

**INTERIM PROGRESS REPORT**  
**MEDUXNEKEAG WATERSHED**



Benthic sampling above Jackson Falls

March 2005

Meduxnekeag River Association

George Peabody  
Simon J. Mitchell

**Executive Summary**

The Meduxnekeag River and its surrounding watershed is unique to western New Brunswick. Its mosaic of farms and forest supports a diversity of resource-based operations and complements the region's strong service sector. Its natural uniqueness stems from the presence of *Appalachian Hardwood Forest*, a tolerant hardwood forest type that currently occupies only 1% of its historical range in western New Brunswick.

The Meduxnekeag River and its surrounding watershed supports some of the best small mouth bass fishing in North America, not to mention providing excellent opportunities for brook and brown trout fishing and canoeing the river from Jackson Falls to Woodstock. The region's mixed history has had both a positive and negative impact on the waterway and the quality of water. Historically there was much more industrial development riverside (sawmills, tanneries) than is present today. Today, development is centred on gravel pits, small, isolated industrial operations and residential development. The expansion of farming and forestry operations throughout the watershed impacts water quality and its subsequent use. The specifics of water quality in the Meduxnekeag watershed are emerging as collected data (2001 to 2004) is analyzed and prepared for later presentation (May 2005).

This report represents the culmination of the first year (8 months) of the Meduxnekeag Watershed Classification Project. Funded by the New Brunswick Environmental Trust Fund, the Meduxnekeag River Association is the lead organization in the water classification process. This project is based on the previous three years of data collection completed by volunteers on behalf of the organization.

## **Acknowledgements**

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This project would not have been possible without the enthusiasm of volunteers and commitment of partners around the region.

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## I. INTRODUCTION

The Meduxnekeag River Association was formed in Woodstock, New Brunswick in 1995 as a community-based non-profit environmental organization. The organization was incorporated in 1998, and received official charitable tax status in 2002. Our purpose is:

- to promote, encourage and assist in the protection, restoration and responsible use of the Meduxnekeag River Watershed;
- to promote and encourage the protection, conservation and enhancement of wild Brook trout, Brown trout and Atlantic salmon;
- to co-operate with landowners to conserve the natural riparian zone along the Meduxnekeag and its wildlife and plant species;
- to preserve remnant Appalachian Hardwood Forests and their inherent biodiversity and natural beauty;
- to promote public education and awareness of the value of preserving the natural qualities and biodiversity of the unique Meduxnekeag River watershed; and,
- to co-operate with and support any agency that shares a common purpose with the Association.

The Association is governed by a 15 member volunteer board (Appendix 1). Active committees are as follows:

Watershed Classification project oversight committee – John Murray (Chair)

Annual Dinner and Auction Committee – Carl Faulkner, Catherine Sutherland (Co-Chairs)

Environmental Awareness Showcase Committee – Darlene Tapley (Chair)

Bell Forest Fundraising Committee – Peter Porteous (Chair),

The Association has purchased and protected as the Meduxnekeag Valley Nature Preserve three ecologically significant properties on the Meduxnekeag river. The Association hosts an annual fundraising Dinner and Auction in Woodstock every Spring; organizes an annual student Environmental Showcase competition at local elementary schools; and provides guided walks for school classes on the Nature Preserve trails (a well-marked 10 km network open to the public).

The Meduxnekeag River Association was recognized for its commitment to the protection of the Meduxnekeag River when it was awarded a New Brunswick Environmental Leadership Award in 2004.

The Natural Environment of the Meduxnekeag

The Meduxnekeag watershed lies in western New Brunswick and eastern Maine. As this classification project is focused on the New Brunswick portion of the watershed, we will begin this description at the end of the Meduxnekeag, where it flows into the St. John River at Woodstock. At the outset, however, it should be borne in mind that the upper 2/3 of the 40,000 hectare (400km<sup>2</sup>) Meduxnekeag watershed lies in the state of Maine, and that, moreover, the Maine part of the watershed was classified in 1986 and partially re-classified in 1999 (Table 1) using a system on which New Brunswick's letter-grade system is based (Table 2).

Portion of waterway	Classification
1) Meduxnekeag River Main Stem	
(a) From the outlet of Meduxnekeag Lake to the international boundary.	Class B
2) Meduxnekeag River, tributaries - Class B unless otherwise specified.	
(a) North Branch of the Meduxnekeag River and its tributaries above the Monticello - T.C, R.2, W.E.L.S. boundary	Class A
(b) Moose Brook and its tributaries, upstream of the Ludlow Road in Ludlow.	Class A
(c) South Branch of the Meduxnekeag River and its tributaries, upstream of the Oliver Road in Cary.	Class A
(d) B Stream and tributaries upstream of the Burnt Brow Bridge in Hammond.	Class A

Table 1: Maine water classification for the Meduxnekeag River  
 Source: <http://janus.state.me.us/legis/statutes/38/title38sec467.html>

Water Quality Class	Biological Standards
AA	No direct discharge of pollutants; aquatic life shall be as naturally occurs.
A	Natural habitat for aquatic life; aquatic life shall be as naturally occurs
B	Unimpaired habitat for aquatic life; discharges shall not cause adverse impact to aquatic life in that the receiving waters shall be of sufficient quality to support all aquatic species indigenous to the receiving waters without detrimental changes in the resident biological community.
C	Habitat for aquatic life; discharges may cause some changes to aquatic life, provided that the receiving waters shall be of sufficient quality to support all species of fish indigenous to the receiving waters and maintain the structure and function of the resident biological community

Table 2: Maine water classification guidelines  
 Source: <http://www.state.me.us/dep/blwq/docmonitoring/biomonitoring/sampling.htm>

Both branches of the Meduxnekeag at the point where they cross the international border into New Brunswick, and hence into the area covered by this classification project, are Class B waterways under the Maine system.

That detour ended, let us return, geographically, to Woodstock and begin with history. Or with geology, for the Meduxnekeag watershed in New Brunswick is shaped by its underlying rocks, not only in the forms of its hills and valleys, wetlands and uplands, but also in its particular ecology. The underlying rocks of the Meduxnekeag watershed are limestone or highly calcareous sandstone, part of a band of calcareous rock stretching up the upper St. John River valley. Where other conditions are suitable, the forests which naturally flourish on this rock type are known as Appalachian Hardwood Forests (AHF) [MacDougall, Andrew, Nature Trust of New Brunswick 1997] or Saint John River Hardwood Forests (SJRHF) [MacDougall, Andrew and Loo, Judy, Canadian Forest Service 1999]. Remnant Appalachian Hardwood Forest sites today contain many flowering plants, ferns and bryophytes listed as rare or uncommon in New Brunswick. These include showy orchis, yellow lady's slipper, wild ginger, wild coffee, maidenhair fern, lopseed, Goldie's fern, and a number of others.

Canadian Forest Service Information Report M-X-204E notes that: "The greatest concentration of species-rich SJRHF sites, and of rare SJRHF species, is in the watershed of the Meduxnekeag River". One such site, the 50-hectare Bell Forest, the most recent addition to the Meduxnekeag River Association's Meduxnekeag Valley Nature Preserve, is described by the Nature Trust of New Brunswick as containing examples of "nearly every species known to live" in Appalachian Hardwood Forests, including one - *desmodium glutinosum* - found nowhere else in New Brunswick.

Tree species associated with AHF include the four "marker" species: white ash, butternut, basswood, and ironwood. These are found in a matrix of sugar maple, along with beech, yellow birch, black cherry and elm. Both beech and elm have become reduced in numbers through diseases introduced in the 20th century, and butternut is presently under a similar threat.

Mature Appalachian Hardwood Forest has been the predominant forest in the Meduxnekeag watershed for at least the last several thousand years. It is presently estimated to cover less than 1 percent of its pre-agricultural extent. This pre-agricultural forest, which remained largely intact until the last decade of the 18th Century, was not entirely AHF of course. White pine and eastern hemlock flourished in suitable habitat throughout the watershed, as did eastern white cedar, red spruce and black ash. Other present-day forest tree species - white and grey birch, the aspens, white and black spruce, balsam fir, tamarack - were also present, but in proportionately lower numbers than today.

The other major characteristic of the pre-agricultural forest was its age. Believed to have been subject to a "major fire event" only once in every thousand years or so, most areas of the forest will have been able to reach full ecological maturity: their largest and oldest trees will have been as large and as old as trees of those species are capable of becoming. That is, 500 to 600 year old white pines will have reached two to three metres in diameter

and sixty metres tall; 400 to 500 year old eastern hemlock will have reached perhaps two metres in diameter, as will the largest of the tolerant hardwoods. These trees will have been found throughout a forest which also contained trees of all ages and sizes from the standing stubs of their dead predecessors down to their newly sprouted seedling descendants. The understorey species will probably also have been at or approaching their maximum richness and diversity (generally, the least disturbance a surviving AHF site has been subject to, the richer is its understorey).

The precise effect of this full-watershed mature forest on the quality and quantity of water in the lakes and streams of the watershed, and the health and diversity of aquatic life, is perhaps not possible to establish now. However, it is reasonable to assume that the longer retention and slower release of rain and snow will have produced generally higher summer water levels, that the full canopy will have kept surface water cooler, that there will have been somewhat less opportunity for erosion, and that the overall water quality – using the criteria of the classification process – will have been very high.

Water quality will also have been positively influenced - as it is today - by the characteristics of the underlying rock and the lime-rich soils, which reduce acidity in the water and help create a nutrient-rich riparian ecosystem with high bio-diversity.

#### Human Activities in the Watershed

The Meduxnekeag watershed is part of the Wulustuk watershed inhabited by the Maliseet people from a very early period. The first traces of human habitation have been dated to a time soon after the glacial ice withdrew, and there is no reason not to believe that the area has not been inhabited ever since. The known Maliseet settlement pattern included the establishment of villages at or near the mouths of major tributary streams; it is very likely that a Maliseet village long preceded the Town of Woodstock at the mouth of the Meduxnekeag and on the island which lay in the St. John off the mouth. As the prime settlement area has since been flooded by the Mactaquac headpond (1967), it is not possible to be certain of the size of the settlement or the length of time it existed, but in the 17<sup>th</sup> century, the earliest surviving written historical records show a Maliseet settlement there.

In any event, the Maliseet residents will not have had a significant shaping effect on the ecology of the watershed or the quality of the water. They may have raised corn and other crops on the offshore island and some of the intervales; they certainly harvested fiddleheads and other edible plants, as well as butternuts; they harvested salmon and other fish; hunted and trapped forest and aquatic animals and birds, and selectively harvested trees – and parts of trees – for raw materials and fuel. They used the Meduxnekeag as a canoe transportation route, but principally within its own watershed: it does not have heavily used portages to other watersheds.

Major changes in the watershed began with the arrival of Loyalist settlers in the mid-1780s. Over the following forty years, the appearance and ecology of much of the watershed was transformed. Most of the original growth trees were removed, beginning with the most valuable (oldest, largest, straightest) and most accessible (closest to the

waterside). The land most suitable for agriculture (best drained, least steep, richest soils) was permanently cleared; virtually all other forest was high-graded for its most valuable trees, excepting only those places which were so remote from water transportation that it was not feasible to get the timber out. The consequences included both a severe and sudden decline in quality and extent of mature forest; and a negative impact on water quality and aquatic life. Erosion increased, as did the frequency and severity of floods.

This transformation continued throughout the 19th Century as settlement and population expanded: more parts of the watershed forests were permanently converted to agricultural uses; the urban areas expanded; economic changes placed further stresses on the remaining forests (these included a mid-19th century iron mine and smelter just outside the watershed at Upper Woodstock which consumed huge quantities of locally produced hardwood charcoal); a major lumber-milling industry developed on the Meduxnekeag at Woodstock, fed largely with timber from the watershed. To transport the timber downstream, tributary streams were altered with temporary “driving dams”; boulders were removed or demolished with explosives. Debris choked smaller streams; bark and waterlogged branches collected on the bottom of the river damaging spawning habitat and negatively impacting benthic life. Water quality necessarily diminished.

By the early years of the 20th Century, agricultural settlement in the watershed had reached its maximum extent; roads had been established throughout; a railway had reached up from Woodstock as far as Red Bridge before turning north and rising up out of the watershed on its way to Centreville; the last stands of the surviving old growth trees – the eastern hemlock – were being rapidly cut for their bark to feed the tanneries in Woodstock; dams had been built at several places on the river, interfering with fish migration.

While the New Brunswick portion of the watershed above Woodstock was impacted principally by agriculture and forestry, the upper watershed in Maine added the effects of urban and industrial development including the dumping of untreated effluent into the main river in the town of Houlton.

These impacts on the Meduxnekeag continued with little abatement until the last three decades of the 20th Century. Water quality in the main Meduxnekeag River probably reached its lowest point in the early 1960s.

By the end of that decade, the construction of the Mactaquac dam had produced a headpond flooding the mouth of the Meduxnekeag and its upstream intervalles almost as far as the Trans-Canada Highway more than two kilometres from the mouth; the railway was abandoned, municipal and industrial effluent in Maine began to be treated and diverted from the river, the water had ceased to be used for the transportation of logs and pulpwood. Water quality slowly began to recover. In the intervening years, this recovery has continued.

Today, the Meduxnekeag in New Brunswick is an important recreational river. Its mouth provides some of the best Small-mouth Bass angling in eastern North America. It supports populations of Brook Trout and Brown Trout. Its intervalles are among the best

fiddlehead harvesting sites in the province. Jackson Falls on the South Branch, and the North Branch below Briggs's Mill Falls are challenging kayak runs in high water. From the confluence to Woodstock is an easy scenic canoe trip in Spring and Fall.

### Meduxnekeag watershed and sub-watersheds

From the old railway bridge (now the NB Trail bridge) at the mouth of the Meduxnekeag in Woodstock, look upstream, over the Main Street bridge and the wide wetland beyond to the TCH bridges two kilometres away. This is the urban Meduxnekeag, within the municipal boundaries of Woodstock. Its waters are subject to run-off from streets and parking lots and to storm sewer outflows. Most of it is heavily influenced by the Mactaquac headpond; its water levels vary with headpond management. Flows are slow except in flood and freshet. In the immediate downtown area, its banks are being stabilized and revitalized with rockwork and buffer plantings. Beyond the downtown, in most places, buffers exist between residential land use and the water. There is one industrial use: a ready-mix concrete plant where significant and continuing degradation of the riparian zone is evident.

This urban Meduxnekeag has water quality sufficient to provide excellent smallmouth bass habitat; habitat, including nesting sites, for ducks and Canada geese; active beaver and muskrat populations and a range of other aquatic, semi-aquatic and bird life, including ospreys.

Two named tributary streams enter the Meduxnekeag in the urban zone. On the right bank, facing upstream, Connell Brook flows in approximately half-way between the mouth and the TCH bridges. It originates in a still undeveloped area of the town, though under encroachment from new commercial development on one side and expanding residential construction on the other. Its course is approximately a kilometre long; its immediate banks in the upper portion are buffered, mostly with cedar and alder, but siltation is evident, becoming more so the further downstream one moves. In its lower course, it passes between Woodstock High School, and a plant nursery business, receives ditch drainage from a major commercial street, passes through an area of expanding commercial businesses, and becomes highly silted as well as choked with litter and debris including discarded concrete construction materials. Its lower course is through treed but eroded banks before reaching the Meduxnekeag intervales. Visual examination shows that fish manage to survive in the upper portion. Connell Brook habitat will be improved in the spring of 2005 through a volunteer rehabilitation project sponsored by the Meduxnekeag River Association.

On the left - south - side of the Meduxnekeag, at about the same distance from the mouth, Upham Brook enters the river. Upham Brook rises in two branches, one in a mature cedar swamp owned by the Town of Woodstock and another in the midst of agricultural fields in potato/grain rotation. After the branches join, it passes through privately-owned woodland and agricultural land, crosses beneath the TCH and a major access highway and near a small industrial zone before reaching the river. Its length is approximately two kilometres. In its upper reaches, it drains an expanding residential sub-division as well as an agricultural area in potato-grain rotation. Upham Brook supports a trout population; in

the late 1990s, it received some restoration / rehabilitation work through Meduxnekeag River Association summer projects. The Upham Brook watershed includes three identified Appalachian Hardwood Forest sites of ecological value. One of these is at the extreme southwest corner of the watershed and is owned by the Town of Woodstock. Another is adjacent to and partially owned by Southern Carleton Elementary School. Both of these sites have some measure of protection. The third is privately owned and has recently become subject to major forest removal which may result in its conversion to agriculture or residential use or some combination of the two.

Water samples were taken from the mouth of Upham Brook in 2002 and 2003.

In the free-flowing part of the Meduxnekeag above the Trans-Canada Highway bridges, the first tributary stream is Marven Brook, which enters the river on the north bank about 250 metres above the bridges. Marven Brook is the largest of the Meduxnekeag tributaries (other than the North Branch of the river itself), and drains the most extensive sub-watershed. It originates in two branches between Lindsay and Briggs's Corner east of Hwy 550, and is significantly augmented in a swampy area about two kilometres downstream by the outflow from 40-hectare Payson Lake carried by Hopkins Brook. There are two cottages on Payson Lake and its immediate shoreline remains wooded. The Payson Lake / Hopkins Brook drainage area constitutes the northeast section of the Marven Brook sub-watershed. Marven Brook then flows south and east roughly parallel to Highway 550, which it crosses on the outskirts of Woodstock before reaching the Meduxnekeag. Its sub-watershed above this crossing is roughly bounded by Highway 550 on the west, and the height of land at the summit of Maple Hill, Iron Ore Hill and Moody Hill on the east. It has some small feeder streams, and also receives drainage from a wetland area on either side of the Trans-Canada Highway between Woodstock and Jacksonville (this wetland will be heavily impacted by the TCH twinning currently in progress). Most of the immediate valley of Marven Brook is wooded. Working agricultural land, much of it in potato/grain rotation, lies close by and constitutes a significant part of the overall sub-watershed. A major Christmas tree growing operation continues to expand. Fertilizer and chemical run-off from these may be reaching the water. In the lower portion of its valley, residential development continues, some of it adjacent to the stream itself. Horses pastured on one hobby farm have full access to the stream. Where Marven Brook lies close to Hwy 550 near Woodstock, an easy opportunity exists for water removal, and this has been a factor in the past for use in dust suppression in highway construction, by a mobile car wash operator, and others. Two Appalachian Hardwood Forest sites with conservation significance are known from this sub-watershed.

Water samples were collected from the mouth of Marven Brook in 2002, 2003 and 2004, and benthic samples were taken from Marven Brook just above the "water removal" point in 2004.

Proceeding upstream, the next significant tributary is MacQuarrie Brook, which enters the Meduxnekeag on the south side approximately two kilometres higher up. Between the mouths of Marven and MacQuarrie brooks, the Meduxnekeag passes through steep wooded hills with riparian lowland strips varying in width from a few metres to perhaps a

hundred metres. Near the river, on the south side, are a quarrying operation which seasonally includes an asphalt plant; a contaminated soil remediation site established in the 1990s and not now receiving soil; and the old (unlined) municipal solid waste site which was closed and capped in the late 1990s.

MacQuarrie Brook originates in several branches in an agricultural and forested area between Hwy 150 and Hwy 540. It crosses Hwy 95 and flows through forested land before reaching the Meduxnekeag. Some agricultural impact on water quality is probable, and the present culvert beneath Hwy 95 has been undercut and is now a barrier to fish movement (NB DoT is aware of this and a replacement culvert is planned). Hwy 95 is being twinned, and some impact can be anticipated from this process, although the EIA takes MacQuarrie Brook into account. Much of the sub-watershed is agricultural. Residential use is expanding here as well. One species-rich Appalachian Hardwood Forest site has been identified in the MacQuarrie Brook sub-watershed.

Water quality samples were collected in 2002, 2003, and 2004 from MacQuarrie Brook at its mouth, and from the Meduxnekeag just below MacQuarrie Brook. Benthic samples were collected from the Meduxnekeag just above the mouth of MacQuarrie Brook in 2004. One of the principal deep water pools on the Meduxnekeag is just below the mouth of MacQuarrie Brook.

No named tributaries enter the Meduxnekeag between the mouth of MacQuarrie Brook and Red Bridge, some six kilometres upstream. For almost all this distance, the Meduxnekeag flows through mature forest extending back between several hundred metres and several kilometres on either side of the river. This forest has been subject to relatively little recent activity. The immediate riparian zone varies between steep banks and intervalles backed by steep slopes, with many islands and braided channels. Tributary streams are small, seldom reaching above two kilometres in length, and most originate within the forested area. Three gravel pits exist in the riparian zone; one, now disused, is literally on the riverbank and erosion from it continues to impact the course of the stream. Two small camps - single buildings - are located on riparian land in this section; no other buildings are visible until just below Red Bridge. On the north side of the river, the Meduxnekeag River Association owns 60 hectares with approximately two kilometres of river frontage, constituting the Wilson Mountain and Leonard Woods portions of the Meduxnekeag Valley Nature Preserve. This stretch of the river contains several deep cold water pools important to the summer survival of the river's brown trout population. At least five ecologically rich Appalachian Hardwood Forest sites (other than the Preserve) are found in this part of the watershed.

Approaching Red Bridge, the steep banks withdraw somewhat and the river passes through an agricultural and residential area. The principal farm - of two - here permits unrestricted cattle access to the river from a pastured section of intervalle. Some run-off from outside manure storage also reaches the river. The arable and pasture land of other farms in this part of the watershed lies much further back from the river. There is a continuing conversion of upland farm land, principally on the north side of the river, to Christmas tree plantations.

Just downstream from the bridge at Red Bridge, Mill Brook enters from the south. Mill Brook is a significant Meduxnekeag tributary, whose ultimate origin is near Parks Hill in the extreme southwest of the watershed. From there it accepts and carries drainage from a mostly forested and often swampy area near Highway 95, and adds the outflow from the small Morrison Lake. The twinning of Hwy 95 will have some impact on this part of the Mill Brook sub-watershed. Mill Brook then drains an extensive, largely forested area between Watson Settlement and Hwy 540. For much of its lower section it flows in a steep and narrow valley. The quality of the forest in this sub-watershed ranges from relatively recent clear cuts to mature woodland of very high ecological value, including at least three rich Appalachian Hardwood Forest sites. The so-called "Watson Settlement Pine" - believed to be the largest white pine in the Meduxnekeag watershed and one of the largest in New Brunswick - is in the Mill Brook sub-watershed.

Water quality tests were carried out in 2002, 2003, and 2004 from the mouth of Mill Brook and from the Meduxnekeag River at Mill Brook. Benthic samples were collected in 2004 from the mouth of Mill Brook.

Immediately above Red Bridge, the Meduxnekeag passes through an area of major gravel deposits (the gravel area extends below Red Bridge as well, particularly on the south side of the river) which are being worked. Highway 540 and the Belleville Road parallel the river on the south and north sides respectively. On the north side of the river, the road separates a narrow strip of agricultural land and three dwellings from the river; after this 250 metre section is passed, the road separates a large area of gravel pits from the river, then rises high above and back from the river, with a widening section of mature forest intervening. On the south side, three gravel pits succeed each other in the immediate riparian area for nearly a kilometre, with the margins of the gravel workings, in some parts, less than ten metres from the river's edge.

No significant tributary brooks enter the Meduxnekeag between Red Bridge and the confluence of the South and North branches of the river. Above the gravel pits, the river flows between steep, mostly forested, banks. Some intensive cutting has occurred within the past decade on a portion of the south bank. Two kilometres of the north bank are Bell Forest, part of the Meduxnekeag Valley Nature Preserve. Further back from the river, within the main drainage and the sub-watersheds, there is limited residential settlement and a mix of agriculture and forest. Some land, particularly on the north side, has been converted to conifer plantations. On the south side, an extensive area of forest has been clear cut within the past three years.

Above the confluence, the South Meduxnekeag has an extensive wetland intervale area below Jackson Falls. Between Jackson Falls and the International Boundary, the immediate riparian area is forested, with a mixture of forest and agriculture - predominantly potato/grain rotation, with some cattle - further back. Three small, and one significant, tributary streams enter the river in this stretch.

The significant tributary, Fitzpatrick Brook, drains an agricultural and forested area from the south and enters the Meduxnekeag approximately a kilometre above Jackson Falls. Some of its headwater tributaries rise in Maine. Agriculture in its watershed is mixed,

although potato/grain rotation dominates. A large industrial hog rearing operation with two barns is located in this sub-watershed.

Water sampling in 2002, 2003, and 2004 was conducted on Fitzpatrick Brook, approximately 500 metres above its mouth; on the Meduxnekeag at Jackson Falls, and on the Meduxnekeag approximately 500 metres below the international boundary. Benthic samples were collected in 2004 from the Meduxnekeag just above Jackson Falls.

The North Branch of the Meduxnekeag between the confluence and Briggs's Mill Falls approximately three kilometres upstream flows rapidly through a narrow rocky gorge with three sets of waterfalls and numerous deep holding pools. Two significant tributaries enter from the northeast. The immediate riparian zone is forested, but the zone is relatively narrow on the western side with farmland and increasing residential development along Hwy 540 which parallels the course of the river.

The first of the principal tributary streams is Carter's Brook which originates in two branches between Lindsay and Briggs's Corners (where its sub-watershed meets that of Marven's Brook) and drains a forested and agricultural area, flowing through a set of linked swampy wetlands around Hwy 550, and passing through forest, some of which has been heavily harvested, before joining the North Branch approximately 1.5 kilometres above the confluence.

The other principal tributary is Hagerman's Brook, which flows into the Meduxnekeag about 200 metres above the mouth of Carter's Brook, and drains a larger sub-watershed, originating in two primary branches on either side of Hwy 550 in Lower Bloomfield. Parts of its upper watershed are principally agricultural, in potato/grain rotation; much of its lower watershed is forested. Its watershed contains one known Appalachian Hardwood Forest site of conservation significance.

Water samples were taken from Hagerman's Brook and Carter's Brook in 2002 and 2003. Samples were taken from the North Branch just above McBride Bridge (approximately 100 metres above the confluence) in 2002, 2003 and 2004. Benthic samples were collected just below McBride Bridge in 2004.

Between Briggs's Mill Falls and the International Border, the North Branch flows through about 6 kilometres of mixed forest and agricultural land. The river has numerous riffles and deep pools. The immediate riparian zone varies between forest and agricultural uses, with the river open to seasonal pasture in several places: agricultural use is more dominant here than at any point along the river and the riparian zone is often only a fringe of alders with arable farmland or pasture on either side. Some residential use is apparent but this does not seem to be increasing significantly.

Water samples were collected in 2002, 2003, and 2004 from this section of the North Branch at a point just above the bridge at Weston (approximately 700 metres below the international border).

## II. WATER CLASSIFICATION PROCESS

In 2004 the Meduxnekeag River Association was selected to undertake the provincial water classification process for the Meduxnekeag Watershed. Over the coming year and a half we will be gathering, and sharing, as much information about the Meduxnekeag as we can. Its history: what it was like and how it has been used in the past; its present condition, based on the results of water quality and other tests we've been carrying out; what's special about it; and, what vision people who live here have for its future.

The classification process involves five steps:

- Identify and involve residents and stakeholders;
- Evaluate the river system - gather and analyze water quality information, land and water use information;
- Reach, through consensus among stakeholders, a vision and a plan for classification of surface water in the Meduxnekeag watershed;
- Develop an action plan that addresses issues and promotes the vision;
- Recommend to the Province the provisional water classification which has been agreed, and begin to implement the action plan.

This process is expected to take about 18 months and be completed by the end of March, 2006.

### Involving residents and stakeholders

All residents and stakeholders have a stake - an interest - in the Meuxnekeag River and how part or all of its watershed is managed. The water classification project relies on resident and stakeholder involvement to lay the ground work. We will be using a number of ways - mailings, newsletters, one-on-one meetings, public meetings, our website - to solicit input and feedback.

What is important to you about the Meduxnekeag River, its tributaries and its watershed? How has it changed from the way it used to be? What do you know about it that should be included in the classification process? How do you use it? How do you think it should be used in the future? What concerns do you have about the Meduxnekeag or about the classification process?

### Evaluating the river system

Over the past three summers, we have collected water samples from more than a dozen sites; water temperatures and pH readings have been recorded; we've done fish surveys and collected benthic samples to find out what lives on the river bottom.

By examining the existing water quality and understanding how land use contributes to water quality, any watercourse within the Meduxnekeag watershed can be placed into one

of the six possible “classes” used in New Brunswick.

The ecological, social and economic consequences of classifying a watercourse in a given class will be considered by residents and stakeholders during the process. The aim is to ensure that long-term impacts of the classification do not negatively affect the Meduxnekeag watershed and those that live and work here.

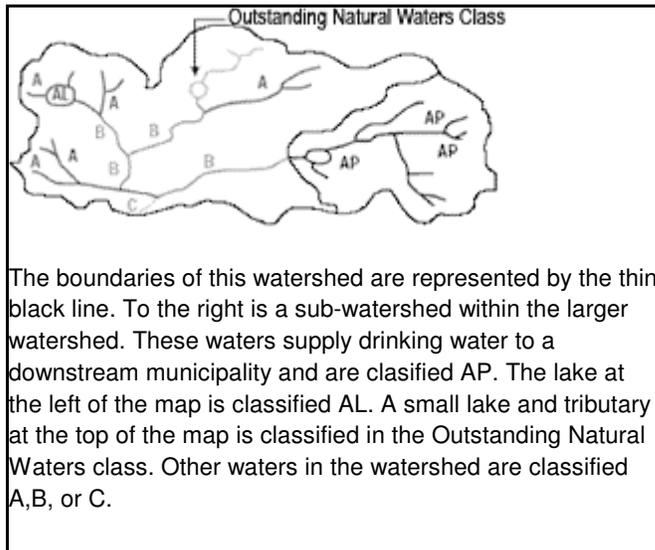


Table 3: Water Classification of a Typical Watershed

### The classes

#### *Outstanding Natural Waters Class - special lakes and rivers*

These waters remain relatively unaffected by human activities and possess an unaltered, natural water quality, quantity, and biology. They may be unique or they may represent good examples of typical natural water quality commonly found in New Brunswick. These lakes or rivers tend to be located at the headwaters of river systems. Their protection will safeguard downstream water quality and quantity. The goal of the *Outstanding Natural Waters Class* is to protect the water quality of these watercourses for posterity in their natural state. These waters are classified through a nomination process, involving objective selection criteria and a Review Panel.

#### *AP Class - designated surface drinking water supplies*

These are waters of watercourses that are designated as Protected Areas under the *Watershed Protected Area Designation Order - Clean Water Act*.

#### *AL Class - lakes, ponds and impoundments*

These are lakes, ponds or impoundments that are not classified into the Outstanding Natural Waters Class or into the AP Class.

The remaining three classes are primarily for rivers and streams, or parts of rivers and

streams that are not placed into one of the first three classes. These three classes are likely to best reflect the majority of the Meduxnekeag watershed:

*A Class* - Waters that can support use as habitat for aquatic life, use for primary contact activities such as swimming and secondary contact activities such as boating. These watercourses would be managed to have water quality and aquatic life as it occurs naturally;

*B Class* - Waters that can support use as habitat for aquatic life, use for primary contact activities such as swimming and secondary contact activities such as boating. These watercourses would be managed to have water quality that would support all native species, and to maintain health in the resident aquatic community;

*C Class* - Waters that can support use as habitat for aquatic life, and use for secondary contact activities such as boating, but not for primary contact activities such as swimming. These watercourses would be managed to have water quality that would support native fish species and, although changes to the aquatic community could occur, the resulting aquatic community would be viable.

#### Recommending classification

The aim of the project is to produce recommendations for classification of the different watercourses within the Meduxnekeag watershed according to the consensus reached by stakeholders. Residents and stakeholders will have a further opportunity to comment on the provisional classification recommendations, with resulting revisions being made prior to the classification being recommended to the provincial Department of Environment and Local Government.

The Minister considers the recommendations of the classification process, and where necessary may undertake additional consultation with residents and stakeholders. The Minister then makes a final decision and informs the public of the result of the classification process. Once accepted by the Minister, the Meduxnekeag watershed classification becomes a regulation of the Clean Water Act.

After a watercourse is classified, the water quality standards associated with the class will apply, and it will be an infraction to use the water, or the land within the watershed associated with the watercourse, in a way that will, directly or indirectly:

- cause the quality of the water to cease to meet the class standards;
- cause the quality of the water to degrade in relation to the class standards;
- impede or stop any progress that the quality of the water may have been making toward meeting the class standards

In most cases, the existing water quality will meet the standards, and most activities in the watershed will already be in compliance.

Future changes to the classification only occur after careful consideration by government and those involved in the region. Changes may occur as a result of shifting

environmental, social or economic priorities, improvements in water quality, and ongoing input from residents and stakeholders.

#### Action planning

Through the participation of residents and stakeholders a plan will be developed to identify and carry out actions that are needed to maintain the classification standards and make the vision we've developed into a real future. Actions can be carried out over a number of years, and may include such things as encouraging voluntary use of best management practices by residents and stakeholders; developing community-based initiatives aimed at improving or maintaining water quality; providing assistance to landowners, and other projects intended to maintain or improve water quality.

The action plan is the basis for the implementation of activities at the watershed level to achieve the vision and goals identified during the water classification process. Ensuring clean water flows in the Meduxnekeag watershed that support a variety of uses and meet the needs of residents and stakeholders now and in the future will be the direct responsibility of the residents and stakeholders.

### **III. PROJECT ACCOMPLISHMENTS**

#### Organizational stakeholders

Stakeholders were identified within the watershed early in the process to ensure organizational support from the various entities operating in the region. A comprehensive contact list was compiled (Appendix 2) and utilized for initial outreach purposes. As opportunities arise and new organizational stakeholders are identified the database is updated. Individual stakeholders are being identified through a variety of means. Initial contacts include the membership list for the Meduxnekeag River Association (Appendix 3), walk-ins to the office and individuals identified through meetings, presentations and general outreach around the water classification process. Several opportunities in early Spring (District meetings for the Carleton-Victoria Wood Producers, Meduxnekeag Annual Dinner and Auction and increased traffic in the office) will present significant opportunities to enhance individual stakeholder outreach and participation.

#### Communications strategy

The purpose of the outreach strategy is to outline the steps that will be utilized to engage stakeholders in the Meduxnekeag Watershed Classification project. This includes outlining the classification process, opportunities for input, preliminary results from water testing, identification of potential issues and opportunities for collaboration (action plan)

The primary audience for this initiative is the residents of the Meduxnekeag River

watershed. This includes private and freehold landowners (of which there are only a few). The remaining audience can be grouped into four broad stakeholder categories, namely:

- a. Local non-governmental organizations - St. John River Valley Tourism Association, Meduxnekeag Family Mud-Runners
- b. Provincial non-governmental organizations - Sentier NB Trails Council, Nature Trust of New Brunswick
- c. Government agencies - Departments of Natural Resources, Transportation, Agriculture, and Department of Environment and Local Government
- d. Quasi-government agencies – Woodstock Local Service District Advisory Committee, Enterprise Carleton Region, Town of Woodstock

A variety of media will be utilized to inform, engage and respond to requests for information from the various stakeholder groups. To ensure an efficient and effective process a variety of approaches will be utilized based on the needs and of each stakeholder group and their role in the Meduxnekeag Watershed Classification project. The following table outlines the protocol for each of the target groups.

Activity	General Public	Freehold landowners	Private landowners	Local NGO's	Provincial NGO's	Gov't agencies	Quasi-gov't agencies
Press releases	X	X	X	X			
Letter of introduction		X	X	X	X	X	X
1 on 1 meeting		X	As requested	X		X	X
Newsletter	X			X	X		X
Water Bulletin	X	X	X	X	X	X	X
Public meeting	X	X	X	X			
Mass media	X	X	X	X			X
Web site	X	X	X	X	X	X	X

Table 4: Stakeholder outreach strategy

Throughout the year, the Meduxnekeag River Association and its work within the watershed has been highlighted in the local media (Appendix 4). We continue to seek other opportunities to publicise the water classification process and anticipate that this will be a valuable outreach tool.

Our website ([www.meduxnekeag.org](http://www.meduxnekeag.org)) is extensive, providing background on the organization, the water classification process, newsletters, the Meduxnekeag Valley Nature Preserves and other activities of the organization. The website is updated regularly as more information becomes available. Opportunities exist for individuals to comment on conditions at the Meduxnekeag Valley Nature Preserve through the Preserve

Blog.

A water bulletin (Appendix 5), highlighting the water classification process and the role of stakeholders was circulated to organizational stakeholders and other interested parties in late November 2004. For most this was the launching point for the water classification project and will continue to be used as an introductory tool for all stakeholders. In addition, *Up the Creek* (Appendix 6), the Meduxnekeag River Association newsletter, was circulated to all members and made available locally.

The second water bulletin is planned for Spring 2005 (theme: water quality within the Meduxnekeag Watershed based on the analysis of the previous 3 years sampling) and a newsletter will be published in early Summer to update stakeholders on the water classification process. Both will be added to the website as published.

#### Interacting with stakeholders

Over the past 8 months (since August 2004) the Meduxnekeag River Association has participated in numerous meetings. Some of these have been to discuss the classification process with organization stakeholders and interested individuals in the region. Other meetings have been at the request of groups and organizations working in the region (where we have taken the opportunity to introduce or discuss the classification project). Specific meetings include:

Provincial 4H Retreat

Date: November 2004

Host: NB 4H Council

Attendees: local 4H leaders and 4H members from the region and other parts of NB

Youth Environmental Forum

Date: November 2004

Host: Falls Brook Centre

Attendees: high school students from the region and other parts of NB

Phase III of the Meduxnekeag River/Downtown Woodstock Stream rehabilitation

Date: January 11, 2005

Host: Town of Woodstock

Attendees: Ducks Unlimited, Department of Transportation, Department of Natural Resources, Department of Environment, BDA Associates, Town of Woodstock,

Mapping the St. John River - Florenceville to Meductic Pilot project

Date: February 22, 2005

Host: St. John River Society

Present: Carleton County Historical Society, Jolly Farmer, Natech Environmental Consultants, Meduxnekeag River Association, St. John River Society, Greater Woodstock Tourism Partnership

Private Land Conservation Workshop

Date: March 4, 2005

Host: Canadian Parks and Wilderness Society – New Brunswick Chapter

Attendees: Meduxnekeag River Association, Nature Conservancy Canada, Department of Natural Resources and Energy, Nature Trust of New Brunswick, Community Land Trust, Fundy Model Forest, Pollett River Watershed Project, Cocagne Sustainable Development, Fredericton Watershed Coalition

### Involving volunteers

To date the majority of our project has not directly targeted the involvement of volunteers, although over the years a number of individuals have assisted in the water quality sampling process (Appendix 7)

The coming year will see considerable effort placed on the recruitment of volunteers for various activities related to the ongoing monitoring of water quality as well as action items. Several groups, namely the Woodstock High School Drama Club, local 4H and two Woodstock High School classes have already expressed an interest in volunteering for various projects related to the Meduxnekeag Watershed. Several individuals have also asked that their names be placed on a volunteer list.

### Other outreach

During the 2004-2005 school year, we have taken one Woodstock High School geography class and twelve elementary school classes on tours of portions of the Meduxnekeag Valley Nature Preserve. These outreach activities offer opportunities to present land use issues and introduce the classification project to students, teachers and accompanying adults.

### Water quality monitoring sites

Water quality has been monitored for the past three years (2002 to 2004) at 15 sites along the Meduxnekeag River (Appendix 8). In the fall of 2004 benthic sampling was undertaken at 5 sites. The resulting water quality data and benthic data is currently being reviewed and analyzed. A water quality report will be submitted by early May 2005 (O'Keefe, personal communication).

### Mapping activities

To date we have acquired and utilized the following mapping data:

- ESRI shapefiles
- Land ownership data (data base)
- Digital Topographic Database (1998) – ESRI shapefiles (from Service New Brunswick)\

The Town of Woodstock has offered to share their geographic information with the Meduxnekeag River Association and to work with the organization to map point sources (predominantly storm sewer outflows). The Carleton-Victoria Wood Producers have an

extensive database that may be of use as mapping activities progress and individual woodlot owners are identified and become involved in the project.

ArcView 9.0 has been the mapping tool of choice. To date we have created several maps and are now utilizing our GPS unit to map specific locations within the watershed (point source pollution, water quality monitoring sites, trails, etc. (Appendix 9).

We have also acquired the most recent aerial photographs of the watershed and assembled them into a large mosaic display for one wall of the office.

#### **IV. NEXT STEPS**

The progress of the Meduxnekeag Watershed Classification project has been reported to the Department of Environment and Local Government and the Environmental Trust Fund through on-going reporting (Appendix 10) and a preliminary workplan for 2005 (Appendix 11).

## **V. REFERENCES**

MacDougall, Andrew. Appalachian Hardwood Forest Conservations Stewardship Project: Phase I Summary Report. Nature Trust of New Brunswick, 1997.

MacDougall, Andrew and Loo, Judy. Canadian Forest Service information report M-X-204E, 1999