Upper Androscoggin River

Fishery Management Plan

By

Francis Brautigam and James Pellerin

Maine Department of Inland Fisheries and Wildlife

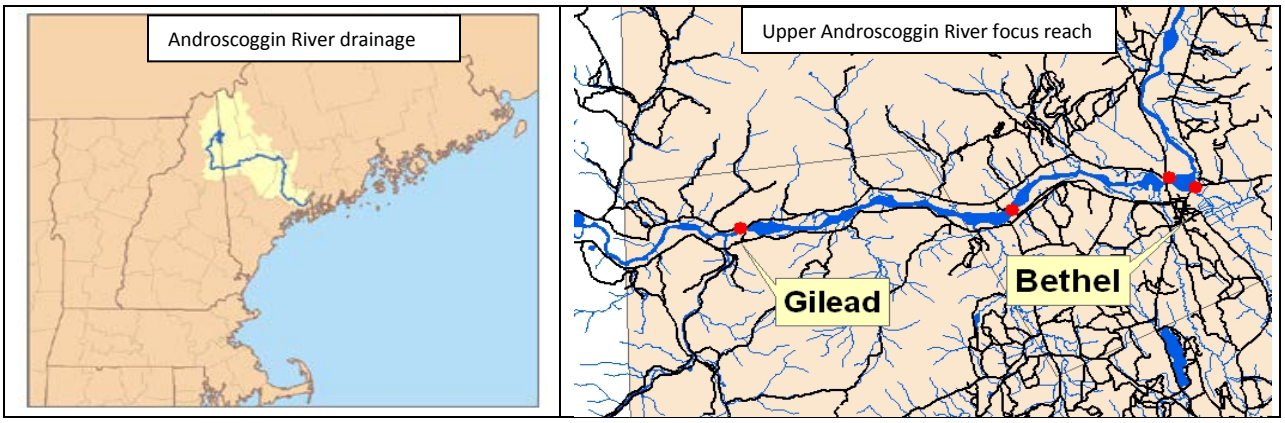
Division of Fisheries and Hatcheries

January, 2014

Introduction

The following document was developed to provide direction and long term planning for the management of trout fisheries in the upper Androscoggin River (Map 1). The "upper" Androscoggin River extends from the Maine-New Hampshire state line to Rumford Falls, although the focus of this plan is the more heavily fished reach from the Maine - New Hampshire state line in Gilead to Davis Park in Bethel (Map 1). This planning effort was prompted by a geographic adjustment to Administrative Fisheries Region A of the Maine Department of Inland Fisheries and Wildlife (MDIFW), which extended management jurisdiction to the entire Androscoggin River.

Map 1. Androscoggin River Location Map (left) and Management Focus Reach (right)



Information presented in the plan reflects a review of available existing information and input gathered through a collaborative stakeholder process utilizing a public work group (PWG) representing area businesses, guides, anglers, and local special interest groups. Participating public work group members and their affiliations are listed in Table 1 below.

Table 1. Public Work Group Stakeholder Participants

Public Member	Affiliation
Dick Walthers	Mollyockett Chapter of Trout Unlimited, Maine Guide
Bob Harkins	Avid Androscoggin River fly fisherman
Brad Jerome	Bethel Inn Resort, Avid fly fisherman
Ron Fournier	Orion Outfitters Guide Service, Bryant Pond Conservation Camp
Scott Stone	Upper Androscoggin Anglers Alliance, Avid fly fisherman
John Wight	Guide, 35 year history fly fishing the Upper Androscoggin R.
Brian Reader	Guide
Lisa Freda	Sun Valley Sports
Joanne Hicks	Guide
Lance Scarborough	Avid spin fisherman, regularly fishes the Upper Androscoggin River

The plan contains two general sections. An initial section summarizes management considerations based on available information and PWG input. The second section contains management goals, objectives, and action items.

The plan offers a road map for managing trout fisheries in the Upper Androscoggin for the MDIFW and other vested stakeholders. Development of the plan does not imply any obligation by the MDIFW to undertake all the action items contained herein, but rather offers a shared vision for those interested in the management of the upper Androscoggin River fishery. Individual action Items will be addressed as MDIFW resources, priorities, and opportunities allow, and as supported by local partnerships with towns and nongovernment agencies.

Management Considerations

Fish Present

Yoder (2004) inventoried fish on the Androscoggin River between Gilead and Bethel in August of 2003. Common names of collected fish are listed in Table 2 below. Yoder did not capture brook trout due to elevated water temperatures at the time of sampling, but native brook trout are well established in the tributaries and are seasonally present in the river, and therefore added to the list. Yoder found fallfish to be the most abundant fish, based on number of individuals captured, however, common sucker accounted for the greatest total biomass of any fish collected. Smallmouth bass were also both relatively abundant and accounted for a high percentage of the fish biomass.

Table 2. Fish Occurring in the Upper Androscoggin River from Gilead to Bethel		
Brown Trout	Blacknose Dace	Yellow Perch
Rainbow Trout	Longnose Dace	Spottail Shiner
White Sucker	Common Shiner	Long Nose Sucker
Burbot	Lake Chub	Fallfish
Brook trout	Smallmouth Bass	
Chain Pickerel	Golden Shiner	

The historical assemblage of native fish in the river is not known with certainty; however, smallmouth bass, brown trout, and rainbow trout found in the upper Androscoggin are not indigenous to Maine. Wild populations of both brook trout and rainbow trout contribute to the river's trout fishery; wild brown trout production is currently negligible. The present recreational "trout" fishery is also dependent upon annual stocking of hatchery brook trout, rainbow trout, brown trout, and to a lesser extent landlocked Atlantic salmon. Brown and rainbow trout have been the focus of trout management

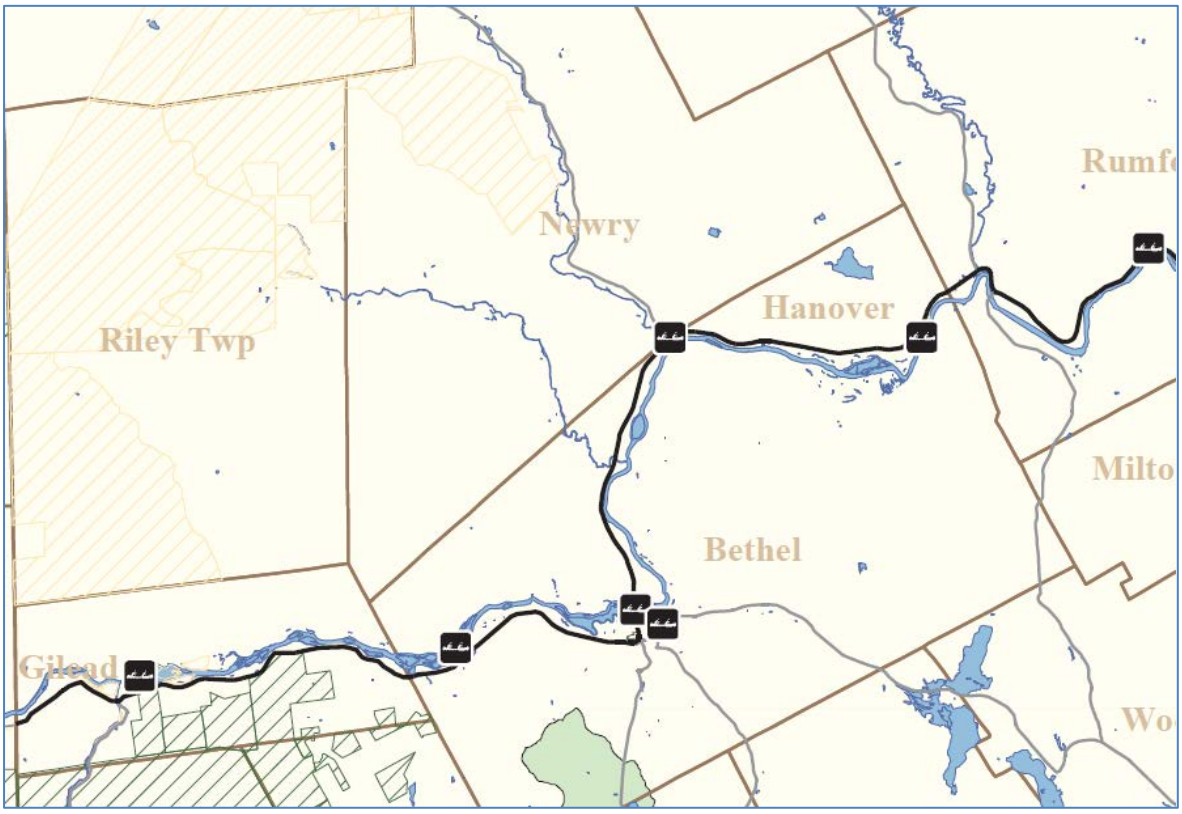
Wild Rainbow Trout, Androscoggin River, 2001

on the upper river, in part because they are more tolerant of elevated water temperatures that occur during much of the angling season. These two species also have a performance history on the upper Androscoggin, producing a multiage class fishery including trout of larger size quality. Habitat within the Bethel to Gilead reach has been considered more suitable for rainbows, while habitat from Bethel to Rumford Falls has been considered more suitable for brown trout and bass. Since 2005 a number of stocking changes have been implemented and are detailed later in this document. Anglers primarily target "trout" from Gilead to Bethel, and therefore it was no surprise that the PWG expressed concerns that the bass population could impact the trout fishery in this reach of river. While some bass are caught by anglers above Davis Park in Bethel, they appear to be more abundant in the flatter water above Rumford Falls, where bass are targeted by area guides during the summer months. Fallfish of noteworthy size quality are commonly caught throughout the upper Androscoggin, although many ardent trout anglers consider them a nuisance.

Public Access

A number of formal and informal existing access sites provide opportunities for anglers and other water based recreationalists to access the upper Androscoggin River. Public access to the river is currently afforded across private, state, town, and land trust properties (Map 2).

Map 2. Popular Existing Water Access Sites, Courtesy of Androscoggin River Watershed Council.



Drift boats: No formal launch provisions exist to accommodate the launching and retrieving of drift boats in the Gilead area (upper most region of the "upper Androscoggin River"), although some undeveloped sites, including the car top launch above the green bridge in Gilead provide opportunity to "man handle" drift boats to the river down steep banks. A hard surface ramp in Bethel (Davis Park) and improvements to a hand carry site in West Bethel (Newt's Landing) offer some additional access opportunities for drift boats lower in the Gilead-Bethel reach. However, Newt's Landing is steep and boats must be winched up from the river. Several additional hard surface launch ramps suitable for drift boats exist in the reach from Davis Park in Bethel to Rumford Falls and are discussed under "Canoes and Kayaks" below. While improving access for drift boats in the Gilead area was not a topic of keen interest amongst the PWG, some conveyed a preference to develop drift boat access closer to the ME/NH state line to maximize angling opportunities in the productive fishing area located upriver of the existing hand carry Gilead launch.

The need to develop access for drift boats was previously acknowledged by the MDIFW, and subsequently the Maine Department of Agriculture, Conservation, and Forestry (MDACF) has been investigating opportunities to develop drift boat access in the Gilead area.

Canoes and kayaks: The presence of three well established launch sites (Gilead, Newt's Landing, and Davis Park) within the upper Androscoggin River between Gilead and Bethel provide excellent opportunities for float trips of various durations and also spans sections of the river that offer

productive trout fishing. The upper-most launch in Gilead is privately owned. The generosity of the land owner under responsible management of the Mahoosic Land Trust and the Androscoggin River Watershed Coalition has enabled the public to access the river at this very popular launch location, located just upriver of the "green bridge". Future access and use of this private property by the public is uncertain and could change with changes in management or ownership. Efforts to secure perpetual public access to this site or another in Gilead will provide long term assurances of public access, which is an important need identified in this management plan. Newt's Landing in West Bethel is owned by the Mahoosic Land Trust, and the Town of Bethel owns the launch ramp in Davis Park. Both the Town and the Trust appear to be committed to providing public access to all members of the public at these sites at this time.

Additional hard surface public access sites are located down river between Davis Park in Bethel and Rumford Falls, including Moran's Landing located off Route 26 in Hanover, east of the Bear River. This access site is owned and managed by the Mahoosic Land Trust. The Town of Hanover also owns and manages a launch site off Route 2 near the Hanover Town Office. The Town of Rumford owns and manages a launch ramp that is located off Route 2, near McDonald's Restaurant. An excellent resource for available water access sites along the entire Androscoggin may be found on the website of the Androscoggin River Watershed Council (www.androscogginwatershed.org).

The PWG was of the general opinion that existing opportunities to launch canoes and kayaks are sufficient, and some concerns were even expressed regarding potential to over develop the river for public access, that could adversely impact the fishery, the aesthetics, and reduce the demand for guided trips (economic concerns).

Walk-in Angler Access: There are few locations specifically designated or developed for anglers to walk to the river. However, there are several currently "undeveloped" properties owned by the State of Maine and managed by either MDACF or MDIFW for walk-in public access opportunities. MDACF owns an undeveloped river front property sandwiched along the west shore of the Wild River and the Androscoggin River, which extends up the Androscoggin River to Lary Island. In addition, the Maine Department of Transportation has conveyed a management agreement to the MDIFW to manage the old Route 2 bridge approach on the west side of the Wild River for public parking and access to the Wild River, where anglers are close to the confluence of the Androscoggin River and may also access river frontage on MDACF property. Additional state lands, including 2 parcels off the North Road (one in Gilead and one in Newry) are owned by MDACF, managed by the MDIFW, and could be developed for additional walk-in access and/or carry in launch opportunities.

Private land owners have very generously allowed public access to many good river fishing locations in the past, but this traditional form of access may become less available over time as seen in other areas of Maine. Fishery enhancements realized with the implementation of this management plan may be viewed as less successful in the absence of some productive walk-in locations along the river. The PWG indicated current walk-in access opportunities are very good, and any efforts to increase public awareness of these locations could lead to increased use and landowner conflicts/concerns, and eventual loss of access. Development of working partnerships with key riparian property owners will be

critical to maintaining traditional access opportunities to the most productive fishing locations and represents an important stewardship need within this management plan.

Physical Habitat

The focus reach (New Hampshire State line to Davis Park in Bethel) offers an abundance of shallow riffle (47% of available habitat) and run (35% of available habitat) habitat, whereas discrete pool habitat is very limited (Boucher, 1997). Flows are swift over a substrate of predominantly cobble, gravel, and sand where water depths average four feet. This reach is 13.6 miles long, with an average width of 412 feet, creating a surface area of about 680 surface acres. The river broadens and deepens for the remaining 22.1 miles from Davis Park in Bethel to Rumford Falls, where depths typically range from five to seven feet deep. The predominant substrate is sand and prevalent habitat is characterized as flat water and run habitat (83% of available habitat), encompassing a surface area of approximately 1,116 acres.

The PWG reported much of the focus reach is wide, shallow, lacks a defined center channel, and lacks abundant cover including aquatic vegetation, boulders, and terrestrial woody debris. Some of this habitat was characterized as "skinny water", and thought to offer less productive fishing. It was also noted that many of the shallow runs (2 – 3') or glides lack an abundance of fish holding cover. Furthermore, available cover was viewed as unstable, and ever changing, which are characteristics consistent with the general nature of rivers and streams. Concern was expressed that the structural habitat may not be as good as it could be or perhaps once was, yet the upper Androscoggin remains the most popular reach to fish for trout. The popularity of the fishery is a testament to the quality of the habitat, although some areas could benefit from enhanced cover.

Concerns were also expressed regarding bank erosion and sedimentation effects on substrate quality. Areas along the Wild River and the existing car top boat launches were identified as specific sources of eroded sediment. Some areas of erosion are due to natural phenomenon, which are challenging and potentially expensive to stabilize. Anthropogenic sources of erosion resulting from land use disturbances may be more successfully corrected and should be a focus of bank stabilization efforts.

Aesthetics

River aesthetics, which are a reflection of the scenic mountainous topography, lack of development, and improvements in water quality were repeatedly emphasized by the PWG as noteworthy attributes contributing to the overall quality of the fishing experience on the upper Androscoggin. This emphasis suggests the importance of proper land use planning by communities in the watershed.

Upper Androscoggin River, 2001

Water Quality

Prior to 1980, the Androscoggin River below Berlin, NH was known as one of the most polluted rivers in North America because of the unregulated discharge of domestic and industrial pollutants (Boucher, 1997). Adoption of the Clean Water Act in 1977 and associated requirements for water treatment and pollutant discharge restrictions brought about significant improvements in river water quality. Noticeable improvements in the river aesthetics were reported by Boucher (1997) in 1990.

Recent closure of the Berlin Mill in 2006 likely contributed to further improvements in river conditions (odor, color, etc.) as evidenced by PWG observations of "cleaner water" in recent years. Changes in river aesthetics likely contributed to noticeable increases in recreational use reported by PWG members.

In spite of these improvements, the presence of dioxin in the environment has resulted in special fish consumption guidelines that remain in effect for the entire Androscoggin River (Table 3). Interestingly, the Androscoggin River has the highest level of dioxin of all rivers tested in Maine, although concentrations have declined from historical levels (Barry Mower, 2013).

Table 3. Androscoggin River Fish Consumption Advisory Issued by the Maine Bureau of Health.

Warning: Some Maine waters are polluted, requiring additional limits to eating fish.
Fish caught in some Maine waters have high levels of PCBs, Dioxins or DDT in them. These chemicals can cause cancer and other health effects. The Bureau of Health recommends additional fish consumption limits on the waters listed below. Remember to check the mercury guidelines. If the water you are fishing is listed below, check the mercury guideline above and follow the most limiting guidelines.

SAFE EATING GUIDELINES	
Androscoggin River Gilead to Merrymeeting Bay:	6-12 fish meals a year.

Changes in river water quality and improved aesthetics following closure of the Berlin Mill in 2006 have been well received by those recreating on the river, however, accompanying reductions in organics and nutrient loading may have also reduced the biological productivity of the river (Chambers, 2000). No analysis of available information collected on the Androscoggin River was located to verify anticipated changes in river productivity, but anecdotal observations reported by PWG members are consistent with these anticipated changes and include: observations of fewer baitfish, fewer and less robust insect hatches, and reductions in rooted aquatic vegetation. Anecdotal information from MDEP (Barry Mower, 2013) and public members attending the 18th Annual Androscoggin River Conference at the University of Southern Maine on December 5, 2013 suggest that crayfish abundance has also declined in more recent years.

Very limited water temperature data is available for the upper Androscoggin River. Review of this information (Chart 1, Chart 2, and Chart 3) suggests that summer temperatures may exceed the preferred range (designated by a pink band) of more temperature tolerant brown (BNT) and rainbow trout (RBT) and during at least some years may be approaching lethal levels (blue and purple-lines, respectively). Careful review of the temperature data also indicates very little variation between daytime and night time temperatures (5 degrees F), and as a result night time cooling offers little reprieve from elevated day time summer water temperatures. This information suggests trout in the upper Androscoggin River are seasonally very dependent upon available cold water refugia for year round survival and healthy growth.

Chart 1. Temperature Logger Located 4.5 Miles Below Davis Park, 2003, Androscoggin River.

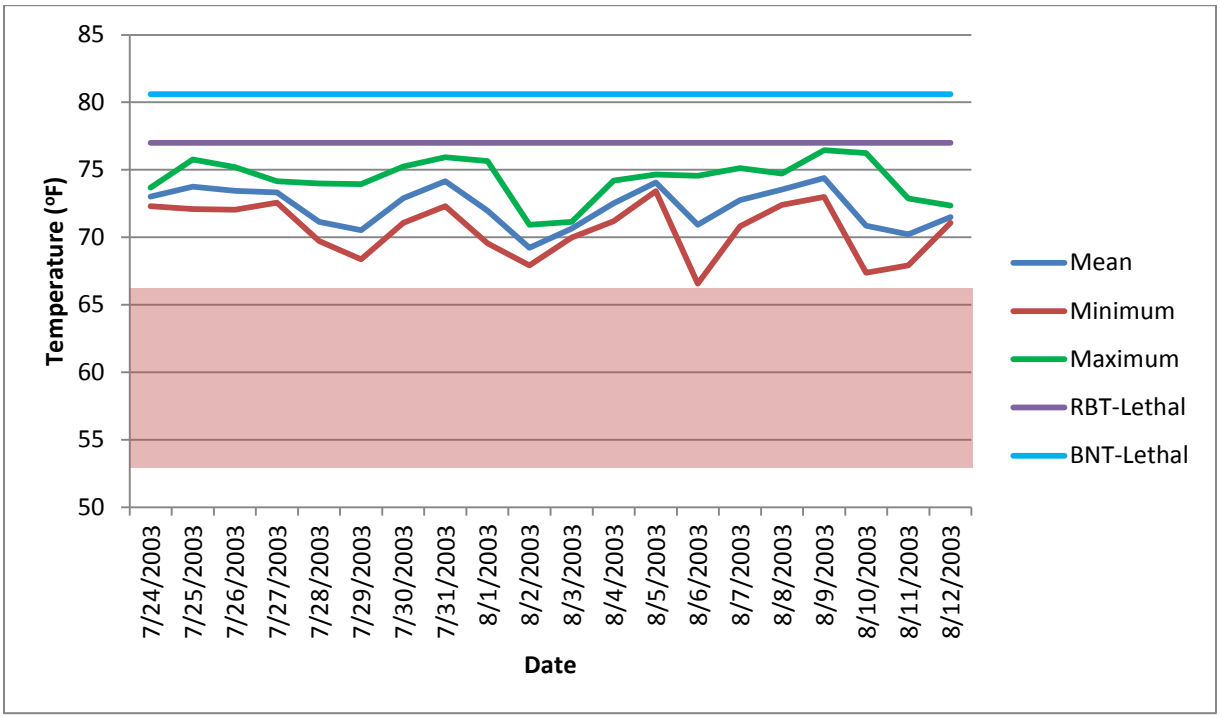


Chart 1. Temperature Logger Located 4.5 Miles Below Davis Park, 2008, Androscoggin River.

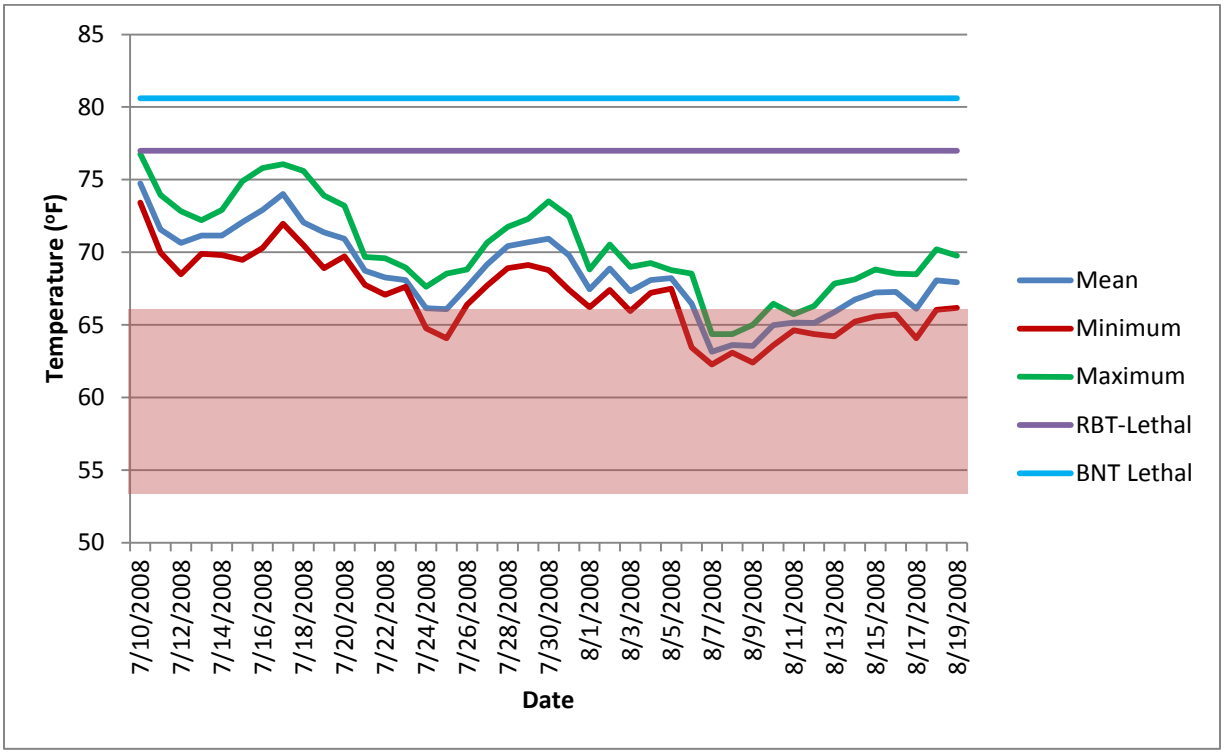
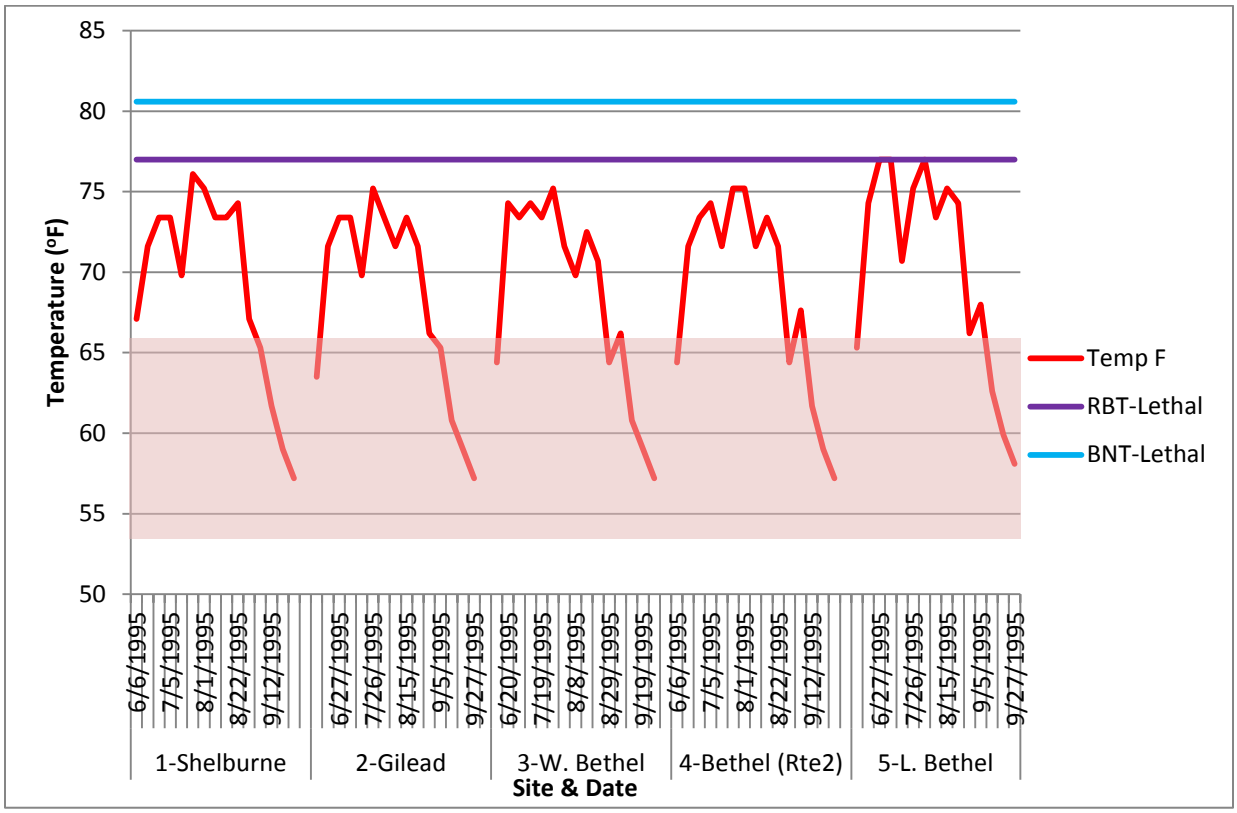


Chart 2. Temperature Data Collected at 5 Sites by Volunteers in 1995, Androscoggin River.

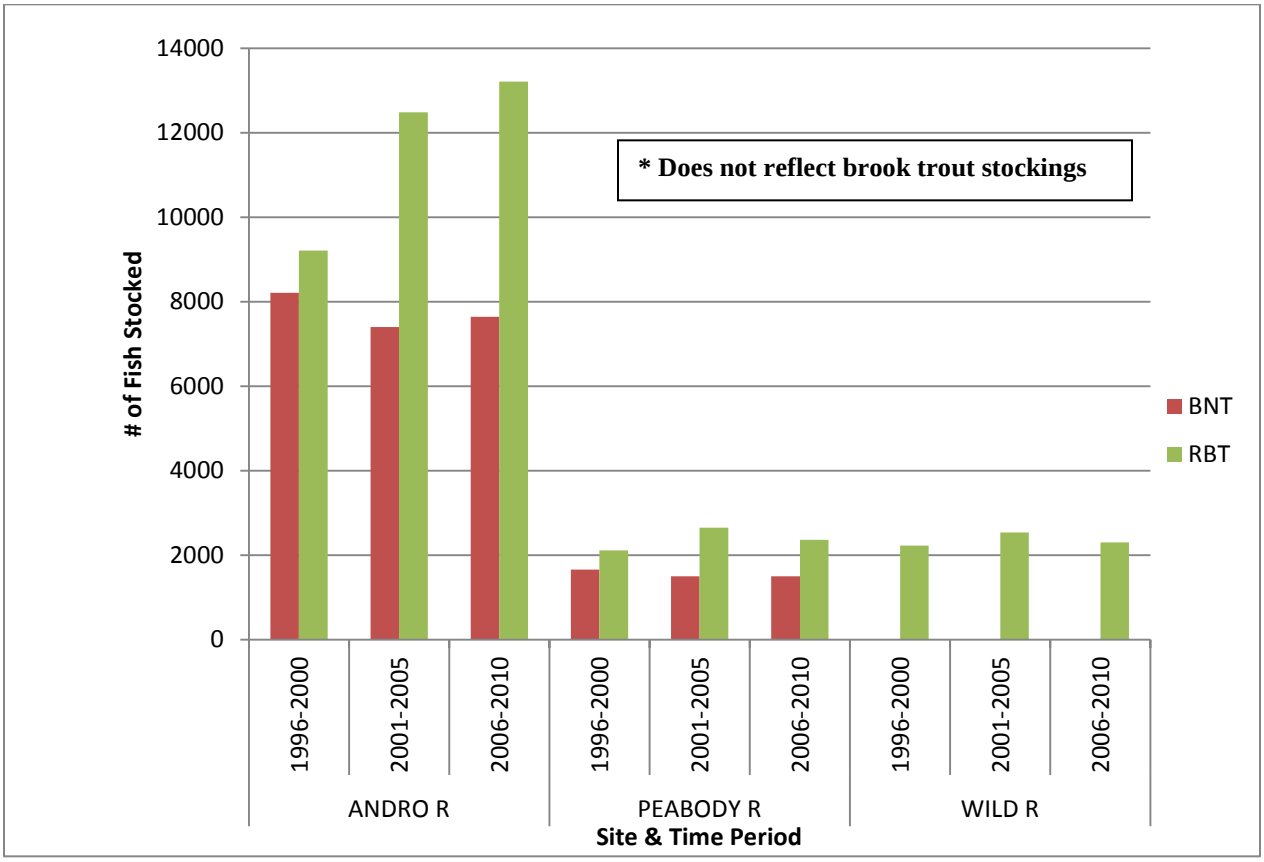


Seasonal shifts in habitat use by trout were confirmed by PWG members, particularly as water temperatures increase during the summer. Trout utilizing thermal refugia during the summer are concentrated, stressed, and more vulnerable to angling and predation.

Stocked Trout

New Hampshire: A review of post-1990 stocking data provided by New Hampshire Fish and Game (Dianne Timmons, 2012) indicates the portion of the Androscoggin River below Berlin (approximately 15 miles upriver from the ME/NH state line) closest to Maine has not been stocked, at least since 1991. Rainbow trout stocking upriver from Berlin, NH has gradually increased since 1996, but increases in stocking above Berlin are not expected to significantly influence fisheries in Maine due to the distance up river above numerous dams. However, large tributaries in NH, including the nearby Wild and Peabody continue to be stocked with brown and/or rainbow trout, and these stockings likely contribute to the fishery on the upper Androscoggin within Maine. Stocking of brown and rainbow trout in the Wild and Peabody Rivers has remained relatively stable (Chart 3).

Chart 3. Stocking of Hatchery Trout by New Hampshire Fish and Game in the Androscoggin River Above Berlin and Two Large Tributaries Below Berlin

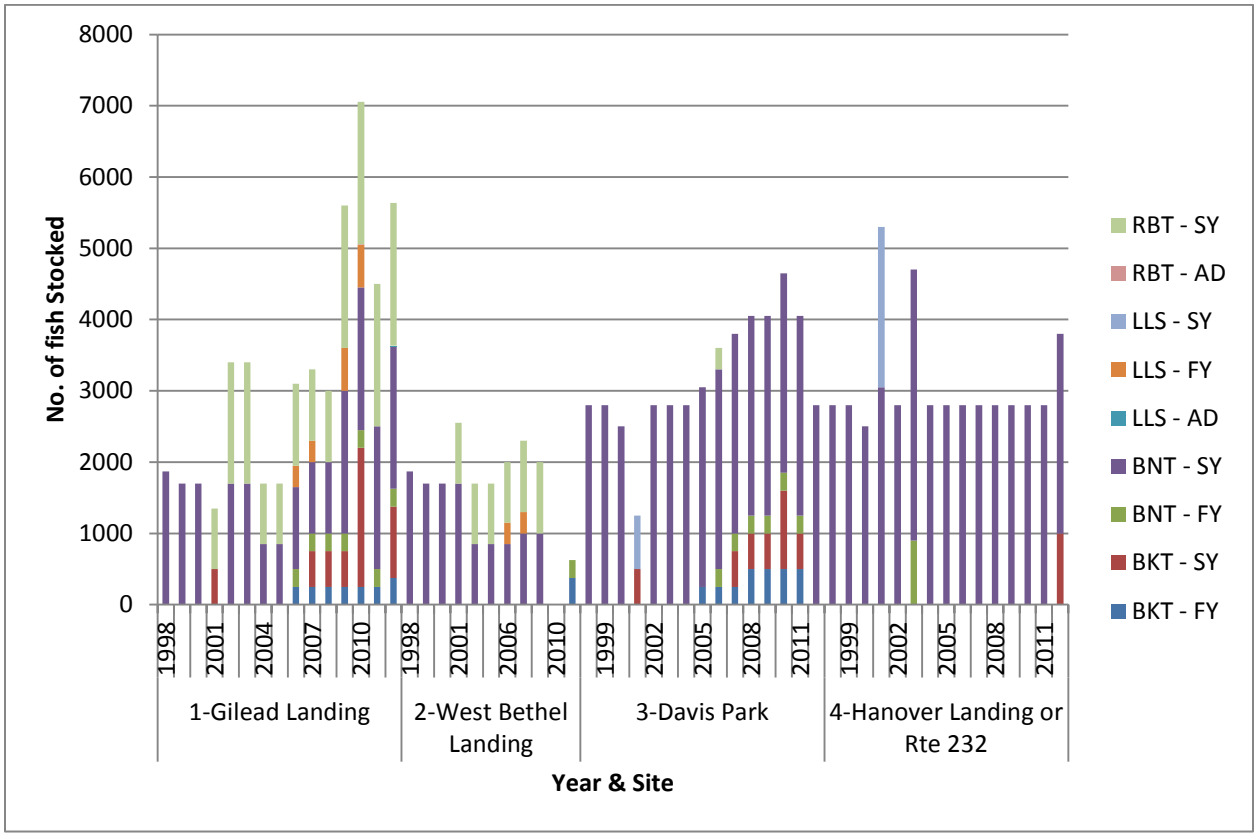


Maine: The upper Androscoggin has been stocked with brown trout (New Gloucester strain) since 1987. A rainbow trout stocking program utilizing Eagle Lake strain rainbows was initiated in 2001. Various strains of brook trout (Maine Hatchery strain, Kennebago strain, and Kennebago-Maine Hatchery strain

crosses) have been stocked since 1985, and Sebago strain landlocked Atlantic salmon have been intermittently stocked since 1992.

Since 2005 MDIFW has increased the number and poundage of brown trout, rainbow trout, brook trout, and landlocked Atlantic salmon stocked between Gilead and Rumford Falls. Stocking increases have been greatest at the Gilead stocking site and to a lesser extent the Davis Park stocking site (Chart 4 and Appendix A). In Gilead combined rainbow and brown trout stockings experienced a modest increase from between 850 to 3,400 trout stocked annually prior to 2005 to between 2,250 and 4,250 trout stocked annually post 2005. Including stocked salmon and brook trout the total annual stocking increased from between 1,350 and 3,400 fish prior to 2005, to between 3,000 and 7,055 fish post 2005. Increased stocking in Maine was also accompanied by more frequent stocking events, including the addition of fall stockings. Fall stockings utilize a larger trout (12 – 14") than in the spring (9 - 12"). MDIFW stocking changes were initiated in response to perceived increases in public use and interest in river angling, increased interest in fall fishing, and concerns that annual production and recruitment from wild rainbow and brown trout were not consistent.

Chart 4. Maine Department of Inland Fisheries and Wildlife Stocking of Hatchery Trout on the Androscoggin River by River Reach between Gilead and Rumford Falls, 1998-2012.



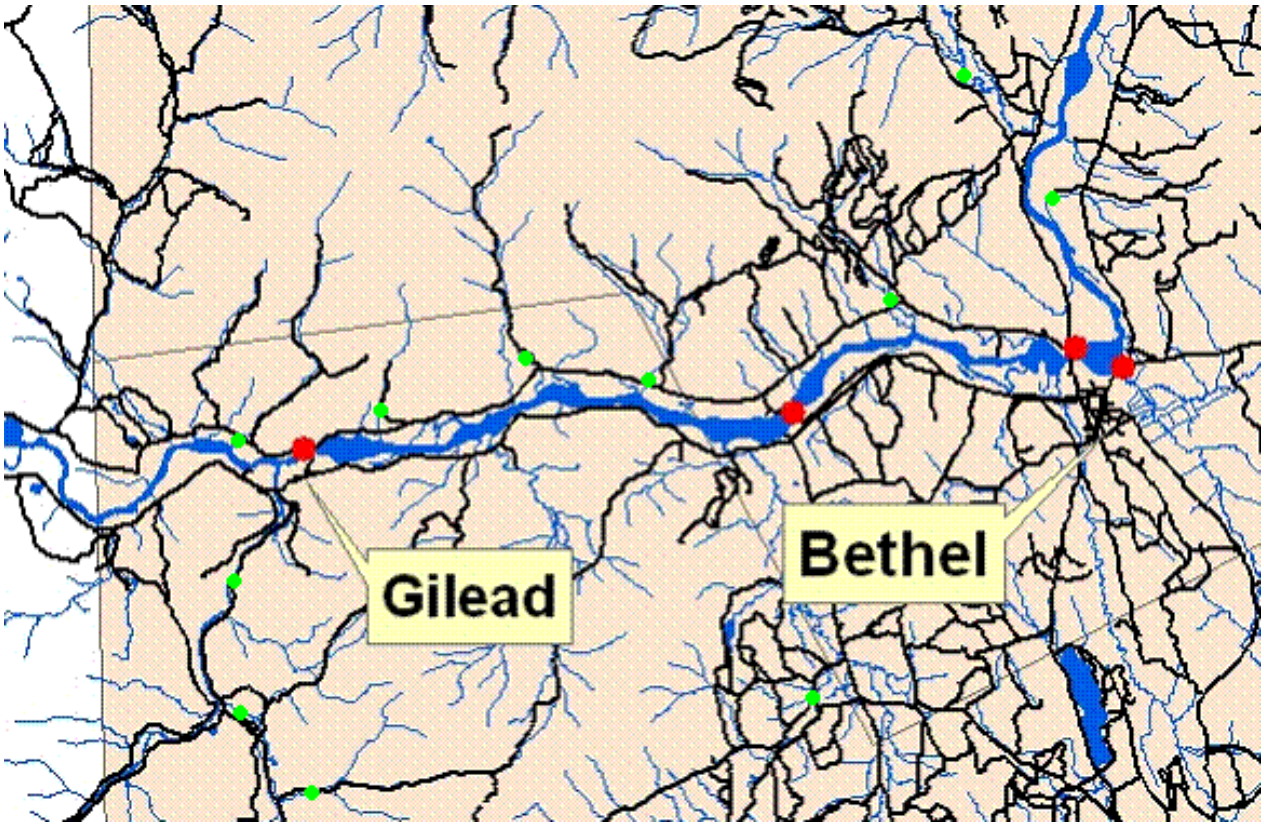
Two additional changes to MDIFW's brown trout stocking program were also implemented. A float stocking program was initiated in 2005 to help spread out hatchery stockings. A relatively small percentage of hatchery trout are float-stocked in Gilead by public volunteers: an event coordinated by the Upper Androscoggin Anglers Alliance. A second stocking change was implemented in 2013, when a new strain (Sandwich strain) of brown trout that was being field-tested in selective Maine waters replaced the old New Gloucester strain on the upper Androscoggin River. Brown trout performance concerns in the upper Androscoggin, and known changes in the genetic integrity of the New Gloucester strain of brown trout (Robb Leary, 1999) prompted this stocking change, although the Androscoggin River is not part of the formal statewide brown trout strain evaluation study.

Some PWG members questioned the value of stocking salmon and brook trout, which were thought to offer limited returns and limited fishing opportunity.

Wild Trout

A wild, nonnative population of rainbow trout resides in the upper Androscoggin River drainage, and likely established from rainbows stocked upriver by New Hampshire Fish and Game. Wild juvenile rainbow trout have been documented in 12 Maine tributaries within the upper Androscoggin River, designated by green dots on Map 2.

Map 2. Androscoggin River Tributaries in Maine Supporting Wild Rainbow Trout



Most of the tributaries to the upper Androscoggin also support wild populations of native brook trout. No significant wild brown trout production has been documented in Maine tributaries, although a small percentage of wild brown trout have been observed in the river fishery on occasion.

Relative Contribution of Wild and Stocked Trout

Rod and reel fish sampling by organized teams of MDIFW biologists and volunteers between 2001 and 2009 provide an important biological data set by which to characterize changes in the relative contribution of wild and stocked trout to the upper Androscoggin River fishery. Analyzed scale samples indicated wild rainbow trout comprised slightly more than half of the fishery prior to 2006 (Table 4). Sampling after 2006 indicated wild rainbow trout only comprised 6% of the fishery. Brown trout sampled prior to 2006 were predominantly stocked (92%). Sampling after 2006 produced too few brown trout (wild & hatchery) for comparison. Interestingly, wild brown trout were observed only in 2005.

Table 4. Relative Contribution of Wild and Hatchery Trout Pre and Post 1996

Time Period	Trout Species	Sample Size (n)	% Wild	% Hatchery
*2001 - 2005	Rainbow	145	54	46
	Brown	35	8	92
*2006 - 2009	Rainbow	35	6	94
	Brown	3	0	**100
*2001 – 2005 data set reflected collective sampling in ’01, ’02, ’03, and ’05. 2006 – 2009 data set reflected collective sampling in ’08 and ‘09				
* *findings inconclusive due to small sample size				

A review of all available brown trout and rainbow trout angling data collected between 2001 and 2010 (Table 5), indicates 57% of all the fish caught were rainbow trout, 23% were brook trout, 18% were brown trout and 2 % were salmon (Table 5). Interestingly, the relative contribution of each species to

Table 5. Contribution of rainbows and brown trout by Data Collection Method (2001 – 2010), Between Gilead and Bethel, Androscoggin River

Data Type	RBT (No. caught(%))	BNT (No. caught(%))	BKT (No. caught(%))	LLS (No. caught(%))
Experimental Angling	175 (80)	39 (18)	6 (2)	0 (0)
Personal Fishing logbook	1491 (66)	392 (17)	331 (15)	34 (2)
Voluntary Survey Station	1424 (48)	556 (19)	942 (31)	73 (2)
ALL	**3090 (57)**	**987 (18)**	**1279 (23)**	**107 (2)**

the catch is comparable for each available data source, except for brook trout which were caught less frequently by the teams of experimental anglers and more experienced anglers maintaining personal fishing log books. This difference is likely accounted for by angler preference (and sampling focus in the

case of experimental anglers) for rainbow and brown trout. This available information suggests rainbows have provided a more dominant fishery in the Gilead-Bethel reach, in spite of stocking slightly more brown trout in recent years (Table 6) and an apparent reduction in wild rainbow trout production.

Table 6. MDIFW Stocking of Rainbow and Brown Trout, Gilead , 2002 and 2012

Year	Miles	Acres	*No. Stocked	Stocked per acre	Stocked per mile
2002	13.6	680	1,700 RBT	2.5	125
			1,700 BNT	2.5	125
			All Trout	**5.0**	**250**
2012	13.6	680	2,000 RBT	2.9	147
			2,250 BNT	3.3	165
			1,375 BKT	2.0	101
			10 LLS	0.01	**0.7**
			All Trout	**8.2**	**410.6**

*All spring yearling trout, except for 250 fall yearling BNT and 375 fall yearling BKT, and 10 adult LLS

As previously discussed the recent contribution of wild rainbow trout appears to be quite low (6%), based on limited available sample data. Based on this information, stocked hatchery rainbow trout currently maintain the predominant rainbow trout fishery. It is also noteworthy to mention that the relatively light stocking of brook trout in conjunction with available wild brook trout production appears to be contributing slightly more fish to the fishery than the heavy allocation of stocked brown trout.

MDIFW stocking programs expanded after 2005 (only 5 years after the start of Maine's hatchery rainbow trout program). Around this time, perhaps as early as 2003 (based on limited anecdotal fishing reports (Pellerin, 2014)), the relative contribution of wild rainbow and all brown trout (wild + hatchery) appeared to decline dramatically in the Gilead-Bethel reach. A relative comparison of stocking levels in 2002 and 2012 (Table 6) reveals the combined stocking of all hatchery fish increased from five hatchery fish per acre (pre 2005) to 8.3 hatchery fish per acre (post 2005), a 66% increase in total stocking. Although rainbow trout stocking levels only increased a modest 18%, the incidence of wild rainbow trout declined by 8-fold. The contribution of brown trout to the fishery has also declined (Table 7) in spite of increasing brown trout stocking at the Gilead site by approximately 32% (Table 6)

Table 7. Comparison of Brown Trout Contribution pre and post 2005 by Data Type, Between Bethel and Gilead, Androscoggin River.

Data Type	Pre 2005 **(No. caught(%))**	**Post 2005 (No. caught (%))**
Experimental Angling	27 (20)	10 (13)
Personal Fishing logbook	223 (24)	169 (18)
Voluntary Survey Station	342 (31)	214 (24)
ALL	**592 (27)**	**393 (21)**

Could apparent declines in wild rainbow trout and all brown trout be related to increased competition between hatchery trout and wild trout, resulting in reduced growth and survival to sexual maturity?

Meyer (2012) provides supporting discussion and a good literature account of interactions between wild and hatchery trout in rivers, and reports hatchery fish are more aggressive, use more energy to maintain holding and feeding positions, consume less food, and are less wary of predators, all of which appear to put them at a competitive disadvantage relative to wild trout. Meyer also found few studies where stocking "catchable" trout in rivers results in negative effects (from competition) on wild trout populations. Most references cited by Meyer reflect investigations in more western rivers that are highly productive and offer optimal habitat, and therefore these findings may not be applicable to the less productive and less optimal conditions found on the upper Androscoggin. The PWG members reported observations of declining condition of post-stocked trout as the fishing season progressed in more recent years, suggestive of competition for limited forage or habitat, or perhaps as reported by Meyer less efficient feeding strategies used by hatchery fish. A number of other factors could also contribute to these observed changes. Stocking of non-sterile trout and associated genetic effects may also be an important factor limiting condition, growth, survival, and recruitment of wild rainbow trout in particular. Genetic changes from hybridization between hatchery and wild trout may negatively affect the fitness and sustainability of the wild trout populations (Krueger, 1991; Christie, 2011; Araki, 2009). Declines in the relative contribution of wild rainbow trout in the upper Androscoggin may be related to genetic changes caused by breeding with different strains of hatchery rainbow trout stocked by Maine and/or New Hampshire. The extent of hybridization is likely to increase where environmental factors (such as increased water temperatures) limit habitat availability and as hatchery stocking of non-sterile trout increase (Marie, 2012). Another potential influence on wild trout production relates to available access to spawning and nursery habitat due to changes in fish passage opportunities at tributary road crossings or changes in habitat caused by activities in the watershed. Also, reported increases in angling and associated hooking and handling mortality could negatively influence the development of an adult spawning rainbow trout population which appears to be comprised of relatively few individuals (See Chart 6; note availability of wild rainbows greater than 14 inches long). There are likely numerous factors collectively contributing to changes in wild rainbow trout production, as well as other changes in the overall river fishery. A lack of available data, including annual production data from rainbow trout spawning tributaries, changes in angler use and exploitation, as well as other resource information precludes a determination of the relative influence of the various factors discussed above.

Stocked brown trout, 2001, Androscoggin River

The PWG indicated guided sports, as well as work group members were most interested in catching "trout", without regard to origin. While catching wild trout was viewed as a "bonus" that added value to the fishery, there was no strong philosophical position favoring management and catching of wild over

hatchery trout. A management strategy utilizing either stocked or wild trout that offered desired catch rates and size quality was acceptable to the PWG. The PWG supported an approach where possible and reasonable, to protect and enhance the wild rainbow trout fishery, but not at the expense of significantly diminished "trout" catch rates. The PWG did not want to eliminate hatchery stocking to enhance growth and survival of wild trout because of the potential time (and associated lost angling opportunity) required to develop an entirely wild fishery, uncertainties regarding management success, and concerns regarding variability in annual production of wild fish. The PWG also requested brown trout continue to be stocked to maintain diversity and maximize habitat utilization by the different species. Having several species of trout present enhances the level of public interest in the fishery.

Trout Growth and Size

Rainbows: Rainbow trout growth data was collected between 2001 and 2005. A plot of "length-at-age" (Chart 5) suggests comparable overall growth rates for both wild and hatchery trout. As expected, wild trout are smaller than hatchery trout at the same age. The difference in growth at a given age reflects about a year's worth of growth in the wild. During the early 2,000s rainbow trout as old as age five and as long as 17-inches were captured during biological sampling.

A review of experimental angling data collected between 2001 and 2009 indicates wild rainbow trout contributed more sublegal trout (6 – 9 inches long) to the fishery than hatchery fish, as might be expected. In addition, on average wild rainbow trout contributed more 14+" trout to the fishery than hatchery stocked trout (Chart 6). Wild rainbow trout contributed as much as 33% more trout to larger size classes than hatchery trout; however, annual production and contribution of wild rainbow trout tends to be more variable. This information certainly verifies that wild rainbow trout in the upper Androscoggin River are able to survive, grow, and contribute larger fish to the fishery than hatchery trout.

Comparing the range of size classes present in the fishery for wild and hatchery rainbow trout prior to and after 2004 indicates a broader distribution of size classes present, including larger rainbow trout prior to 2004 (Charts 7 & 8). This information suggests a decline in available larger, older aged rainbow trout after 2004. This finding is consistent with PWG angling observations, and somewhat coincides with MDIFW stocking increases, as well as changes anecdotally reported by the PWG including increased fishing pressure, improved water clarity, and loss of fish-holding structure.

Chart 5. Length at Age of Wild and Hatchery Rainbow Trout Collected on the Androscoggin River Between Gilead and Bethel (2001-2009)

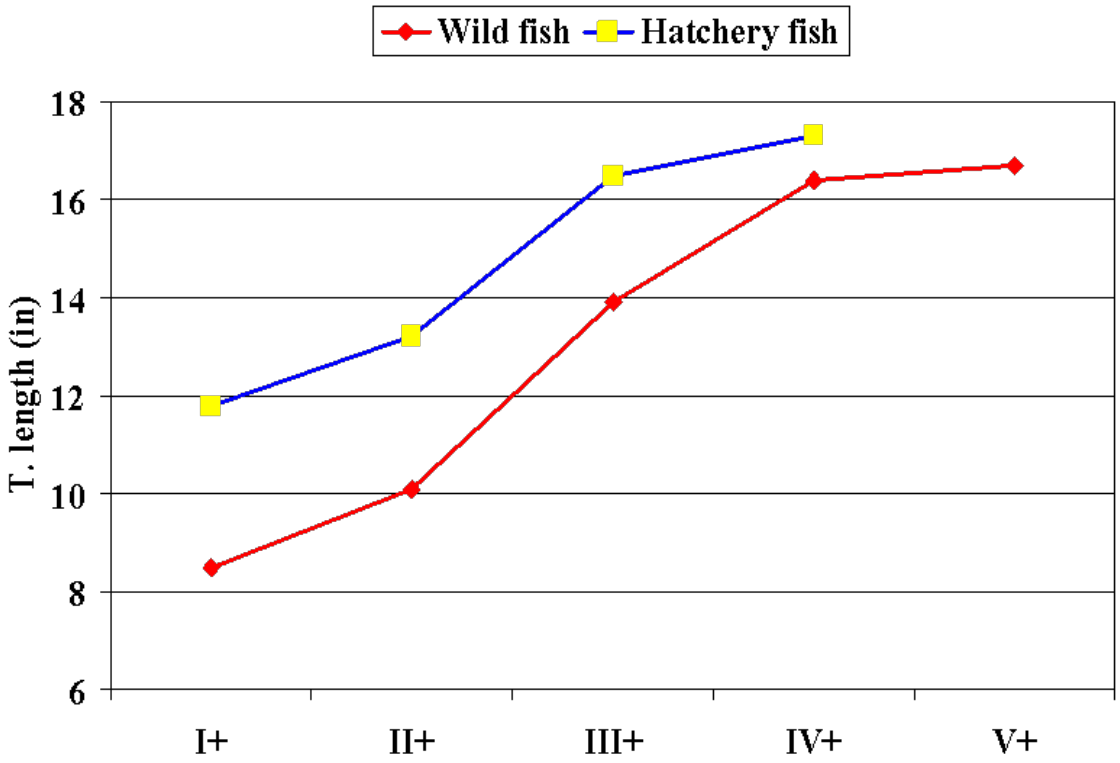


Chart 6. Length Frequency of Wild and Hatchery Rainbow Trout Captured on the Androscoggin River Between Gilead and Bethel.

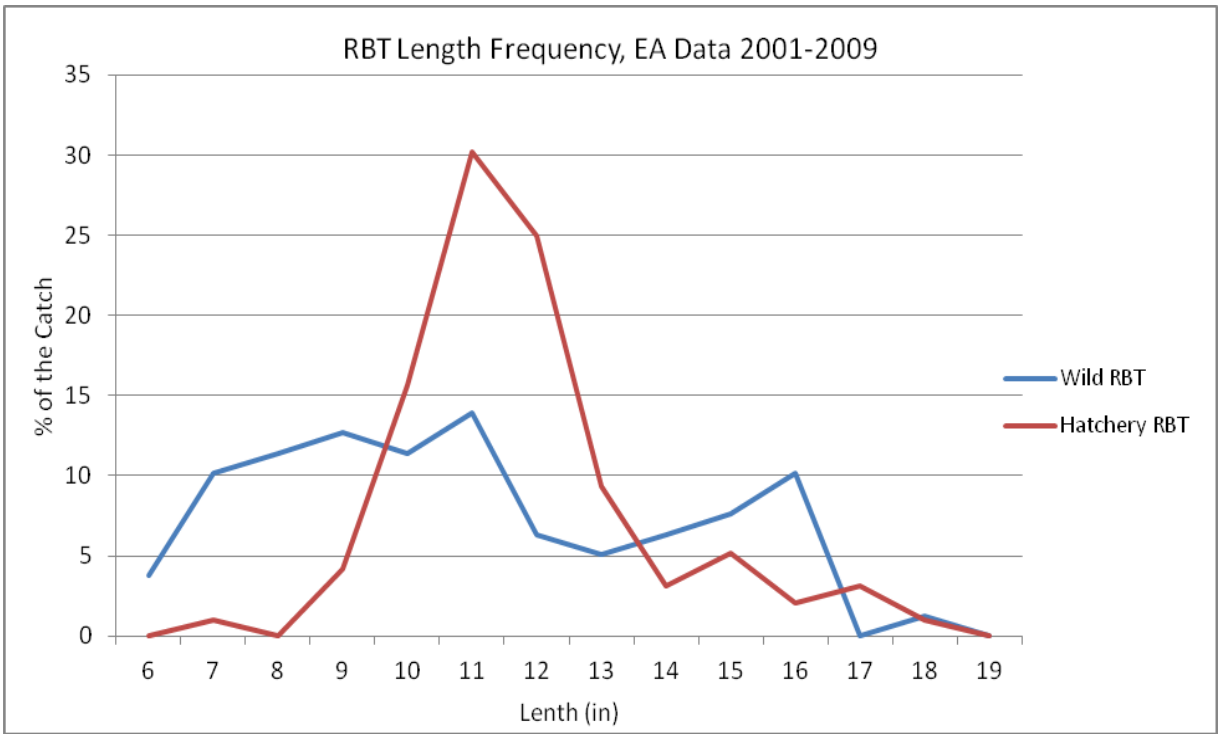


Chart 7. Length Frequency for Hatchery Rainbow trout Captured on the Androscoggin River Between Gilead and Bethel, Pre and Post-2004

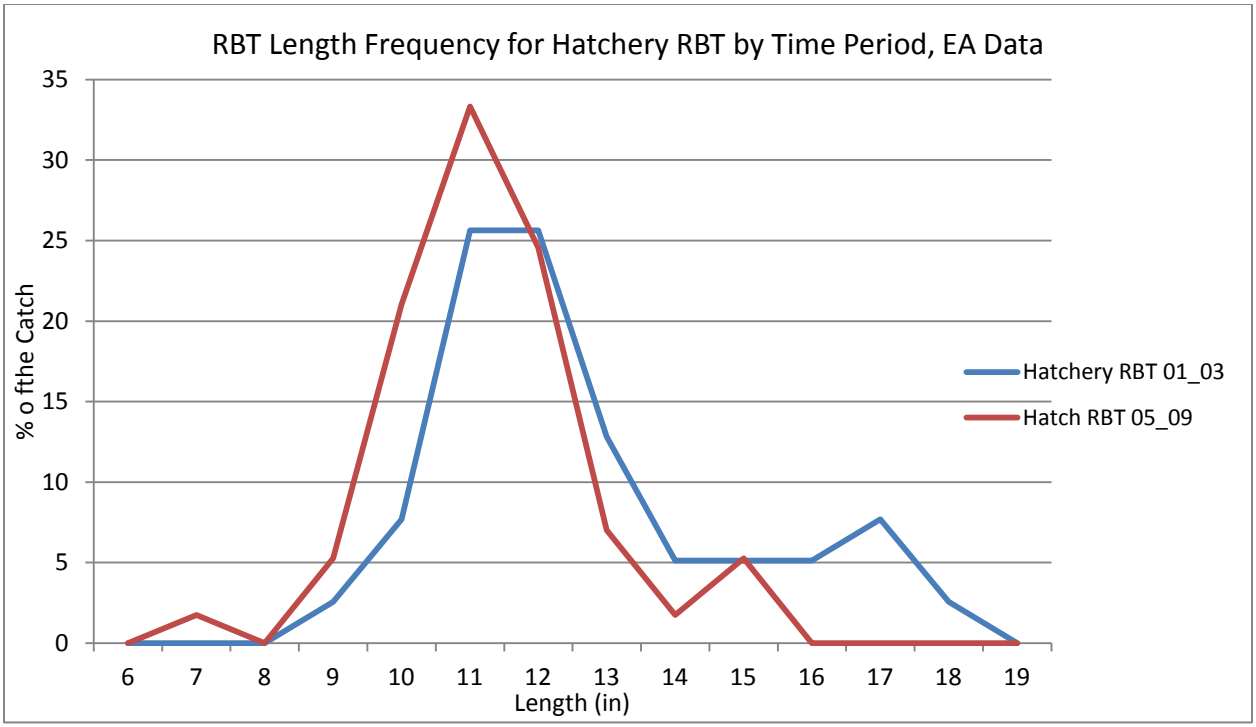
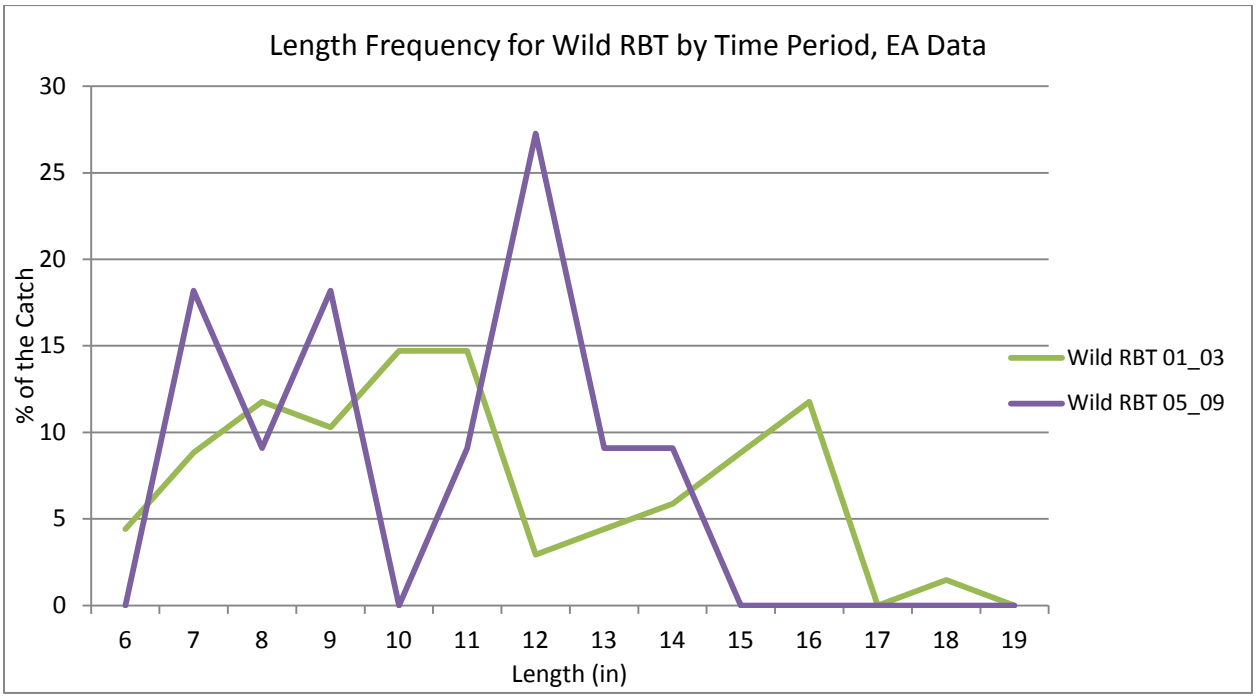


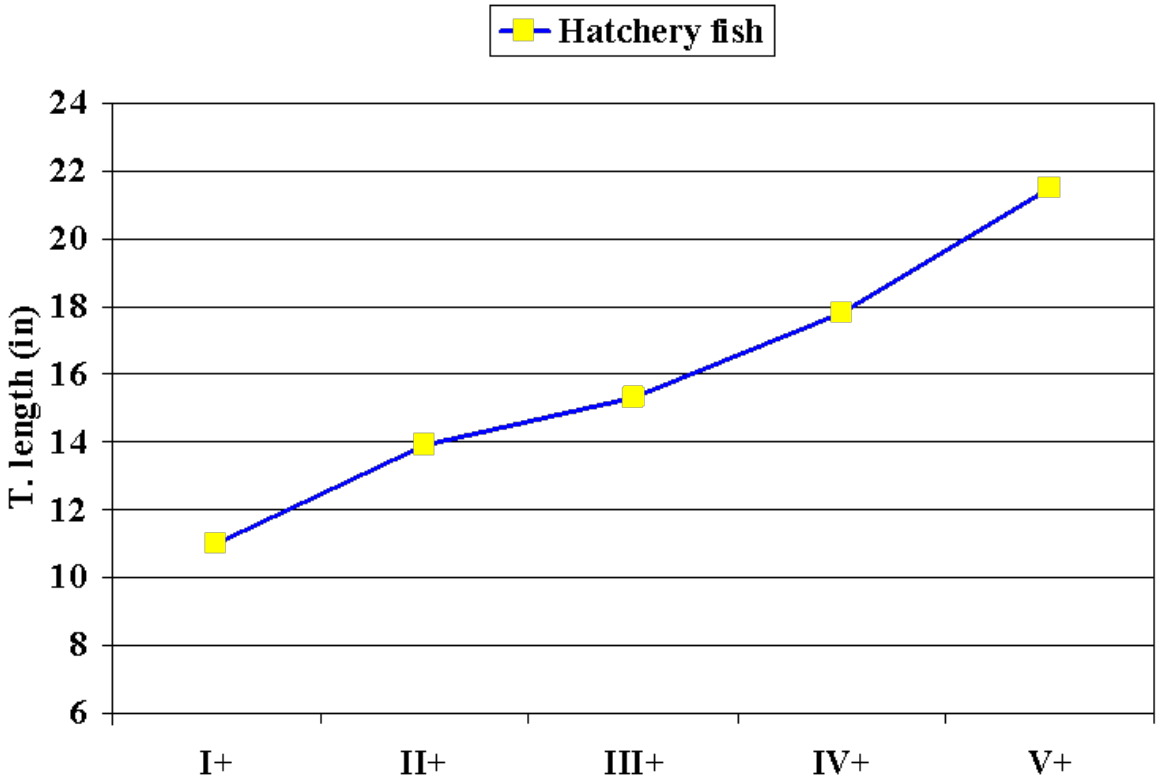
Chart 8. Length Frequency for Wild Rainbows Captured on the Androscoggin River Between Gilead and Bethel, Pre and Post-2004



Brown Trout: Only brown trout growth information collected between 2001 and 2005 provided sufficient numbers of hatchery brown trout to develop a "length-at-age" plot provided below (Chart 9). Hatchery browns as old as age five and as long as 21-inches were collected during biological sampling.

Biological sampling after 2005 yielded an insufficient trout sample size to compare and contrast any changes in growth prior to 2005. Insufficient numbers of hatchery and wild brown trout were captured to provide a comparative plot of length frequency and an assessment of any change in the contribution of trout larger than 14-inches pre and post 2004, as completed for rainbows.

Chart 9. Length at Age of Hatchery Brown Trout Collected on the Androscoggin River between Gilead and Bethel (2001-2009)

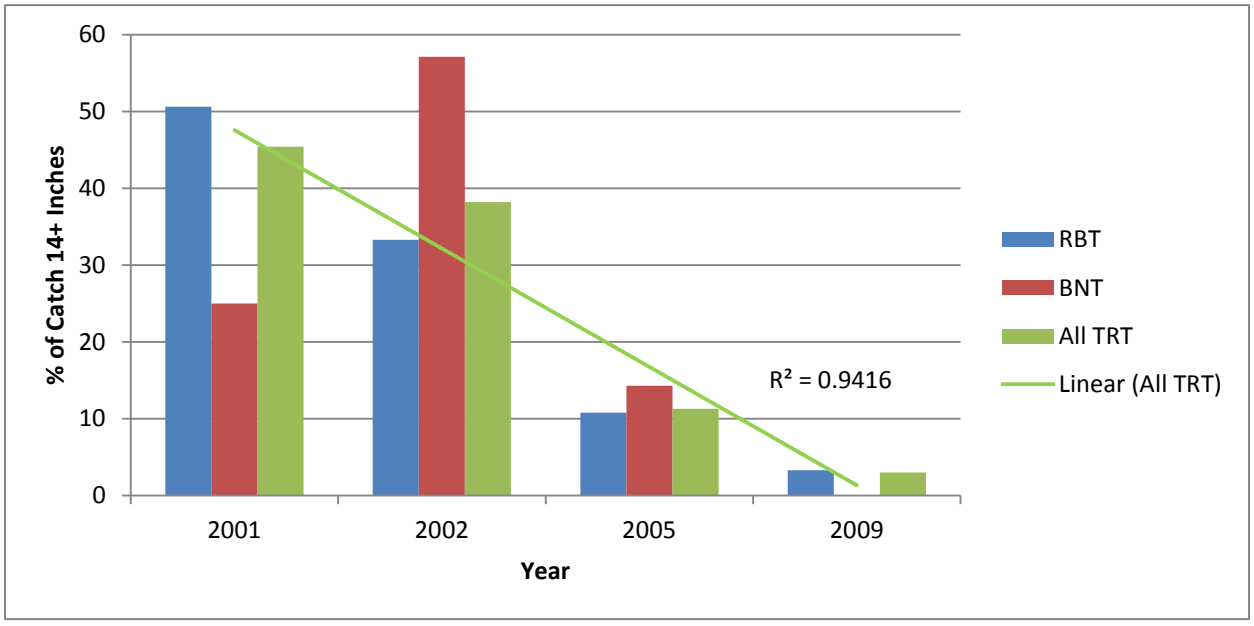


All trout: The percentage of brown trout, rainbow trout, and both combined representing fish 14-inches and larger was plotted between 2001 and 2009. This plot revealed a strong trend of fewer trout 14-inches and larger being caught over time, with an abrupt decline noted between 2002 and 2005 (Chart 10). As previously discussed, diminished growth, survival, and production of wild rainbow trout may account for fewer larger trout being caught, since wild trout appear to contribute a higher percentage of larger fish. Additional factors including undocumented changes in fishing pressure, water quality, river productivity, and angler harvest practices may have influenced trout growth and survival.

PWG expressed general satisfaction with catching 10 – 14-inch trout that largely comprise the current fishery, particularly in the context of existing relatively high catch rates. The PWG noted the size quality

of trout on the upper Androscoggin is typical of what may be found on "good trout rivers". Nevertheless PWG members did identify a decline in trout size quality as a significant management concern, but noted existing angler catch rates were very good and should be maintained. Rainbows up to 24" were caught in the upper Androscoggin one to two decades ago and this level of past performance has inspired a desire by some PWG members to restore this lost opportunity. The majority of the PWG expressed a desire to create more opportunities to catch trout of a size quality that existed in the early 2,000's, so long as catch rates were not severely compromised. Maintenance of angler catch rates was deemed a higher priority by the PWG than restoring larger overall size quality to the fishery.

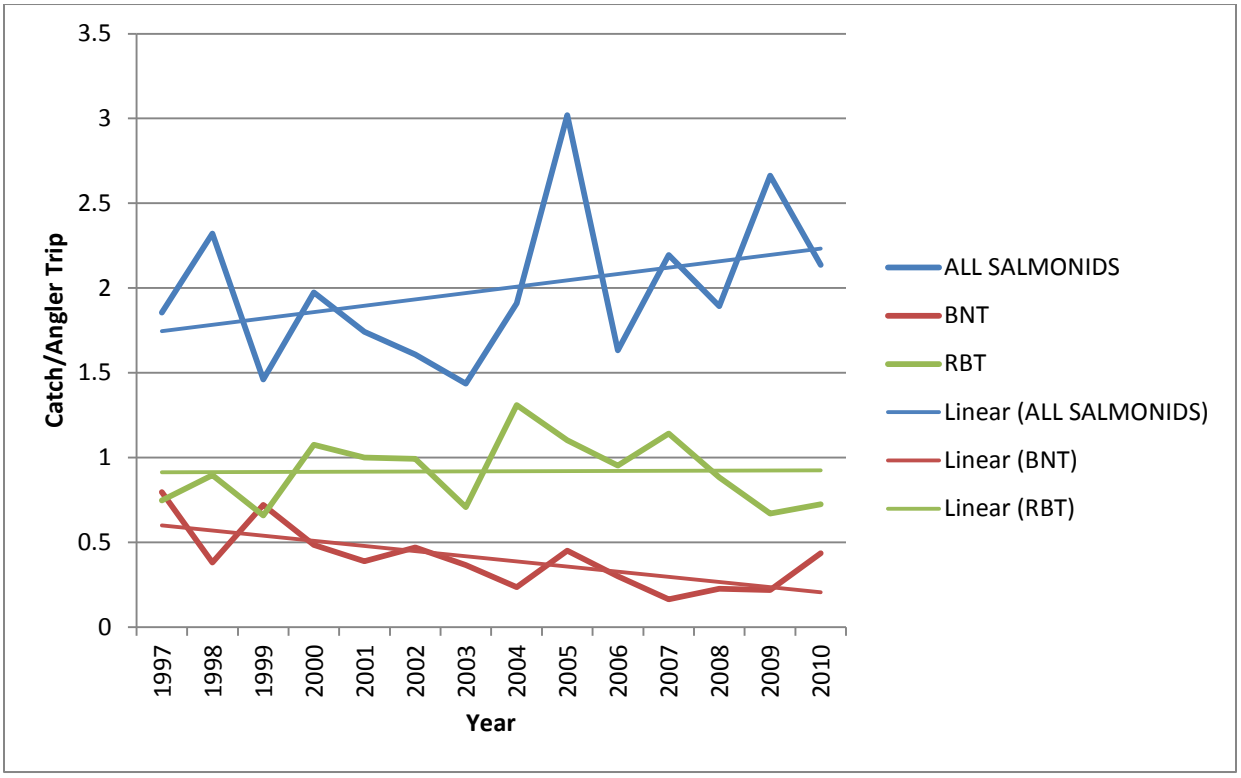
Chart 10. Percentage of Trout (Brown and Rainbow Trout Combined) 14-Inches and Larger Captured by Experimental Fishing by Year, Androscoggin River Between Gilead and Bethel



Angler Catch Rates

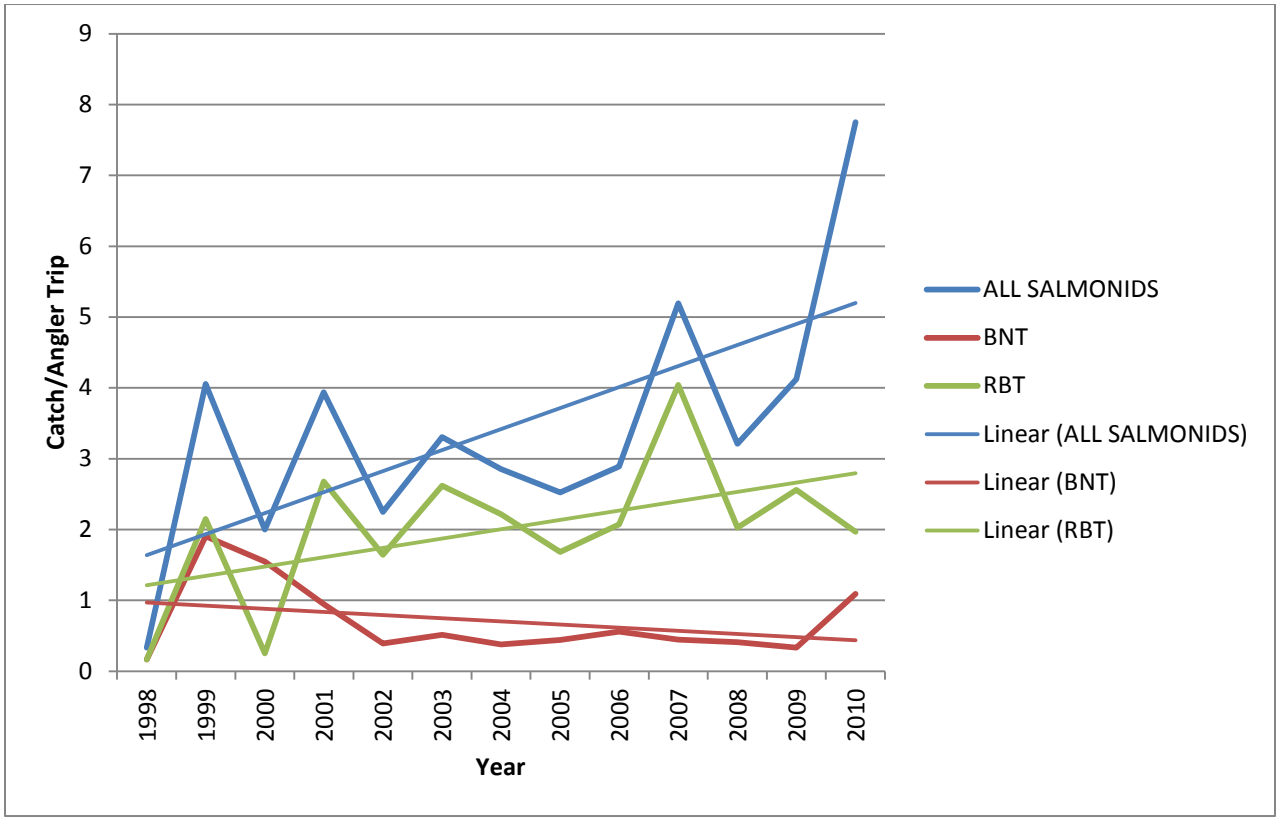
The MDIFW collected angling data from the public between 1997 and 2010 using two strategies. Angler survey cards were provided in angler survey "kiosks" strategically placed at key, high use angler access launch sites in Bethel, West Bethel, and Gilead. Anglers voluntarily completed a survey card to report information relating to that day's fishing trip. In addition, anglers who frequent the river volunteered to maintain personal fishing log books, which were returned to MDIFW at the end of the fishing season. These anglers tend to spend more time on the river and may reflect more experienced angling skills. Data from both survey methods were analyzed and both types of data indicated overall angler catch rates for "trout" have increased from 1997 to 2010 (Table 11 & 12).

Chart 11. Angler Catch Per Trip by Year Reported on Survey Cards Placed on the Androscoggin River Between Gilead and Bethel (1997 – 2010).



Both data sets also suggest a decline in brown trout catch rates over the same time period, in spite of higher levels of brown trout stocking in this reach of the river. Rainbow trout catch rates have markedly increased for log book record keepers, which tend to be comprised of more "river-knowledgeable" and experienced anglers. Relatively steady rainbow trout catch rates were identified for those anglers completing survey cards at survey kiosks. Since overall salmonid catch rates reported on survey cards have increased, while the catch of rainbow trout remained level, and declining catch was observed for brown trout it is speculated that additional stocking of brook trout and more limited salmon stocking has elevated the collective salmonid catch rate. Table 8 indicates brook trout and to a lesser extent landlocked salmon collectively account for 23% of the total calculated "combined salmonid" catch rate. This contribution in conjunction with increases in rainbow trout catch reported by personal fishing log book record keepers would at least partially account for the overall observed increase in the "combined salmonid " catch rates observed for both kiosk and log book anglers.

Chart 12. Angler Catch Per Trip by Year Reported in Personal Fishing Look Books Covering the Androscoggin River Between Gilead and Bethel (1997 – 2010).



PWG members indicated a strong desire to maintain current catch rates, which they perceived to be around one to three trout per hour of angling time (depending on ability level) for fish between 10 and 14"; this combination of catch rate and size quality represented "good fishing". According to PWG members this rate of return is currently being realized. One PWG member reported that guided children are able to catch four to five trout in the middle of the day during the summer and viewed this as very successful. Interestingly, catch rates calculated from personal fishing logbooks (1997 – 2010) indicate a season-long overall catch rate of 0.86 salmonids per hour of fishing time (Table 8); yet this estimated catch rate appears to reflect a level of "good fishing" according to PWG members.

Table 8. Mean Catch Per Angler Trip Calculated From Person Fishing Log books Covering the Androscoggin River from Gilead to Bethel (1997-2010)

Fish	Mean Catch Per Angler Trip
Brook Trout	0.17
Brown Trout	0.17
Rainbow trout	0.52
Landlocked Atlantic Salmon	0.03
All Combined	**0.86**

Angler Use

Angler use data is not available for the upper Androscoggin River. Collection of this type of information is relatively expensive and challenging to collect in riverine systems. The PWG was queried to obtain general patterns of observed angling use and their perceptions of angler use and changes in river recreational use. PWG observations are discussed below.

Highest overall angling was observed from late May (once high spring flows subside) to early July. Angler use in the fall (September through Columbus Day) appears to be increasing, perhaps in response to enhanced fall stocking programs. Highest use was generally observed on weekends during both time periods. The least amount of angling was observed during the late fall (after Columbus Day), winter, and in April. During mid-summer a marked increase in non-motorized recreational watercraft is generally observed on the river, when more casual and incidental fishing occurs. Incidental angling associated with high use may cumulatively account for high fishing pressure, but this can neither be confirmed nor denied due to a lack of data. Many of the guides and experienced anglers do not fish the river during the middle of summer, in part due to higher overall recreational use, and in part due to concerns for the welfare of the trout that are stressed by warming water temperatures. Many of the guides switch over to bass and fish lower in the river during the summer.

PWG indicated it is not uncommon to observe seven to eight anglers fishing in the evening above and below the Gilead Bridge during "prime time". Angling on many of the river tributaries is reported to be "heavy", particularly where these tributaries confluence with the Androscoggin River. Inquiries of the PWG regarding angler use between Gilead and Rumford Falls revealed the heaviest use occurred from the Gilead launch to Newts Landing in West Bethel, with modest use between Newts Landing in West Bethel and Davis Park in Bethel, and the least use between Davis Park in Bethel and Rumford Falls. Angling pressure from the New Hampshire state line to the launch in Gilead is relatively light, except for the approximately ½ mile reach down river from the confluence with the Wild River to the launch in Gilead, where angler use is high and concentrated at the confluence with the Wild River and Lary Brook, and within the vicinity of the launch in Gilead.

Regulations

Current recreational fishing regulations on the main stem of the upper Androscoggin River are considered restrictive and conducive to the development of a multiage class fishery, particularly for stocked brown and rainbow trout. The regulations offer year round open water fishing opportunity, encourage release of larger, sexually mature trout, and rely on gear restrictions to minimize hooking mortality to encourage survival and growth to larger size. The regulations even offer a modest level of protection to fall and spring spawning trout. Special regulations in effect from the NH state line to the Gilead Bridge reflect efforts by MDIFW to improve consistency with special regulations in effect in NH. Fishing regulations that apply to the upper Androscoggin River include:

- *See Fish Consumption Advisories on Warning About Eating Freshwater Fish.*
- *Closed to ice fishing. Open to open water fishing from January 1 – December 31.*
- *From the Maine-New Hampshire border downriver to the bridge crossing in Gilead:*

    - *Single hook artificial lures only, all trout, landlocked salmon, and togue caught must be released alive at once.*
- *From the bridge crossing in Gilead to the Route 232 Bridge, Rumford Point:*
    - *From April 1 – September 30: Artificial Lures Only; daily bag limit on trout: 1 fish; minimum length limit on salmon, rainbow trout, and brown trout: 12 inches. All trout between 16 and 20 inches must be released alive at once.*
    - *From October 1 – March 31: Artificial Lures Only; all trout and salmon must be released alive at once.*

The special 16 to 20-inch release slot limit has been in effect since 2003, and the specials from the NH state line to the Gilead Bridge have been in effect since 2007. These regulation changes have not succeeded in maintaining or enhancing trout size quality, as intended. That is not to say these regulations are not appropriate, but rather other factors have likely had a greater influence and are more limiting.

The PWG discussed the merit of other regulation options including fly fishing only (FFO) and catch and release as strategies that might enhance the quality of the fishery, increase public interest, awareness, and "marketing" of the river to better support local businesses. Biological justification of these further restrictive regulations are contingent upon the type of management being pursued, including whether the management focus is on wild or stocked trout, and to what extent attainment of larger fish size is to be achieved by growing fish in the river or growing them in the hatchery. Adoption of more restrictive regulations, particularly FFO would alienate and eliminate some existing user groups including the more casual family angling community that floats the river during the summer months. Given the small difference in hooking mortality using flies versus artificial lures (Warner, 1977); any proposal to advance FFO could not be based on biological justification. There was strong debate and no consensus within the PWG on the merit of FFO. The catch and release option could also enhance "marketing", but could reduce opportunity to enhance growth and size quality, as well as negatively impact overall condition of the fish, where high catch rates and high rates of stocking are desired. It is also currently unclear if the harvest of trout has any meaningful impact on the quality of the fishery, as catch and release appears to be a common practice on the river, and already restrictive regulations severely limit harvest opportunity. Additional data collection will provide needed information on the harvest of fish in the river, the type of gear used by anglers, and the implications of adopting catch and release or other regulations.

The desire for fishing license reciprocity between Maine and New Hampshire was discussed, but previous attempts by MDIFW to do so have been unsuccessful. This is in part due to negative financial implications and other administrative challenges for each state to implement, and as such future resolution prospects remain doubtful. Reciprocity would offer convenience to those anglers floating from New Hampshire into Maine.

Existing water temperature data discussed earlier suggests elevated summer water temperatures likely result in trout migrating to cold water refugia, where fish are concentrated and vulnerable. It was recognized by the PWG that some additional regulatory protection of the most important cold water refugia may enhance survival, growth to larger size, and protection of adult spawners. No specific

proposal was developed, but the PWG entertained consideration of summer area closures and even river temperature triggered closures. Discussion regarding the importance of fishing to the summer's "general recreation" crowd was explored, but not really known, due to a lack of data.

Proposed Management

Management Goal: Develop and maintain a year round open water fishery primarily for rainbow trout and a secondary fishery for other salmonids including brown and brook trout. Management should strive to create opportunities enjoyed by adults and youth of varying skill and ability levels. Four key expectations support successful management: 1) provide adequate, long term public access opportunities for various angler user groups, 2) maintain river aesthetics and scenery, 3) provide relatively high trout catch rates, and 4) provide opportunity for catching some trout of larger size quality.

Full attainment of this management goal cannot be achieved solely by MDIFW, and will require support and active involvement from other state agencies, local towns, Androscoggin Valley Council of Governments, land trusts, and conservation organizations (UAAA, ARWC, TU, etc.), private land owners, and those who recreate on the Androscoggin River.

Management Objectives and Action Items:

1) ***Provide a trout fishery comprised primarily of rainbow trout, and a secondary fishery for brown and brook trout to maintain desired diversity and maximize habitat utilization.***

    a. Stock hatchery rainbow trout, brown trout, and brook trout annually to supplement recruitment from wild trout to maintain consistent and desirable catch rates.
    b. Consider strains of trout available in Maine that offer the best available performance, given management objectives. Beginning in 2013 an experimental stocking of Sandwich strain brown trout was instituted as a strategy to improve field performance. A statewide investigation of new brown trout strains is ongoing, allowing for incidental use of the Sandwich strain in the Androscoggin River.
    c. Assess post-stocking fish movements and fate of stocked trout (SY, FY, float stocked, etc.) to identify stocking practices that maximize survival and contribution of stocked trout to the fishery, consistent with periods of high public use. A telemetry study would be best suited for this research need.

2) ***Provide desirable angler trout catch rates for 10 to 14-inch trout.***

    a. Annually stock spring yearling and fall yearling hatchery trout, including rainbows, brown trout, and brook trout. Personal logbook records and kiosk survey data indicate a calculated overall trout catch rate of 0.86 and 0.70 fish per hour, respectively. These rates appears to reflect a catch rate perceived by the public as desirable. A proposed roving clerk survey would provide a more accurate estimate of actual catch rate to assess future change. The relationship between calculated catch rates and angler perceptions regarding the quality of the fishing should be gauged to help assess management success. Consider time of stocking, species stocked, and frequency of stocking to maintain desirable catch rates during high use fishing periods.

b. Decrease brown trout stocking densities to pre-2005 levels as a strategy to enhance growth and survival. Should this change negatively influence angler catch rates consider modest increases in rainbow trout stocking which offer much higher catch rates.

3) Provide opportunity to catch trout greater than 14-inches.

a. Stock 2 year old and retired brood, (may include some combination of rainbow trout, brown trout, salmon, and /or brook trout). If possible, stock these larger trout in the spring when angler use is highest and opportunity to contribute to the fishery is greatest.
b. Reduce the total number of spring yearling and fall yearling hatchery trout stocked by at least 25% to improve condition and survival of post-stocked trout, and offset with increases in proposed stocking of larger hatchery trout. Additional changes in stocking may be explored, particularly for brown trout, which currently offer low returns (as noted in 2b above).

4) Protect and enhance the contribution of wild rainbow trout, even though annual stocking will likely be necessary to sustain desired angler catch rates on a consistent basis.

a. Enhancing wild trout production adds value to the fishery by adding diversity to the angling experience, and increases opportunity to grow trout to larger size. However, inconsistent annual production from wild trout and management strategies required to create a fishery largely comprised of wild trout would involve considerable time and effort, would result in diminished angling opportunities for an uncertain period of time, as well as uncertainty regarding prospects for success. While enhancing wild rainbow trout production is part of proposed management, it is not at the forefront of this planning effort.
b. Conduct fish passage impediment surveys on trout spawning tributaries to identify road crossings that prevent or limit upstream fish passage and utilization of available spawning, nursery, and thermal refugia habitat.
c. Promote adoption of “stream smart” strategies at replacement road crossings on tributaries to the upper Androscoggin River. Providing fish passage at road crossings will ensure wild trout have access to available habitat and thereby maximize trout production potential.
d. Explore the benefits of area or seasonal fishing closures on the river to protect the most critical pre-spawning staging areas and/or areas used during late summer as thermal refugia. Also consider tributary closures to protect spawning adults.
e. Re-inventory tributaries that historically produced wild rainbow trout to determine current use and perhaps identify index sites to be used to monitor production over time.
f. Stock sterile trout, in particular sterile rainbow and brook trout, to reduce hybridization with wild populations of each that contribute to the river fishery. The MDIFW owns equipment to produce sterile trout, but existing brood management needs and special research obligations currently complicate the production of sterile trout in Maine hatcheries. Furthermore, continued stocking of non-sterile trout in New Hampshire may limit benefits of stocking sterilized trout in Maine on the upper Androscoggin River. Explore interest by NHFG to stock sterile trout in the watershed below Berlin,

NH, as a strategy to enhance wild trout production. In addition, DNA tests may be conducted to assess the influence of stocking hatchery rainbow and brook trout on the genetic integrity of the wild populations.

g. Explore the feasibility and necessity of increasing wild rainbow trout production and recruitment by planting rainbow trout eggs in tributaries as a strategy to enhance "wild" production. Implications of stocking hatchery strain eggs should be carefully considered before implementation.

5) Collect biological, chemical, physical, and recreational angling data to support long term management.

a. Conduct a season long angler clerk survey (May–mid October) (up to 3 days per week to included weekends and weekdays) to collect angler catch rate, species caught, size quality, harvest, gear type, etc. to provide baseline information to monitor and assess proposed changes. This one season data collection effort should occur before stocking changes are implemented and then repeated five years after implementation. A roving clerk is preferred over fixed location interviews, but access to suitable watercraft will be needed to support a roving clerk census. A shuttle service may also be needed. Fishing location information would also be collected (reach floated, shore angling) to understand seasonal angling patterns.
b. Develop a season long (at least late May through mid-October) estimate of angler and non-angler use. Ideally count data would be collected the same year a creel survey is conducted to permit estimates of total catch and harvest. If logistically possible angler count data will also be collected by the clerk. The river may be sufficiently wide to offer visibility for aircraft counts (1 weekday/1 weekend day per week). Use should be estimated preferably in conjunction with scheduled clerk surveys. Shore and boat anglers would be counted separately. Furthermore, clerk count data may be used to adjust flight count data due to the inability of the pilot to observe all shore anglers.
c. Develop a long term (at least 10 years) water temperature monitoring program utilizing continuous temperature recording devices that would collect data from May through October at 3 different locations on the river that may be easily accessed, and preferably located in Gilead, Bethel, and Newry/Rumford. The information will be used to assess habitat limitations and recommendations for fishing restrictions. Additional limited water quality parameters, including dissolved oxygen data may be collected during the low flow late summer period in association with temperature monitoring.
d. Collect additional angler catch data using lower cost "passive" data collection strategies:
    i. Issue personal fishing logbooks to guides and anglers focused on the Upper Androscoggin River;
    ii. Install three voluntary angler survey kiosks at existing launches in Gilead, West Bethel, and Bethel. Survey stations should be visited once/week to remove completed cards, refresh blank survey cards and pencils, and address any maintenance of the survey stations. Survey stations should be installed with special signage regarding river management and should be maintained for a period of no more than three to five years. At least two years should lapse before survey stations are reinstalled. This practice will help maintain angler interest and participation.

iii. Upper Androscoggin Anglers Alliance will also develop a phone application for anglers to report their fishing trip information. The data entry format should reflect that used in MDIFW's personal fishing logbook. This data collection strategy will begin as a pilot study to investigate the feasibility/functionality of this data collection effort.

e. Investigate the feasibility of collecting biological samples (for age/growth/size structure) using MDIFW's e-raft. Alternatively or in conjunction with recruiting skilled anglers to assist MDIFW staff in biological sampling with rod and reel. Data collection would occur over one to two days every three years or as needed to support ongoing management.
f. Identify critical areas used as summer refugia, important for trout. A telemetry and/or snorkeling survey in August would support needed data collection at river tributaries and known springs.

6) Create desirable angling opportunities on the upper Androscoggin River, as well as other waters in the area that will draw anglers and support the local economy by better utilizing the existing infrastructure developed to service the winter snow sport industry.

a. To be realized as a culmination of plan objectives.
b. Explore opportunities for fisheries management initiatives in other nearby regional waters that create desirable fishing destinations, including reclaimed brook trout pond fisheries.
c. Consider regulation changes that provide branding and marketing value (attractive to anglers) that do not adversely impact angling opportunity for existing user groups and do not undermine fishery management goals and objectives. Nonregulatory promotional strategies are likely to be less contentious and exclusionary.

7) Maintain and enhance existing public access opportunities for non-motorized watercraft and walk-in access.

a. Examine existing deeded use opportunities at carry-in launches with the goal of establishing public access for all members of the public in perpetuity. If this assurance cannot be attained at existing sites then explore opportunities to redevelop access at other site(s). Access needs in proximity to the state line are of particular importance.
b. In conjunction with "a" above, explore opportunities to provide a launch in Gilead that will accommodate drift boats.
c. Identify popular and traditional walk-in access sites currently used by the public with the intent of exploring opportunities to partner with land owners and land trusts to conserve these areas for angling access for future generations to enjoy.
d. Strive to balance interest in providing long term public access for the various angler user groups (walk-in, car top, drift boat, guiding, etc.) while being mindful not to over develop access such that other user groups are adversely impacted.

8) Investigate opportunities to increase fish-holding structure.

a. Review existing MDIFW habitat data including habitat type, substrate, and depths.
b. Conduct limited field survey to identify river areas that would benefit from enhanced fish-holding structure.

c. Identify available non-MDIFW funding to support habitat enhancement and discuss options with professionals with experience in accessing large rivers and installing in-river structure.

9) Identify and explore opportunities to correct areas of significant bank erosion that may be impacting downstream habitat from sedimentation.

a. In conjunction with other data collection efforts identify areas of significant anthropogenic sources of erosion in the upper Androscoggin and its tributaries.
b. Identify partners and funding sources to abate sources of erosion.

10) Encourage and support local planning efforts to protect the scenic and aesthetic qualities important to river anglers.

a. Create local awareness of the upper Androscoggin Fishery Management Plan and the importance of "setting" in the quality of the overall fishing experience

Appendix A. MIDFW Stocking History for the upper Androscoggin River, 1998-2012.

YEAR	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
SPECIES (AGE CLASS)	**Site 1-Gilead Landing**														
Brook Trout (FY)									250	250	250	250	250	250	375
Brook Trout (SY)				500						500	500	500	1950		1000
Brown Trout (FY)									250	250	250	250	250	250	250
Brown Trout (SY)	1870	1700	1700		1700	1700	850	850	1150	1000	1000	2000	2000	2000	2000
Landlocked Salmon (AD)															10
Landlocked Salmon (FRY)									6000						
Landlocked Salmon (FY)									300	300		600	600		
Rainbow Trout (AD)													5		
Rainbow Trout (FRY)						1792				8000					
Rainbow Trout (SY)				850	1700	1700	850	850	1150	1000	1000	2000	2000	2000	2000
Site 2-West Bethel Landing															
Brook Trout (FY)															375
Brown Trout (FY)															250
Brown Trout (SY)	1870	1700	1700	1700			850	850	850	1000	1000				
Landlocked Salmon (FY)									300	300					
Rainbow Trout (AD)													5		
Rainbow Trout (SY)				850			850	850	850	1000	1000				
Site 3-Davis Park															
Brook Trout (FY)								250	250	250	500	500	500	500	
Brook Trout (SY)				500						500	500	500	1100	500	
Brown Trout (FY)									250	250	250	250	250	250	
Brown Trout (SY)	2800	2800	2500		2800	2800	2800	2800	2800	2800	2800	2800	2800	2800	2800
Landlocked Salmon (FRY)									6000						
Landlocked Salmon (SY)				750											
Rainbow Trout (SY)									300						
Site 4-Hanover Landing or Rte. 232															
Brook Trout (SY)															1000
Brown Trout (FY)						900									
Brown Trout (SY)	2800	2800	2500	3050	2800	3800	2800	2800	2800	2800	2800	2800	2800	2800	2800
Landlocked salmon (SY)				2250											
Grand Total	**9340**	**9000**	**8400**	**10450**	**9000**	**12692**	**9000**	**9250**	**23500**	**20200**	**11850**	**12450**	**14510**	**11350**	**12860**

Acknowledgements

Special thanks are extended to Wende Gray of the Upper Androscoggin Anglers Alliance and the Bethel Inn Resort for hosting informational and public work group meetings. Appreciation is also extended to the dedicated members of the public work group including Dick Walthers, Bob Harkins, Brad Jerome, Ron Fournier, Scott Stone, John Wight, Brian Reader, Lisa Freda, Joanne Hicks, and Lance Scarborough.

Literature cited

Androscoggin River Watershed Council. www.androscogginwatershed.org. Bethel, Maine.

Boucher, D.P. April 1997, Fishery Progress Report No. 97-4, Androscoggin River Survey (New Hampshire to Rumford Falls). Maine Department of Inland Fisheries and Wildlife. Augusta, Maine. 7 pp.

Chambers, Patricia et al. 2000. Nutrient Enrichment of Northern Rivers in Response to Pulp Mill and Municipal Discharges. Journal of Aquatic Ecosystem Stress and Recovery. 8(1): 53-66.

Christie, M.R. 2011. Genetic Adaption to Captivity Can Occur in a Single Generation. Proceedings of the National Academy of Sciences. Washington, DC.

Hitoshi Araki, Becky Cooper, and Michael S. Blouin. 2009. Carry-over effect of Captive Breeding Reduces Reproductive Fitness of Wild-born Descendants in the Wild. Biology Letters.

Krueger, C.C. 1991. Ecological and Genetic Effects of Salmonid Introductions in North America. Canadian Journal of Fisheries and Aquatic Resources. 48(1): 66-77.

Leary, Robb. 1999. Letter from University of Montana to Russ Danner of the Maine Department of Inland Fisheries and Wildlife. 15 pp.

Marie, A.D., Bernatchez, and Garant. 2012. Environmental factors correlate with hybridization in stocked brook trout (Salvelinus fontinalis). Canadian Journal of Fisheries and Aquatic Sciences. 69: 884-893.

Meyer, K.A., High and Elle. 2012. Effects of Stocking Catchable-Sized Hatchery Rainbow Trout on Wild Rainbow Trout Abundance, Survival, Growth, and Recruitment. Transactions of the American Fisheries Society. 141:1, 224-237.

Mower, Barry. 5-17-2013. Personal Communication. Maine Department of Environmental Protection. Augusta, Maine.

Pellerin, James. 1-6-2014. Personal Communication. Maine Department of Inland Fisheries and Wildlife. Gray, Maine.

Timmons, Dianne. 2012. Data file containing stocking records since 1991. New Hampshire Fish and Game. Lancaster, New Hampshire.

Warner, Ken. 1977. Hooking Mortality of Landlocked Salmon , Salmo Salar, Final report #5. Maine Department of Inland Fisheries and Wildlife. Bangor, Maine. 34 pp.

Yoder, Chris O. et al. 2004. Maine Rivers Fish Assemblage Assessment: Interim Report. Midwest Biodiversity Institute & Center for Applied Bioassessment and biocriteria. Columbus, Ohio. 205 pp.