Joint Report
of the Two Rivers-Ottauquechee Regional Commission
and
the Windham Regional Commission
pursuant to Section E 700 and 700.1 of Act SS01 of the 2009 Legislative Session

Recommended Water Management Types for the White River watershed (Basin #9) and the West, Williams and Saxtons Rivers' watersheds (Basin #11)

Executive Summary

This report, and accompanying data and maps, is meant to satisfy legislative intent that the two regional planning commissions develop a Water Management Typing proposal for the Class B waters of Basin #11 and #9, in the absence of such typing in basin plans for these basins pursuant to the Vermont Water Quality Standards (VWQS) §1-02 D.5 (*In basins that include Class B waters which have not been allocated into one or more Water Management Types pursuant to § 3-06 of these rules, the basin plan shall propose the appropriate Water Management Type or Types based on both the existing water quality and reasonably attainable and desired water quality management goals.*) This typing proposal was developed in accordance with our understanding of the VWQS, including the anti-degradation policy (VWQS §1-03 *All waters shall be managed in accordance with these rules to protect, maintain, and improve water quality.*) The proposal is to provide for designation of undifferentiated Class B waters into types B1, B2, B3 (VWQS §3-06 *To provide for the protection and management of Class B waters in a manner that more explicitly recognizes their attainable uses and the level of water quality protection already afforded under the anti-degradation policy (see § 1-03 of these rules), all Class B waters shall eventually be designated as being either Water Management Type 1, Type 2 or Type 3. . . .*).

Introduction

In the FY 2010 budget for the state of Vermont (Act SS01) passed in the spring of 2009, the Legislature directed the Agency of Natural Resources to grant funds to the Two Rivers Ottauquechee Regional Commission (TRORC) and Windham Regional Commission (WRC) for the purpose of developing recommended water management type designations for the White River basin and the West, Williams and Saxtons River basin, respectively. The legislative language also directed the commissions to submit to the Agency of Natural Resources and the Natural Resources Board the recommended water management type designations by January 31, 2011. This report is the recommendation of the two commissions.

This report contains recommended water management types (WMTs) for waters in Basin #9, the White River watershed and Basin #11, the West, Williams and Saxtons Rivers' watersheds, and briefly reviews the history of water management typing, discusses how we arrived at the

recommendations and notes some items not called for in the legislation but that are pertinent or were raised during our development of the recommendations.

We were tasked to type "waters" in two basins, #9 and #11. The areas covered by river basins in Vermont were designated years ago by the Agency of Natural Resources and may contain one of more river watersheds. "Waters" are defined in 10 VSA, § 1251, as "all rivers, streams, creeks, brooks, reservoirs, ponds, lakes, springs and all bodies of surface waters, artificial or natural, which are contained within, flow through or border upon the state or any portion of it." To find the initial set of waters, we used the local resolution of the latest version of the National Hydrography Dataset (known as the Vermont Hydrography Dataset) as the base source for the stream and pond data layer and then clipped the data to the basin boundaries.

In the case of Basin #9, the basin is a single watershed that ends at the mouth of the White River where it joins the Connecticut River in Hartford, Vermont. Basin #11 includes the watersheds of West, Williams and Saxtons Rivers to their respective confluences with the Connecticut River in Brattleboro, Rockingham and Westminster. Basin #11 does not include the small watersheds between these confluences that also drain into the Connecticut.

Current Classification and Typing

Pursuant to 10 VSA, § 1252, all waters in Vermont were to be designated as Class A or B. Class A waters are defined by this section of law as those waters suitable for public water supply with disinfection when necessary and of a uniformly excellent character, or as high quality waters which have significant ecological value. Class B waters are defined as those waters suitable for bathing and recreation, irrigation and agricultural uses, good fish habitat, good aesthetic value, and acceptable for public water supply with filtration and disinfection. All waters must meet at least a B standard. Waters not meeting these standards are still Class B, but are listed as impaired and must be restored to meet at least the minimum allowable criteria for Class B waters.

Individual waters were legislatively placed en masse into Class A or B under 10 VSA § 1253 as follows:

> (a) The waters of all lakes, ponds and reservoirs, natural or artificial, used exclusively for public water supply prior to July 1, 1971, and all waters flowing into such lakes, ponds and reservoirs, and all waters located above 2,500 feet altitude, National Geodetic Vertical Datum, are designated Class A waters and shall be maintained as such unless reclassified.
> (b) The remaining waters except as otherwise classified by the board prior to July 1, 1971, are designated Class B waters and shall be maintained as such unless reclassified. All waters designated as Class C waters prior to July 1, 1992, are designated Class B waters and shall be maintained as such unless reclassified.

Subsequently, Class A waters were further divided into Class A2 and Class A1 waters by the Vermont Water Quality Standards (VWQS). In Basin #9, the VWQS currently lists three A2 waters: 2 miles of Farnsworth Brook and all waters within its watershed in the Town of Braintree upstream of the water intake as water supply for the Village of East Braintree; and Lake Casper

& Lake John (both of which are actually very small ponds) and all waters within their watersheds in the Town of Royalton for the Village of South Royalton and F.D. #1 water supply. Class A1 waters are listed in the VWQS as all waters in this basin above 2,500 feet.

In Basin #11, four waters are listed as A2: Sunset Lake and Stickney Brook and all waters in their watersheds above the water intake (approximately 2.5 miles from Sunset Lake) in the Towns of Marlboro, Newfane, and Brattleboro (3.0 sq. miles) for the Brattleboro water supply (it should be noted that the Sunset Lake and Stickney Brook watershed also includes land in the town of Dummerston); Styles Brook and all waters in its watershed above the diversion to Styles Reservoir (1.0 sq. miles) as the emergency water supply for Stratton Corp.; Chester Reservoir and the outlet stream above the water intake (1.0 sq. miles) as the emergency Chester water supply; and Bolles Pond Brook and all waters in its watershed above the water intake in the Town of Rockingham (1.0 sq. miles) as the Village of Saxtons River & Vermont Academy water supply.

Designated A1 waters include all waters above 2,500 feet, as well as three lower elevation stream segments that were reclassified by the former Water Resources Board in the 1990s upon citizen petition: approximately 2.5 miles of Kidder Brook and all its headwaters, including named and unnamed tributaries, beginning in the Town of Stratton at an elevation of 2,500 feet and continuing downstream to its confluence with the North Branch in the Town of Jamaica; approximately 6.0 miles of Cobb Brook and its tributaries beginning in the Town of Windham at an elevation of 2,500 feet and continuing downstream to its confluence with the West River in the Town of Jamaica; and the upper reach of the Winhall River including the river's two principal headwaters, beginning at an elevation of 2,500 feet in the Town of Stratton, and continuing downstream a distance of approximately 7.4 miles to the point at which the river crosses the current boundary of the Green Mountain National Forest in the Town of Winhall.

Except as detailed above, all other waters in Basins #9 and #11 are currently Class B. The VWQS revisions in 2000 established that all Class B waters would eventually be assigned into one of three water management types (WMTs) – B1, B2 and B3.

Section 3-06 of the VWQS states the purpose for WMTs as follows:

> "To provide for the protection and management of Class B waters in a manner that more explicitly recognizes their attainable uses and the level of water quality protection already afforded under the anti-degradation policy (see Section1-03 of these rules), all Class B waters shall eventually be designated as being either Water Management Type 1, Type 2 or Type 3."

Section 1-02 D.5 of the VWQS describes how these types are to be developed:

> "In basins that include Class B waters which have not been allocated into one or more Water Management Types pursuant to §3-06 of these rules, the basin plan shall propose the appropriate Water Management Type or Types based on both the existing water quality and reasonably attainable and desired water quality management goals."

TRORC and WRC would therefore logically have looked to the Basin #9 and Basin #11 basin plans for recommendations, but there is no plan for Basin #9 and there are no typing recommendations in the plan for Basin #11. All 17 basin plans were required by 10 VSA § 1253

to be completed by 2006 and updated again by 2011. To date, however, only two basin plans (#2 and #9) have contained recommendations for assigning WMTs and both of those plans have expired. The recommendations for typing in Basin #9 were considered by the Vermont Water Resources Panel for adoption, but were deemed to be seriously flawed and the petition to adopt them was dropped. We have included the maps showing proposed WMT assignments that were included in that expired plan for Basin #9 for comparison.

The basin plan for Basin #11, covering the West, Williams and Saxtons Rivers was adopted in a legislatively directed grace period in 2008 that allowed for the adoption of that plan without a recommendation for assignation of WMTs. The legislation establishing that grace period also directed that the Basin 11 plan be updated to include recommended WMT assignments by June 2010. This update was not done.

Therefore, WRC and TRORC have approached typing as somewhat of blank slate. While water management typing is a decade old concept, it has never been successfully used as a management tool, and no WMT assignments have been formally adopted to date. Lengthy discussions were held and long memos written in early 2006 dealing with how typing was to be approached, but these were never solidified into an agreed upon approach.

TRORC and WRC have each used a different approach that is described below, but we were guided by the same principles and believe that our results are comparable. Using the principle of anti-degradation, TRORC and WRC believe that waters should not be typed below their actual quality as shown by existing data. Though the anti-degradation policy found in the VWQS, "*Section 1-03 Anti-Degradation Policy, A. General Policy All waters shall be managed in accordance with these rules to protect, maintain, and improve water quality"* and an implementation rule (when that is adopted) are meant to apply to specific cases, the central tenet of anti-degradation is to severely restrict degradation. Therefore, if data exists (including landscape data that is rationally connected to water quality) to indicate that current water quality is B1, B2 or B3, we believe that is the lowest possible WMT level that should be assigned. This is also the basic approach that the Panel proposed in early 2006.

We also believe in the "elevator only goes up" approach regarding the intent of the phrase "desired water quality management goals" as laid out in section 1-02 D.5 of the VWQS. That is, we doubt that a goal, policy or plan that a town or even a region might adopt that seeks to *lower* water quality is compatible with state or federal law. Rather, we believe that "desired" is intended in an aspirational manner that would lead toward *improved* water quality.

Finally, we believe that section 1-02 D.5 of the VWQS states that a water should be typed *higher* than its actual quality if that quality is "reasonably attainable." There were several cases where current water quality does not completely meet all applicable criteria for WMT B1 waters, but where, we believe, the deficiencies can "reasonably" be corrected and the water at issue brought into full compliance with the criteria.

Technically, while TRORC used a remote approach and WRC used a more "on the ground" approach to evaluation, both commissions did very similar GIS work and the results are compatible datasets. Proposed water management typing codes (B1, B2, B3) are stored in a GIS

(Geographic Information System) data environment as polygon and line feature classes in an ESRI Geodatabase. Each basin has a unique Geodatabase, and each sub-basin (in the case of Basin 11, the West, Williams, and Saxtons sub-basins) has a unique polygon and line feature class.

The feature classes were created using ESRI's ArcGIS software and USGS's HEM tool (Hydrography Event Management tool, http://nhd.usgs.gov/tools.html). The resulting data, while in a feature class format, have attribute tables whose data structure corresponds to that of an "event" table. Such an event table can link with hydrography data from the USGS NHD (National Hydrography Dataset) "local resolution" data (http://nhd.usgs.gov/data.html). Thus, ultimately, the data can be stored and presented in a simple table – an event table, instead of a GIS data file – where water management typing is defined by beginning and ending points on a stream reach whose identification code is both unique, and standard, nation-wide.

The proposed water management typing master dataset for this project is, as stated, an ESRI geodatabase containing polygon and line feature classes. The feature classes are in geographic (e.g. latitude and longitude) coordinates. The actual water management typing values are stored in the field TYPING2010.

TRORC Approach to Typing

Waters in the White River Basin were assigned types primarily using remote landscape evaluation. Streams in intact forested landscape were typed as B1, as well as streams with good buffers and few road crossings or development or agriculture close to the stream. Streams and ponds with poor buffers were typed as B2. Only a few special cases were typed as B3.

The 2009 color leaf-on orthophotography was paired with GIS data layers including roads, waterbodies, dams, USGS topos, town boundaries, 2500 foot contour, conserved lands and data sample points from field assessements. Field assessment lat/longs were used to create a point layer that could then later be queried.

An ArcReader utility, that we called TyperMap, was created that incorporated these data. The landscape was evaluated at a 1:20,000 scale in TyperMap and simply drawn on using the marker tool in different colors to indicate various WMT (i.e. green for B1 and yellow for B2). Where it was unclear at that scale if a stream had a forested buffer, or open land was transitional field (a low impact use), active pasture (possible impact), or cropland (mainly corn and a higher impact use), then we would zoom in to check this (see Figures 1 and 2). If a field data point was present, then it was looked up in the DEC provided spreadsheet (see Figures 3 and 4). If the field data indicated a different typing than the landscape would have otherwise, then the reason was simply written on with the marker tool.

In the example shown in the figures, the water at the assessement site would have been typed as B2 due to the agricultural use and lack of buffer, but recent macroinvertebrate sampling showed a macroinverterbrate assessement of "very good" to "excellent". Only macro sites rated at these levels were typed as B1. Similarly, if fisheries data was at this level the water was typed as B1. It should be noted that where field data was checked, it either verified the assigned WMT or

increased the typing level. Many streams were changed to B1 after looking at field data, but none were changed to B2. For this reason, we believe that in general our proposed typing was conservative and that additional field data might show *more* B1 waters than we proposed. Additionally, some streams were typed as B1 due to comments from knowledgeable fishing guides.

Using the above approach, non-GIS staff could do all initial evaluations, and on computers not running full ArcGIS, and GIS staff could then code the streams or ponds accordingly. Since streams are "arcs" in GIS terms, and the arc often does not stop and start where typing changes, a tool was needed to create stream segments that did not rely on existing arc breaks. To do this, streams were broken into "line events" (a sort of virtual arc) in ArcGIS using the Hydrography Event Management (HEM) tool v 2.3 developed by USGS/USDI that was mentioned above. Ponds are discreet polygons and so there is no need to break them into segments. We typed ponds after streams, first placing all ponds not connected to streams as B2 as they were likely dug ponds, and typing on-stream ponds that had inflows and outflows as B1 or B2 the same. We then visually rechecked ponds and verified the draft typing. Natural beaver ponds were typed as B1.

For ease of later use in determining which stream segments were typed at what levels, stream type changes by TRORC were only proposed at confluences, road intersections, and outlets and inlets to ponds. Since the number of stream segments and ponds are literally thousands, and many of the streams and ponds that are typed have no names, the map and tabular data associated with this report will best serve to determine which streams have which proposed typing. Nearly 1,900 miles or stream were broken into over 3,400 line events, resulting in almost exactly one-third B2 and two-thirds B1 waters. B3 waters were only a tenth of a percent. . Over 1,500 ponds/lakes were also typed, with roughly the reverse percentages, 28% were B1 and 72% B2, and again only a handful of B3s.

TRORC provided notice of its typing process through its newsletter that goes to hundreds of local officials, the www.TRORC.org and website, and also held meetings on the draft product with the White River Partnership, the Greater Upper Valley chapter of Trout Unlimited, ANR staff, the TRORC Board and the Rochester Planning Commission. Changes resulting from these meetings were on some smaller tributaries that were changed from a B2 to a B1 where it was noted that native brook populations were actually quite good.

(revised 3/16/11)

Figure 1

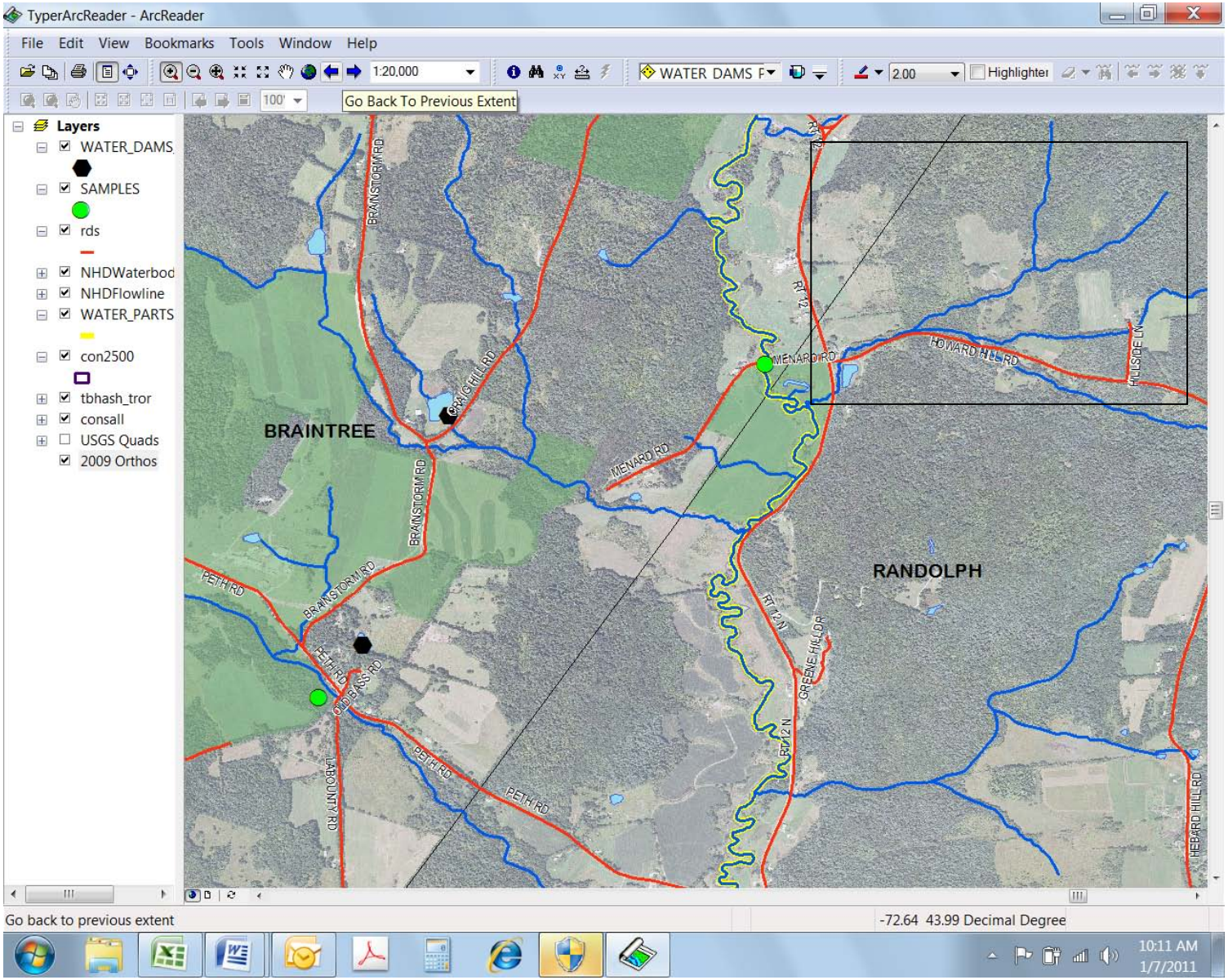
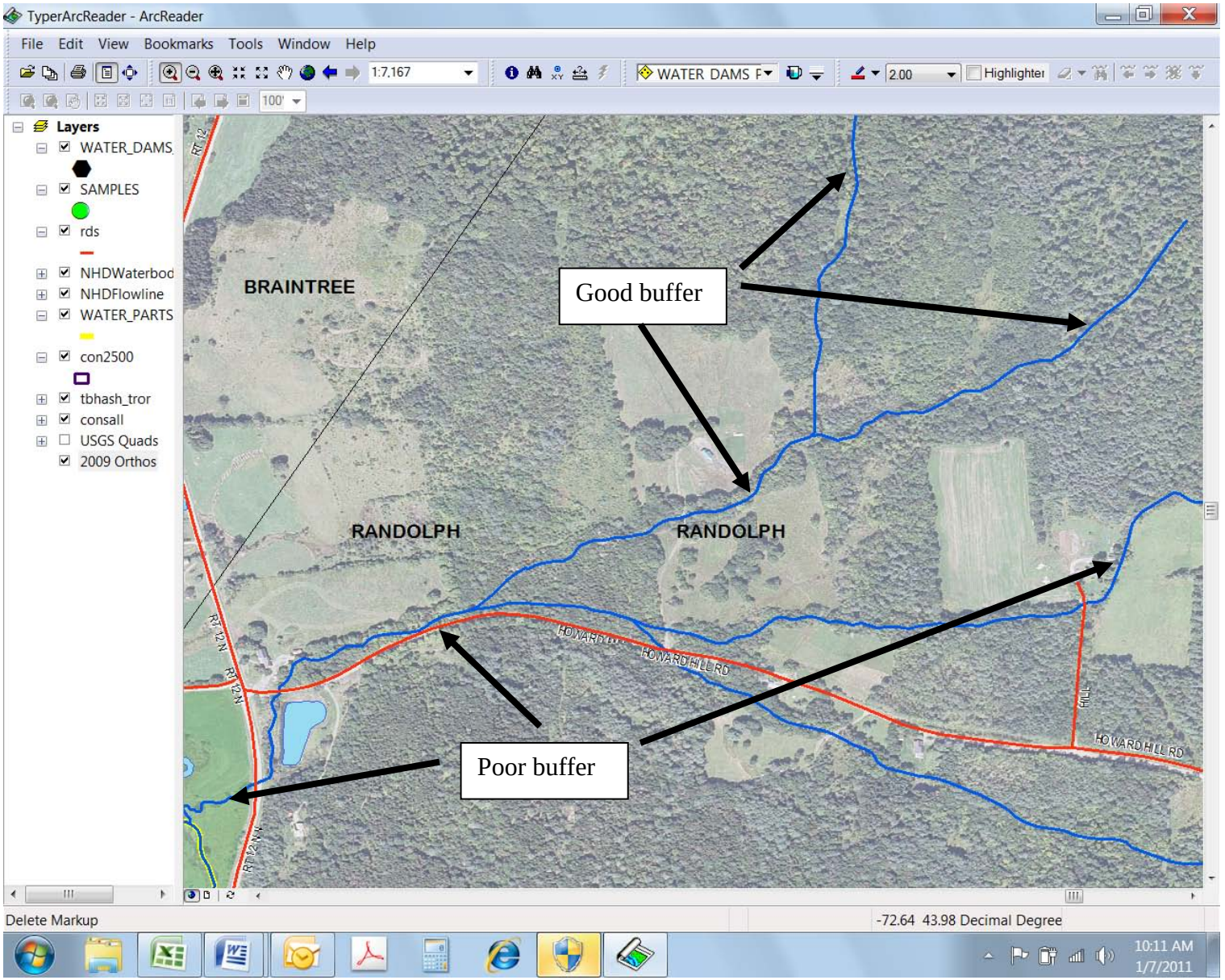


Figure 2


TyperArcReader - ArcReader
File Edit View Bookmarks Tools Window Help
Layers
WATER_DAMS
SAMPLES
rds
NHDWaterbod
NHDFlowline
WATER_PARTS
con2500
tbhash_tror
consall
USGS Quads
2009 Orthos
BRAINTREE
RANDOLPH
RANDOLPH
Good buffer
Poor buffer
HOWARD HILL RD
Delete Markup
-72.64 43.98 Decimal Degree
10:11 AM
1/7/2011

(revised 3/16/11)

Figure 3

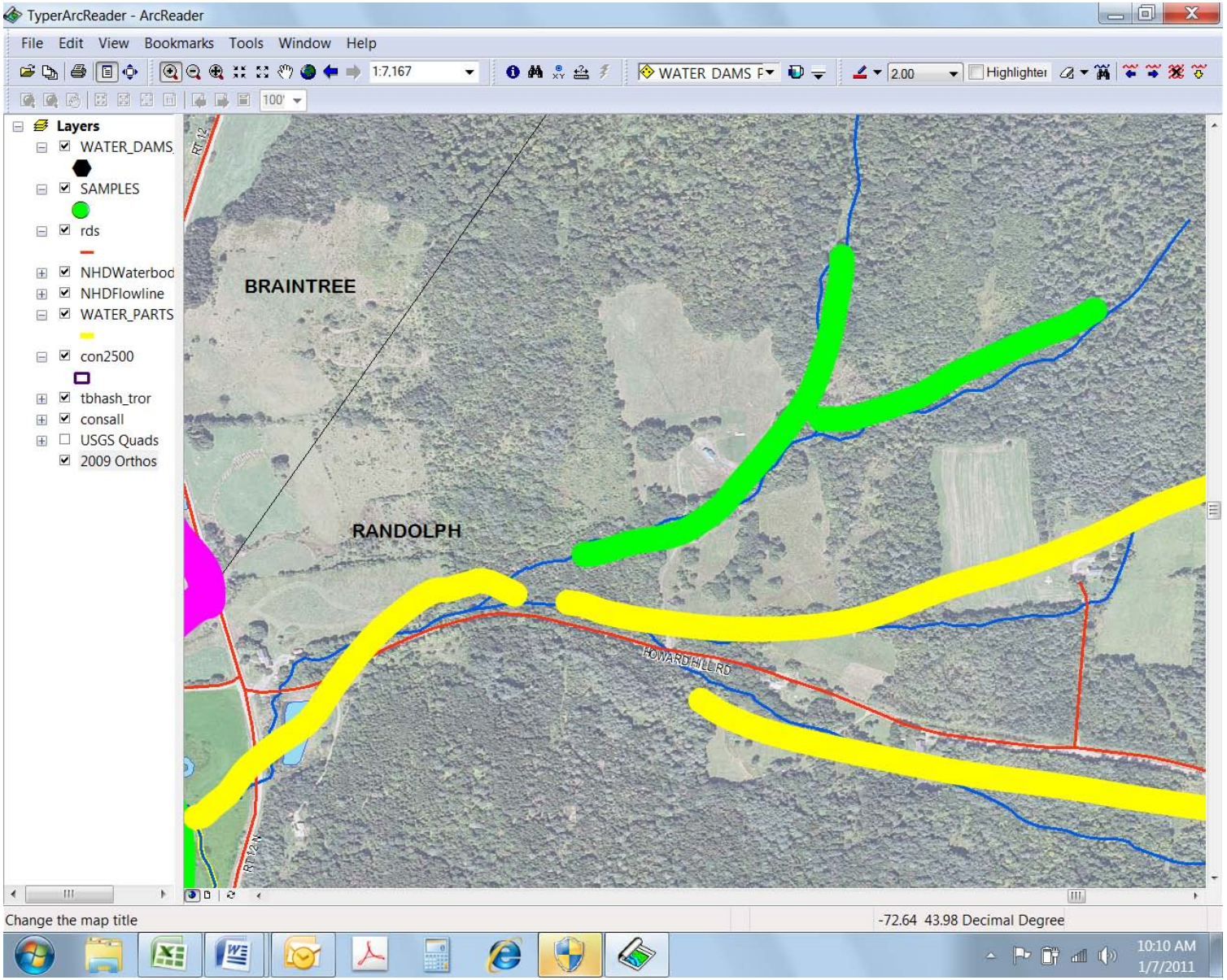


Figure 4

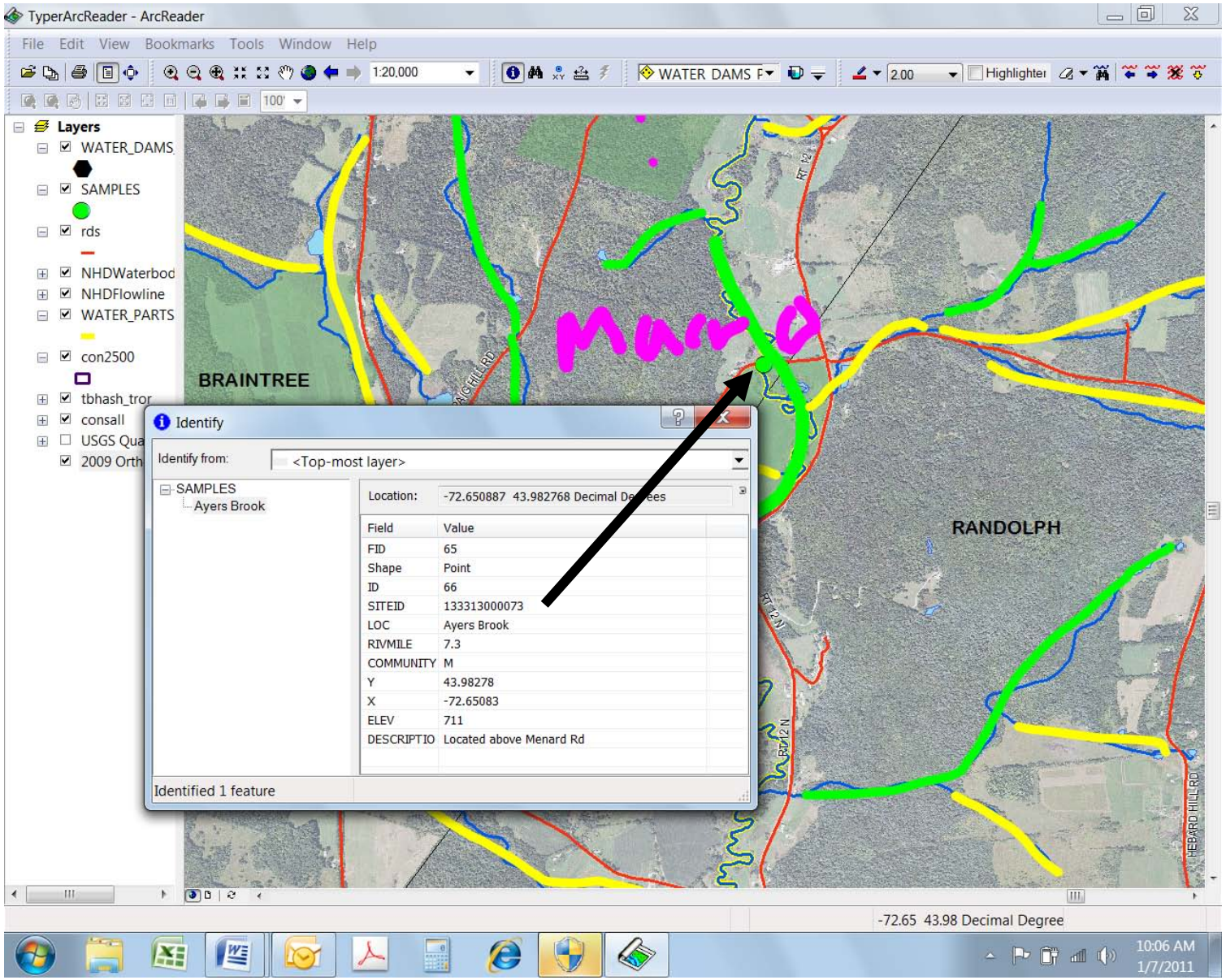
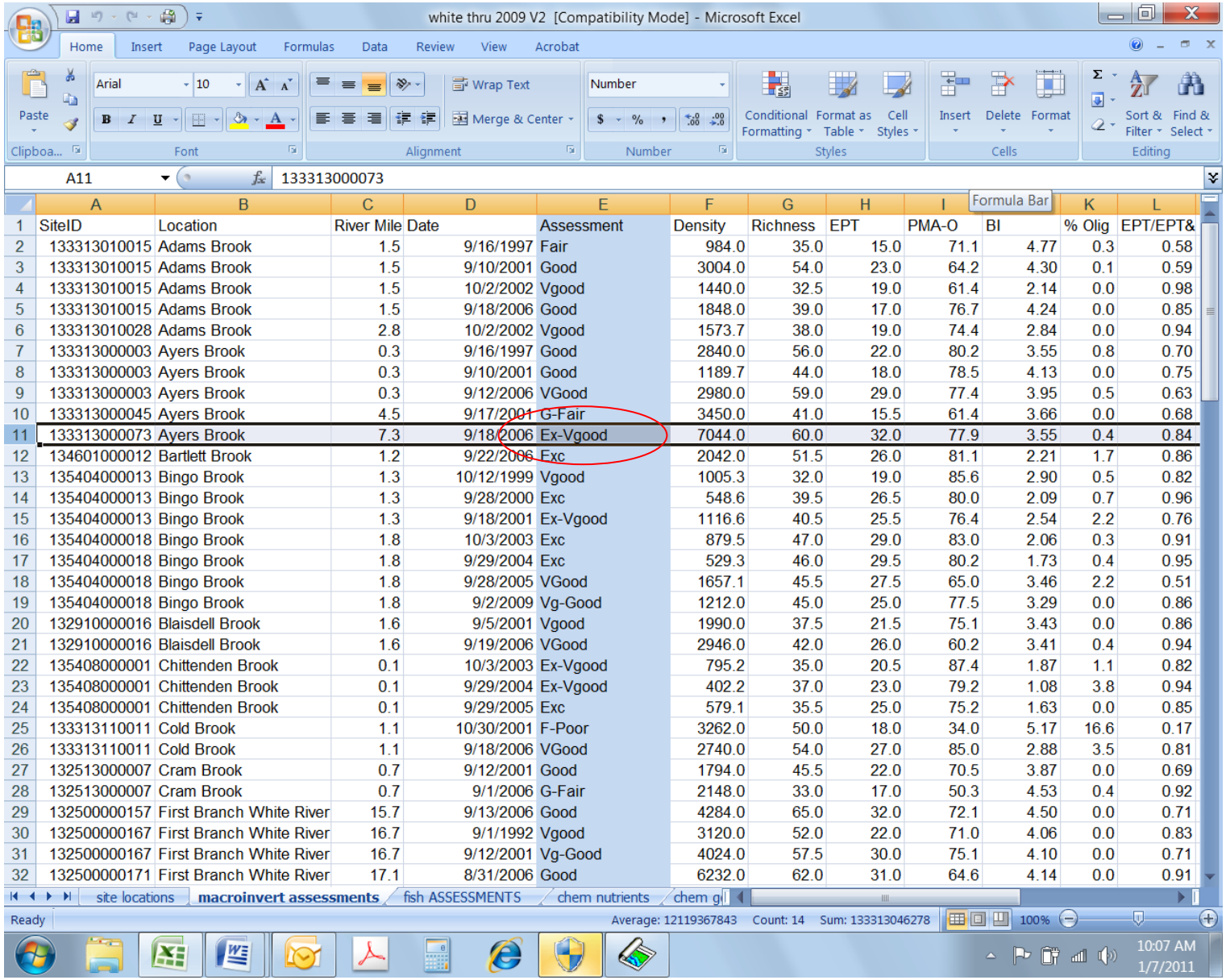

TyperArcReader - ArcReader
File Edit View Bookmarks Tools Window Help
1:20,000
WATER DAMS F
2.00
Highlighter
100'
Layers
WATER_DAMS
SAMPLES
rds
NHDWaterbod
NHDFlowline
WATER_PARTS
con2500
tbhash_tror
consall
USGS Qua
2009 Orth
BRAINTREE
RANDOLPH
Identify
Identify from:
<Top-most layer>
SAMPLES
Ayers Brook
Location:
-72.650887 43.982768 Decimal Degrees
Field Value
FID 65
Shape Point
ID 66
SITEID 133313000073
LOC Ayers Brook
RIVMILE 7.3
COMMUNITY M
Y 43.98278
X -72.65083
ELEV 711
DESCRIPTIO Located above Menard Rd
Identified 1 feature
-72.65 43.98 Decimal Degree
10:06 AM
1/7/2011

Figure 5



	A	B	C	D	E	F	G	H	I	J	K	L
1	SiteID	Location	River Mile	Date	Assessment	Density	Richness	EPT	PMA-O	BI	% Olig	EPT/EPT&
2	133313010015	Adams Brook	1.5	9/16/1997	Fair	984.0	35.0	15.0	71.1	4.77	0.3	0.58
3	133313010015	Adams Brook	1.5	9/10/2001	Good	3004.0	54.0	23.0	64.2	4.30	0.1	0.59
4	133313010015	Adams Brook	1.5	10/2/2002	Vgood	1440.0	32.5	19.0	61.4	2.14	0.0	0.98
5	133313010015	Adams Brook	1.5	9/18/2006	Good	1848.0	39.0	17.0	76.7	4.24	0.0	0.85
6	133313010028	Adams Brook	2.8	10/2/2002	Vgood	1573.7	38.0	19.0	74.4	2.84	0.0	0.94
7	133313000003	Ayers Brook	0.3	9/16/1997	Good	2840.0	56.0	22.0	80.2	3.55	0.8	0.70
8	133313000003	Ayers Brook	0.3	9/10/2001	Good	1189.7	44.0	18.0	78.5	4.13	0.0	0.75
9	133313000003	Ayers Brook	0.3	9/12/2006	VGood	2980.0	59.0	29.0	77.4	3.95	0.5	0.63
10	133313000045	Ayers Brook	4.5	9/17/2001	G-Fair	3450.0	41.0	15.5	61.4	3.66	0.0	0.68
11	133313000073	Ayers Brook	7.3	9/18/2006	Ex-Vgood	7044.0	60.0	32.0	77.9	3.55	0.4	0.84
12	134601000012	Bartlett Brook	1.2	9/22/2006	Exc	2042.0	51.5	26.0	81.1	2.21	1.7	0.86
13	135404000013	Bingo Brook	1.3	10/12/1999	Vgood	1005.3	32.0	19.0	85.6	2.90	0.5	0.82
14	135404000013	Bingo Brook	1.3	9/28/2000	Exc	548.6	39.5	26.5	80.0	2.09	0.7	0.96
15	135404000013	Bingo Brook	1.3	9/18/2001	Ex-Vgood	1116.6	40.5	25.5	76.4	2.54	2.2	0.76
16	135404000018	Bingo Brook	1.8	10/3/2003	Exc	879.5	47.0	29.0	83.0	2.06	0.3	0.91
17	135404000018	Bingo Brook	1.8	9/29/2004	Exc	529.3	46.0	29.5	80.2	1.73	0.4	0.95
18	135404000018	Bingo Brook	1.8	9/28/2005	VGood	1657.1	45.5	27.5	65.0	3.46	2.2	0.51
19	135404000018	Bingo Brook	1.8	9/2/2009	Vg-Good	1212.0	45.0	25.0	77.5	3.29	0.0	0.86
20	132910000016	Blaisdell Brook	1.6	9/5/2001	Vgood	1990.0	37.5	21.5	75.1	3.43	0.0	0.86
21	132910000016	Blaisdell Brook	1.6	9/19/2006	VGood	2946.0	42.0	26.0	60.2	3.41	0.4	0.94
22	135408000001	Chittenden Brook	0.1	10/3/2003	Ex-Vgood	795.2	35.0	20.5	87.4	1.87	1.1	0.82
23	135408000001	Chittenden Brook	0.1	9/29/2004	Ex-Vgood	402.2	37.0	23.0	79.2	1.08	3.8	0.94
24	135408000001	Chittenden Brook	0.1	9/29/2005	Exc	579.1	35.5	25.0	75.2	1.63	0.0	0.85
25	133313110011	Cold Brook	1.1	10/30/2001	F-Poor	3262.0	50.0	18.0	34.0	5.17	16.6	0.17
26	133313110011	Cold Brook	1.1	9/18/2006	VGood	2740.0	54.0	27.0	85.0	2.88	3.5	0.81
27	132513000007	Cram Brook	0.7	9/12/2001	Good	1794.0	45.5	22.0	70.5	3.87	0.0	0.69
28	132513000007	Cram Brook	0.7	9/1/2006	G-Fair	2148.0	33.0	17.0	50.3	4.53	0.4	0.92
29	132500000157	First Branch White River	15.7	9/13/2006	Good	4284.0	65.0	32.0	72.1	4.50	0.0	0.71
30	132500000167	First Branch White River	16.7	9/1/1992	Vgood	3120.0	52.0	22.0	71.0	4.06	0.0	0.83
31	132500000167	First Branch White River	16.7	9/12/2001	Vg-Good	4024.0	57.5	30.0	75.1	4.10	0.0	0.71
32	132500000171	First Branch White River	17.1	8/31/2006	Good	6232.0	62.0	31.0	64.6	4.14	0.0	0.91

WRC Approach to Typing

The WRC conducted two efforts to develop typing recommendations for Basin 11. The first, in the mid 2000s, started with a small part of the West River watershed and eventually grew to encompass the entire basin. That proposal was intended to be incorporated in the Basin 11 Plan, but when ANR adopted the Plan in 2008 it was not included. Pursuant to the 2009 directive of the legislature, the WRC revised the initial proposal using newer technology and the data provided by ANR. The products of that effort are the recommendations contained herein, including maps, data, and this narrative.

WRC initially began work on developing preliminary proposed typing designations in 2003. The first several years' work involved discrete projects covering a small number of towns at a time, funded through a series of §604b grants. Subsequently, development of the typing proposal intended to be an integral part of the Basin 11 Management Plan was included in overall efforts of a larger partnership developing the Basin 11 Management Plan, partially funded through §319 grant funds.

The WRC developed the early proposal using a typing team including a member of the 2000 VWQS Update Task Force, the ANR District Fisheries Biologist, the Windham County NRCD Agricultural Resource Specialist/Basin Planner, a WRC Senior Planner, WRC's GIS Senior Planner, and, eventually, the ANR Watershed Coordinator (once hired for Basin 11). When addressing the Williams River watershed, the team collaborated with representatives of the Southern Windsor County Regional Planning Commission (SWCRPC).

The typing team first conducted remote sensing work, using available maps (e.g., USGS topographic quadrangles, WRC town base maps), orthophotos, and other information it could acquire, e.g., watershed assessments, water quality monitoring data, and dam data. The team agreed upon a basic methodology derived from the intent and letter of the VWQS. Essentially, the approach was to use the best available data to evaluate actual existing water quality within each watershed, starting at the headwaters of each stream (or at the 2,500 foot contour if the headwaters were above that elevation) and work downstream.

Since hard data was usually not available in higher elevation remote headwaters, and was of limited extent elsewhere, the team employed other available information, such as land cover, the professional knowledge of the fisheries biologist, and the personal knowledge of team members. Where no sampling or monitoring data were available in the relevant reaches of the watershed, the primary evaluation metric was landscape condition. If the waters were in an intact forested landscape the team believed there was a reasonable presumption that water quality equaled or closely approximated the reference condition and the waters were draft designated B1.

If the available information indicated that actual water quality met or exceeded the criteria for WMT B1, a draft B1 designation was applied and continued downstream until encountering a reason or reasons why the B1 criteria were no longer fully met and could not, in the team's opinion, be reasonably attained. Such reasons were either data indicating lower water quality or significant breaks in the forested landscape. Where waters entered, or started in, landscapes of dense development, agriculture, or proximity to unstable gravel roads (susceptible to frequent

wash outs), a draft B2 designation was applied. A draft B3 designation was applied to waters whose quality was degraded by artificial flow and water level fluctuations.

After developing draft designations for waters, the team conducted extensive site visits to field verify the proposed typing and answer any questions raised in the bench exercise stage. These examinations included assessing some or all of the following: the landscape for riparian and/or lacustrine buffer and proximity of roads and development, including agriculture; the stream for existence of sand and gravel deposits (often resulting from wash-off from roads), macroinvertebrates (turning over rocks and evaluating insect larvae), and fisheries.

The initial typing work considered only on-stream impoundments; it did not address the hundreds of isolated ponds in the watersheds. Small on-stream ponds were generally typed the same as streams entering and leaving. Larger ponds with significant residency time were considered to have greater than minimal departure from reference conditions and were typed B2.

The team used all available existing information it could acquire regarding aquatic conditions, e.g., existing data regarding water quality, aquatic habitat, and fisheries. Data reviewed in determining initial water management types included:

- BASS biomonitoring data, for fish and macroinvertebrates
- Fisheries abundance, distribution, and diversity data
- West River Watershed Alliance chemical and bacteria monitoring data
- Mapped drinking water Source Protection Areas for surface water sources
- Mapped locations of permitted discharges

Members of the team evaluated municipal and regional plans for water quality policy implications. If the plans articulated such water quality management objectives they were almost invariably supportive of maintaining and/or enhancing existing water quality.

Remote sensing work was accomplished using best available information, largely in the form of hard copy maps, aerial photos, plans, and monitoring and assessment reports. Typing maps were generated by GIS using latitude and longitude coordinates to identify WMT reaches and breaks.

WRC and the typing team conducted public information meetings throughout the basin to inform interested parties about the typing proposal and to solicit local input and feedback. The team reviewed all input and revised the proposal where warranted and feasible.

Current WRC typing activities (2009-2011)

The WRC re-engaged in WMT development pursuant to the legislative directive of 2009. WRC redeveloped GIS data incorporating new technology (HEM tool described above) and new, revised base hydrography information (NHD/VHD, described above). The work revisited all streams and ponds and, also, developed typing recommendations for the hundreds of isolated ponds that were not addressed in the development of the earlier proposal. Team members reviewed and revised typing designations based on continuing field work and the data ANR provided electronically (chemistry, macroinvertebrates, fisheries). WRC coordinated with the SWCRPC to review, recreate and integrate the Williams River watershed typing into a revised compatible GIS coverage. (In the prior effort SWCRPC had generated its own GIS typing data

for the Windsor County towns in the Williams River watershed. That GIS data was different in level of detail and format from that which WRC had developed for the West and Saxtons Rivers' watersheds.)

WRC also used newly available technology to review and refine the typing. Specifically, WRC used Google Earth with Keyhole Markup Language layers (KMZ files) of typing attributes (coding of lines and polygons) and ANR water quality data points for aerial photographic assessment verification of remote, inaccessible, and other locations.

Although using new technology and data, WRC continued with the typing philosophy, also shared by TRORC, of starting with the highest quality waters and retaining that typing until encountering land cover or analytical data indicating the type should be lowered to accurately reflect in-stream conditions. WRC, continuing the original process and general methodology, worked with original team members and others and consulted with the ANR watershed coordinator to review and refine the typing recommendations. This effort included additional field verification work and further revisions. It also involved coordination with the neighboring regional planning commissions SWCRPC and the Bennington County Regional Commission. WRC also held additional public information presentations to explain the typing proposal and solicit local knowledge input and feedback.

WRC published information about the typing process and the public information meetings in its monthly newsletter that goes to municipal officials and other interested parties in all 27 region towns and beyond, and on its website. The WRC also sent meeting notices and invitations to officials of watershed towns, including Selectboards, Planning Commissions, and Conservation Commissions. WRC presented the typing process and recommendations and solicited local input at those meetings, as well as at a meeting of the full Windham Regional Commission. Much of the discussion of typing had to do with the implications, particularly of type B1, for small scale hydro development and some focused on local knowledge related to the perceived accuracy of the hydrography data. There was discussion of upgrading one minor tributary from B2 to B1, but the final consensus of all involved was that such a change was not warranted or recommended.

Issues Raised

In the process of developing these typing recommendations, the commissions encountered several questions or issues that should be addressed to make typing a more certain and smooth process. However, we believe that typing is best learned by doing, that the process has been stalled for far too long, and that it should not wait on answers to all possible questions.

Errors in the VHD data

In general, the VHD is quite accurate, but we did find instances where:

- the stream is not exactly matched to where it appears on the corresponding orthophoto,
- where a stream or pond is shown on USGS topographic maps but not included in the VHD
- where streams or ponds were encountered in the field but not in VHD, and
- where streams or ponds were in the VHD but not found in the field or on the orthophoto.

These limitations will be inherent in any remotely created data, and we believe it should not stop typing efforts. However, during any permit proceedings that rely on such data, we feel that the worry about perfect data could be addressed in the same manner that errors in wetlands or flood maps are – the applicant and other parties should have the ability to prove or disprove the location or existence of waters with qualified field surveys.

What are "waters"?

The definition in 10 VSA, § 1251 does not specifically include wetlands by name, nor are specific wetlands currently classed as A or B in the VWQS. We did not recommend WMTs for wetlands, but it is possible that such should be done if they are "waters". The VHD does include intermittent streams, so we recommended WMTs for them.

Mistypes

One of the concerns raised with typing in a field data-poor environment is that you can be wrong. This possibility should be acknowledged and addressed through a process instead of creating an obstacle. A potential way forward is to allow applicants or other parties that believe a water was mistyped to provide qualified field data to show that the initial typing was in error. This would be simliar to the ability to refute wetland or flood maps or other data that is derived at a large scale. However, this ability should work both ways, so it could also be demonstrated during permit proceedings that WMTs should be higher. These cases should not be considered as formal lowering or raising the typing, especially if typing is later changed to subclassification.

The 1253e Dilemma

Section 3-06 of the VWQS has language that says that, "Water Management Type designations shall be made by amending these rules in accordance with the provisions of applicable law and the provisions of subsection B below." The Panel's previous counsel argued in 2006 that typing did not necessarily "increase or decrease the level of protection for a designated use" as talked about in subsection B, so therefore it need not apply, but the VWQS give no other indication of what to do with Class B waters. WRC and TRORC do not see another alternative to using the three-part process in the VWQS and the use of the word "Type" in the title to subsection B lends logical weight to this reasoning. However, we do feel the process is not clear and that this point should be clarified.

Assuming all of the process in 3-06.B applies to our recommendations, then it would seem necessary during rulemaking that the three-part demonstration be addressed:

> "1. the current level of protection is not in the public interest after giving due consideration to the provisions of 10 V.S.A. 1253(e);
> 2. the proposed level of protection is appropriate after consideration of any recommendations of any Basin plan that pertains to the waters in question; and
> 3. the proposed level of protection is in compliance with all applicable federal requirements, including 40 CFR Section 131.10(g)."

Reasonably Attainable

The VWQS direct that basin plans shall, "propose the appropriate Water Management Type or Types based on both the existing water quality and reasonably attainable and desired water

quality management goals." But what is reasonably attainable? For our purposes, some waters that are impacted were typed above their current quality because we felt them able to be improved. For example, waters impacted by acid precipitation are improving as the sources for this are cleaned up, and we believe these waters will continue to improve. Similarly, some streams and rivers have been destabilized due to encroachments and channel modifications and are in the process of active channel reformation. In general, while these are suffering now due to the results of erosion and deposition, they will sort themselves out over time and the river or stream will restabilize.

Dammed ponds were largely proposed for B2 (versus B3) typing as they are generally near the top of the watershed and boating is not practical, nor is there much fish habitat above these man-made ponds. Theoretically, they could be removed but not practically. In some riverine instances, existing dams do pose significant obstacles to fish passage and boating, and so are proposed as B3. However, if, in our judgment, the dam might reasonably be removed then a B2 was assigned.

A1 and A2

WRC has waters below 2,500 feet in elevation that were classed that way due to petition. WRC and TRORC were not asked to propose any changes in classification, but we do note that some lower elevation waters that are in a natural condition but currently in class B could certainly be candidates to be classed as A1.

In the TRORC region, there is a very large mapped SPA for a public water supply in South Royalton that uses the White River itself, but there are no A2 classed water associated with this supply. If this SPA should be reclassed as A2 then the proposed typing in several towns would need to be revised.