Report in Support of a Request for Final Classification of Water Courses of the Nashwaak Watershed under Section 8.2 of Classification Regulation 2002-13 of Clean Water Act 2002-56

Submitted to NB ELG

DATE 12 June, 2012

Compiled by

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Resident of the Nashwaak Watershed

Signed:

L J Wuest

Executive Summary

This report is compiled in support of a request for final classification of water courses of the Nashwaak Watershed under Section 8.2 of Regulation 2002-13 of the Clean Water Act 2002-56 (CWA). The official form for making a request for classification of a watercourse, which accompanies this document, instructs:

> "Attach a map showing the location of the water to be reclassified or excluded. Provide a summary of the information in support of this request. Attach any letters of public opinion."

This document is tasked with providing that background information and evidence of public opinion in fulfillment of the requirements for the request.

The report "WATER QUALITY OF THE NASHWAAK RIVER WATERSHED" (henceforth NWAI; 2003) prepared by the Nashwaak Watershed Association, Inc. was submitted to the New Brunswick Department of Environment and Local Government in 2003. The report concluded that NWAI and the residents of the watershed had accepted the pattern of classification contained in Figure 5.3 of that report (see figure 1). The text and most appendices of that report accompany this document as part of a CD "WATER QUALITY OF THE NASHWAAK RIVER WATERSHED 2003"

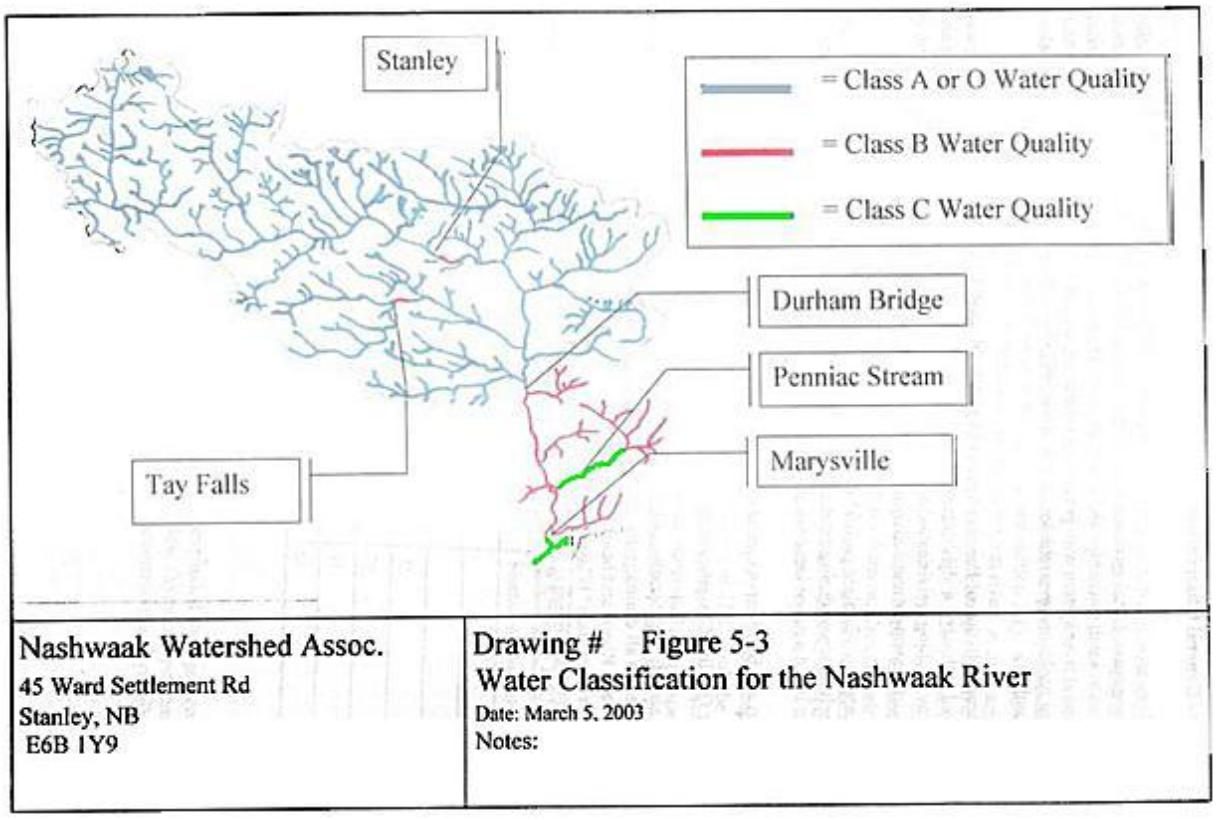

Figure 1. NWAI proposed pattern of classification for the Nashwaak Watershed.

This report quotes extensively from NWAI (2003) but also incorporates more recent observations, data and results in support of the current classification request including :

1. A report from the Canadian Rivers Institute (CRI) "Development of an interpretive model for watercourses in New Brunswick using benthic macroinvertebrate communities (Monk and Curry; 2008)
2. Studies using the Maine Bio-assessment Protocol of Davis (1999) in use by the Maine Department of Environmental Protection (DEP).

We will demonstrate in this report that there is general agreement among sources that the majority of watercourses of the Nashwaak Stream are of an extremely high quality, qualifying the Nashwaak as a Class A stream from its source to its mouth under the Classification Regulation of the CWA. However, we will also show that the public has accepted a pattern of classification that is lower than might be demanded in some sections of the watercourse, in the interest of facilitating some realities of human coexistence with the watershed.

This report examines the inaction of successive governments since 2003 in pursuing the classification issue. That inaction has largely ignored the governmental resources invested, and the time and energy invested by volunteers of the Nashwaak Watershed on the classification projects. These volunteer efforts have reflected a hope and commitment to see the high water quality of the Nashwaak entrenched in law as a means of assuring the continued protection of the watershed. Those hopes, as documented by NWAI, acknowledged the realities of the heritage, origins, existing sources of pollution and ongoing possibilities for development, extant in the Nashwaak Watershed. This report concludes:

- Water quality of sections of the Nashwaak, as of the 2003 reporting date, equaled or exceeded the classification accepted by the public in 2003. There was public acceptance of the pattern of classification reported. There has been no documented change in public attitude with respect to aspirations for the quality of the water in the watershed since that time.
- Government inaction on the NWAI water classification submission of 2003 has constituted a breach of trust with the public of the Nashwaak in general, and with the NWAI in particular. Government inaction since 2003, and continuing through 2012, has exposed the watershed to unnecessary risk to new sources of pollution, and has needlessly left the watershed without the full legal protections afforded by Classification Regulation2002-13 of the Clean Water Act 2002-56. Those risks currently include some very serious threats to the integrity of the watershed. For 5 years from 2003-2008, the Nashwaak public operated under an erroneous assumption that the government had acted in good faith in 2003 to protect the watershed following the NWAI request for classification.
- Successive governments have continued to delay attempts to finalize the classification of the Nashwaak through 2012 in violation of the CWA.

All of this points to attempts by successive governments to avoid regulatory responsibilities with respect to water in hopes of attracting industry with lax environmental regulation. Such avoidance constitutes a serious dereliction of governmental responsibility to its citizens under the CWA.

This report recommends that :

- Government immediately undertake the data collection and studies required to finalize the classification of the Nashwaak Watershed.
- Government finalize the provisional classification of the Nashwaak Watershed before any EA/EIA approvals of projects potentially detrimental to the quality of the water in the Nashwaak Watershed.

1.0 Introduction

The Nashwaak Watershed is a sub-watershed of the Saint John River Watershed of Western New Brunswick and Northeastern Maine. The report "WATER QUALITY OF THE NASHWAAK RIVER WATERSHED" (henceforth NWAI; 2003) prepared by the Nashwaak Watershed Association, documented the socio-economic and ecological importance of the watershed. NWAI(2003) described the watershed thusly:

> "With a drainage area of 1, 700 km2, the Nashwaak River flows approximately 110 km in an easterly and southerly direction from Upper Nashwaak Lake (on the York/Carleton county line) to its confluence with the Saint John River at Fredericton. The river is the largest salmon-producing tributary of the Saint John River below the influence of the Mactaquac Dam."

The NWAI report also carefully documented the physical, chemical and biological state of the river, which had coincidentally formed the basis of the NWAI classification request of 2003.

The report was submitted to the New Brunswick Department of Environment and Local Government in 2003. The report concluded that NWAI and the residents of the watershed accepted the pattern of classification contained in Figure 5.3 of the report (see figure 1).

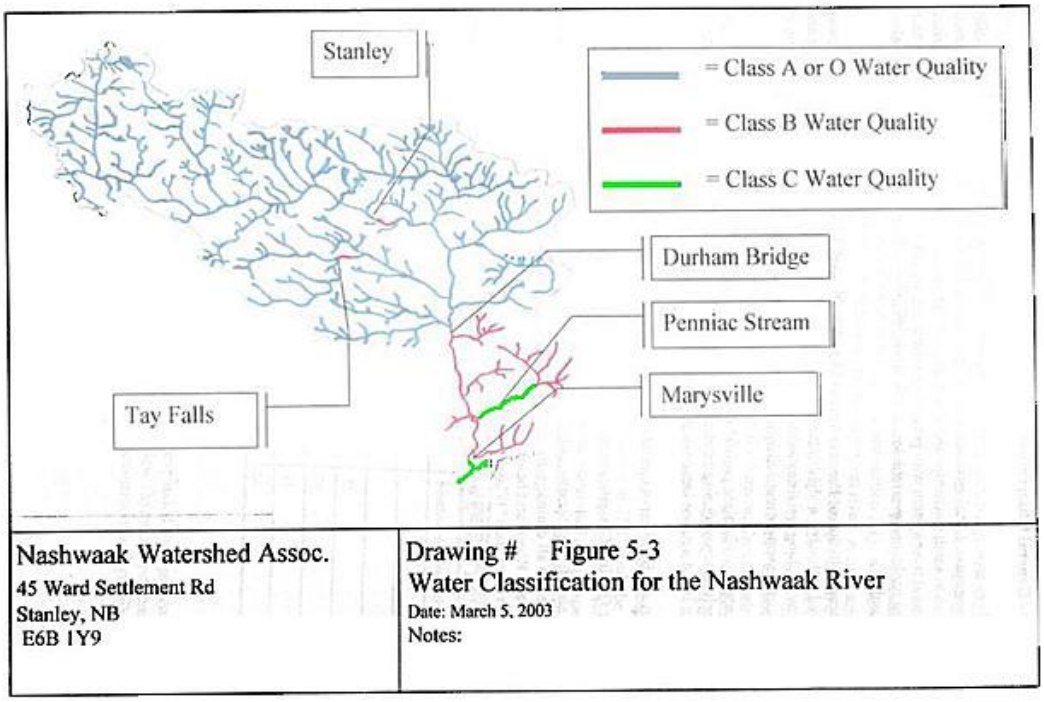

Figure 1. NWAI proposed pattern of classification for the Nashwaak Watershed.

Prior to filing of the classification report in 2003, NWAI had presented the findings and the proposal for the pattern of classification at a series of public presentations throughout the watershed. Public

comment and feedback were solicited at these open house events. To our knowledge, no formal objections to the findings of the report have ever been filed.

An important facet of the classification request was the collection of benthic macroinvertebrate data using the "rock bag" method as described by Davis (1999). This method had formed the basis of the stream classification protocol in the State of Maine since 1999. Unfortunately, the results of the rock bag analysis arrived too late to be considered in the NWAI report of 2003. The importance of this protocol for this current request is evidenced by a brief history of recent classification regulation in New Brunswick.

1.1 A brief history of stream classification in NB

Watershed assessment is an essential part of environmental protection across North America. In 1997, Canada and the United States formed an International Joint Commission to guarantee proper assessment and protection of shared boundary waters. Maine and New Brunswick were part of an eventual agreement to protect shared boundary waters.

Pursuant to that agreement, New Brunswick embarked on an ambitious study of the water quality of watersheds in the province. Volunteers in 22 watersheds spent thousands of hours collecting data to establish the existing quality of water in their respective watersheds. The scientific work associated with the initiative was funded by millions of dollars of Environmental Trust Fund grants.

In 2002, the NB government passed the current Clean Water Act 2002-56 with an accompanying water quality Classification Regulation 2002-13. Because Maine's program of bio-assessment of rivers and streams was more advanced, New Brunswick adopted the Maine Assessment Protocol for its own program.

Volunteers of 22 watershed associations spent years collecting the data for the classification of streams, rivers and other water bodies based on the Maine Bio-Assessment Protocol. These additional watercourse classifications were intended to be added to the schedule of regulated watercourses under the Water Classification Regulation of the Clean Water Act. Finalization of these classifications in the regulation would have augmented and substantially strengthened the environmental protections of the provisionally classified streams and rivers. The additional regulatory classifications would have joined the lakes of the watersheds on the schedule of classified watercourses. The government had finalized classification of all natural lakes as Class AL waters in the Classification Regulation in 2002.

In 2005, the Canadian Rivers Institute (CRI) at UNB received a three year Environmental Trust Fund (ETF) grant to develop a "made in New Brunswick" protocol of stream assessment and classification. In 2008, Wendy Monk and Allen Curry of CRI published their report "Development of an interpretive model for watercourses in New Brunswick using benthic macroinvertebrate communities". That report documented the development of a U-Net method of BMI data collection and analysis that provided an alternative to the Maine Model of analytical assessment. The new U-Net method was put forward as providing a more instantaneous snapshot of BMI colonization of stream sediment compared to the two

week long colonization of the rock bags used by the Maine Protocol. It was argued that the rock bag method created an artificial environment for BMI thus biasing analytical results.

In 2008, the province provisionally adopted the U-Net Protocol developed by CRI as the basis of Bio-Assessment of watercourses in NB. Under the new protocol "Rock Bag" data previously collected on the Nashwaak became obsolete and could no longer be used. Many other watersheds were also left in a state of indeterminate assessment.

Soon after adoption of the U-Net protocol, it was determined that the new bio-assessment method faced scientific and legal obstacles because of a statistically inadequate number of reference sites. The lack of sufficient reference sites left the method less than statistically robust. As such, the method was indefensible as a scientific and legal basis for the classification regulation. Again watersheds were left with less than adequate regulatory protections.

The government was aware of this issue soon after implementation of the U-Net Method in 2008. However, as of this writing, successive governments have taken no steps to shore up the statistical reference base of the protocol by analyzing more reference samples. This inaction has resulted in a state of extreme uncertainty in water classification, and has created the potential for much legal confusion with respect to industrial development within the province.

1.2 Implications for the Nashwaak Watershed

NWAI filed its report in 2003 with the expectation that the proposed classification pattern would be finalized and entrenched in the schedule of classified watercourses in Regulation 2002-13 of the CWA 2002-56. Because no such finalization ever occurred, the watershed has never been fully covered by the protections that the Act and Regulation were designed to achieve.

The Nashwaak Watershed is currently facing major industrial developments, including shale gas exploration and development, and mineral exploitation. The state of uncertainty in the water classification regulation reflects a lack of regulatory will on the part of government. To leave watersheds devoid of many of the protections afforded by the CWA is demonstrably irresponsible and unfair to the public of the Nashwaak Watershed .

1.3 Current State of Analysis

Monk and Curry not only developed the U-Net Protocol for stream assessment, they provided a comparison to the existing rock bag protocol. Figure 2 below shows the sites involved in the U-Net protocol formulation. The results of the analysis are shown in figure 3. It is noteworthy for the purposes of this report that no U-Net samples were ever taken at sites within the Nashwaak Watershed.

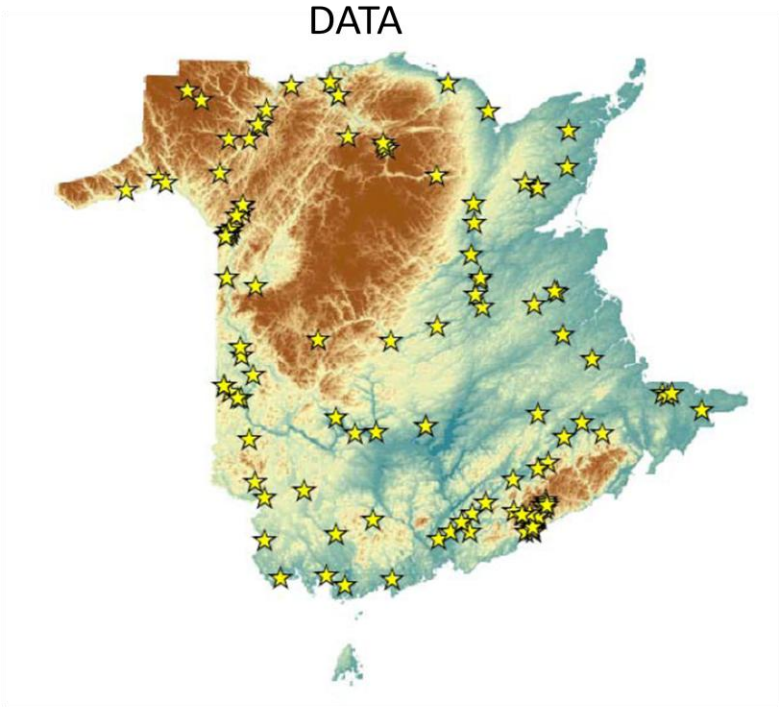

Figure 2. Reference and sample sites for Monk and Curry (2008). Used with permission from NB ETF and CRI.

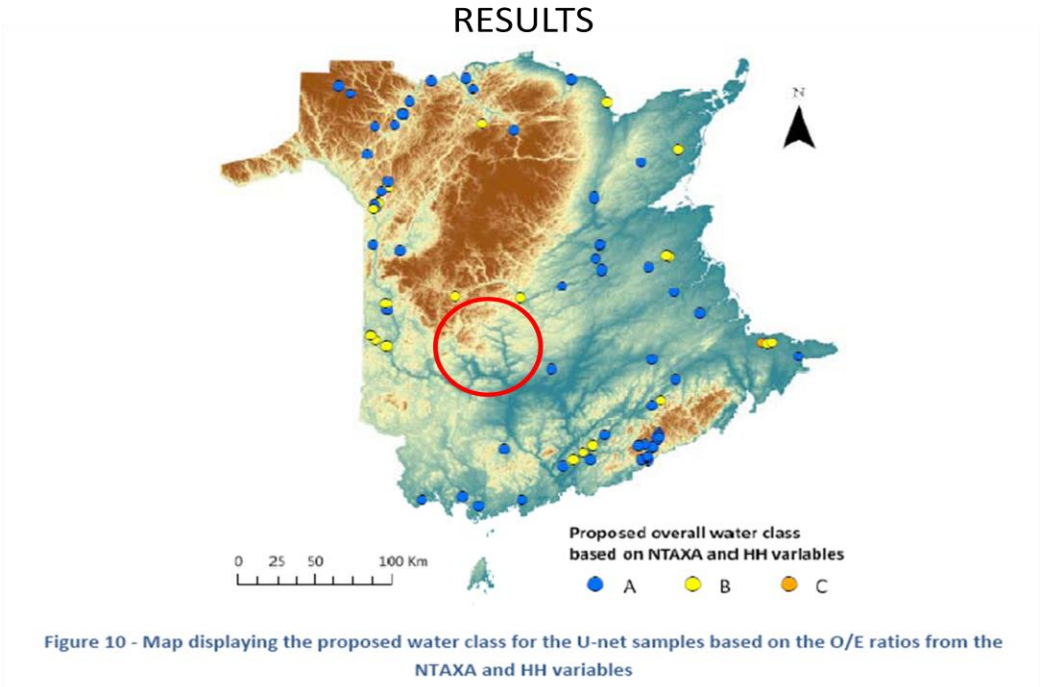

Figure 3. Results of the U-Net sampling and analysis. The absence of any reference sites or test samples in the Nashwaak Watershed is noted. Used with permission from NB ETF and CRI.

Results based on the Maine Protocol

As previously stated, Monk and Curry also compared the results of their U-Net protocol to results obtained from a rock bag protocol similar to, but not exactly the same as the Maine Protocol. Because CRI slightly modified the Maine Protocol , they renamed their output classes from A, B and C to VERY GOOD, GOOD and FAIR. Given the existence of rock bag samples on the Nashwaak, that stream was included in the results reported in figure 12 of the Monk and Curry report (see Figure 4). As evidenced in the figure, the Nashwaak samples uniformly achieved the highest class possible from source to mouth. It can be seen in figure 4 that the provincial wide distribution of the three classes follows closely the geographic distribution of the three U-Net classes of Figure 3.

It is difficult to draw firm conclusions from evidence based on separate data and methods but the circumstantial evidence of the high quality of the Nashwaak is supported by further evidence below.

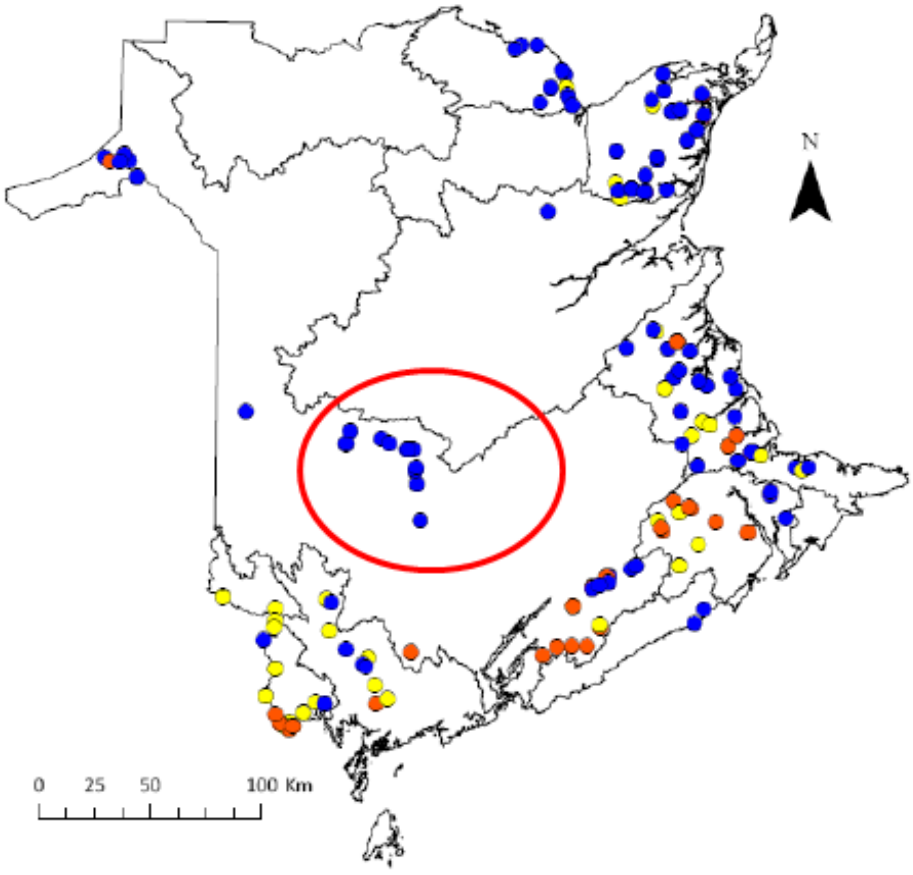

Figure 4 - Map of the proposed categories for rock bag samples based on the two stage linear discriminant function model (Very good = blue circles, Good = yellow circles and Fair = orange circles) The circled sites are along the Nashwaak. Adapted from Monk and Curry (2008). Used with permission.

Maine continues to use a rock bag protocol for stream bio-assessment. The method is part of the Code of Maine Rules 06-096 chapter 579, the legal basis of water classification in the State. The method is based on a multivariate Linear Discriminant Function model. The full particulars of the model are reported at http://water.epa.gov/scitech/swguidance/standards/wqslibrary/upload/06-096-CMR-579-2011-02-18.pdf .

Under the Maine model, Streams are classified as A, B, C or non-attainment of any class, with Class A as the highest quality. The model is best utilized with sample data for which the taxonomy of BMI has been carried to the genus level. In the case of the rock bags for the Nashwaak, the taxonomy was carried only to the family level. As such, the data are problematic for analysis by the Maine Method. However, application of the model can be informative for discussion purposes. We provide evidence that results from application of the model are relevant, if not completely scientifically defensible.

Given taxonomic analysis of stream samples at the family level, the biggest concern for applying the Maine model is a lower than actual measure of generic richness of the taxonomic order Diptera; genera in the order Diptera are inordinately associated with lower class streams. Undervaluation of true generic richness of the order Diptera can inflate the class determination of a stream under the Maine Protocol. Similarly, lack of generic taxonomy can lower generic richness of the orders Ephemeroptera, Plecoptera and Trichoptera. However, in this case the effect would be to deflate the output class, possibly compensating for an underestimate of generic richness of Diptera. Applying the model to non-generic data undoubtedly greatly increases the uncertainty of any result. However, we have tested each classification result for sensitivity to undervaluation of Diptera richness by inflating dipteral richness by the maximum count of Diptera in a triplicate sample. We based this test on the assumption that each count could be of a different genera. Based on the result of these perturbations, the effect on resultant probabilities was less than 5% in every instance. It should be noted that the effect on the resultant probabilities though small, was in a direction opposite to what was expected under the assumptions. This suggests that increased total richness under the assumption, counters the impact of dipteral richness alone.

The results of the application of the Maine Protocol to the NWAI rock bag data are portrayed in figure 5. The detailed reports of the analyses are presented in Appendix I. The stream uniformly attained Class A from near its source at Nashwaak Lake to its mouth at the St. John River in Fredericton. The "A or Better Model" of Stage 2 of the protocol yielded a minimum probability of 0.92 "Class A" compared to a 0.08 probability of "Class B or C or Non-Attainment" for the 9 sampled sites.

Like all methods currently being considered, these results are not scientifically robust or defensible, but they do demonstrate yet once again the need for prompt governmental action to collect the appropriate data as soon as possible to break the stalled progress on this issue in order to provide legal clarity for the citizens of the Nashwaak.

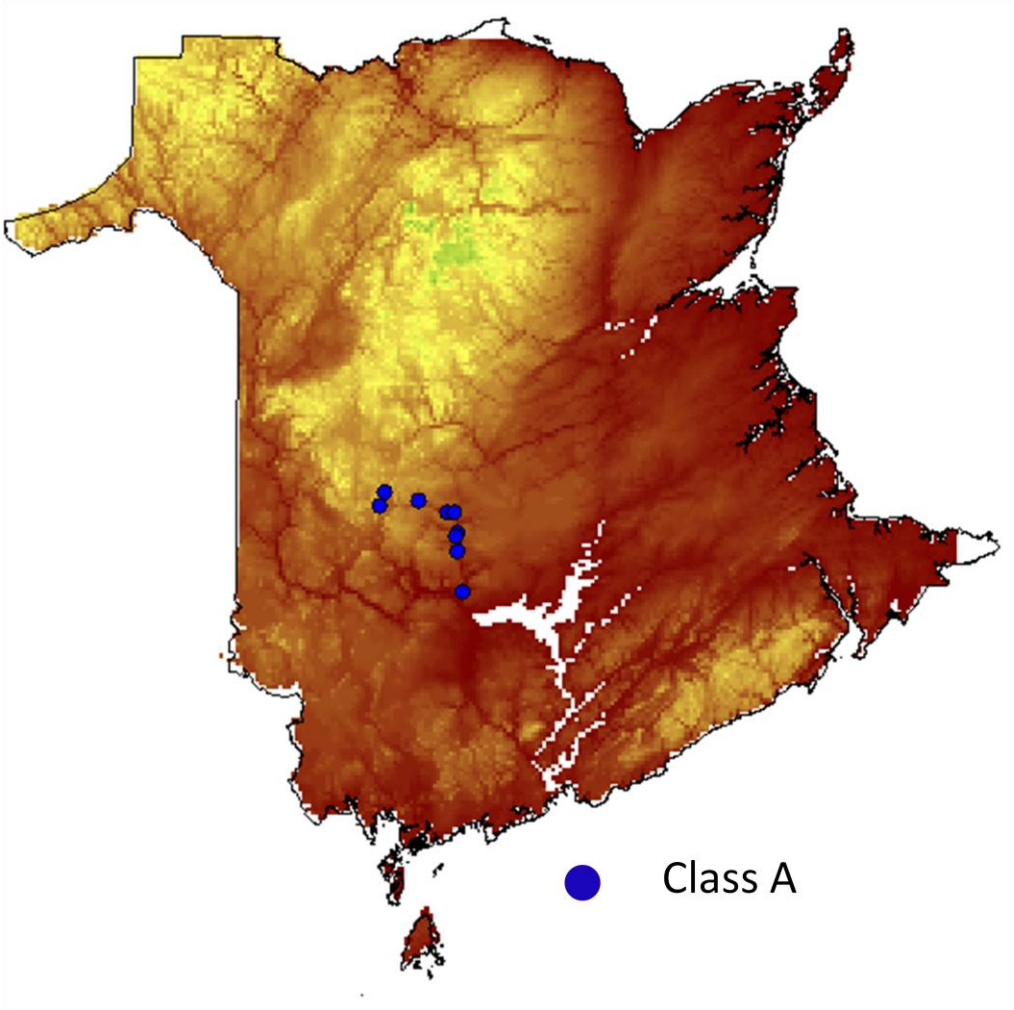

Figure 5. Nashwaak rock bag sample points .

Conclusions

Although the available data and all currently available methods suffer from lack of scientific rigour when applied in New Brunswick, the available information suggests that

- Water quality of sections of the Nashwaak, as of the 2003 reporting date, equaled or exceeded the classification accepted by NWAI and the Nashwaak public in 2003. There has been no documented change in public attitude with respect to aspirations for the quality of the water in the watershed since that time.
- Government inaction on the NWAI water classification submission of 2003 has constituted a breach of trust with the public in general, and with the NWAI in particular. Government inaction since 2003, and continuing through 2012, has exposed the watershed to unnecessary risk to

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- Successive governments have continued to delay finalization of the classification of the Nashwaak through 2012 in violation of the CWA.

All of this points to attempts by successive governments to avoid regulatory responsibilities with respect to water in hopes of attracting industry with lax or unenforced environmental regulations. Such avoidance constitutes a serious dereliction of governmental responsibility to its citizens under the CWA.

This report recommends that :

- Government immediately undertake the data collection and studies required to finalize the classification of the Nashwaak Watershed.
- Government finalize the provisional classification of the Nashwaak Watershed before any EA/EIA approvals of projects potentially detrimental to the quality of the water in the Nashwaak Watershed.

Enclosures

A CD labeled “Supplementary Material” containing:

- A copy of this report.
- Copies of emails as evidence of public support for finalization of the Classification of the Nashwaak as proposed by NWAI in 2003.
- Copy of the text and some Appendices of NWAI (2003)
- Copy of DEP. 2003. Chapter 579: Classification Attainment Evaluation Using Biological Criteria for Rivers and Streams: Title 38 Article 4-A Water Classification Program §464.5. Maine DEP.

Acknowledgements

I thank the many people who have shown patience through my constant questioning and encouragement to take action on this issue. I also thank the volunteers of NWAI who have stood as guardians of the Nashwaak for many years, and without whose work and cooperation, compilation of this report would have been impossible. I also thank Leon Tsomides and Susan Meidel of Maine DEP who have considered the available Nashwaak Rock Bag data and have kindly offered knowledgeable suggestions.

REFERENCES

Davies, S.P., L. Tsomides, J. DiFranco and D. Courtemanch. 1999. Biomonitoring retrospective: fifteen year summary for Maine rivers and streams. DEPLW199926. Maine Department of Environmental Protection, Augusta, Maine. pp 190.

Davies, S. and L. Tsomides. 2002 Methods for Biological Sampling and Analysis of Maine's Rivers and Streams. Maine Department of Environmental Protection Bureau of Land and Water Quality Division of Environmental Assessment . Augusta, Maine 04333

DEP. 2003. Chapter 579: Classification Attainment Evaluation Using Biological Criteria for Rivers and Streams: Title 38 Article 4-A Water Classification Program §464.5. Maine DEP. http://water.epa.gov/scitech/swguidance/standards/wqslibrary/upload/06-096-CMR-579-2011-02-18.pdf

Monk, W. and A. Curry. 2008. Development of an interpretive model for watercourses in New Brunswick using benthic macroinvertebrate communities. Report to NB DELG under ETF.

NWAI. 2003. WATER QUALITY OF THE NASHW AAK RIVER WATERSHED. Report to NB DELG. Fredericton, NB.

APPENDIX I Classification Summaries based on the Maine Protocol.

Aquatic Life Classification Attainment Report

Station Information

Station Number: 10540
Waterbody: Nashwaak
Town: Durham Bridge
Directions:

Latitude: **46.126374**
Longitude: **-66.612382**

Sample Information

Log Number: **00BR01AL0001** Type of Sample: Rock Bag Date Deployed July 2001
Subsample Factor: Replicates: 3 Date Retrieved Aug. 2001

Classification Attainment

Statutory Class: B **Final Determination:** A Date: 18/05/2012
Model Result with P>.6: A **Reason for Determination:** Model
Date Last Calculated: 18/05/2012 Comments:

Model Probabilities

First Stage Model			
Class A	.80	Class C	0.0
Class B	.20	NA	0.0

C or Better Model	
Class A, B, or C	1.0
Non-Attainment	0.0

B or Better Model	
Class A or B	1.0
Class C or Non-Attainment	0.0

A Model	
Class A	.99
Class B or C or Non-Attainment	.01

Model Variables

01 Total Mean Abundance	192.67	18 Relative Abundance Ephemeroptera	0.24
02 Generic Richness	23.00	19 EPT Generic Richness	18.00
03 Plecoptera Mean Abundance	33.00	21 Sum of Abundances: *Dicrotendipes, Micropsectra, Parachironomus, Helobdella*	0.00
04 Ephemeroptera Mean Abundance	45.67		-
05 Shannon-Wiener Generic Diversity	3.84	23 Relative Generic Richness- Plecoptera	0.00
06 Hilsenhoff Biotic Index	3.39	25 Sum of Abundances: *Cheumatopsyche Cricotopus, Tanytarsus, Ablabesmyia*	0.00
07 Relative Abundance - Chironomidae	0.12		-
08 Relative Generic Richness Diptera	0.17	26 Sum of Abundances: *Acroneuria, Maccaffertium, Stenonema*	0.00
09 *Hydropsyche* Abundance	52.33		-
11 *Cheumatopsyche* Abundance	0.00	28 EP Generic Richness/14	0.57
12 EPT Generic Richness/ Diptera Generic Richness	4.50	30 Presence of Class A Indicator Taxa/7	0.00
	-		
13 Relative Abundance - Oligochaeta	0.00		
15 Perlidae Mean Abundance (Family Functional Group)	1.00		
	-		
16 Tanypodinae Mean Abundance (Family Functional Group)	0.00		
	-		
17 Chironomini Abundance (Family Functional Group)	6.00		

Aquatic Life Classification Attainment Report

Station Information

Station Number: 10543
Waterbody: Nashwaak
Town: Taymouth
Directions:

Latitude: **46.192243**
Longitude: **-66.616010**

Sample Information

Log Number: **00BR01AL0011** | Type of Sample: Rock Bag | Date Deployed July 2001
Subsample Factor: | Replicates: 3 | Date Retrieved Aug. 2001

Classification Attainment

Statutory Class: A | **Final Determination:** A | Date: 18/05/2012
Model Result with P>.6: A | **Reason for Determination:** Model
Date Last Calculated: 18/05/2012 | Comments:

Model Probabilities

First Stage Model			
Class A	.92	Class C	0.0
Class B	.08	NA	0.0

C or Better Model	
Class A, B, or C	1.0
Non-Attainment	0.0

B or Better Model	
Class A or B	1.0
Class C or Non-Attainment	0.0

A Model	
Class A	1.0
Class B or C or Non-Attainment	0.0

Model Variables

01 Total Mean Abundance	71.00
02 Generic Richness	25.00
03 Plecoptera Mean Abundance	17.00
04 Ephemeroptera Mean Abundance	33.67
05 Shannon-Wiener Generic Diversity	3.82
06 Hilsenhoff Biotic Index	3.08
07 Relative Abundance - Chironomidae	0.11
08 Relative Generic Richness Diptera	0.16
09 *Hydropsyche* Abundance	10.67
11 *Cheumatopsyche* Abundance	0.00
12 EPT Generic Richness/ Diptera Generic Richness	5.00
13 Relative Abundance - Oligochaeta	- 0.00
15 Perlidae Mean Abundance (Family Functional Group)	1.00
16 Tanypodinae Mean Abundance (Family Functional Group)	- 0.00
17 Chironomini Abundance (Family Functional Group)	- 1.67
18 Relative Abundance Ephemeroptera	0.47
19 EPT Generic Richness	20.00
21 Sum of Abundances: *Dicrotendipes, Micropsectra, Parachironomus, Helobdella*	0.00 -
23 Relative Generic Richness- Plecoptera	0.00
25 Sum of Abundances: *Cheumatopsyche Cricotopus, Tanytarsus, Ablabesmyia*	0.00 -
26 Sum of Abundances: *Acroneuria, Maccaffertium, Stenonema*	0.00 -
28 EP Generic Richness/14	0.71
30 Presence of Class A Indicator Taxa/7	0.00

Aquatic Life Classification Attainment Report

Station Information

Station Number: 10546
Waterbody: Nashwaak
Town: MacLaggan Bridge
Directions:

Latitude: **46.270113**
Longitude: **-66.671425**

Sample Information

Log Number: **00BR01AL0013** | Type of Sample: Rock Bag | Date Deployed July 2001
Subsample Factor: | Replicates: 3 | Date Retrieved Aug. 2001

Classification Attainment

Statutory Class: A | **Final Determination:** A | Date: 18/05/2012
Model Result with P>.6: A | **Reason for Determination:** Model
Date Last Calculated: 18/05/2012 | Comments:

Model Probabilities

First Stage Model			
Class A	.74	Class C	0.01
Class B	.25	NA	0.00

C or Better Model	
Class A, B, or C	1.0
Non-Attainment	0.0

B or Better Model	
Class A or B	1.0
Class C or Non-Attainment	0.0

A Model	
Class A	.98
Class B or C or Non-Attainment	.02

Model Variables

01 Total Mean Abundance	99.67
02 Generic Richness	24.00
03 Plecoptera Mean Abundance	12.00
04 Ephemeroptera Mean Abundance	52.33
05 Shannon-Wiener Generic Diversity	3.68
06 Hilsenhoff Biotic Index	3.87
07 Relative Abundance - Chironomidae	0.16
08 Relative Generic Richness Diptera	0.17
09 *Hydropsyche* Abundance	27.00
11 *Cheumatopsyche* Abundance	0.00
12 EPT Generic Richness/ Diptera Generic Richness	4.50
13 Relative Abundance - Oligochaeta	- 0.00
15 Perlidae Mean Abundance (Family Functional Group)	0.99
16 Tanypodinae Mean Abundance (Family Functional Group)	- 0.00
17 Chironomini Abundance (Family Functional Group)	- 3.33
18 Relative Abundance Ephemeroptera	0.53
19 EPT Generic Richness	18.00
21 Sum of Abundances: *Dicrotendipes, Micropsectra, Parachironomus, Helobdella*	0.00 -
23 Relative Generic Richness- Plecoptera	0.00
25 Sum of Abundances: *Cheumatopsyche Cricotopus, Tanytarsus, Ablabesmyia*	0.00 -
26 Sum of Abundances: *Acroneuria, Maccaffertium, Stenonema*	0.00 -
28 EP Generic Richness/14	0.79
30 Presence of Class A Indicator Taxa/7	0.00

Aquatic Life Classification Attainment Report

Station Information

Station Number: 10547
Waterbody: Nashwaak
Town: Currieburg
Directions:

Latitude: **46.312817**
Longitude: **-66.817287**

Sample Information

Log Number: **00BR01AL0015** | Type of Sample: Rock Bag | Date Deployed July 2001
Subsample Factor: | Replicates: 3 | Date Retrieved Aug. 2001

Classification Attainment

Statutory Class: A | **Final Determination:** A | Date: 18/05/2012
Model Result with P>.6: A | **Reason for Determination:** Model
Date Last Calculated: 18/05/2012 | Comments:

Model Probabilities

First Stage Model			
Class A	.95	Class C	0.0
Class B	.05	NA	0.0

C or Better Model	
Class A, B, or C	1.0
Non-Attainment	0.0

B or Better Model	
Class A or B	1.0
Class C or Non-Attainment	0.0

A Model	
Class A	1.0
Class B or C or Non-Attainment	0.0

Model Variables

01 Total Mean Abundance	140.00
02 Generic Richness	25.00
03 Plecoptera Mean Abundance	21.33
04 Ephemeroptera Mean Abundance	36.00
05 Shannon-Wiener Generic Diversity	3.38
06 Hilsenhoff Biotic Index	2.27
07 Relative Abundance - Chironomidae	0.08
08 Relative Generic Richness Diptera	0.16
09 *Hydropsyche* Abundance	6.67
11 *Cheumatopsyche* Abundance	0.00
12 EPT Generic Richness/ Diptera Generic Richness	4.75
13 Relative Abundance - Oligochaeta	- 0.00
15 Perlidae Mean Abundance (Family Functional Group)	1.00
16 Tanypodinae Mean Abundance (Family Functional Group)	- 0.00
17 Chironomini Abundance (Family Functional Group)	- 4.33
18 Relative Abundance Ephemeroptera	0.26
19 EPT Generic Richness	19.00
21 Sum of Abundances: *Dicrotendipes, Micropsectra, Parachironomus, Helobdella*	0.00 -
23 Relative Generic Richness- Plecoptera	0.00
25 Sum of Abundances: *Cheumatopsyche Cricotopus, Tanytarsus, Ablabesmyia*	0.00 -
26 Sum of Abundances: *Acroneuria, Maccaffertium, Stenonema*	0.00 -
28 EP Generic Richness/14	0.71
30 Presence of Class A Indicator Taxa/7	0.00

Aquatic Life Classification Attainment Report

Station Information

Station Number: 10549
Waterbody: Nashwaak
Town: Nashwaak Narrows
Directions:

Latitude: **46.290666**
Longitude: **-67.024591**

Sample Information

Log Number: **00BR01AL0017** | Type of Sample: Rock Bag | Date Deployed July 2001
Subsample Factor: | Replicates: 3 | Date Retrieved Aug. 2001

Classification Attainment

Statutory Class: A | **Final Determination:** A | Date: 18/05/2012
Model Result with P>.6: A | **Reason for Determination:** Model
Date Last Calculated: 18/05/2012 | Comments:

Model Probabilities

First Stage Model			
Class A	.64	Class C	0.02
Class B	.34	NA	0.00

C or Better Model	
Class A, B, or C	1.0
Non-Attainment	0.0

B or Better Model	
Class A or B	.99
Class C or Non-Attainment	.01

A Model	
Class A	.92
Class B or C or Non-Attainment	.08

Model Variables

01 Total Mean Abundance	73.33
02 Generic Richness	16.00
03 Plecoptera Mean Abundance	4.33
04 Ephemeroptera Mean Abundance	9.67
05 Shannon-Wiener Generic Diversity	2.46
06 Hilsenhoff Biotic Index	3.76
07 Relative Abundance - Chironomidae	0.08
08 Relative Generic Richness Diptera	0.19
09 *Hydropsyche* Abundance	55.33
11 *Cheumatopsyche* Abundance	0.00
12 EPT Generic Richness/ Diptera Generic Richness	4.00 -
13 Relative Abundance - Oligochaeta	0.00
15 Perlidae Mean Abundance (Family Functional Group)	0.97 -
16 Tanypodinae Mean Abundance (Family Functional Group)	0.00 -
17 Chironomini Abundance (Family Functional Group)	0.00
18 Relative Abundance Ephemeroptera	0.13
19 EPT Generic Richness	12.00
21 Sum of Abundances: *Dicrotendipes, Micropsectra, Parachironomus, Helobdella*	0.00 -
23 Relative Generic Richness- Plecoptera	0.00
25 Sum of Abundances: *Cheumatopsyche Cricotopus, Tanytarsus, Ablabesmyia*	0.00 -
26 Sum of Abundances: *Acroneuria, Maccaffertium, Stenonema*	0.00 -
28 EP Generic Richness/14	0.57
30 Presence of Class A Indicator Taxa/7	0.00

Aquatic Life Classification Attainment Report

Station Information

Station Number: 10536
Waterbody: Nashwaak
Town: Marysville
Directions:

Latitude: **45.979304**
Longitude: **-66.590956**

Sample Information

Log Number: **00BR01AL0036** | Type of Sample: Rock Bag | Date Deployed July 2001
Subsample Factor: | Replicates: 3 | Date Retrieved Aug. 2001

Classification Attainment

Statutory Class: A | **Final Determination:** A | Date: 18/05/2012
Model Result with P>.6: A | **Reason for Determination:** Model
Date Last Calculated: 18/05/2012 | Comments:

Model Probabilities

First Stage Model			
Class A	.90	Class C	0.00
Class B	.10	NA	0.00

C or Better Model	
Class A, B, or C	1.0
Non-Attainment	0.0

B or Better Model	
Class A or B	1.0
Class C or Non-Attainment	0.0

A Model	
Class A	1.0
Class B or C or Non-Attainment	0.0

Model Variables

01 Total Mean Abundance	67.00
02 Generic Richness	19.00
03 Plecoptera Mean Abundance	20.00
04 Ephemeroptera Mean Abundance	13.67
05 Shannon-Wiener Generic Diversity	3.47
06 Hilsenhoff Biotic Index	3.08
07 Relative Abundance - Chironomidae	0.09
08 Relative Generic Richness Diptera	0.16
09 *Hydropsyche* Abundance	26.33
11 *Cheumatopsyche* Abundance	0.00
12 EPT Generic Richness/ Diptera Generic Richness	5.00 -
13 Relative Abundance - Oligochaeta	0.00
15 Perlidae Mean Abundance (Family Functional Group)	1.00 -
16 Tanypodinae Mean Abundance (Family Functional Group)	0.00 -
17 Chironomini Abundance (Family Functional Group)	1.33
18 Relative Abundance Ephemeroptera	0.20
19 EPT Generic Richness	15.00
21 Sum of Abundances: *Dicrotendipes, Micropsectra, Parachironomus, Helobdella*	0.00 -
23 Relative Generic Richness- Plecoptera	0.00
25 Sum of Abundances: *Cheumatopsyche Cricotopus, Tanytarsus, Ablabesmyia*	0.00 -
26 Sum of Abundances: *Acroneuria, Maccaffertium, Stenonema*	0.00 -
28 EP Generic Richness/14	0.57
30 Presence of Class A Indicator Taxa/7	0.00

Aquatic Life Classification Attainment Report

Station Information

Station Number: 10545
Waterbody: Nashwaak
Town: Cross Creek Station
Directions:

Latitude: **46.270074**
Longitude: **-66.636646**

Sample Information

Log Number: **00BR01AL0038** | Type of Sample: Rock Bag | Date Deployed July 2001
Subsample Factor: | Replicates: 3 | Date Retrieved Aug. 2001

Classification Attainment

Statutory Class: A | **Final Determination:** A | Date: 18/05/2012
Model Result with P>.6: A | **Reason for Determination:** Model
Date Last Calculated: 18/05/2012 | Comments:

Model Probabilities

First Stage Model			
Class A	.83	Class C	0.00
Class B	.17	NA	0.00

C or Better Model	
Class A, B, or C	1.0
Non-Attainment	0.0

B or Better Model	
Class A or B	1.0
Class C or Non-Attainment	0.0

A Model	
Class A	.99
Class B or C or Non-Attainment	.01

Model Variables

01 Total Mean Abundance	111.33
02 Generic Richness	23.00
03 Plecoptera Mean Abundance	21.67
04 Ephemeroptera Mean Abundance	31.00
05 Shannon-Wiener Generic Diversity	3.66
06 Hilsenhoff Biotic Index	3.48
07 Relative Abundance - Chironomidae	0.10
08 Relative Generic Richness Diptera	0.17
09 *Hydropsyche* Abundance	43.33
11 *Cheumatopsyche* Abundance	0.00
12 EPT Generic Richness/ Diptera Generic Richness	4.50
13 Relative Abundance - Oligochaeta	- 0.00
15 Perlidae Mean Abundance (Family Functional Group)	1.00
16 Tanypodinae Mean Abundance (Family Functional Group)	- 0.00
17 Chironomini Abundance (Family Functional Group)	- 1.00
18 Relative Abundance Ephemeroptera	0.28
19 EPT Generic Richness	18.00
21 Sum of Abundances: *Dicrotendipes, Micropsectra, Parachironomus, Helobdella*	0.00 -
23 Relative Generic Richness- Plecoptera	0.00
25 Sum of Abundances: *Cheumatopsyche Cricotopus, Tanytarsus, Ablabesmyia*	0.00 -
26 Sum of Abundances: *Acroneuria, Maccaffertium, Stenonema*	0.00 -
28 EP Generic Richness/14	0.79
30 Presence of Class A Indicator Taxa/7	0.00

Aquatic Life Classification Attainment Report

Station Information

Station Number: 10449
Waterbody: Nashwaak
Town: Napadogan Stream
Directions:

Latitude: **46.34317**
Longitude: **-67.00061**

Sample Information

Log Number: **00BR01AL0047** Type of Sample: Rock Bag Date Deployed July 2001
Subsample Factor: Replicates: 3 Date Retrieved Aug. 2001

Classification Attainment

Statutory Class: A **Final Determination:** A Date: 18/05/2012
Model Result with P>.6: A **Reason for Determination:** Model
Date Last Calculated: 18/05/2012 Comments:

Model Probabilities

First Stage Model			
Class A	.95	Class C	0.00
Class B	.05	NA	0.00

C or Better Model	
Class A, B, or C	1.0
Non-Attainment	0.0

B or Better Model	
Class A or B	1.0
Class C or Non-Attainment	0.0

A Model	
Class A	1.0
Class B or C or Non-Attainment	0.0

Model Variables

01 Total Mean Abundance	143.33
02 Generic Richness	23.00
03 Plecoptera Mean Abundance	21.33
04 Ephemeroptera Mean Abundance	19.67
05 Shannon-Wiener Generic Diversity	3.48
06 Hilsenhoff Biotic Index	2.13
07 Relative Abundance - Chironomidae	0.06
08 Relative Generic Richness Diptera	0.17
09 *Hydropsyche* Abundance	43.33
11 *Cheumatopsyche* Abundance	0.00
12 EPT Generic Richness/ Diptera Generic Richness	4.50
13 Relative Abundance - Oligochaeta	- 0.00
15 Perlidae Mean Abundance (Family Functional Group)	1.00
16 Tanypodinae Mean Abundance (Family Functional Group)	- 0.00
17 Chironomini Abundance (Family Functional Group)	- 1.00
18 Relative Abundance Ephemeroptera	0.14
19 EPT Generic Richness	18.00
21 Sum of Abundances: *Dicrotendipes, Micropsectra, Parachironomus, Helobdella*	0.00 -
23 Relative Generic Richness- Plecoptera	0.00
25 Sum of Abundances: *Cheumatopsyche Cricotopus, Tanytarsus, Ablabesmyia*	0.00 -
26 Sum of Abundances: *Acroneuria, Maccaffertium, Stenonema*	0.00 -
28 EP Generic Richness/14	0.79
30 Presence of Class A Indicator Taxa/7	0.00

Aquatic Life Classification Attainment Report

Station Information

Station Number: 10542
Waterbody: Nashwaak
Town: Tay Creek
Directions:

Latitude: **46.181097**
Longitude: **-66.621027**

Sample Information

Log Number: **00BR01AL0020** | Type of Sample: Rock Bag | Date Deployed: July 2001
Subsample Factor: | Replicates: 2 | Date Retrieved: Aug. 2001

Classification Attainment

Statutory Class: A | **Final Determination:** A | Date: 18/05/2012
Model Result with P>.6: A | **Reason for Determination:** Model
Date Last Calculated: 18/05/2012 | Comments:

Model Probabilities

First Stage Model			
Class A	.84	Class C	0.00
Class B	.16	NA	0.00

C or Better Model	
Class A, B, or C	1.0
Non-Attainment	0.0

B or Better Model	
Class A or B	1.0
Class C or Non-Attainment	0.0

A Model	
Class A	.99
Class B or C or Non-Attainment	.01

Model Variables

01 Total Mean Abundance	217.50
02 Generic Richness	23.00
03 Plecoptera Mean Abundance	52.00
04 Ephemeroptera Mean Abundance	84.50
05 Shannon-Wiener Generic Diversity	3.39
06 Hilsenhoff Biotic Index	2.98
07 Relative Abundance - Chironomidae	0.10
08 Relative Generic Richness Diptera	0.17
09 *Hydropsyche* Abundance	84.00
11 *Cheumatopsyche* Abundance	0.00
12 EPT Generic Richness/ Diptera Generic Richness	4.50
13 Relative Abundance - Oligochaeta	- 0.00
15 Perlidae Mean Abundance (Family Functional Group)	1.00
16 Tanypodinae Mean Abundance (Family Functional Group)	- 0.00
17 Chironomini Abundance (Family Functional Group)	- 1.00
18 Relative Abundance Ephemeroptera	0.39
19 EPT Generic Richness	18.00
21 Sum of Abundances: *Dicrotendipes, Micropsectra, Parachironomus, Helobdella*	0.00 -
23 Relative Generic Richness- Plecoptera	0.00
25 Sum of Abundances: *Cheumatopsyche Cricotopus, Tanytarsus, Ablabesmyia*	0.00 -
26 Sum of Abundances: *Acroneuria, Maccaffertium, Stenonema*	0.00 -
28 EP Generic Richness/14	0.71
30 Presence of Class A Indicator Taxa/7	0.00