 2). Generally, these fisheries are located throughout the state near larger urban areas in an effort to provide the maximum number of anglers with diverse, close to home fishing opportunities.

Table 2: Fisheries included in the 2018 Community Trout Fishing program. Each fishery was stocked in Fall/Winter 2018 and again in the Winter/Spring 2019.

Location (Lake, City)	County	Stocked By
Ada Hayden, Ames	Story	Decorah
Bacon Creek, Sioux City	Woodbury	Decorah
Banner Lake (South), Indianola	Warren	Big Springs
Big Lake, Council Bluffs	Pottawattamie	Big Springs
Blue Pit, Mason City	Cerro Gordo	Decorah
Discovery Park, Muscatine	Muscatine	Manchester
Heritage Pond, Dubuque	Dubuque	Big Springs
Lake of Hills, Davenport	Scott	Manchester
Moorland Pond, Fort Dodge	Webster	Big Springs
North Prairie, Cedar Falls	Black Hawk	Big Springs
Ottumwa Park Pond	Wapello	Manchester
Lake Petocka, Bondurant	Polk	Decorah
Prairie Park (Cedar Bend), Cedar Rapids	Linn	Manchester
Sand Lake, Marshalltown	Marshall	Big Springs
Scharnberg Pond, Spencer	Clay	Decorah
Terra Park, Johnston	Polk	Decorah
Terry Trueblood Lake, Iowa City	Johnson	Manchester
Wilson Lake, Fort Madison	Lee	Manchester

Wild Trout Management

Wild trout are an increasingly important part of trout management in Iowa as many put-and-grow streams become self-sustaining. Populations of wild Brown and Brook Trout provide additional angling opportunities for anglers compared to a program that relies solely on stocking catchable-size trout. Naturally reproducing Brown Trout populations have been established in northeast Iowa streams through stockings of fingerling French Creek origin Brown Trout and wild Brook Trout fisheries have been developed with stockings of fingerling South Pine origin Brook Trout. To simplify reporting of natural reproduction, the Iowa DNR ranks natural reproduction in trout streams as Category 1 or 2 with streams classified as Category 1 exhibiting fairly consistent natural reproduction and maintaining a viable population of the species without any stocking whereas streams classified as Category 2 exhibiting recent, but inconsistent, reproductive success not capable of maintaining a viable population of the species at the time of listing. In 2017, 52 streams showed consistently strong natural reproduction (Category 1) while 25 streams exhibited inconsistent natural reproduction (Category 2). Many of those streams are open to public fishing, providing anglers with ample opportunities to pursue wild trout in Iowa (Table 3).

Efforts to expand wild trout fisheries in Iowa are ongoing. Working with willing landowners and other conservation partners, trout program staff continuously search for new streams that are suitable for Brook Trout reintroductions. Before stocking new restoration sites, fish community sampling and water temperature monitoring is conducted to determine the suitability of each site. Candidate sites are then stocked with fingerling Brook Trout of South Pine origin for at least two years in an effort to establish a wild population. Stockings then cease for at least two years before established monitoring protocols are followed to determine the success of each restoration stocking effort (Appendix A).

Brown Trout are a non-native species with established wild populations throughout the Driftless Region of Iowa, so fingerlings of the species are no longer needed for stocking most streams. Brown Trout of French Creek origin have proven to be well-adapted to northeast Iowa and are a desirable recreational species; unfortunately, Brown Trout are known competitors with Brook Trout. Sympatric populations of wild Brown and Brook trout are not likely to occur in the small coldwater systems of northeast Iowa. Brown Trout fingerlings are used to establish recreational fisheries where Brook Trout recovery has failed, but are not stocked into new streams within watersheds of existing or planned native Brook Trout population restorations. Typical stocking rates for Brown Trout fingerlings are about 2,000 fish per stream mile each year. Stocking success is usually assessed after three consecutive years of stocking (Appendix A). If no trout are found during the stocking assessment or if natural reproduction is documented, the stocking is discontinued. A few Brown Trout populations are currently sustained through maintenance stocking (e.g., Maquoketa River) where fingerlings are stocked annually over the long-term. The overall goal for the trout program is to have few, if any, Brown Trout fisheries that rely on maintenance stocking.

Table 3. Wild trout fisheries found on streams with segments open to public fishing as of 2018. A “W” in the fish species column represents a population of trout originating from natural reproduction in the stream, and “F” means the trout were stocked as fingerlings (2-inch long fish) and allowed to grow in the stream. Location of furthest downstream public access point is also provided.

Stream	County	Nearest Town	Brown Trout	Brook Trout	Location Latitude/Longitude
Bear Creek	Allamakee	Dorchester	W		43.43554 / -91.56596
Chihak	Howard	Cresco	W		43.32929 / -91.08066
Clear Creek (Lansing)	Allamakee	Lansing	W		43.358781 / -91.237809
Clear Creek	Allamakee	New Albin	W		43.448879 / -91.420057
French Creek	Allamakee	Waukon	W	W	43.408171 / -91.398724
Hickory Creek	Allamakee	Volney	W		43.117625 / -91.406520
Lansing Wildlife Area Creek	Allamakee	Lansing	W	W	43.40709 / -91.26553
Little Paint	Allamakee	Harpers Ferry	W	W	43.183944 / -91.236129
Paint Creek	Allamakee	Harpers Ferry	W		43.171122 / -91.244335
Patterson Creek	Allamakee	Waukon	W		43.350490 / -91.575502
Pine Creek	Allamakee/ Winnebago	Sattre	W	W	43.396042 / -91.589994
Waterloo Creek	Allamakee	Dorchester	W		43.450737 / -91.506585
West Branch French Creek	Allamakee	Waukon	W	W	43.381971 / -91.401451
Wexford Creek	Allamakee	Harpers Ferry	W		43.272426 / -91.133328
Bear Creek (Bixby)	Clayton	Edgewood	F		42.675072 / -91.400427
Bloody Run Creek	Clayton	Marquette	W		43.039685 / -91.217803
Hewett Creek (Ensign Hollow)	Clayton	Strawberry Point	W		42.757368 / -91.561821
Maquoketa River	Clayton/ Delaware	Strawberry Point	F		42.643976 / -91.579794
Mossy Glen	Clayton	Edgewood	W		
North Cedar Creek	Clayton	McGregor	W	W	42.962597 / -91.228981
Sny Magill Creek	Clayton	McGregor	W		42.952408 / -91.195279
Bailey's Ford	Delaware	Manchester	W		42.447789 / -91.410252
Fountain Springs	Delaware	Greeley	W,F		42.618064 / -91.301048
Little Turkey River	Delaware	Colesburg	W,F		42.634472 / -91.155289
Richmond Springs	Delaware	Strawberry Point	W		42.635670 / -91.560953
Spring Branch	Delaware	Manchester	W		42.461033 / -91.397409
Twin Bridges	Delaware	Greeley	W,F		42.631350 / -91.285079
Bankston Creek	Dubuque	Bankston	W		42.558286 / -90.954971
Catfish Creek (Swiss Valley)	Dubuque	Dubuque	W,F		42.423057 / -90.758802

Table 3 continued

White Pine Hollow	Dubuque	Luxemburg	F		42.628429 / -91.094124
Dutton Springs Creek	Fayette	West Union		W	42.997945 / -91.766490
Grannis Creek	Fayette	Fayette	W		42.824597 / -91.721390
Mink Creek	Fayette	Wadena	W		42.869452 / -91.651649
Big Mill Creek	Jackson	Bellevue	W		42.270402 / -90.523846
Little Mill Creek	Jackson	Bellevue	W		42.249197 / -90.476612
South Fork Mill Creek	Jackson	Bellevue	W		42.270402 / -90.523846
Turtle Creek	Mitchell	St. Ansgar	W		43.393394 / -92.922616
Canoe Creek	Winneshiek	Decorah	W		43.36713 / -91.61682
Casey Springs	Winneshiek	Decorah	W	W	43.358202 / -91.865269
Coldwater Creek	Winneshiek	Bluffton	W		43.434564 / -91.948782
Coon Creek	Winneshiek	Decorah	W		43.315912 / -91.629177
Falcon Spring	Winneshiek	Decorah		W	43.33892 / -91.87055
North Bear Creek	Winneshiek	Highlandville	W		43.449434 / -91.616945
Pine Spring Creek	Winneshiek	Decorah	W	W	43.38205 / -91.80648
South Bear Creek	Winneshiek	Highlandville	W		43.449434 / -91.616945
South Pine Creek	Winneshiek	Sattre	W	W	43.385440 / -91.663031
Trout River	Winneshiek	Decorah	W		43.264155 / -91.661142
Trout Run	Winneshiek	Decorah	W		43.290393 / -91.759205
Twin Springs	Winneshiek	Decorah	W		43.298393 / -91.812067
West Canoe Creek	Winneshiek	Decorah	W		43.402151 / -91.806966

Water Quality and Angler Access Easement Program

In 2006, the Iowa DNR began developing a trout fishing easement program. In 2010, the first substantial funding for easements became available through the State of Iowa's I-JOBS infrastructure and flood relief bonding program. Since that time, funding for easements has typically come from the DNR's Fish and Wildlife Trust Fund or Fish Restitution Fund. Since inception, trout program staff have worked with willing landowners to protect stream corridors and allow public fishing access through the Water Quality and Angler Access Easement Program (AAP). Easement widths vary, but are typically 75 to 100 feet towards each bank measured from the center of the stream (150 to 200 feet total width); the easement moves with the stream through time. To enroll in the program, landowners must agree to allow public fishing access and access by Iowa DNR staff to stock and sample fish, as well as fish habitat and water quality improvements. Per 2017 program guidelines, the landowner must also agree to required conservation components or use restrictions as part of the AAP easement.

In many cases, AAP easements are easily accessed from adjacent public lands or road right-of-ways. In cases where access across private land is required to enter the easement, angler access corridors are included as part of the program agreement. Parking areas can also be added for improved user safety.

Handshake Public Access Agreements

About 23 miles of trout water that are currently open to public fishing are managed under a handshake agreement. Many landowners prefer handshake agreements because they are not official agreements and offer the landowner the maximum amount of flexibility while still allowing them to partner with the Iowa DNR to provide public fishing access. As long as they remain open to public fishing, the Iowa DNR will stock many of the streams managed under handshake agreements. Landowners partnering with the Iowa DNR on handshake agreements are often the first to be contacted when other conservation opportunities, such as the AAP easements, are available for enrollment.

Since the early days of the Iowa trout program, handshake agreements have been an important tool used by staff to increase the miles of trout water open to public fishing, and the agreements remain an

important facet of today's trout program. The advantage of handshake agreements include ease and low cost but the disadvantage is that public fishing can be terminated at any time. Over the past decade, fisheries that were traditional public fisheries have been lost as land ownership along streams changed. For this reason, the long-term goal of the program will be to replace handshake agreements with permanent angler access easements as funding and opportunity allows.

Stream Habitat and Watershed Improvement on Public and Private Property

Each year, northeast Iowa Fisheries Management teams consult and collaborate with multiple management agencies and private landowners to improve coldwater stream habitat through watershed improvement, riparian and floodplain improvement, streambank erosion reduction techniques, and installation of instream habitat structures. Public lands in Iowa with trout water include Federal Refuges, State Wildlife Management Areas, State Parks, State Preserves, County lands, and City properties. Management teams provide help to all entities with trout resources, as long as the project goal is to improve coldwater habitat and trout populations. Assistance commonly includes technical aspects of stream habitat improvement along with project permitting and identification of funding sources. Recent funding sources for public lands projects include the Iowa Fish and Wildlife Trust Fund, Resource Enhancement and Protection (REAP), County Fish Habitat Fee, 319 Clean Water Act, National Fish Habitat Action Plan, and fishing organizations such as Trout Unlimited and Hawkeye Fly Fishing Association.

In 2016, fishing organizations joined forces to complete the first habitat improvement project on state property that was completely funded by angling groups. Nearly 900 feet of streambank was reshaped along Waterloo Creek as part of the project. Fisheries management staff also assist any private landowner interested in improving their property for aquatic species, including trout. In most cases, management staff provide technical assistance with habitat improvement techniques, permit requirements, and funding sources. State funds can be used for stream improvements on private lands managed under an AAP easement, but work on private lands without permanent access easements is typically funded with Federal Farm Bill programs and the private landowner's own funds.

IOWA'S TROUT HATCHERIES AND MANAGEMENT TEAMS

Administration of the Iowa trout program is the responsibility of the Fisheries Bureau Chief with daily operations and 15 program staff supervised by the Trout Program Manager (Public Service Manager 1) stationed at the Manchester Trout Hatchery.

Big Spring Trout Hatchery

The hatchery is located in Clayton County, about ten miles northwest of Elkader in northeast Iowa. The station is home to Iowa's largest coldwater spring, with flows ranging from 15,000 to 50,000 gallons per minute and a documented watershed size of 66,000 acres. The Turkey River runs adjacent to the southern boundary of the facility. This section of the river has excellent angler access and is stocked weekly April through October.



Photo 3: Big Spring Trout Hatchery

The hatchery was originally built as a private hatchery and fishing club in 1938. Inclement weather, floods, and excessive silt loads eventually led the original owners, Otto and Mary Bankes, to sell the facility to the Iowa Conservation Commission in March of 1961. The hatchery was completely renovated in 1974. As part of flood protection work in 2000, an existing levee around the facility was raised 18 inches. Also in 2000, a new residence was built. Record flooding in 2008 caused significant damage to the office and shop building. A replacement structure that includes the office, shop, feed room, storage, visitor center, and conference room was completed in 2010. Upgrades completed in 2017 included replacement of the hatchery water supply line that transports water from the spring source to the individual raceways.

The facility uses 24 cement flow-through raceways (147' x 7' x 4'). Historically, the hatchery served as a rearing station for growing Rainbow, Brown, and Brook Trout from fingerling to catchable-size with fingerling trout transferred to Big Spring from the Manchester hatchery. In 2003, four rock-lined earthen ponds that were used for rearing catchable Brown Trout were converted to a series of kid's trout fishing ponds after the discontinuation of catchable Brown Trout stocking. Today, only catchable Rainbow and Brook Trout are reared. Catchable Brook Trout stocking will be discontinued after the 2019 stocking season. Personnel at the hatchery are also responsible for stocking and maintaining access on 16 streams and stocking six community trout fisheries throughout Iowa. About 130,000 Rainbow Trout and 17,500 Brook Trout are reared and stocked each year. Fish from Big Spring are stocked in streams in Allamakee, Clayton, and Fayette counties. Once grown to catchable size, some trout are also transferred back to Manchester for stocking.

Since 1984, Big Spring has been a testing site for the National Atmospheric Deposition Program to track acid rain trends throughout the United States (<http://nadp.slh.wisc.edu/NADP/>). The Big Spring Watershed is also a nationally known study site for monitoring and mapping groundwater movement in a karst dominated landscape.

Facility personnel include a Natural Resource Biologist and a Natural Resource Technician 2. Additional help is also provided by a seasonal Natural Resource Aide.

Decorah Trout Hatchery

The hatchery is located two miles south of Decorah in Winneshiek County of northeast Iowa. The tract, originally known as the Siewers Springs Bass Hatchery, was constructed on a 17-acre plot of land purchased from the John Hjelle family in 1931 for \$7,500. The fish hatchery was built as a project of the Civilian Conservation Corps. The construction started in 1933 and was completed in 1935. The limestone office, residence, and pit toilet are the remaining original buildings.



Photo 4: Decorah Fish Hatchery, July 1971.

The original emphasis at the facility was Smallmouth Bass culture, taking advantage of a dependable water supply from Siewers Spring, Iowa's second largest coldwater spring. The initial investment for construction of buildings, ponds, and raceways totaled \$25,000. Over the years, fish production at the fish hatchery slowly changed from mainly Smallmouth Bass and Northern Pike to trout.

Using Sport Fish Restoration program funding, the Fisheries Bureau of the Iowa DNR renovated the hatchery in 1988. About \$2.4 million were spent to upgrade the facility. The updated hatchery went online in 1989. The hatchery now has 24 cement flow-through raceways and three rubber lined earthen ponds. Improvements to the new fish hatchery also included two clarifier ponds on the south end of the facility and an oxygen injection system. The clarifier ponds were designed to help remove heavy sediment loads from the spring water before it flows through the raceways. The water flows through the clarifier ponds and is then pumped up to the packed columns of the degassing tower. As the water falls through the packed columns, the nitrogen gas is stripped out of the water and oxygen is injected into the water.

The hatchery is a production rearing station for growing catchable Rainbow Trout and Brook Trout; however, Brook Trout catchable stockings will be discontinued after 2019. Fingerling trout are received from the Manchester Fish Hatchery from May through July and reared to a catchable-sized fish at Decorah. It takes about 16 months for the hatchery to raise trout to a catchable-size (11 inch average). The time required to reach 11 inches varies by strain of trout and water conditions at the hatchery.

The hatchery is responsible for stocking 15 catchable stocked trout streams in Winneshiek, Allamakee, Howard, and Mitchell counties and six community trout fisheries. Most streams are stocked once a week from April through October; however, three streams are stocked only twice a month. Decorah Fish Hatchery personnel stock approximately 120,000 trout into streams and 18,500 in the community ponds annually.

In 2010, The Friends of the Decorah Fish Hatchery was established as a non-profit (501c3) organization to support and improve the services delivered to the public by the Decorah Fish Hatchery. The Friends Group works to educate the public on the conservation, enhancement, and protection of natural resources that are vital to the success of the hatchery and develop and coordinate fundraising efforts to support these activities. The maintenance and operation of the public trout food vending machines is also coordinated by the Friends Group. They purchase the feed for vending as well as collect the money used for projects their board approves. To date, the Friends of the Decorah Fish Hatchery have funded a new restroom and interpretive center, the first building of its kind that was constructed on DNR property that was 100% privately funded. They have also purchased a new UTV for hatchery operations, a trailer to transport the UTV to area streams, an AED unit for the hatchery, and supported habitat improvement projects along Trout Run Creek.

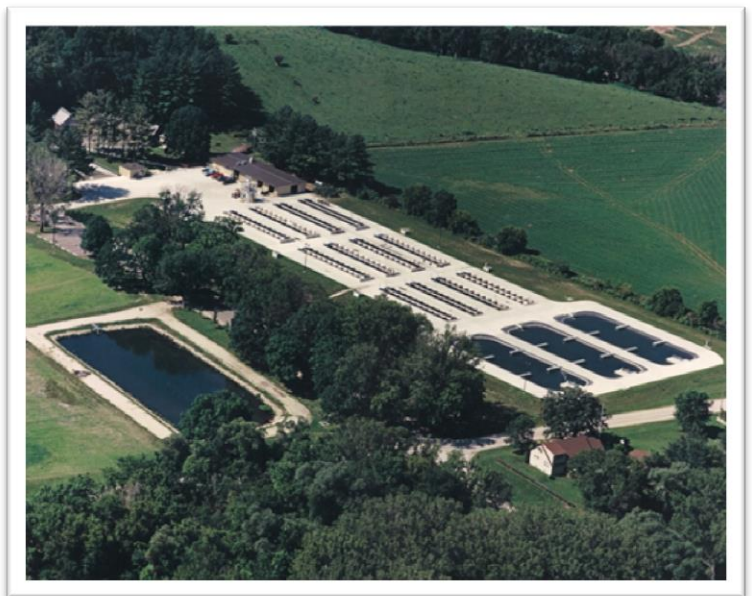


Photo 5: Decorah Fish Hatchery, July 1990

Staffing at the facility includes a Natural Resources Biologist and two Natural Resource Technician 2s. Additional help is provided by one seasonal Natural Resource Aide typically employed through the summer.

Manchester Trout Hatchery

This hatchery is located four miles southeast of Manchester in Delaware County. In the late 1880s the U.S. Department of the Interior sent a representative to the Upper Mississippi River to find a suitable site for fish culture. On August 18, 1894 the 25-acre site owned by Thorpe Bros. and Co. was deeded to the federal government “for the purpose of establishing a United States fish culture station” for a total amount of \$501.00. By an act of Congress, acquisition and development was authorized and \$15,000 was appropriated for hatchery construction. Hatchery construction was completed in 1896 and the first trout were produced in 1897.



Photo 6: The Manchester Federal Fish Hatchery in 1899.

In the late 1950s the hatchery was completely renovated to what presently exists at a cost of \$250,000. The U.S. Fish and Wildlife Service supplied trout to Iowa, Illinois, Minnesota, and Indiana from the Manchester facility from 1897 through 1976. In 1977, the State of Iowa began operating the Manchester Federal Hatchery. On June 6, 1986, the U.S. Fish and Wildlife Service traded the Manchester Fish Hatchery to the Iowa Conservation Commission for land adjacent to Union Slough in Kossuth County.

Water supply for all fish culture comes from three Silurian springs found within one-half mile of the hatchery. Total flow varies with seasonal fluctuations in weather from a record low of <500 gpm to 3,000 gpm with flow averaging 1,500 to 2,000 gpm.

The Manchester Fish Hatchery is Iowa's coldwater broodstock facility. All eggs used in the trout program are incubated at Manchester. The hatchery was historically responsible for supplying between 400,000 to 500,000 fingerling Rainbow Trout, Brown



Photo 7: Manchester Fish Hatchery.

Trout, and Brook Trout to the Big Spring and Decorah rearing facilities. Today, it hatches about 700,000 Rainbow Trout, 30,000 Brook Trout, and 45,000 Brown Trout. The hatchery is responsible for raising 45,000 catchable-size fish for stocking into 12 streams and two ponds in Delaware, Dubuque, Jackson, and Clayton counties. Hatchery staff also stock 10,000 catchable trout as part of the Community Trout Program into six urban ponds.

Several hundred brood trout (2 to 10 pounds each) are kept at the hatchery to provide eggs and milt for spawning. Brook and Brown Trout eggs are taken during October and November whereas Rainbow Trout are spawned in January. About 800,000 eggs are taken each year to provide catchable-sized fish for Iowa's more than 45,000 trout anglers. After hatching, the fry are raised for four to five months in tanks inside the hatchery. Upon reaching two to four inches long, most fingerlings are transferred to the Big Spring and Decorah hatcheries where they are raised for the next year until they reach a catchable-size of 10 to 12-inches.

Current personnel at the facility include a Natural Resources Biologist, two Natural Resources Technician 2s, a Natural Resources Technician I, and a Secretary 2. One seasonal Natural Resource Aide is also typically hired.

Decorah District Management Team

A Natural Resources Biologist and one Natural Resource Technician 2 are stationed at the Decorah Fish Hatchery. The team is responsible for fisheries management activities in Allamakee, Chickasaw, northern Clayton, Fayette, Floyd, Howard, Mitchell, and Winneshiek counties. Over 120 miles of publicly-accessible trout streams consisting of state and county lands, angler easements, and handshake agreements exist in the Decorah District. Trout management activities account for about two-thirds of this district's annual work load with remaining time focused on warmwater fisheries including the Cedar, Shell Rock, Turkey, Upper Iowa, Volga, Wapsipinicon, and Yellow Rivers as well as constructed lakes, ponds, and river impoundments.

Manchester District Management Team

Stationed at the Manchester Fish Hatchery, one Natural Resources Biologist and one Natural Resource Technician 2 oversee fisheries management activities in Black Hawk, Bremer, Buchanan, Butler, Delaware, Dubuque, Jackson, and southern Clayton counties. The team manages about 30 miles of trout stream that are open to public fishing, 2 public trout ponds, and 2 community trout fisheries in the Waterloo/Cedar Falls and Dubuque Metro. About 36,000 resident fishing licenses and about 8,500 trout fees are purchased by residents of this district each year. Trout management activities account for about one-third of the district's annual work load, with warmwater fisheries including the Cedar, Maquoketa, Shell Rock, and Wapsipinicon Rivers as well as constructed lakes and ponds, river impoundments, and a natural lake comprising the remainder.

FUTURE CHALLENGES AND OPPORTUNITIES

Limited Supply of Trout

Although Iowa DNR coldwater hatcheries continue to meet production goals, they are ageing facilities. To maintain, or at some point increase production at each facility, repairs and/or upgrades will be required. The last major renovation of a coldwater hatchery occurred at the Decorah Trout Hatchery in 1989. The Manchester Hatchery was last upgraded in 2017 and some infrastructure at the Big Spring Hatchery was updated in 2018.

Program Funding

Although trout stamp sales pay for a portion of the personnel and direct costs associated with the Iowa trout program, costs of trout production continue to increase necessitating future increases in permit fees to operate at current levels. For example, production costs per pound of trout reared at the Decorah Trout Hatchery have increased to over \$3.20/lb compared to 2010 costs of about \$2.40/lb, a 33% increase (Figure 3).

In 2016, 46,604 Iowa trout stamps were sold setting total revenue (less administrative processing fees) at \$501,924. At the same time, expenditures to staff and operate Iowa's three coldwater hatcheries exceeded \$1 million annually.

Non-governmental groups have provided financial support towards program costs such as habitat improvements, easement acquisitions, and land acquisitions. As interest in trout fishing grows, there will be additional opportunities to partner with these groups. A large proportion of licensed trout anglers are unengaged or do not belong to organized fishing groups. Determining how to involve these anglers in opportunities to support the trout program will be important moving forward.

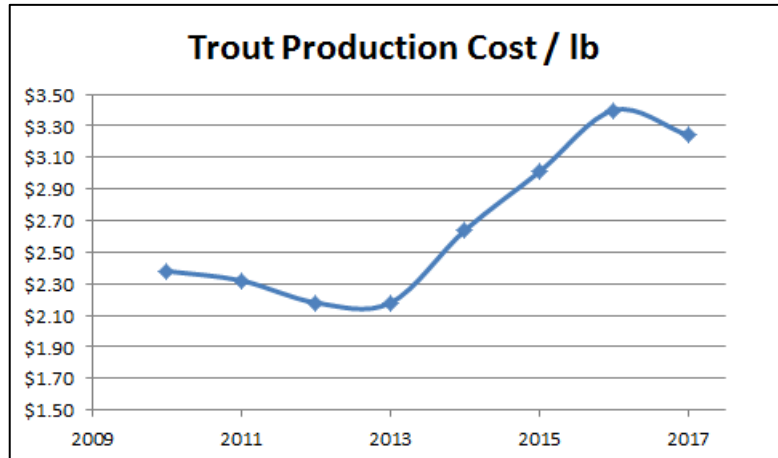


Figure 3: Decorah Fish Hatchery trout production costs from 2010 through 2017.

Native Brook Trout Management

Genetic investigations have suggested that the Iowa South Pine Creek population of Brook Trout is unique to Iowa. Since the South Pine Creek population has been used to restore populations in other streams, the condition of all Brook Trout populations should be assessed. With more Brown Trout naturally reproducing in Iowa than ever before, it will also be important to understand their effects on Brook Trout populations.

Expanding and Diversifying Angling Opportunities

As land is transferred to new owners, the trout program may have opportunities to expand public fishing access in those areas if the land can be purchased by the DNR; however, a more likely scenario is that the land will be bought and held under private ownership. New landowners may purchase property for recreational reasons and public fishing access may not be compatible with their land management goals. Changing landowner preferences could limit our ability to expand angling opportunities along trout streams in the Driftless Region of Iowa. In other parts of the state, especially in urban areas, opportunities to expose urban anglers to trout fishing continue to expand under the Community Fishing Program.

Angler Recruitment

As Iowa shifts towards a more urban population, the trout program should continue to engage communities and offer them trout angling opportunities. Any opportunities to bring trout angling to urban residents should be considered and local partnerships developed to support those

opportunities. Opportunities in ponds or rivers that flow through urban areas should be considered. Trout program staff should participate in angler recruitment, retention, and reactivation (R3) efforts when possible.

Social Economic Threats

As agricultural operations expand or retract in response to human populations and commodity prices, there may be conversion of lands to uses that are not compatible with coldwater trout fisheries. Water could become a resource of ever increasing value given possible demands on quantity and quality, and trout production must directly compete with other water needs. Society may judge the relative value of trout versus other competing needs as an increasingly urbanized culture less connected to nature and with a smaller fraction of the human population that fishes.

Natural Threats

Changing precipitation patterns may exacerbate the nutrient and sediment impacts on fisheries. Extreme flooding may damage or destroy habitat improvement projects and negatively impact trout populations and populations of important food sources, such as aquatic macroinvertebrates. Conversely, extended droughts could damage trout populations if groundwater sources decrease. Extended periods of poor water quality at hatcheries may slow trout production and increase incidence of diseases.

Invasive plants, animals, parasites, and viruses associated with human globalization and changing climate patterns will directly threaten trout populations through competition and disease. Invasives will indirectly threaten trout populations by altering habitat and food resources.

Trout Genetics

Strong genetic diversity is critical to long-term success of the Iowa trout program. If genetic diversity is low in hatchery broodstock, it may lead to reduced hatch rates, increased fry mortality rates, and deformities in fingerling and adult trout. Low genetic diversity in wild populations may reduce long-term viability in the wild. Broodstock and wild trout hatching programs need to work towards a better understanding of the genetic origin and population diversity of existing Iowa trout stocks. Spawning protocols to retain genetic diversity of stocks are also important.

Research Needs

Relatively little research has been done on coldwater resources in Iowa. Work on trout genetics, distribution of native Brook Trout stocks, extent of Brown Trout natural reproduction, effectiveness of habitat restoration programs, and how watersheds, sinkholes, and springs influence coldwater resources is all needed to effectively manage coldwater resources in the future. A review of existing data related to surface water classifications may allow us to refine our coldwater classifications and more accurately describe their prevalence. Additional work on movement of catchable trout after stocking and capture rates of stocked trout could help improve our catchable stocking program. Evaluating habitat improvement techniques that better withstand intense flooding events and comparing the sampling efficiencies of various gears using standardized settings may also warrant consideration. This work could be done by current research staff, additional research staff, or by contract work to meet the needs of the trout program.

A PLAN FOR IOWA TROUT MANAGEMENT

This plan provides a vision and guidance for Iowa's trout program over the next 25 years.

Trout Program Mission

Use science and collaboration with partners to enhance trout fishing opportunities for all Iowans while conserving coldwater resources for future generations.

Implementation Plan

This plan will generally be implemented as part of annual work plans. In some cases, supplemental funding will be needed to advance particular goals and objectives. In many cases, partnerships with other government agencies and non-governmental organizations will be necessary to advance trout management. At 5, 10, 15 and 20 years after the plan is approved, program staff will provide a progress update to Fisheries Bureau leadership. Recommended adjustments to the plan's goals and objectives will also be reviewed at that time based on achievements, challenges, and changes to trout fishing and trout populations.

Goal 1: Maintain populations of native Brook Trout in the nine streams where they currently are known to exist.

Objective 1.1: Determine genetic origin and diversity of wild Brook Trout populations.

Discussion: Genetic testing technology has rapidly improved providing opportunities to better understand the origin of Brook Trout in Iowa. Testing the nine known populations and other populations discovered during work related to Objective 2.1 will allow us to incorporate a genetic conservation plan into our Brook Trout management.

Objective 1.2: Phase-out non-native Brook Trout rearing and stocking that includes Iowa "domestic" Brook Trout that do not originate from the Driftless Region of the Midwest United States.

Discussion: If Iowa South Pine Brook Trout are determined to be native to the Iowa Driftless Region, then continuing to stock a "domestic" non-native strain in northeast Iowa could lead to genetic contamination and jeopardize our native populations if cross-breeding occurred. By eliminating the stocking of non-native strains, we improve our ability to maintain our native Brook Trout.

Goal 2: Develop native Brook Trout populations in at least ten streams where they were not known to previously exist.

Objective 2.1: Locate two extant populations of native Brook Trout.

Discussion: A better understanding of where Brook Trout persist in Iowa will improve our ability to manage and protect all native populations. Many small headwater creeks and spring branches have habitat suitable for supporting Brook Trout, but many of these areas have never been surveyed. Targeting small, coldwater streams, fish community data should be examined from all major watersheds in the Driftless Region of Iowa.

Objective 2.2: Implement a Brook Trout restoration plan.

Discussion: Using genetic testing results from Objective 1.1, determine Brook Trout populations suitable for use as broodstock. To ensure that we maintain genetic diversity of Iowa Brook Trout populations, staff will develop a genetic conservation and restoration stocking plan that outlines proper spawning techniques including gamete collection, proper site selection for reintroductions, and fingerling stocking guidelines.

Objective 2.3: Complete restoration stockings of Brook Trout in at least eight streams with suitable habitat.

Discussion: Following protocols developed as part of the Brook Trout restoration plan, South Pine origin Brook Trout fingerlings should be stocked into at least eight new streams in an effort to develop self-sustaining populations.

Goal 3: Maintain quality trout fishing opportunities in catchable-stocked streams and community trout fisheries that result in trout angler satisfaction of at least 7 out of 10 as measured by the Iowa Trout Angler Survey.

Objective 3.1: Evaluate hatchery performance of Rainbow Trout broodstock to reduce undesirable hatchery products.

Discussion: Several strains of Rainbow Trout are available for production. Program staff should evaluate the performance of these strains to ensure that Iowa hatcheries are using trout that perform best in the conditions that are common in our hatcheries. Performance measures could include feed conversion rate, time to catchable-size, disease susceptibility, and angling vulnerability once stocked.

Objective 3.2: Produce catchable-sized Rainbow Trout that deviate less than 15% from a target mean length, and periodically review the target mean length. For example, the current production target length for Rainbow Trout is 11-inches with a range from 9.5 to 12.5 inches.

Discussion: Evaluate hatchery performance and develop rearing methods so that size variation in catchable-stocked Rainbow Trout is minimized, thereby providing a consistent, quality product to our trout anglers. Angler preferences about fish harvest and size change over time and production targets should be periodically reviewed to maximize hatchery efficiency.

Objective 3.3: Review the number of trout stocked in all catchable-stocked streams in the year following publication of the trout angler survey.

Discussion: Angler preferences change through time, making it important to periodically review our catchable-stocked numbers. As angler use increases on some areas, staff may wish to revise the number of catchables stocked into each stream. Staff should also determine how best to incorporate the number of wild fish at large in each stream into this process.

Objective 3.4: As angler preferences change, reconsider the proportion of announced and unannounced stockings to maintain diverse trout angling opportunities.

Discussion: Different trout angling groups have diverse expectations when it comes to trout angling (see Steuck and Kopaska 2019). Some trout anglers are harvest oriented and prefer to know when fish are stocked. Other trout angling groups do not focus on stocking of catchable trout; therefore, it is important to maintain a stocking calendar that meets the needs of the angling public with stockings that provide a diversity of trout fishing opportunities.

Objective 3.5: Review and update Iowa DNR Fish Stocking Policy as needed to reflect changes adopted by the trout program.

Discussion: Any changes to trout stocking protocols should be developed following guidelines provided in the Iowa DNR's Fish Stocking Policy. Any changes to trout stocking protocols should be incorporated into the Fish Stocking Policy.

Goal 4: Evaluate management of all Iowa trout fisheries.

Objective 4.1: Review all trout fishing regulations.

Discussion: Existing trout regulations should be reviewed every five years to ensure they are still meeting intended management goals. When possible, regulations should be simplified. Law enforcement staff should be consulted on existing and future regulations so they are written in an enforceable manner. The number of angler trips to restrictive regulation streams has steadily declined from 14% of all trips in 2001 to only 4% of all trips in 2016 (Steuck and Kopaska 2019), suggesting these fisheries may not be as important as they once were. Regulations to protect developing Brook Trout populations in some streams may warrant consideration. Trout anglers have diverse preferences and the Iowa trout program should strive to maintain diversity within the program to meet angler preferences determined by the Iowa trout angler survey or expressed during communications with program staff.

Objective 4.2: Continue the Iowa trout angler survey.

Discussion: Valuable information on angler demographics and preferences are obtained from the trout angler survey. This information is later used to prioritize streams, guide stocking strategies, and develop fishing access. Program staff should continue to complete this survey every 5 to 10 years.

Objective 4.3: Annually update the trout program list of naturally reproducing trout streams.

Discussion: Up-to-date information on natural reproduction in trout streams is used to guide trout management in Iowa and also to prioritize acquisition and easement opportunities. Staff should follow a standard process when deciding to add a new stream to the list (Appendix A) or update category 1 (Appendix B) or category 2 (Appendix C) streams currently on the list.

Objective 4.4: Review relevancy of the Iowa put-and-grow trout program.

Discussion: When the put-and-grow program was first developed, there was limited natural reproduction of trout occurring in Iowa coldwater streams. As a result, stocking was an important management tool, especially on streams that were entirely private. Natural reproduction in trout streams is very common today and stocking of fingerling trout is used on a limited basis. Staff should occasionally examine the occurrence of natural reproduction in the put-and-grow program streams to determine if stocking is still necessary, and to ensure it is still providing a valuable service to trout anglers.

Goal 5: Expand trout fishing access in Iowa.

Objective 5.1: Expand the Iowa Water Quality and Angler Access Program (AAP) by 25 miles.

Discussion: Working with partners and willing landowners, trout program staff will work to add 25 miles of AAP easements in the next 25 years at an estimated cost of \$1.3 million. Prioritization of easements for acquisition should be completed using tools developed by Objective 5.5.

Objective 5.2: In cooperation with DNR Realty staff, refine easement monitoring guidelines for all AAP easements by 2020.

Discussion: Current easement monitoring guidelines were developed for general conservation easements. Trout program staff will work with Realty staff to develop monitoring guidelines and timelines specific to AAP easements.

Objective 5.3: Maintain and refine informational materials for landowners.

Discussion: Program staff will annually review and revise informational materials related to the trout program, including the handshake agreement and AAP informational document, AAP easement brochure, and FAQ document.

Objective 5.4: Acquire by purchase from willing landowners, public access to an additional five miles of coldwater streams by 2040.

Discussion: In some cases, acquisition of property with trout streams may be justified over an AAP easement. Many properties that have trout streams also have other unique or important conservation attributes that are worthy of protection through acquisition. Staff will work with Wildlife and Realty staff to ensure properties offered by willing landowners are protected in the best way possible. Prioritization of properties available for acquisition should be informed using tools developed in Objective 5.5.

Objective 5.5: Develop by 2020 internal tools to aid prioritization for funding of easements and land purchases offered to the Iowa DNR by willing sellers.

Discussion: To assist staff with prioritizing properties (objective 5.1, 5.4) offered by willing sellers, ranking tools should be developed that take into account biological, hydrological, and sociological aspects of trout management so properties can be compared in an objective manner.

Objective 5.6: Review stream classification of all perennial northeast Iowa streams during the next five years to ensure that all eligible streams are correctly classified as coldwater based on biological or physical parameters.

Discussion: Trout program staff should install water temperature monitors in at least one new stream a year to determine if the stream has suitable water temperatures for trout. New technology, such as aerial imagery, could also be used to determine appropriate stream segments for trout reintroductions. Iowa's surface water classifications should be reviewed by 2025 to ensure streams are correctly classified as coldwater based on current stream conditions. In many cases, biological data collected by program staff or partners could be used to evaluate and update classifications. Staff should work with Iowa DNR Water Quality staff to complete reclassification requests.

Objective 5.7: Install four new universal access points along trout streams.

Discussion: Many of our trout streams have difficult access. Many trout anglers are unable to access those areas for a variety of reasons. Universal access should be improved where possible, but consider potential use, expected longevity, annual maintenance, and other factors when planning and locating these access points. Areas prone to flooding are usually not good areas for universal access structures and will require extensive maintenance.

Objective 5.8: Identify and improve five additional areas where kid-friendly trout fishing opportunities can be developed with partners.

Discussion: Many trout fisheries provide difficult access for young anglers. Staff should work to find new areas that provide kid-friendly fishing opportunities. In many cases, these opportunities may exist at community fishing lakes.

Goal 6: Evaluate Brown Trout fingerling stockings.

Objective 6.1: Reduce by 25% the number of streams annually stocked with Brown Trout by 2030.

Discussion: Complete fish population surveys on all streams currently receiving Brown Trout fingerling stockings. As part of efficient use of resources, it is not necessary to stock fingerling Brown Trout into streams with consistent natural reproduction. Appendices A, B, and C provide guidance for this evaluation process.

Objective 6.2: Complete a risk analysis for all current Brown Trout populations and stocking locations to assess potential for each population to impact Brook Trout recovery efforts.

Discussion: Brown Trout populations can negatively affect Brook Trout fisheries. The potential for Brown Trout stocking practices to impact Brook Trout fisheries should be considered and stocking practices modified as needed to minimize potential interactions with native trout.

Objective 6.3: Investigate the origins and genetic composition of Iowa Brown Trout populations with regard to management questions, including the need to extract eggs only from French Creek parents.

Discussion: The genetic diversity and origin of Iowa Brown Trout could guide future management of these fisheries. Currently, broodstock are only collected from a single stream although other streams have maintained naturally reproducing populations for long periods of time. Staff should investigate the genetic benefits of using multiple streams as broodstock sources.

Goal 7: Develop a coldwater research program to assist trout management and hatchery staff with science-based fisheries decisions.

Discussion: As the popularity of trout fishing in Iowa continues to expand, it will be increasingly important to implement science-based decision making to ensure hatchery and wild trout are reared and managed in the best way possible. Grazing as a possible stream corridor management technique should be investigated and ways to protect spring flows that support many of our coldwater streams (e.g., limit pond construction on spring sources) should be evaluated. Additional work should be conducted on trout angler preferences that would better guide future hatchery production and management of trout in Iowa. Trout program staff should convene annually to identify research needs.

Goal 8: Complete trout program improvements to increase coldwater hatchery production and efficiency and improve management capabilities of Iowa's two trout management teams.

Objective 8.1: Increase the management capacity of the Decorah and Manchester Fisheries Management teams.

Discussion: Increasing interest in trout fishing and expanding trout populations in northeast Iowa have increased the management demands on the trout program. Incorporating new staff (e.g., private lands fisheries biologist, stream habitat management crew, watershed coordinator) into the program would improve the management of publicly owned trout streams, provide better angler experiences while fishing, and allow for more outreach to private landowners who may be interested in participating in some aspects of the Iowa trout program. Purchasing of additional equipment (e.g., skid steer with forestry attachment, hydromulcher) would allow staff to more efficiently partner with Wildlife staff to manage existing public trout fishing areas. Management teams should routinely review existing equipment inventories and request replacements when needed.

Objective 8.2: Complete five hatchery improvements at each facility by 2040 to increase production efficiency and capabilities of Iowa's three coldwater hatcheries.

Discussion: Iowa's trout hatcheries are dated. Normal wear through time has resulted in the need for many repairs. Budget limitations and competing culture interests have limited the investments into Iowa's coldwater hatcheries. The three facilities need improvements if they are expected to maintain

production at current levels. Appendix D provides a summary of improvements that are considered a high priority at each coldwater hatchery.

Goal 9: Incorporate ten more trout fishing locations into the Community Fishing Program.

Discussion: Working with our Community Fisheries Biologist, investigate opportunities to expand the trout stocking component of the Community Fishing Program so we can bring trout fishing to more Iowans living in urban areas. Trout fishing location additions to the Community Fishing Program are currently limited by fish distribution and staffing limitations. Update and formalize criteria for possible expansion of trout stocking into other communities. We will determine and develop a report on the costs and benefits of the community trout stocking program that will inform future program discussions. As Iowa communities grow and new partners are identified, we will incorporate ten more community trout fishing locations by 2040.

Goal 10: Rehabilitate ten miles of public stream corridor.

Discussion: We will use techniques available in the Iowa River Restoration Toolbox to increase flood resiliency of the riparian corridor while also improving instream fish habitat along ten miles of trout stream corridor. Nongame wildlife and angler accessibility should be considered during planning. Working with partners, improve habitat in and along ten miles of Iowa trout streams by 2040. Program staff will continue to work with partners to promote conservation practices where needed in trout stream watersheds. Changes in rainfall and flooding patterns emphasize the importance of continuing to work with these partners to promote and install watershed practices that reduce or slow runoff of rainfall, nutrients, and soil.

Goal 11: Improve trout program communications with resource users, landowners, and program partners.

Objective 11.1: Continually improve trout fishing information digitally available from the Iowa DNR.

Discussion: Trout program staff will meet annually with communications staff to review the website and discuss possible changes. Before the meeting, staff will review information available online and provide written changes to communications staff to ensure the trout program webpage is providing accurate information to our constituents. Downloadable stream maps should be annually reviewed by district trout program staff to provide the most accurate information possible on trout angler access.

Objective 11.2: Work with partners to develop two additional county-specific trout maps.

Discussion: Northeast Iowa Resource Conservation and Development, Iowa's Coldwater Conservancy, and county visitors' bureaus have been important partners to develop and fund county-specific trout fishing maps. We will continue to work with partners to fund the development of new maps and the update and reprint of existing maps.

Objective 11.3: Continue to build relationships with trout angling groups, other conservation groups, and agency partners.

Discussion: The Iowa DNR, other state and federal agencies, and non-governmental organizations can achieve greater conservation successes by working together. Trout program staff should attend at least one meeting of each partner every year. Staff should take the opportunity to update partners on the recent achievements of the trout program. Diverse partnerships strengthen grant applications and show support for coldwater conservation programs.

Objective 11.4: Develop a standard operating procedure for signing trout fishing areas by 2021.

Discussion: Trout program staff will develop a standard operating procedure for installing signs at all publicly-accessible trout fishing areas. Standards for sign installation will provide consistency in sign design and placement at parking areas and angler access boundaries. Consistently signing areas will clear up confusion among anglers about where they can and cannot fish.

Objective 11.5: Create at least ten online videos to educate stakeholders about the trout program.

Discussion: Technological advances have greatly improved the capacity for the general public to create professional-grade videos. Further, several online platforms make it easy for anglers to quickly access this information. To further promote specific aspects of the trout program, staff should develop at least ten informative online videos that could be shared through the Iowa DNR's social media platforms.

Objective 11.6: Contact all landowners that provide fishing access via the handshake agreement program at least once every three years.

Discussion: Landowner cooperation is critical to the success of the handshake agreement program. Staff should communicate with landowners by mail or phone to ensure they are happy with angler behavior. In the past, landowner frustration over angler behavior has led to some areas being closed to public fishing. Staff should also reach out to new landowners that are not currently in the handshake agreement program to see if they would be interested in participating.

Goal 12: Partner with Law Enforcement to identify areas that would benefit from targeted enforcement efforts along trout streams.

Discussion: Law Enforcement is an important partner in the trout program to promote safety, equity, and protection of resources. Stocking naive trout into small streams provide opportunities for conservation laws to be violated. Program staff will annually review trout regulation enforcement with Law Enforcement staff to determine areas where teams can collaborate on protecting fisheries.

Goal 13: Limit threats posed by introduced exotic species and pathogens.

Objective 13.1: Assess biosecurity at each hatchery, develop and implement comprehensive biosecurity plans by 2025.

Discussion: Disease and invasive species could threaten hatchery production at Iowa's coldwater hatcheries. To minimize this threat, each hatchery should consider possible production threats and develop a comprehensive biosecurity plan to be in place by 2025.

Objective 13.2: Review annually the list of private fish providers to ensure the Iowa DNR is recommending safe sources for Iowans wishing to buy trout.

Discussion: Independent fish hatcheries are a source of fish for many Iowans; however, there are few checks on these hatcheries to ensure they provide an acceptable product. Fish from hatcheries that are prone to disease, parasites, or invasive species infestations could impact wild trout populations when stocked. Trout program staff will annually review the list of approved aquaculture suppliers that is provided to the public on the Iowa DNR website to ensure any trout provided to the public come from a reliable, safe source.

Goal 14: Introduce students in ten new classrooms to conservation education over the next 25 years.

Discussion: Working with funding partners and staff from Iowa high schools, trout program staff will expand conservation education programs, including "Trout in the Classroom". We will also update and

formalize criteria that provide guidance during expansion of educational programs into other classrooms.



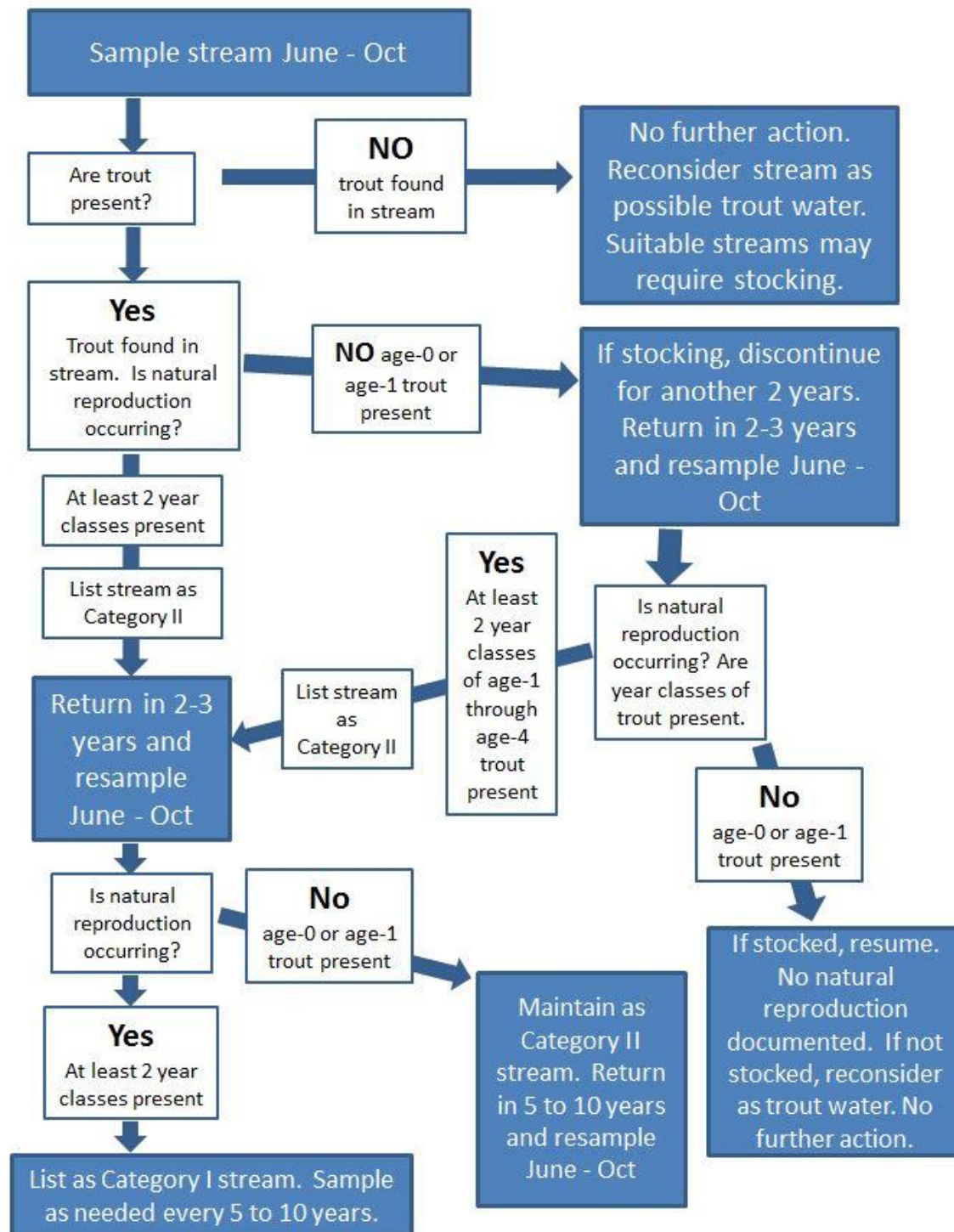
Photo 8: Anglers fishing Big Paint Creek in the Yellow River State Forest (Allamakee County).

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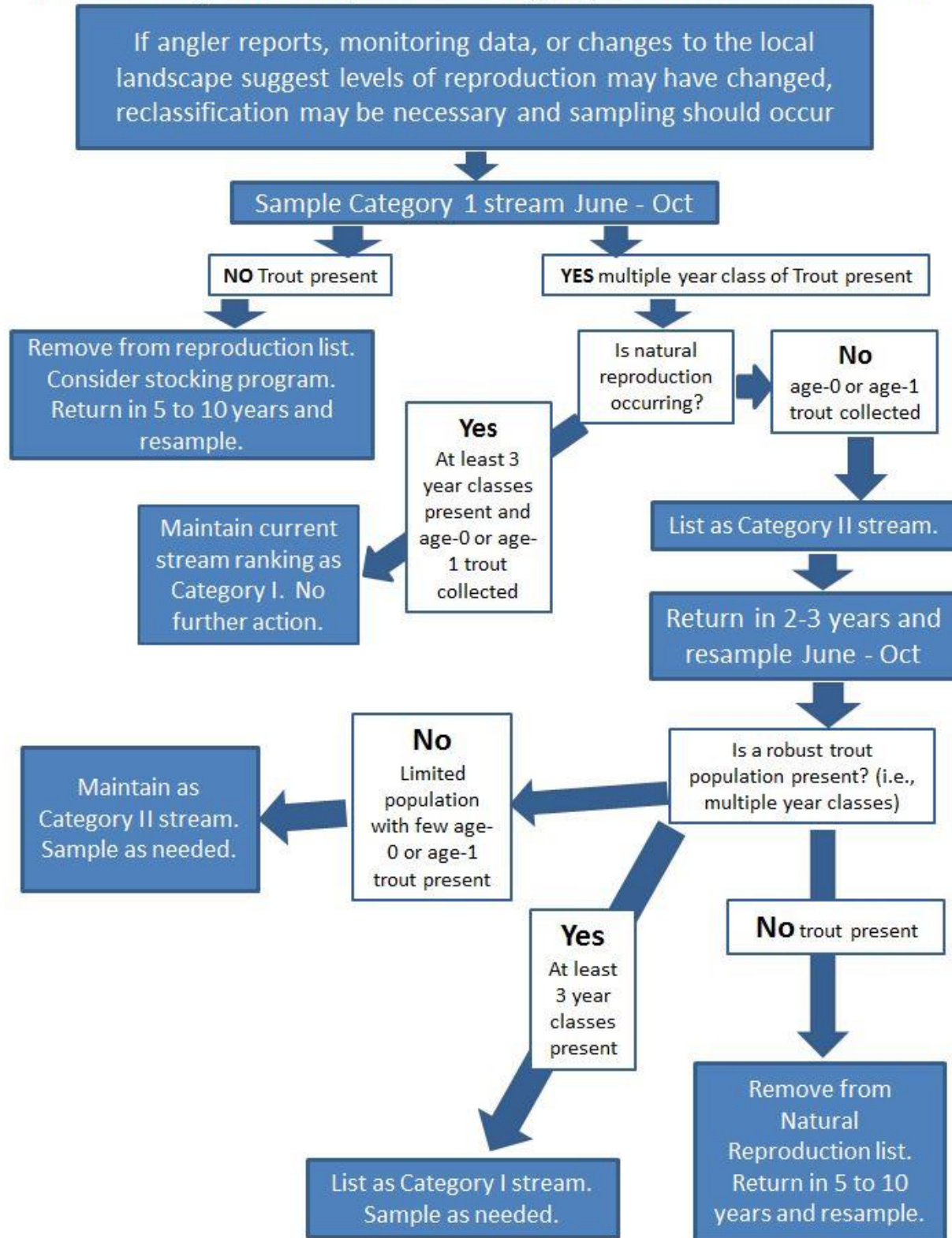
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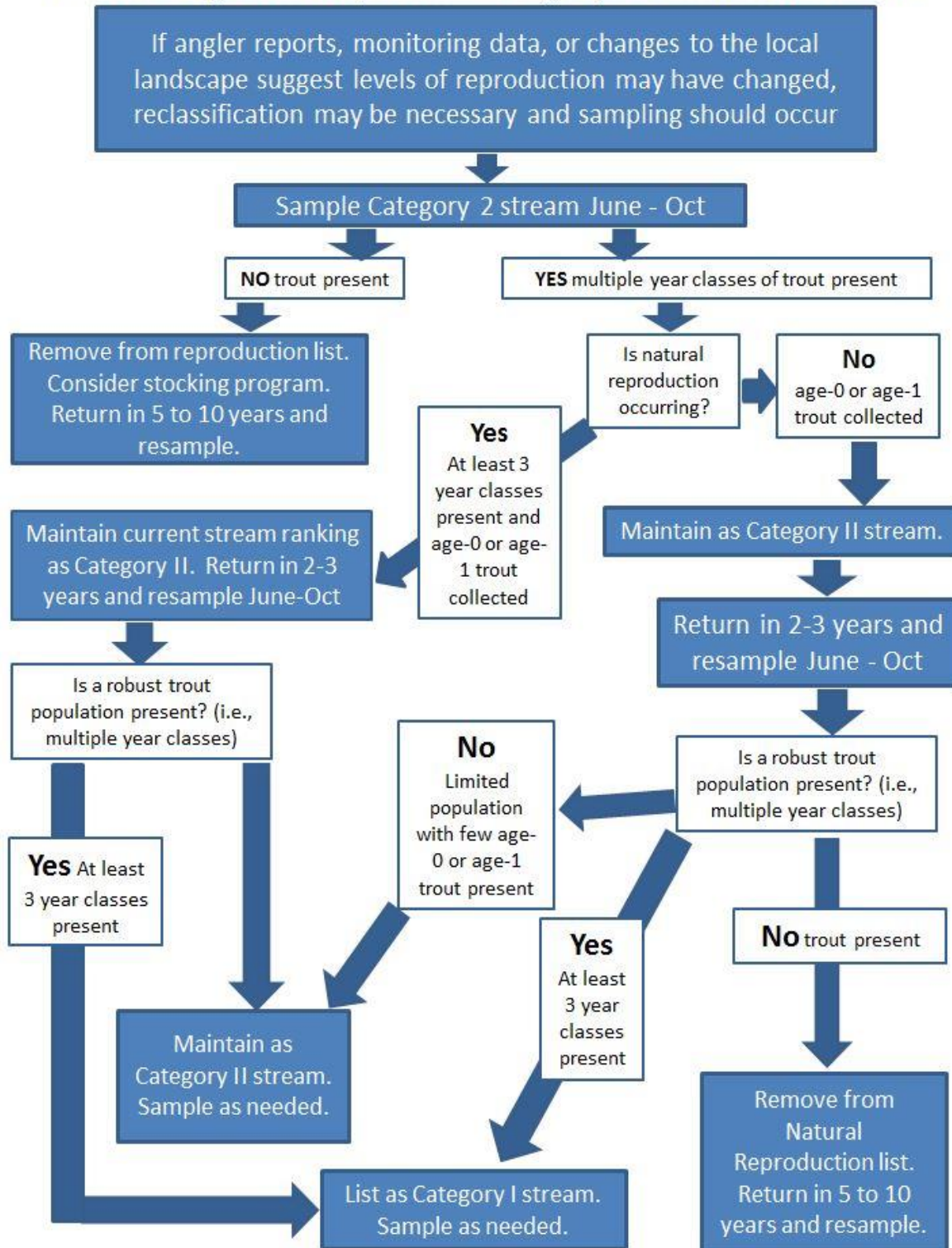
Evaluation of Unlisted Coldwater Streams not Stocked Within the Last Two Years



Reassessing Currently Listed Category 1 Coldwater Streams



Reassessing Currently Listed Category 2 Coldwater Streams



Appendix D. Proposed improvements considered high priority in 2018 at Iowa's coldwater hatcheries.

Big Spring Trout Hatchery

1. Continued landowner outreach in the Big Spring watershed to improve conservation practices and water quality of the spring.
2. Investigate an alternate water source such as a high capacity sand point that could provide water during periods of poor water quality and flooding.
3. Repair and maintenance of existing fish rearing raceways that have become weathered and cracked over time.
4. Invest in settling ponds to capture silt loads before spring water enters the raceways and to capture effluent solids.
5. Repair of deteriorating spring retaining walls.
6. Repair of kids fishing pond walls and pond structures.
7. Comprehensive habitat enhancement and improved fishing access on the Turkey River adjacent to the hatchery and upstream to the campground.
8. Additional self-guided tour educational panels to improve education and outreach.

Decorah Trout Hatchery

1. Renovate office and visitors center, including new phone system.
2. Resurface office driveway.
3. Install new degassing tower.
4. Renovate raceways: install new concrete around raceways, replace leaking pipes and tile around raceways, replace existing frost valves and change water supply plumbing.
5. Install new concrete around shop so it no longer heaves and crushes siding.
6. Renovate hatchery residence, including updating wiring.
7. Rewire and rework all pumps and control panels.
8. Investigate water supply well or wells for the hatchery to alleviate the poor spring water conditions.
9. Install two-stage settling pond to help with heavy silt loads in spring water.
10. Replace flow meters and low oxygen sensors and update the hatchery alarm system.
11. Add insulation to shop.
12. Purchase new raceway screens.
13. Install commercial ventilation system in shop for welding and other activities that require specialized ventilation.
14. Install biosecurity system fencing around raceways and install a vehicle and equipment disinfection area to clean all equipment as it re-enters the hatchery.
15. Purchase a fish grader to improve fish stockings.
16. Repurpose oxygen generation room.
17. Purchase a bulldozer, dump truck, and skid steer and accessories like forestry mulching attachment for stocking road and crossing maintenance.

Manchester Trout Hatchery

1. Repair middle spring to capture about 200 more gallons of water per minute currently escaping through the outdated structure.
2. Raise head ends of raceways about 3" to allow for the use of LHO degassing and oxygenation in the raceways.

3. Investigate feasibility of installing LHO degassing and oxygenation in the water supply tower.
4. Repair or replace raceways since original raceways are crumbling, especially at seams.
5. Refurbish raceway driveways; current roads around raceways are primarily limestone dust and organics; removing material and reshaping a new roadbed would be necessary.
6. Build a new office and visitors center above the floodplain.
7. Build new indoor shop, feed storage, and laboratory facilities.
8. Install backup generator for pumps at hatchery.
9. Resurface facility roadways.
10. Address suspension bridge.



Photo 9: Angler fishing along South Bear Creek (Winneshiek County).