Phase 1 Stream Geomorphic Assessment
Tributaries to the Otter Creek
Rutland County, Vermont

Including:
Clarendon River, Ira Brook, Mill Brook
(with preliminary work on Furnace Brook, Baker Brook & Roaring Brook)

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TABLE OF CONTENTS

Phase 1 Stream Geomorphic Assessment
Tributaries to the Otter Creek
Rutland County, Vermont

LIST OF APPENDICES **Page #**

Phase I Stream Geomorphic Assessment
Tributaries to the Otter Creek
Rutland County, Vermont

EXECUTIVE SUMMARY

- A Phase I Stream Geomorphic Assessment of tributaries to the Otter Creek within the towns of Rutland, Clarendon, Ira, Tinmouth, Danby, West Rutland and Middletown Springs was completed by Arrowwood Environmental in February 2007. The study included a complete Phase I assessment on the Clarendon River, Ira Brook and Mill Brook.

- In addition, preliminary Phase I assessment work was completed in the towns of Pittsford, Chittenden, Brandon and Goshen for Furnace Brook; the town of Wallingford for Roaring Brook and the towns of Danby and Tinmouth for Baker Brook. The preliminary work included assignment of reach breaks, delineation of subwatersheds, and running of the SGAT geomorphic assessment GIS tool for all reaches.

- This report principally focuses on those reaches for which the complete Phase I assessment was conducted. The reaches for which only preliminary steps were conducted are generally excluded from evaluation and conclusions due to incomplete information.

- The watersheds of the Clarendon, Ira and Mill were divided into 54 reaches based on confinement, slope, soils, and tributary influence. The watersheds of the Furnace, Roaring and Baker were divided into 75 reaches. Preliminary subwatershed delineation and SGAT steps were completed for a total of 129 reaches.

- The study followed the Phase I assessment protocol developed by the Vermont Agency of Natural Resources. Information from the study came from the Vermont Department of Environmental Conservation, the Vermont Fish and Wildlife Department, the Vermont Mapping Program, the Vermont Center for Geographic Information, and the windshield survey.

- The dominant surficial geology of the assessed reaches ranges from alluvium to glacial lacustrine and ice-contact (glacial fluvial). Certain reaches are dominated by soils in the "other" category and are typically comprised of wetland mucks and other saturated soils. The higher elevation reaches tend to be dominated by soils of unsorted glacial till origins.

- Of the four impact categories measured during the Phase I Assessment, Land Cover/Land Use was the primary category identified as being at risk of causing channel adjustments.

- The meander migration, meander width ratio, and meander wavelength indicate ongoing channel adjustment. Based on the review of current and historical orthophotos, meander migration was evident on the main stem of the Clarendon River and in select spots within the Mill and Ira Brook watersheds.

- The watershed condition generated from the Phase 1 database was generally similar to the reach condition based on professional judgment and observations during the Phase I windshield survey.

- Reaches in poor to fair condition include many of the lower reaches of the Clarendon River, Mill Brook and Ira Brook. Reaches that rated a poor or fair in relationship to the assessment area generally fall into fair to good categories when considered on a statewide basis.

- Based on Phase 1 evaluation, Arrowwood Environmental recommends that the following reaches be prioritized for Phase 2 Assessment fieldwork:
  Clarendon River main stem reaches- *(R20T1.0)*1 to 7
  Clarendon River tributary reach- *(R20T1.07S3.0)*1
  Ira Brook main stem reaches- *(R20T1.05S3.0)*1 to 4
  Mill Brook main stem reaches-*(R33T3.0)*1to 5

  Other reaches recommended for secondary Phase 2 priority are detailed herein.

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Rutland County, Vermont

1.0 INTRODUCTION

Arrowwood Environmental (AE) was retained by the Rutland Natural Resource Conservation District (RNRCD) in July 2006 to conduct a Phase 1 Stream Geomorphic Assessment of select tributaries to the Otter Creek. A complete Phase 1 assessment was conducted on the Clarendon River, Ira Brook (a tributary to the Clarendon) and Mill Brook (Figure 1 and 1b). In addition, AE was contracted by RNRCD to conduct preliminary assessment work on some additional streams in the Otter Creek Watershed, including Furnace Brook, Roaring Brook and Baker Brook. The preliminary assessment included assignment of reach breaks[1], delineation of reach subwatersheds and running the SGAT geomorphic assessment GIS tool to derive basic spatial data and evaluation of those streams.

Table 1. Phase 1 steps completed by Arrowwood	
Phase 1 Step	Stream
Steps 1-10	Clarendon River Mill Brook Ira Brook
SGAT Steps only 1.2, 1.3, 2.1-2.10	Furnace Brook Baker Brook Roaring Brook

The primary objective of the study was to provide an overview of the general physical characteristics of certain tributaries in the Otter Creek watershed and determine which reaches may be in adjustment. A secondary objective of the study was to select reaches to be recommended for Phase 2 Assessment. The Phase 2 Assessment would then be used to provide the RNRCD, Vermont Agency of Natural Resources (VT ANR) and the towns of the watershed with information that can be used for watershed planning and restoration activities.

Phase 1 steps included in this project are listed in Table 1 above. The steps referenced are described in the VT ANR Vermont Stream Geomorphic Assessment Phase 1 Handbook, March 2006 version. The Feature Indexing Tool (FIT) was utilized for this project on those reaches for which a complete assessment was conducted.

[1] Per the VT ANR protocols major tributaries constitute ten percent or more of the watershed area at the confluence with the main stem.

Data and information for the tributaries to the Otter Creek was obtained from the Vermont Department of Environmental Conservation (VDEC), the Vermont Fish and Wildlife Department (VF&W), the Vermont Center for Geographic Information (VCGI), and Arrowwood Environmental. Windshield surveys of the watershed were conducted on February 1st and 8th of 2007. A Project metadata summary is provided in the Appendix, page 1.

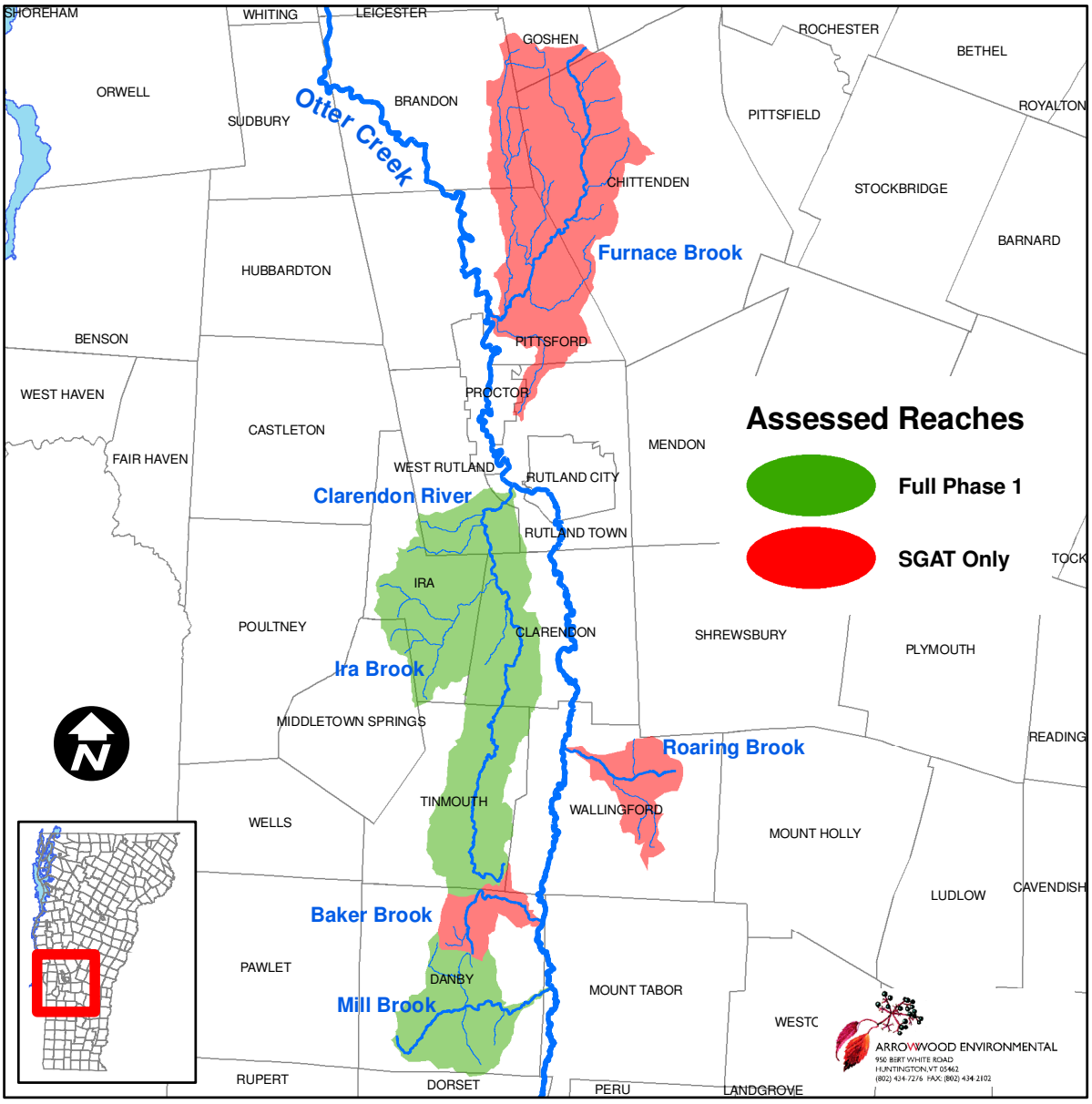


Figure 1. Project Location Map for the Phase I Assessment

2.0 BACKGROUND

The Clarendon River Watershed has a watershed area of 48 square miles, 13 square miles of which drains first to Ira Brook. Mill Brook has a watershed area of approximately 14 square

miles. Because Ira Brook drains to the Clarendon River, this report will combine the two and refer generally to them under the title "Clarendon River". The Clarendon River was given the tributary ID R20T1- as it is the first tributary (*R20***T1**) flowing into the 20th reach (*R***20***T1*) of the Otter Creek (**R***20T1*). Ira Brook is R20T1.05S3, indicating it is the third stream (*R20T1.05***S3**) flowing into the fifth reach (*R20T1.***05***S3*) of the Clarendon River (**R20T1***.05S3*). Mill Brook is referred to as R33T3 as it is the third tributary (R33**T3**) entering the 33rd reach (R**33**T3) of the Otter Creek.

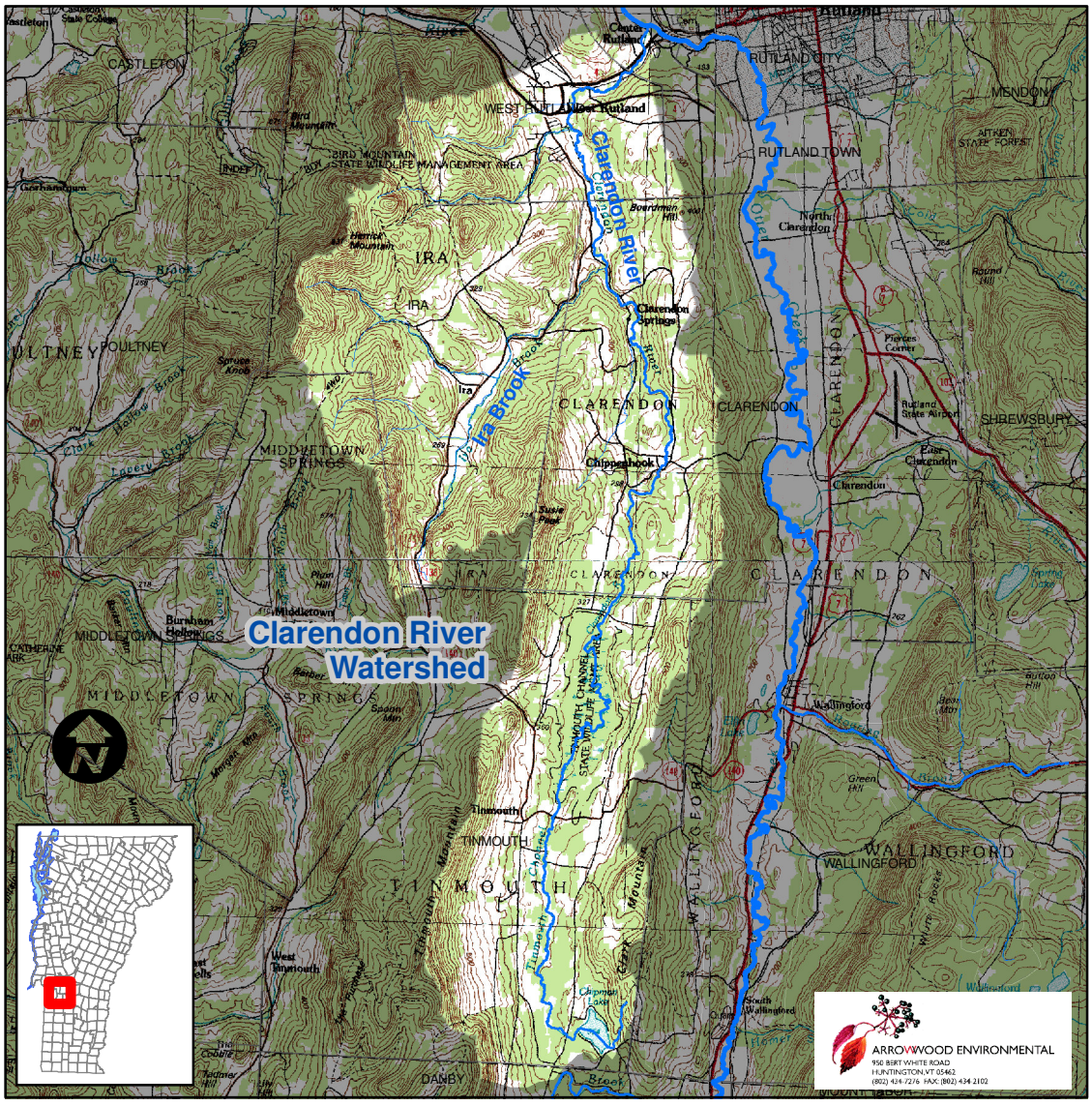


Figure 1b. Clarendon River Watershed

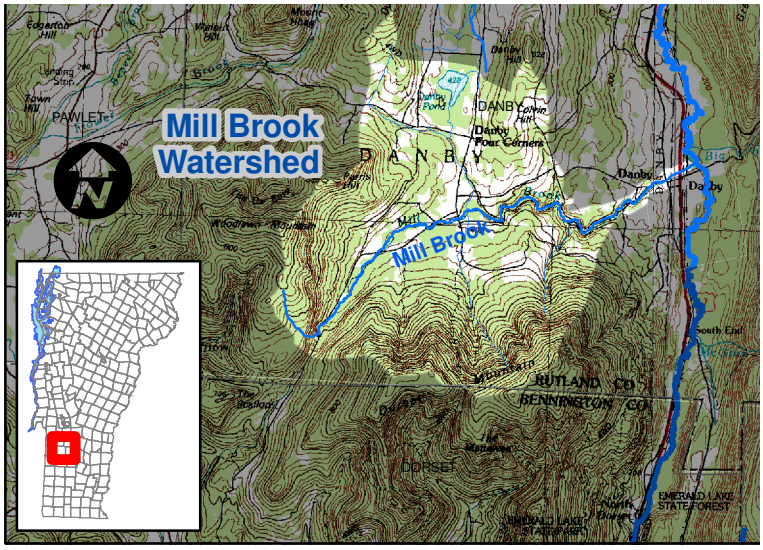


Figure 1c. Mill Brook Watershed

3.0 METHODOLOGY

The Phase I ssessment followed procedures specified in the Vermont Stream Geomorphic Assessment Handbook Phase I (Vermont Agency of Natural Resources March 2006), and used version 4.53 of the Stream Geomorphic Assessment Tool (SGAT) GIS extension including feature indexing. All assessment data were recorded in formats consistent with the Agency of Natural Resources (ANR) Phase I data sheets or in GIS database files, and were entered in to the most current version of the ANR Phase I Online data management system.

3.1 Parameters

During the Phase I Assessment, each parameter in Table 2 was rated according to the following menu options (NS – not significant, low impact, high impact or No info –no information). A zero was scored for options NS and No info, a one for low impact and a two for high impact.

Table 2. Parameters Included in Impact Scores	
Step #	**Parameter**
4.1	Watershed Land Cover/ Land Use
4.2	Corridor Land Cover/ Land Use
4.3	Riparian Buffer Width
5.1	Flow Regulations and Water Withdrawals
5.2	Bridges and Culverts
5.3	Bank Armoring and Revetments
5.4	Channel Modifications
5.5	Dredging and Gravel Mining History
6.1	Berms and Roads
6.2	River Corridor Development
6.3	Depositional Features
6.4	Meander Migration / Channel Avulsion
6.5	Meander Width Ratio
6.6	Wavelength Ratio
7.2	Bank Erosion – Relative Magnitude
7.3	Ice and Debris Jam Potential

3.2 QA Review

AE completed the Phase 1 – Quality Assurance Worksheet to document: (a) the tools used to collect the Phase 1 data, (b) the confidence level in the data, (c) the date the assessment was completed, and (d) the date each Phase 1 step was checked by the local and state QA teams (see page 2-3 of the Appendix). AE then rated the confidence level in the Phase 1 data from moderate to high. A few of the reaches could not be accessed due to remoteness or lack of public access points. Because the windshield survey was conducted in February, snow and ice cover prohibited a complete evaluation for some reaches, especially small order tributaries. For these reasons, the quality of the data was rated as moderate to high rather than high. In addition, some of the historic in-stream and floodplain modifications were not known.

The ArcView shapefiles for the Otter Creek Tributaries Phase 1 study were submitted to Shannon Hill and Kari Dolan of the VTANR, River Management Program. SGAT generated data and database entries were made to the Online Geomorphic Assessment Database for a QA review from August 2006 to February 2007. Minor modifications were made to data following QA steps.

4.0 RESULTS

4.1 Reach Locations

The Clarendon River and Mill Brook Watersheds were divided into 54 reaches for the Phase I Assessment. Phase 1– Step 1. Reach Locations Report on pages 4-6 of the Appendix provides

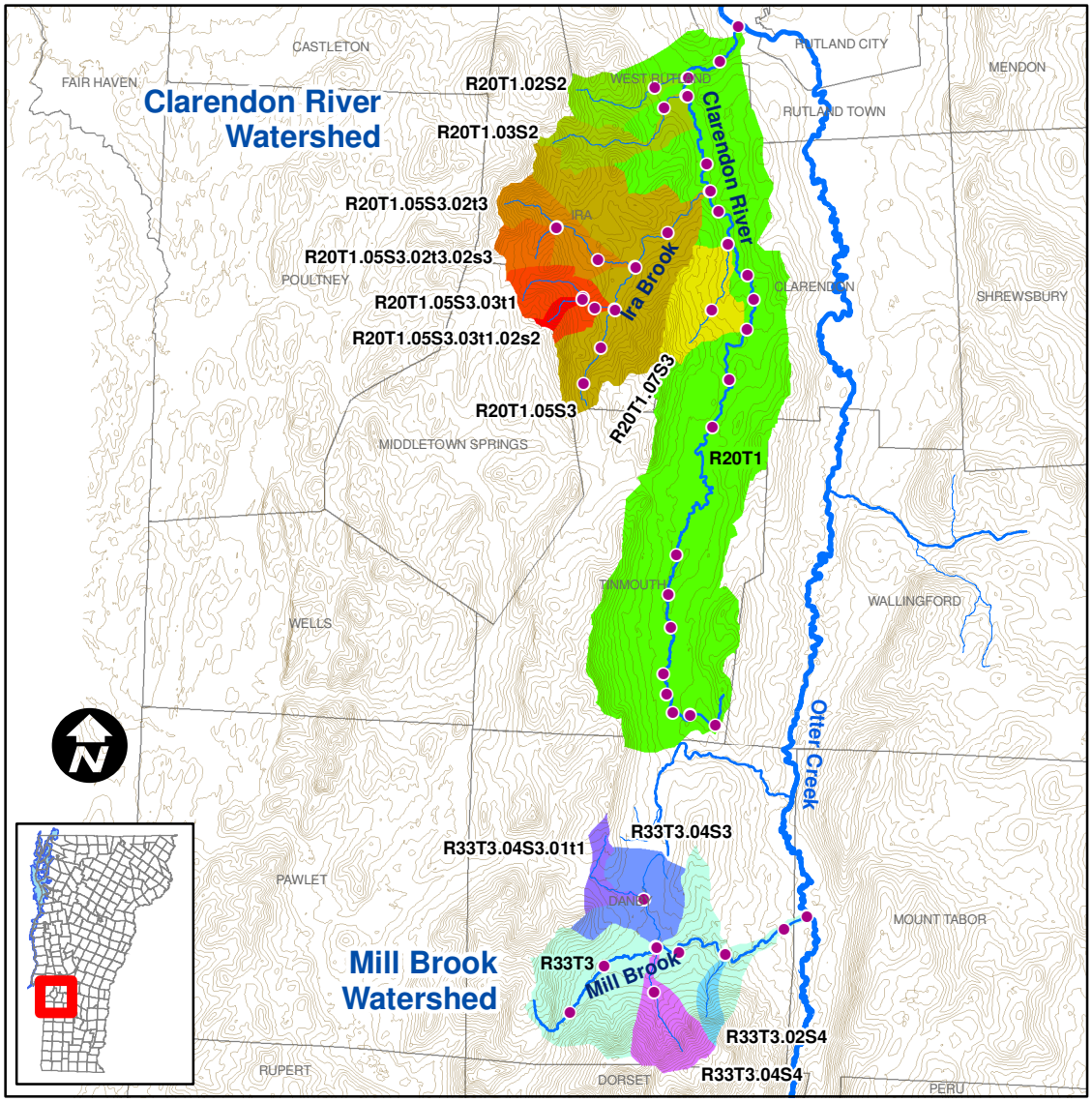
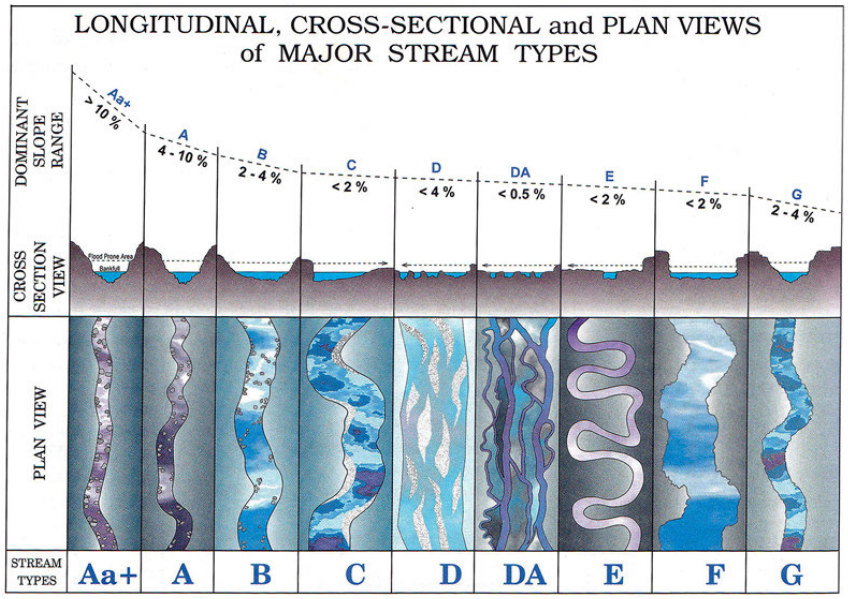


Figure 2. Reach Location Map

the reach locations including reach description, town where the reach is located, and Latitude and Longitude generated from SGAT. Figure 2 shows the location of study reaches used in the Phase I Assessment. In Figure 2, major tributary watersheds are similarly colored, and reach breaks are indicated by a point. Note that two reaches, although included in these figures,

were not assessed since they are impounded for much to all of their length. The reaches not assessed due to impoundment were- R33T3.04S3.02 (Danby Pond) and R20T1.20 (Tinmouth Pond).

4.2 Stream Typing



Reference stream types are defined as stream channel forms and processes that would exist in the absence of human-related changes to the channel, floodplain, and/or watershed. Stream and valley characteristics including valley confinement, and slope determined through remote sensing were used to ascertain the stream type. The reference reach characteristics were later refined during the windshield survey. Reference reach typing was based on both the Rosgen (1996) and the Montgomery and Buffington (1996) classification systems (See illustration above).

Phase 1-Step 2. Preliminary Reference Stream Type Report on pages 7-10 of the Appendix provides a complete listing of reference stream types for each reach within the project area. The reference stream types, based on the Phase I Stream Geomorphic Assessment are shown in Figure 3. The majority of the stream length falls within the C stream type (38%), followed by A stream type (27%) (see Table 3 & Figure 3). A few of the reaches in the watershed were not easily accessible and were not visited during

Table 3- Reference stream types

Reference Stream	total Chan. length	Percentage of total
A/Cascade	12278	4%
A/Step-Pool	72221	23%
B/Plane Bed	2547	1%
B/Step-Pool	65107	21%
C/Dune-Ripple	25758	8%
C/Plane Bed	33391	11%
C/Riffle-Pool	59084	19%
E/Dune-Ripple	39213	12%
E/Plane Bed	4562	1%

the windshield survey. Best professional judgment was used to assign a bed form (eg. step-pool, plane bed) to these reaches that were not able to be visited during the windshield survey.

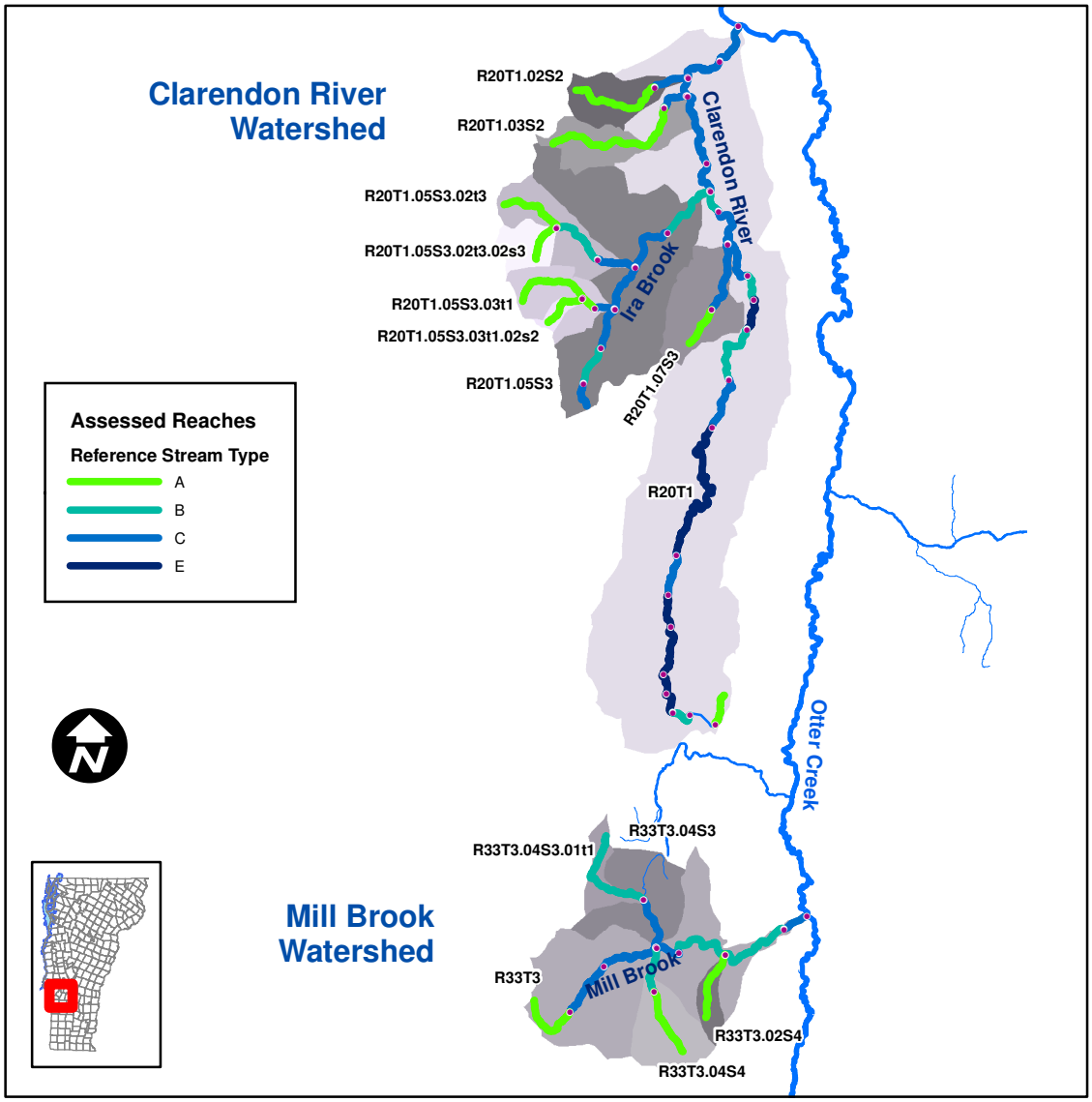


Figure 3. Stream Typing for Phase I Assessment Reaches

Twenty three reaches, comprising approximately 38 percent of the study area, by length, fall into the C stream type and were generally noted to be plane bed or riffle pool systems.

Twelve of the 52 assessed reaches (approximately 27 percent of the study area by stream length) fall within the A stream type and were generally noted to be step-pool systems.

Eleven of the 52 reaches (approximately 22 percent by stream length) are B stream type and are typically step-pool systems. The remaining six reaches, 14% by length were E type,

predominantly dune-ripple systems associated with the large Tinmouth Channel wetland complex.

4.3 Basin Geology and Soils

The characteristics of the Otter Creek tributary watersheds were determined using a combination of soils data, review of topographic maps, and information acquired during the windshield survey.

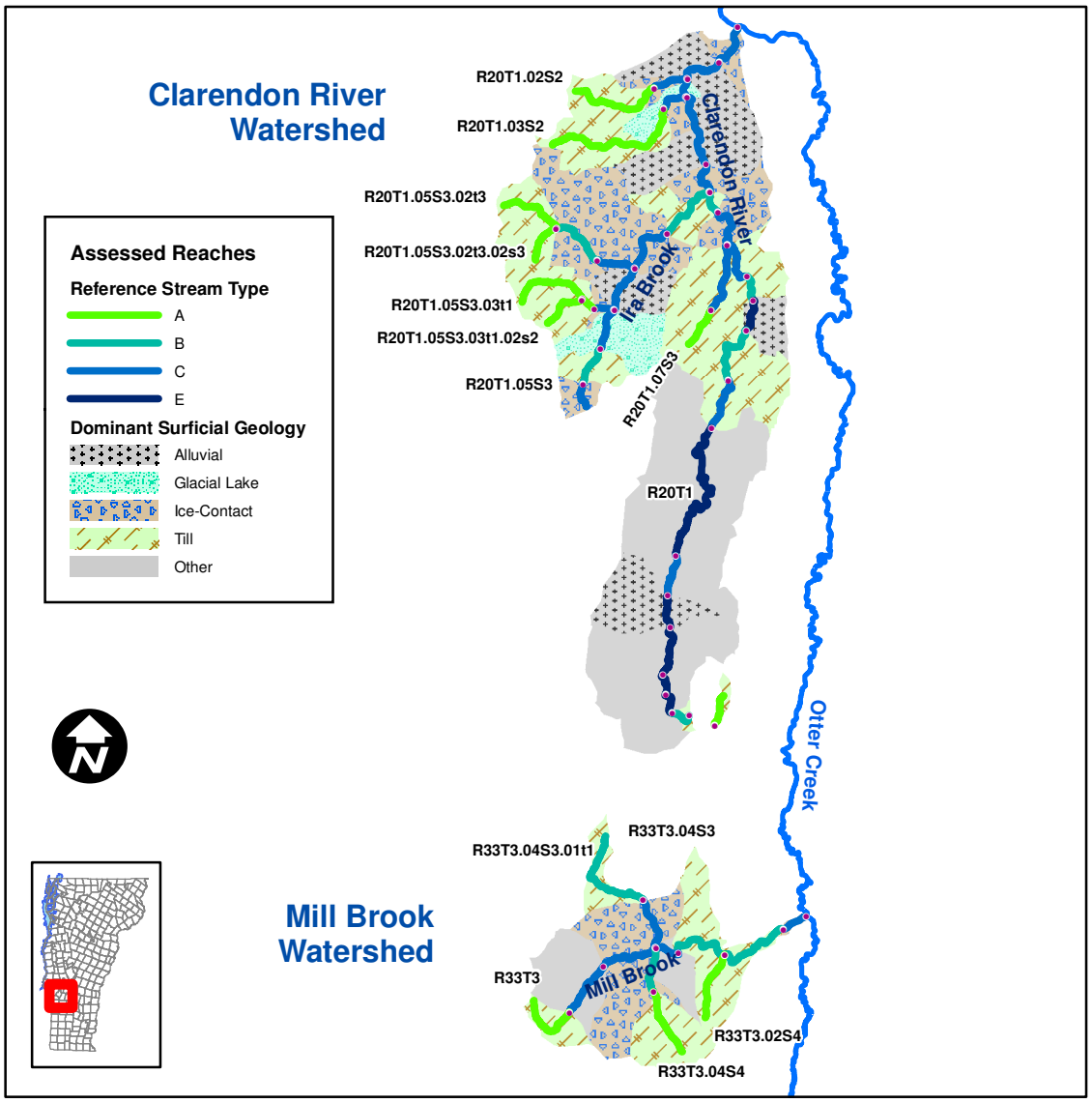


Figure 4. Dominant surficial geology

Phase 1-Step 3. Basin Characteristics: Geology Report, located on pages 11-12 of the Appendix, provides a summary of the basin characteristics, such as alluvial fans, grade control structures, geologic materials, valley side slopes, and soil characteristics.

Several alluvial fans were identified within the study reaches, predominantly from topographical signature. Grade control structures such as dams were identified from Vermont dam inventory records. No additional dams were noted during the windshield survey. Ledge acts as a grade control by keeping the base elevation of a river from being lowered, and prevents the river from incising in that location, however no channel spanning ledge was noted during the windshield survey.

The steepness of the valley side slopes was determined using a slope layer derived from Vermont digital elevation models. This layer was used to identify the slope characteristics of the valley walls within each reach. The valley side slope steepness was variable, but overall steep to very steep side slopes dominated the Clarendon River, while steep to extremely steep slopes were noted in the Mill Brook watershed.

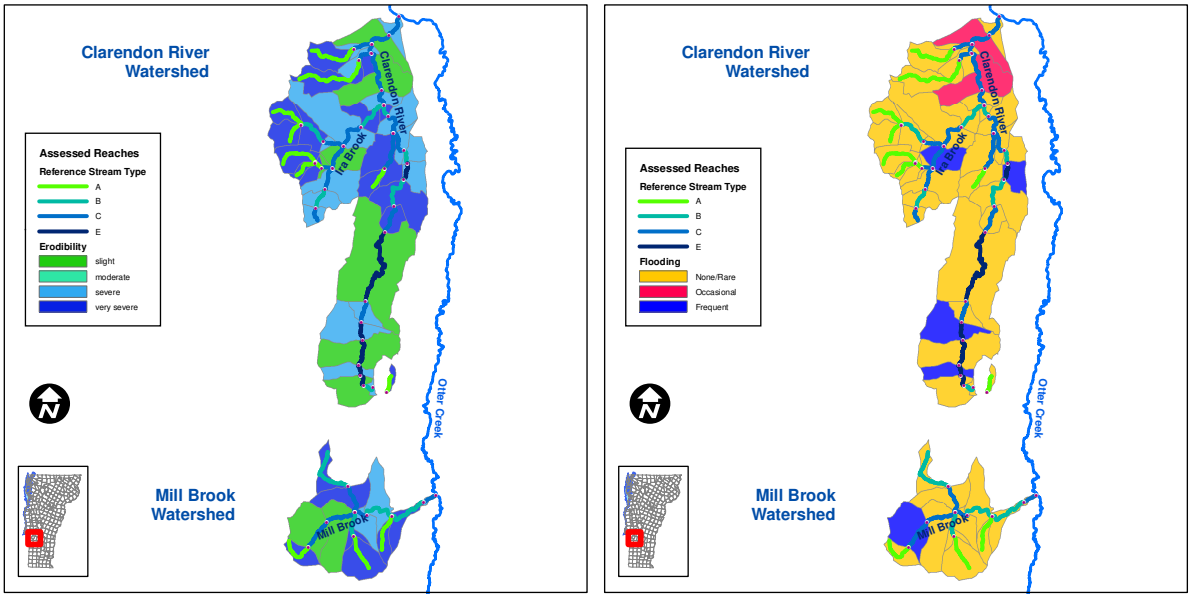


Figure 4a. Erodibility and Flood ratings

The dominant surficial geology of the Otter Creek tributary watersheds consists of alluvium, glacial till, glacial lake and ice contact deposits (see Figure 4.). The reaches characterized as E channels within the Clarendon River watershed typically have mucky soils as the dominant geologic material (shown as "other" in Figure 4), reflecting the extensive wetland complexes called the Tinmouth Channel. These soils are frequently flooded, but only slightly erodible. The majority of the C type channels have till or alluvial soils, tend to be rarely flooded and

generally are very severely erodible. The B type channels typically have glacial till and ice contact deposits as the dominant geologic material, which are rarely flooded and are highly erodible.

4.4 Land Cover – Reach Hydrology

The land use within the watershed plays a significant role in the hydrology of the receiving waters. The percentage of urban and cropland development within the watershed are factors which change a watershed's response to precipitation. The most common effects of urban and cropland development is increasing peak discharges and runoff by reducing infiltration and travel time (United States Department of Agriculture 1986). The land use/land cover within the stream corridor itself is also an important parameter to evaluate. The land use/land cover plays an important role in the sediment deposition and erosion which occurs during annual flood events (Vermont Agency of Natural Resources 2006).

As outlined in the Phase I Protocols, impact ratings were assigned for watershed land cover/land use and stream corridor land cover/land use as follows:

High – 10% or more is crop and/or urban
Low – Between 2 and 10 % is crop and/or urban
NS – Not Significant – Less than 2 % is crop and/or urban

As provided in Phase 1-Step 4. Land Cover-Reach Hydrology Report (see Appendix, pages 13-14), the dominant watershed land cover/land use within the Clarendon River and Mill Brook watersheds is forest. Forty-six of the reaches resulted in a watershed /land use impact rating of high.

The dominant land cover/land use within the river corridor is also summarized in Phase 1-Step 4. Land Cover-Reach Hydrology Report. Thirty-two of the reaches resulted in a high impact rating for corridor land cover/use (see Figure 5.)

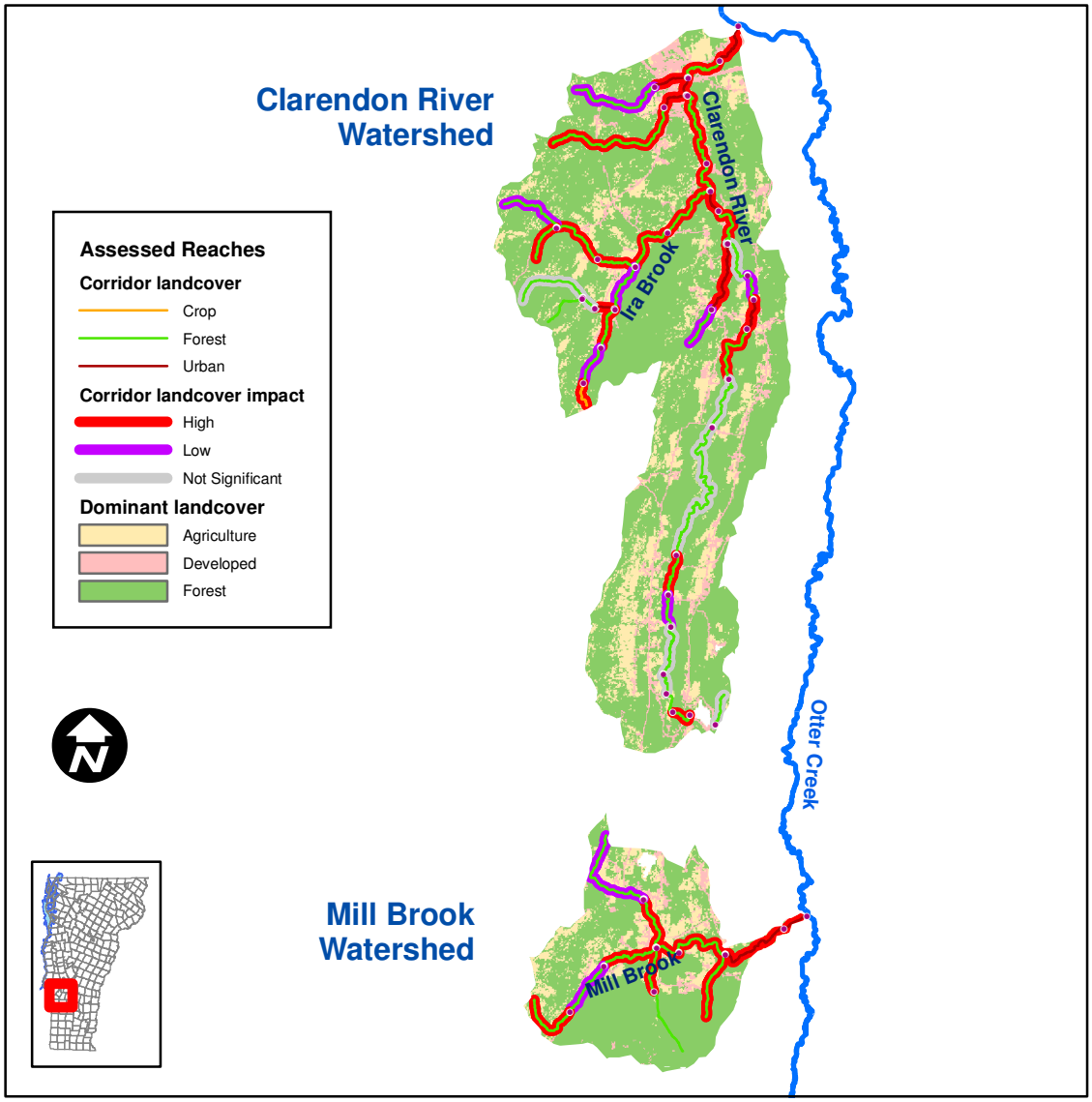


Figure 5. Watershed and corridor landcover

Riparian buffers provide many benefits. Some of these benefits are protecting and enhancing water quality, providing fish and wildlife habitat, providing streamside shade, and providing root structure to prevent bank erosion. Thirty-seven of the stream reaches had at least 75 percent of the reach with little or no buffer on one or more banks. These stream reaches which lack a high quality riparian buffer are at significantly higher risk of experiencing high rates of lateral erosion. Riparian buffer conditions are summarized in the Phase 1-Step 4. Riparian Condition Summary Report located in the Appendix, pages 17-18.

4.5 Historic Channel Modifications

Channel modifications may impact a stream reach by affecting the hydraulics and the sediment regime. Historic channel modifications were assessed in this Phase I Assessment by evaluating flow regulations, bridges and culverts impacts, bank armoring, windrowing, straightening, and dredging. The percentage by length of reach impacted by one or more of these channel modifications was estimated and is summarized in Phase 1-Step 5. Instream Channel Modification Report (see Appendix pages, 19-20).

Flow Regulations

Only one reach was impacted by flow regulations, R20T1.03S2 (the second assessed tributary to the Clarendon River). This regulation is an impoundment listed in the Vermont Dam Inventory.

Bridges and Culverts

As part of the Phase I Assessment, the number of bridges and culverts within the study reach was counted by identifying stream crossings through review of E-911 roads databases, Vermont Hydrography stream data and orthophotos. These stream crossings were confirmed and generally used as access and review points during the windshield survey. Bridge and culvert impacts were recorded using the Feature Indexing Tool (FIT), a component of SGAT. The impact from bridges and culverts on stream dimension, pattern or profile appears to be low or not significant.

Bank Armoring

The amount of bank armoring within a watershed is often indicative of the occurrence of channel processes, which result in bank erosion. Bank armoring, also called revetments, can be made of a variety of material including wooden cribs, concrete, and rock riprap. The most common type of revetment in Vermont is rock riprap.

Rock riprap as well as concrete and stone retaining walls were noted within the study area. The amount of revetment mapped from the Phase I windshield survey is likely an underestimation of the total amount of revetment, since only a portion of individual reaches are evaluated during the windshield survey. Armoring was mapped first from remote sources such

as aerial imagery and then during the windshield survey, additional features were mapped by GPS and subsequently recorded using FIT in SGAT. The following criterion was used to provide an impact rating for human placed bank armoring.

Table 4- Armoring impact rating	
H	High – Greater than 30% of the reach length is armored
L	Low – Between 10 and 30% of the reach length is armored
NS	Not Significant – Less than 10% of the reach length is armored
No Info	Bank armoring has not been evaluated for the entire reach and impact at the reach level is unknown

During the remote review or windshield survey, armament was noted in 42 reaches. Generally the armoring took the form of rip-rapped banks but some reaches included some form of stone wall or concrete hard bank armoring. Of these reaches, armoring received an impact rating of low for 4 of the reaches and not significant for 38.

Channel Modifications (Windrowing and Straightening)

During the windshield survey and orthophoto examination, evidence of historic channelization projects was recorded. The total reach length (in feet) and the percentage of the reach length directly impacted by the channel modification were recorded in the field and documented using the FIT in SGAT. Categories considered as part of the Step 5.4 (Channel Modifications) included the following menu options:

- Windrowing – pushing gravel up from the stream bed onto the top of either bank
- Straightening – Dredging, windrowing, and bulldozing the stream into a straight course
- Multiple – Multiple channel modifications, where neither windrowing nor straightening are the dominant channelization type
- None – No known modifications

The only channel modification noted within the Clarendon River and Mill Brook watersheds was straightening. Channel straightening was identified by reviewing orthophotos and through field confirmation during the windshield survey. Portions of stream reaches that have been historically channelized or straightened are identified below in Figure 6.

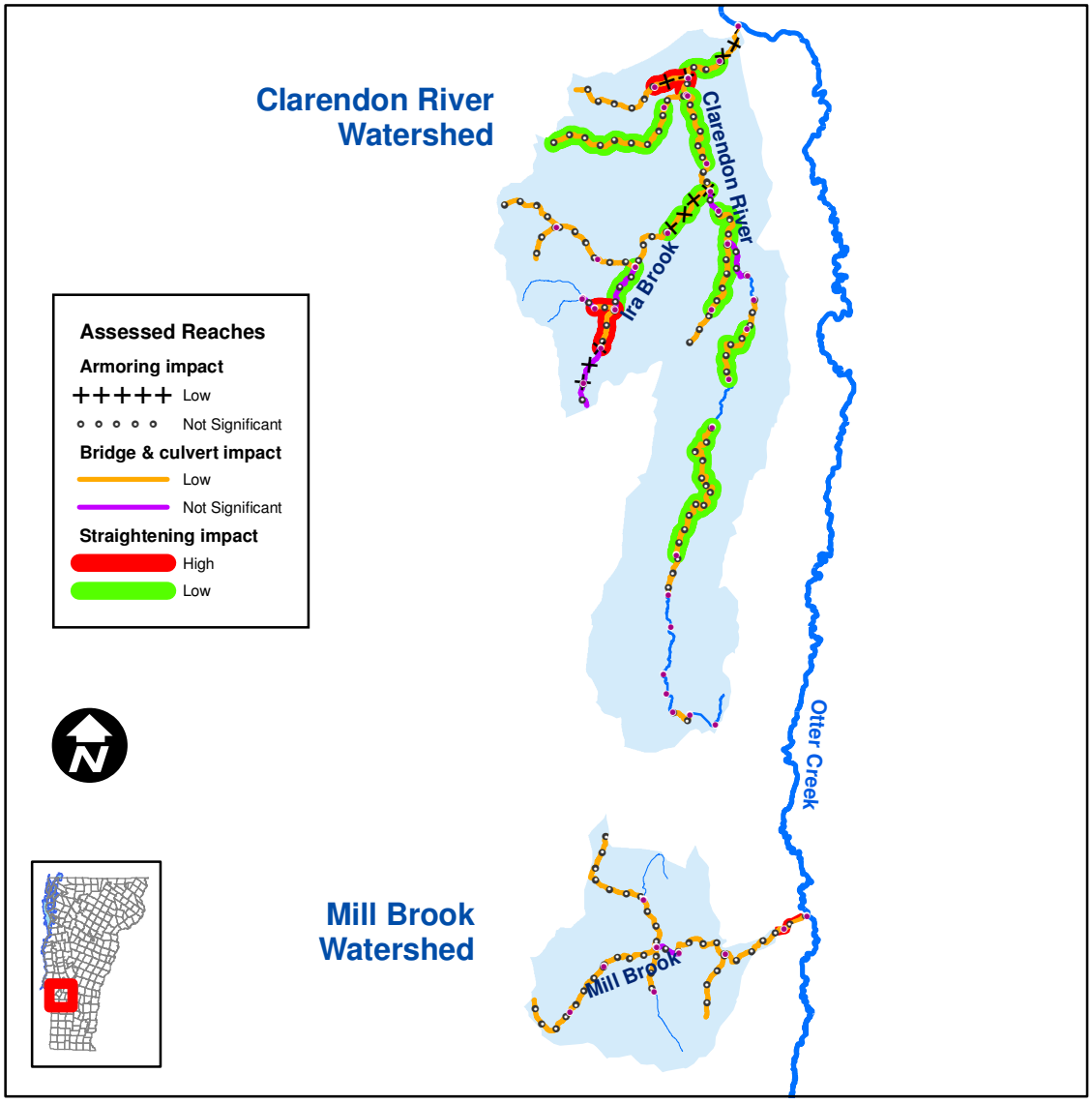


Figure 6. Instream Channel Modifications Identified for Phase I Reaches

Dredging History

Requests for information from the regional Stream Alteration Engineer were not returned as of the writing of this report. As with many Vermont streams, it is likely that some dredging and gravel mining has taken place in the past. This is most likely to have occurred in the lower elevation reaches, particularly in the Clarendon River. The extensive Tinmouth Channel wetland complex likely restricted extensive dredging or mining in that section of the River.

4.6 Floodplain Modifications

In this step of the Phase I Assessment, careful attention is paid to infrastructure and other development which restricts access to the floodplain, resulting in vertical or lateral confinement of flood flows. The parameters included in this step are: Berms and Roads, River Corridor Development, Depositional Features, Meander Migration/Channel Avulsion, Meander Width Ratio, and Wavelength Ratio. Some of the primary factors which may influence floodplain function in the assessed reaches are discussed below. Phase 1-Step 6. Floodplain Modification and Planform Changes Report, which is included on pages 22-23 of the Appendix, contains the Phase 1 information for Floodplain and Planform changes.

Berms and Roads

Using information from maps, orthophotos, and the windshield survey, the areas of the river corridor along which berms, roads, railroad, or improved paths run parallel to the stream were delineated. Reaches where berms, roads, railroads or improved paths were located along 20 percent or more of the river corridor were given impact ratings of high. The 17 reaches, making up most of the lower, more developed reaches of the Clarendon River, Ira Brook and Mill Brook all received high impact ratings for encroachment by berms, roads and railroads.

River Corridor Development

The river corridor development parameter looks at whether developments within the river corridor are effectively decreasing the belt width. The percentage of the reach length with houses, fill, parking lots or other development within the river corridor was tabulated using maps, E-911building data, orthophotos, and knowledge from the windshield survey and recorded using FIT in SGAT. Twenty three reaches had corridor development ratios greater than 20 percent, and thus, were given an impact rating of high. These reaches again corresponded with the lower more commercial and residential areas of the watersheds.

Channel Bars

The 1990s orthophoto series, 2003 NAIP orthophotos, as well as results from the windshield survey were used to evaluate depositional features within the assessed watersheds. The presence of bars (mid channel or point bars) and deltas were noted in each of the study

reaches. The VT ANR has included depositional features as a component of the Phase I Assessment because these features are indicative of an increased sediment load and a high likelihood that the streambed is actively aggrading and/or undergoing lateral migration. An unvegetated bar can indicate that the bar has recently formed or is in the process of growing.

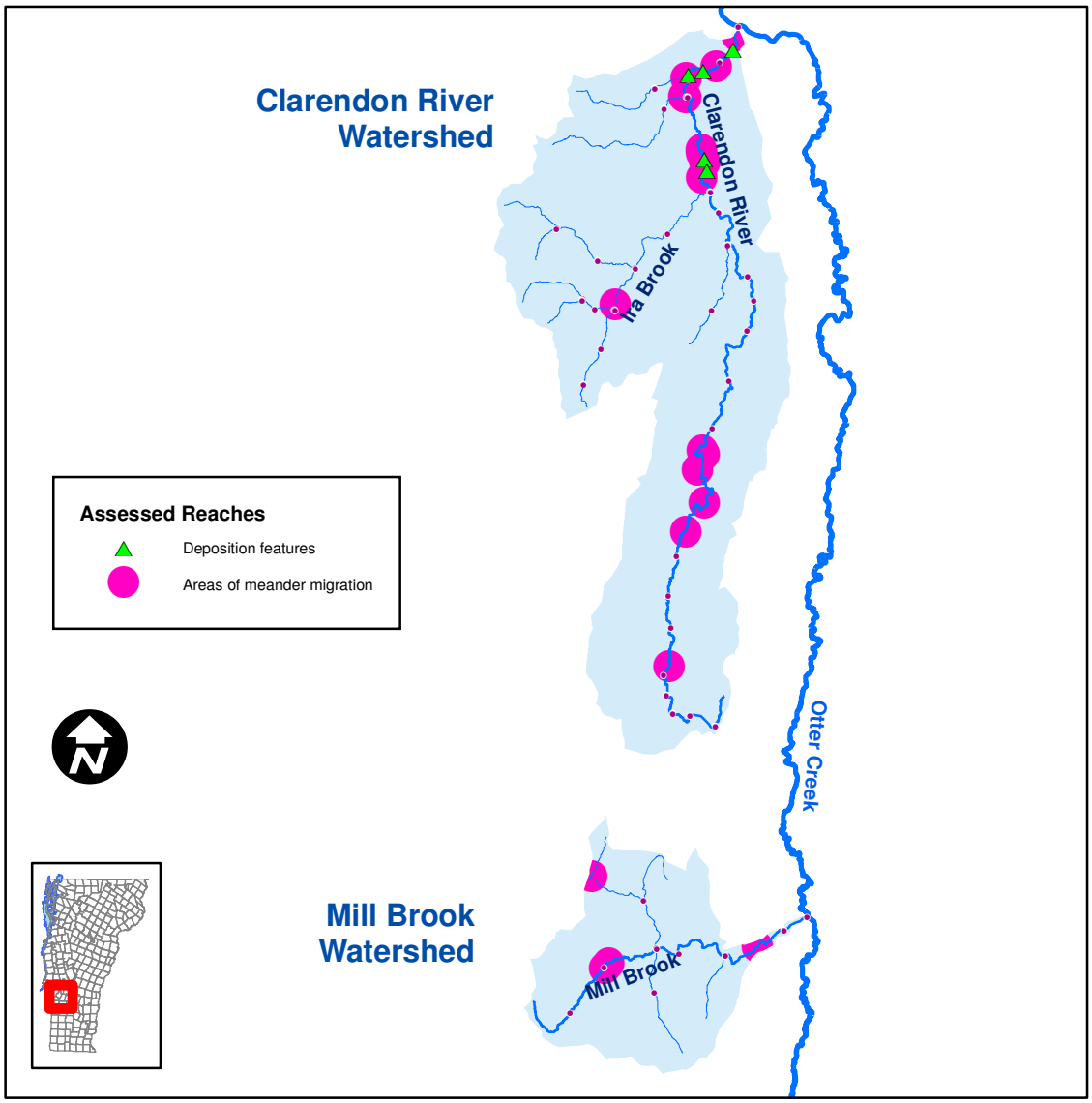


Figure 7. Meander migration/avulsion and deposition

Because of the small nature of the assessed streams, very few depositional features were evident in aerial photo analysis. Of the 52 reaches assessed, deposition features (point bars) were noted in only 4 reaches. All four of these reaches were in the lower portions of the Clarendon River. Timing of this project led to the windshield survey portion of the assessment being completed during winter months, which meant most depositional features were likely obscured by ice and snow, therefore no additional deposition features were tabulated in the

field. Phase 2 Assessment would likely reveal significantly more depositional features than were observable through this primarily remote assessment.

Meander Migration

Recent and historic aerial photos were used to evaluate areas where the assessed reaches have migrated, bifurcated, or avulsed[2]. 1960s era aerial photos housed at the VT DEC offices is Waterbury Vermont were scanned, and georeferenced using GIS software so they could be overlayed on recent

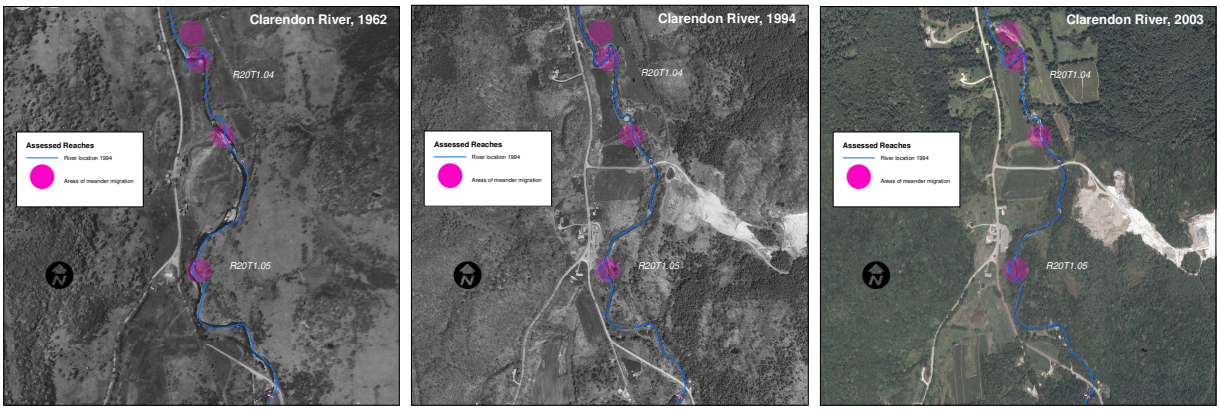


Figure 8. Forty-one years of migration

orthophotos taken in between 1994 and 2003. Changes in channel location were digitized on-screen and these changes were used to evaluate migration impacts. The current and the historic orthophotos span a range of over 40 years (Figure 8). Four reaches received an impact rating of high for meander migration, while 6 reaches received an impact rating of low. Avulsion, the cutting off of meander bends, appears to be the primary mechanism for lateral migration of the channel within the watersheds.

Meander Width and Wavelength

The 1990 series (1:5000) & 2003 NAIP orthophotos in conjunction with topographic maps were used to determine the meander belt width and the meander wavelength for streams typed in Step 2.10 as C or E riffle-pool or ripple dune reference stream types (i.e. unconfined

[2] An avulsion is a change in planform resulting from a meander cut-off.

systems). The topographic maps were used to determine the valley direction, while the most current orthophoto series was used to provide the accurate location of channel meanders.

The meander belt width is the horizontal distance to opposite, outside banks on fully developed meanders. The meander width ratio is calculated by dividing the average belt width for the reach by the bankfull width. The VT ANR Phase 1 Assessment protocol considers unconfined, gravel dominated streams with moderate to gentle gradients, which are in regime, to have belt widths in the range of 5 to 8 times the channel width. Twenty-three of the unconfined reaches fell outside of the range expected for channels which are in regime. Twelve of the study reaches were rated as high impact for meander width ratio, and 11 reaches received an impact rating of low.

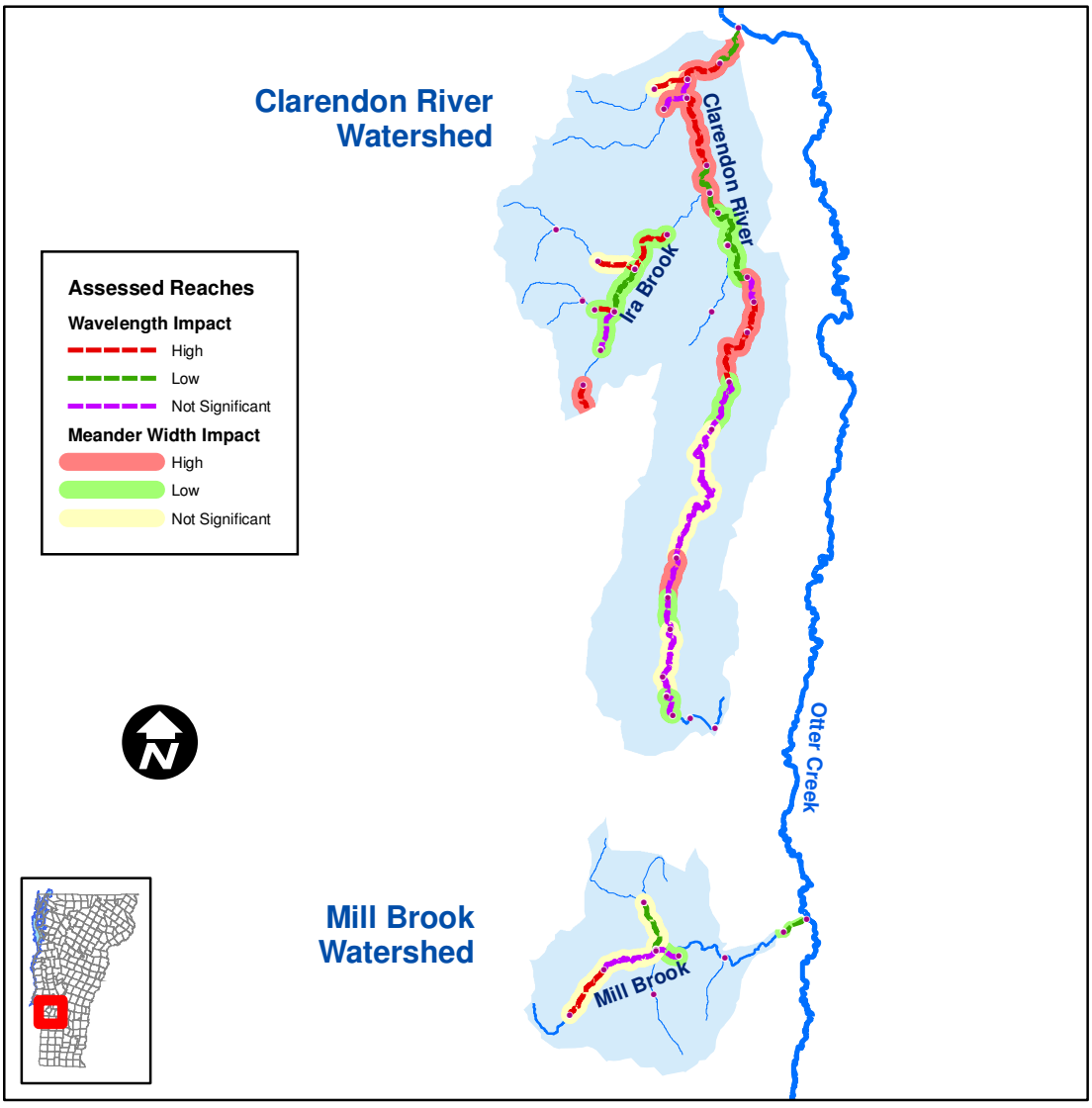


Figure 9. Meander width and wavelength impacts.

Of the 23 stream reaches which resulted in a low or high impact rating, 21 had meander width ratios of less than 5. These low values may indicate the stream has become straighter and steeper, possibly resulting in degradation and loss of access to its floodplain. Field observations confirm the finding that the Clarendon River and Mill Brook have lost access to their floodplains in many locations, often due to road encroachments and other development.

The meander wavelength consists of two bendways. The wavelength ratio is calculated by dividing the average wavelength by the bankfull channel width. Leopold 1994 and Williams 1985 (cited in Vermont Agency of Natural Resources, 2006) have shown unconfined, gravel dominated streams in shallow-sloped valleys to have wavelengths in the range of 10 to 12 times the channel width. Eighteen of the reaches fell outside the range of expected meander wavelength ratio: 8 of the reaches resulted in a low impact rating and 10 of the stream reaches received an impact rating of high for wavelength ratio. The wavelength ratio was less than 8 for eight reaches (but greater than 1.0), suggesting the stream is starting to aggrade and become more sinuous. This has resulted in a decrease in channel slope as the stream migrates laterally.

4.7 Bed and Bank Windshield Survey

The dominant bed form, dominant bank material, bank erosion/bank height, and debris/ ice jam potential were recorded during the windshield survey, and these results are summarized in Phase 1-Step 7, Bed and Bank Windshield Survey Report on pages 24-26 of the Appendix. The dominant bed form and dominant bank material were previously discussed under Section 4.2, Stream Typing. Bank erosion, bank armoring, straightening and other bank and bed features were recorded in the field using a GPS device and a handheld computer running GIS software. The features were then indexed using orthophotos and the FIT in SGAT back in the office. Impact ratings for many features are derived from bed and bank characteristics recorded using the FIT. Bank erosion was rated as low impact in 8 of the reaches evaluated. Again, due both to the often single point access of the windshield survey, and the ground conditions (ice and snow) it is certain that additional bank erosion would be recorded during a Phase 2 Assessment.

<u>Debris/Ice Jam Potential</u>

Undersized culverts or bridges with spans less than the average channel width or bridges with piers in the middle of the channel were the primary factors identified as potential for ice and debris jams. These structures, which are likely to cause constrictions during high flow events may result in lateral erosion or channel avulsions or may even endanger infrastructure. Two bridges were identified with ice jam potential, one due to its low clearance and the second due to narrow span. From the windshield survey, there appear to be numerous private bridges within the assessed watershed. A complete bridge and culvert inventory is recommended to fully evaluate the ice jam potential and other geomorphic implications of these structures.

5.0 DATA ANALYSIS

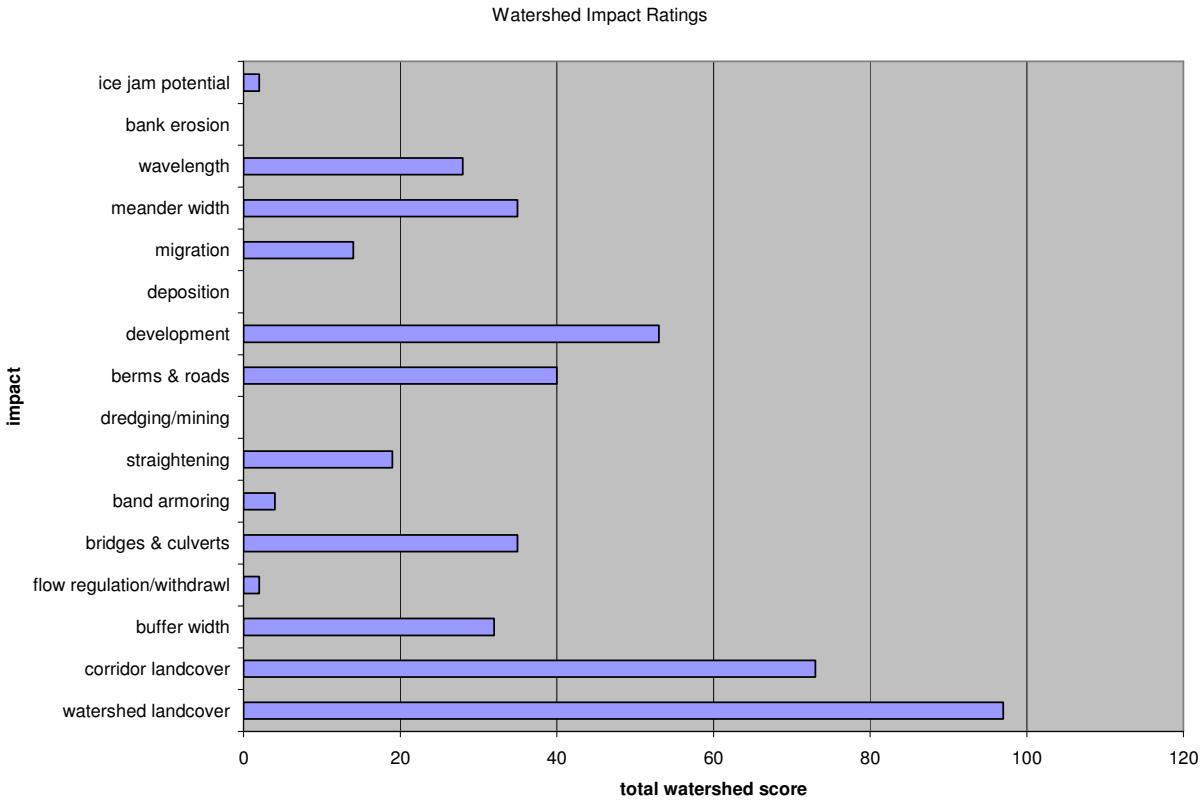
The Phase 1 Assessment evaluates parameters that may cause channel adjustment. These parameters are grouped into four major categories: land use, instream modifications, floodplain modifications, and bed and bank windshield survey. For each parameter, the maximum impact score for the entire watershed is 104 (52 reaches multiplied by the impact score of 2). As shown below in Figure 6, most impact scores were less than 70 out of the possible 104. Parameters in the land use category and the floodplain modification (development) category received high impact ratings for the watershed.

Figure 10 shows the watershed impact ratings for the channel adjustment parameters.

The total impact scores for the Phase I Assessment are provided in Phase 1-Step 8. Stream and Watershed Impact Rating Report**,** on pages 30-31 of the Appendix and are plotted below in Figure 10.

Five reaches in poor condition (at the watershed, not statewide, level) include the Clarendon River main stem reaches R20T1.01-T1.04 and T1.07. Also in poor condition, are the mainstem reaches of Mill Brook, R33T3.04 and T3.06-T3.07.

The majority of the unconfined stream reaches were in the poor or fair category, while all of the unconfined reaches were in good or reference condition.



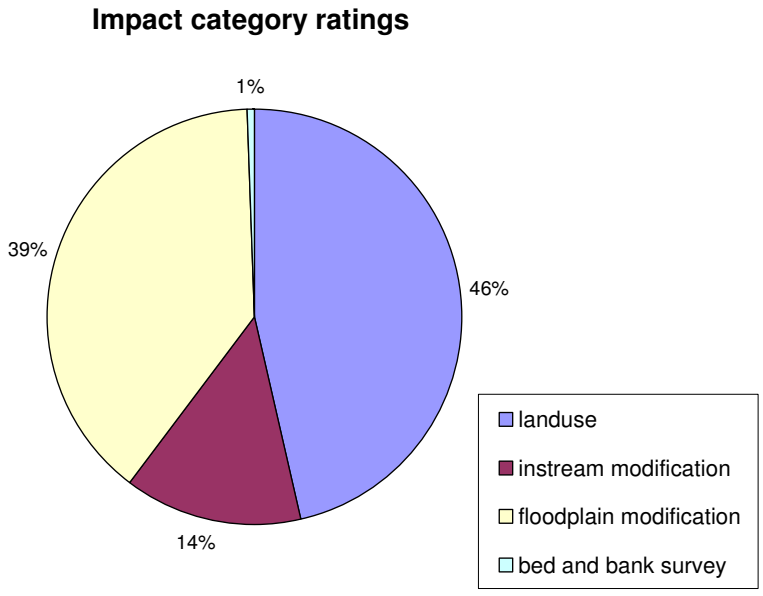


Figure 10: Watershed Impact Rating Scores

5.1 Impact Scores

Streams in poor condition are out of regime with reference conditions and could be deeply entrenched or aggrading, while those in fair condition are fully in adjustment and are experiencing major and rapid changes due to recent floodplain and channel modifications, land cover changes, and/or loss of riparian buffer. The majority of the unconfined stream reaches were in the poor or fair category. Ten reaches were placed in the good category. The streams in the good category had experienced some degree of human-induced change to their watershed, floodplain and/or channel and appeared to be undergoing only minor adjustments.

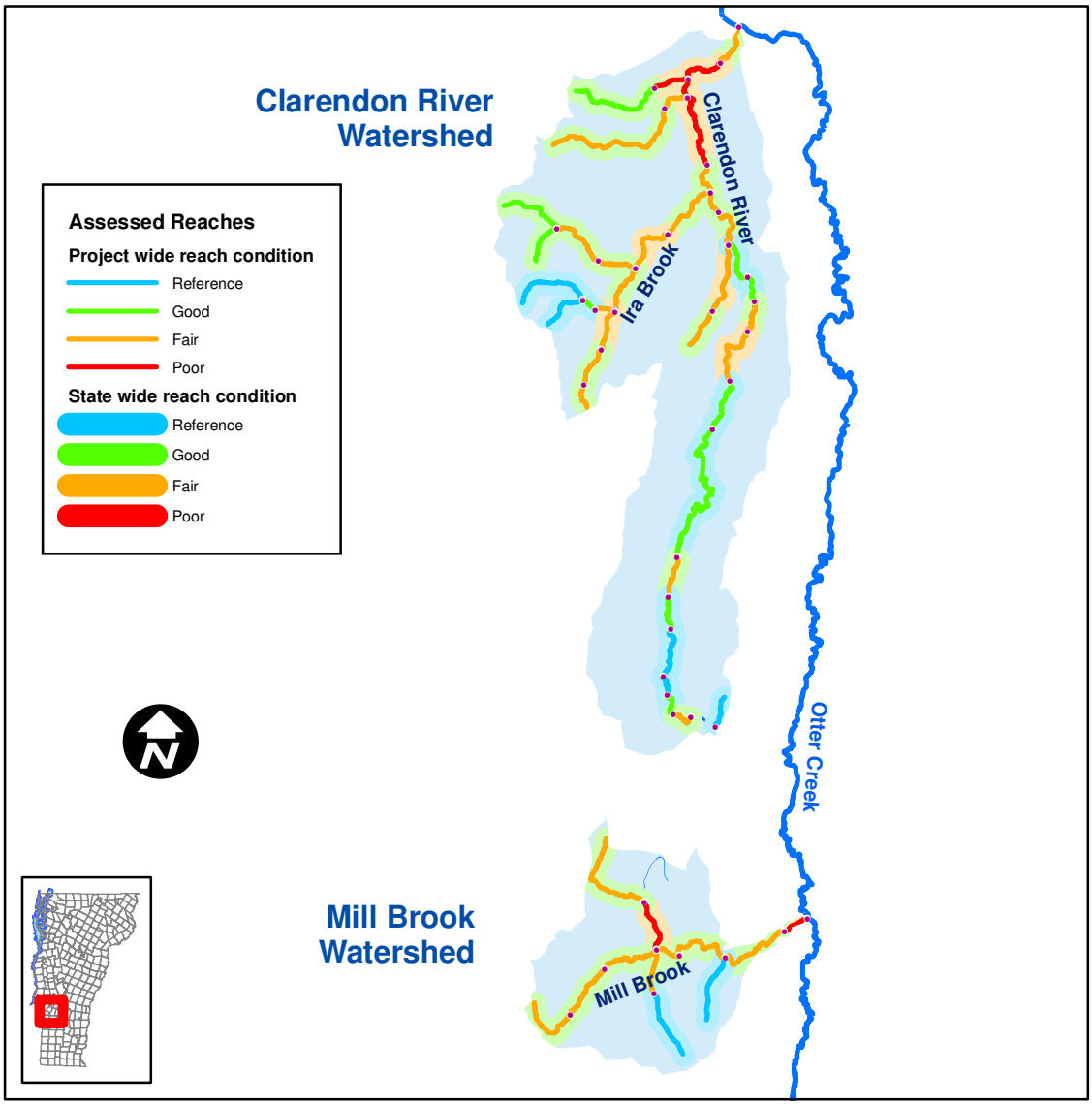


Figure 11. Reach Condition of Assessed Streams

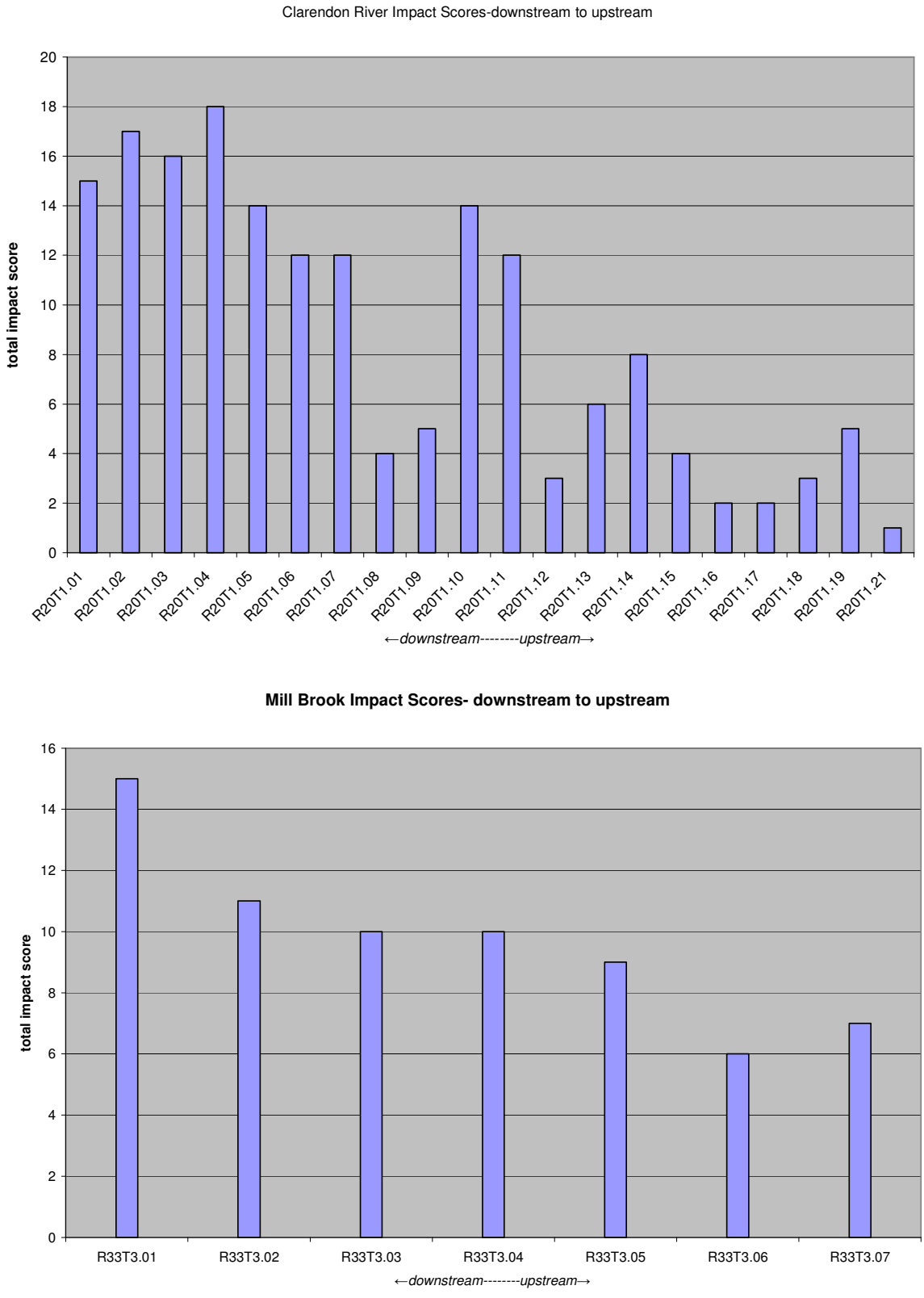


Figure 12. Impact Ratings from downstream to upstream on the Clarendon River and Mill Brook

A reference reach has no significant channel or floodplain modifications and has a forested buffer, adjacent to the channel. These reaches are close to the natural condition. Streams identified as reference are generally located in headwater areas or areas with extensive wetland limiting the development and landuse impacts seen in other locations.

Figure 12 above shows impact ratings from downstream on the main stem to the headwaters. Reach condition generally improves on both streams as one moves upstream.

5.2 Adjustment Processes

Phase 1-Step 9. Adjustment Process and Reach Condition Report**,** on pages 36-37 of the Appendix, provides a summary of the primary adjustment processes that were predicted based on the Phase 1 Stream Geomorphic Assessment. The Phase 1 data suggest that most of the assessed stream reaches are experiencing more than one type of channel adjustment process.

5.3 Reach Sensitivity

The online data management system assigns a reach sensitivity rating based on the reference stream type. Highly sensitive reaches are more likely to be in adjustment, and are very sensitive to land use changes within the watershed. The reach sensitivity is summarized in Phase 1-Step 9 Adjustment Process and Reach Condition Report**,** on pages 36-37 of the Appendix. There were 10 stream reaches with a stream sensitivity rating of high, all but 2 of which were unconfined. There were 20 moderately sensitive reaches, 14 of which were unconfined.

6.0 RECOMMENDATIONS FOR PHASE 2 ASSESSMENT

The Phase 1 Assessment results are valuable for providing recommendations for reaches to select for the Phase 2 Assessment.

Based on the results of the Phase 1 Assessment, the following recommendations are made for Phase 2 Assessment. Phase 1 reach condition and reach sensitivity ratings for the proposed Phase 2 Assessment reaches are summarized in Table 5 and Figure 13.

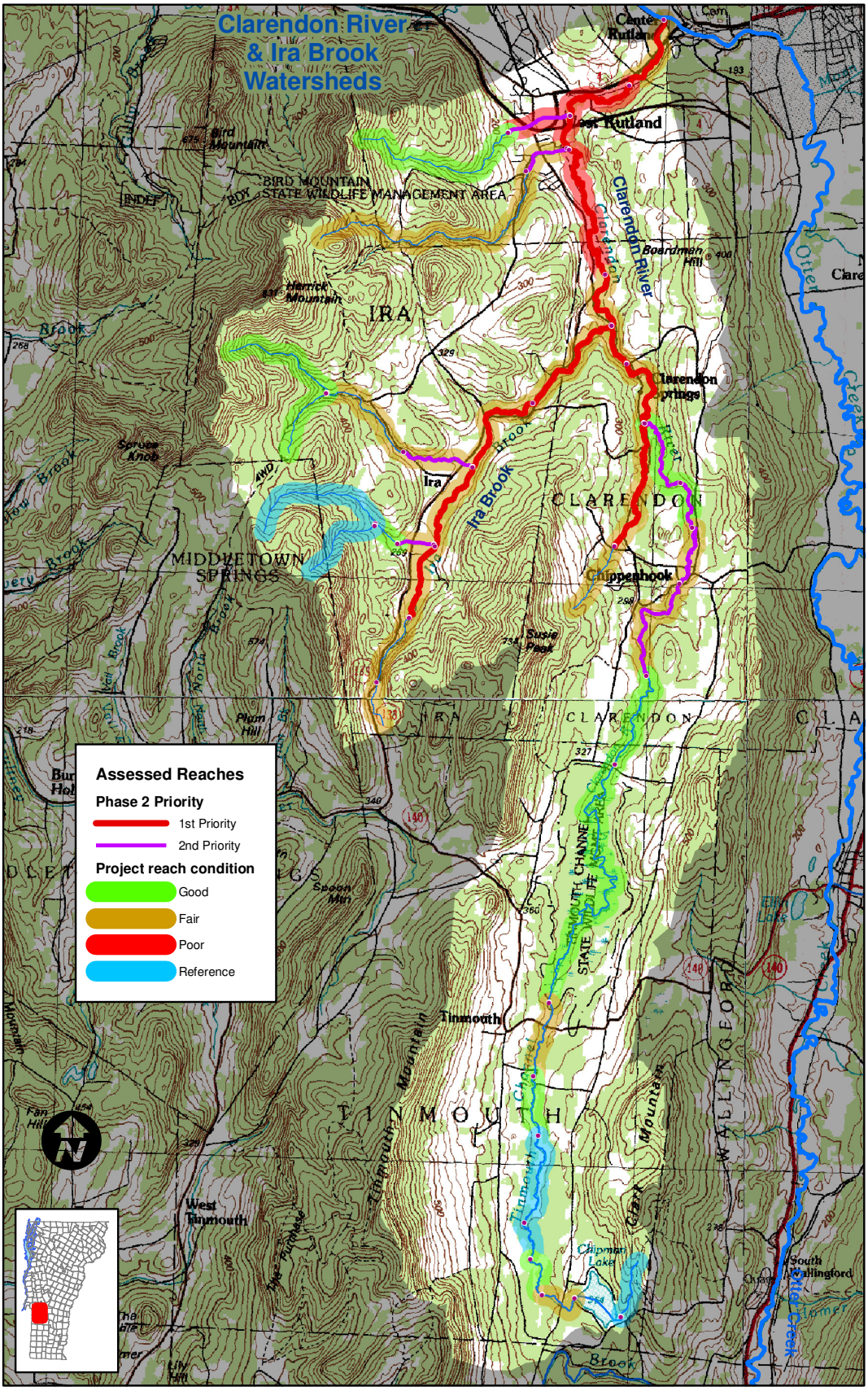


Figure 13a. Phase 2 Recommendation- Clarendon River & Ira Brook

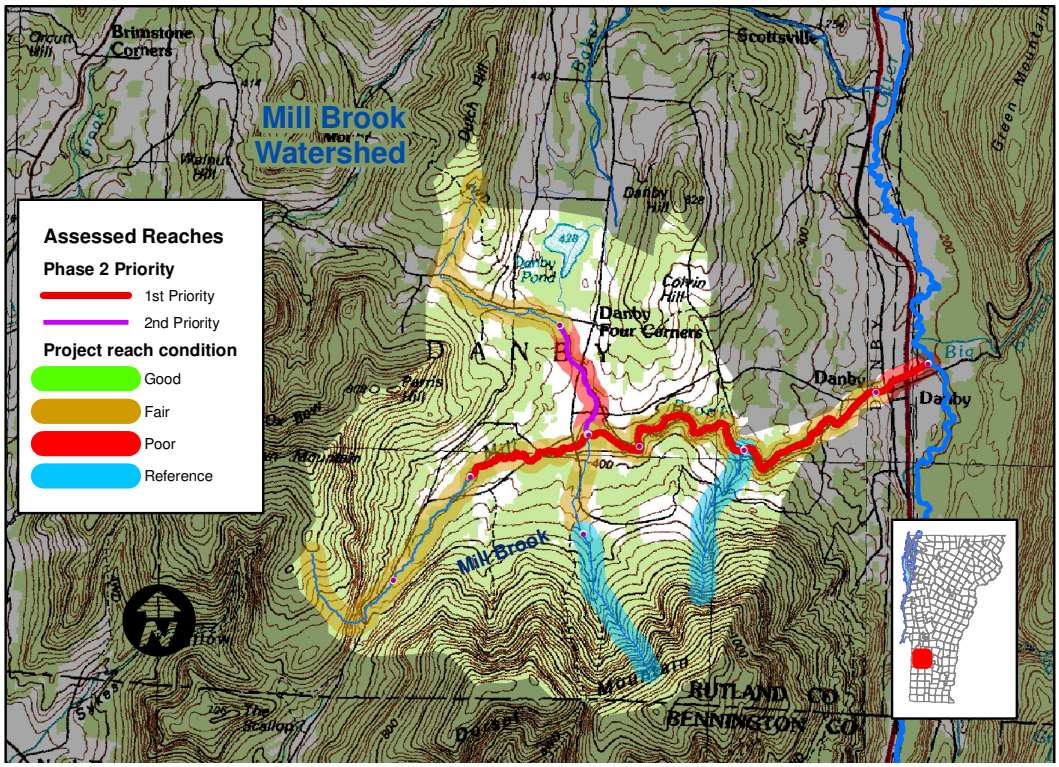


Figure 13b. Phase 2 Assessment Recommendations- Mill Brook

Recommendations for first priority Phase 2 Assessment include Clarendon River reaches from the mouth upstream to approximately the confluence with the tributary- R20T1.07, and then continuing up the first reach of the tributary. Phase 2 Assessment priorities also include much of the main stem of Ira and Mill Brooks. Second priority reaches are detailed in Figure 13 and Table 5.

Table 5- Reaches recommended for inclusion in Phase 2 Assessment

Reach ID	Stream miles	Con-fine ment	Ref. Strm	Bed material	Bed-form	WS Cond.	State Cond.	Reach Sensitivity
Phase 2: 1st Priority								
Clarendon River								
R20T1.01	0.95	BD	C	Gravel	Riffle-Pool	Fair	Good	High
R20T1.02	1.03	VB	C	Sand	Dune-Ripple	Poor	Fair	High
R20T1.03	0.41	VB	C	Gravel	Riffle-Pool	Poor	Fair	High
R20T1.04	1.92	VB	C	Gravel	Riffle-Pool	Poor	Fair	High
R20T1.05	0.75	VB	C	Cobble	Riffle-Pool	Fair	Good	Moderate
R20T1.06	0.48	SC	B	Cobble	Plane Bed	Fair	Good	Moderate
R20T1.07	1.06	VB	C	Gravel	Riffle-Pool	Fair	Good	High

Table 5- Reaches recommended for inclusion in Phase 2 Assessment (cont.)								
Reach ID	**Reach ID**	**Reach ID**	**Reach ID**	**Reach ID**	**Reach ID**	**Reach ID**	**Reach ID**	**Reach ID**
Ira Brook								
R20T1.05S3.01	1.36	SC	B	Cobble	Step-Pool	Fair	Good	Moderate
R20T1.05S3.02	1.24	VB	C	Cobble	Riffle-Pool	Fair	Fair	Moderate
R20T1.05S3.03	1.11	VB	C	No Data	Dune-Ripple	Fair	Good	
R20T1.05S3.04	0.90	VB	C	Not Eval	Dune-Ripple	Fair	Fair	
Clarendon Tributary								
R20T1.07S3.01	1.71	VB	C	Gravel	Riffle-Pool	Fair	Fair	High
Mill Brook								
R33T3.01	0.54	VB	C	Cobble	Plane Bed	Poor	Fair	Moderate
R33T3.02	1.64	NC	B	Cobble	Step-Pool	Fair	Good	Moderate
R33T3.03	1.45	NW	B	Cobble	Step-Pool	Fair	Good	Moderate
R33T3.04	0.56	VB	C	Gravel	Riffle-Pool	Fair	Good	High
R33T3.05	1.41	VB	C	Cobble	Plane Bed	Fair	Good	Moderate
Phase 2: 2nd Priority								
Clarendon River								
R20T1.08	1.05	BD	C	Not Eval	Plane Bed	Good	Referen	
R20T1.09	0.59	NW	B	Cobble	Step-Pool	Good	Referen	Moderate
R20T1.10	0.86	VB	E	Cobble	Plane Bed	Fair	Good	Moderate
R20T1.11	1.47	BD	B	Cobble	Step-Pool	Fair	Fair	Moderate
Clarendon Tributaries								
R20T1.02S2.01	0.72	VB	C	No Data	Riffle-Pool	Poor	Fair	
R20T1.03S2.01	0.60	VB	C	No Data	Riffle-Pool	Fair	Fair	
R20T1.05S3.02t3.01	0.85	VB	C	Cobble	Plane Bed	Fair	Good	Moderate
R20T1.05S3.03t1.01	0.40	VB	C	No Data	Plane Bed	Fair	Fair	
Mill Brook Tributary								
R33T3.04S3.01	1.12	VB	C	Cobble	Plane Bed	Poor	Fair	Moderate

Phase 2 Assessment work on the mainstem reaches of the assessed streams will assist analysts and planners by providing a more in-depth and accurate assessment of the current reach conditions and the stressors causing regime departures in those areas.

Clarendon River mainstem reaches T1.12 through T1.17 are dominated by the extensive wetland complex known as the Tinmouth Channel. This area is designated as a Class I wetland by the State of Vermont, and generally has very few threats to geomorphic stability due to lack of access and very little in the way of development or agricultural pressure. Its Class I status affords one of the highest levels of regulatory protection available within the State of Vermont.

Although some headwater stream reaches are included in Phase 2 Assessment recommendations, in general those upstream headwater sections of the assessed streams were small and undeveloped and Phase 2 Assessment prioritization was not deemed appropriate.

REFERENCES

United States Department of Agriculture. 1986. Urban Hydrology for Small Watersheds. Soil Conservation Service, Engineering Division, Technical Release 55. Washington, D.C.

Vermont Agency of Natural Resources. March 2006. Vermont Stream Geomorphic Assessment Phase 1 Handbook. Watershed Assessment Using Maps, Existing Data, and Windshield Surveys. Waterbury, Vermont

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Phase I Stream Geomorphic Assessment
Tributaries to the Otter Creek
Rutland County, Vermont

Project Appendices Page

Phase 1 Project Metadata

Parameter	Metadata
Alluvial fan	1:24K topos, surficial geology (SG) data
Bank armoring and revetments	1:24K topos, 1:5K orthos
Bank erosion - relative magnitude	Field obs. at access point along reach
Dominant bed form and material	Preliminary estimate
Belt width	1:5K NHD, 1:5K orthos
Berms and roads	1:24K topos, 1:5K orthos, files
Bridges and culverts	1:24K topos, 1:5K NHD & orthos, files
Channel length	SGAT automated
Channel straightening	1:24K topos, 1:5K NHD & orthos
Confinement type	1:24K topos
Corridor land use - land cover data	Land use - land cover (1990s statewide)
Corridor soil data	NRCS soil survey maps
Debris and ice jam potential	Field obs. at access point along reach
Depositional features	1:5K orthos, other aerial photos
Dredging and gravel mining history	Not Evaluated
Downstream and upstream elevations	1:24K topos
Flow regulations and water withdrawals	1:24K topos, 1:5K NHD & orthos, files
Grade controls	1:24K topos, bedrock map, dam inventories
Latitude and Longitude	SGAT automated
Meander centerline	1:24K topos, 1:5K NHD
Meander migration and channel avulsion	1:5K orthos (1990s), other aerial photos
Historic corridor land use - land cover	1:5K orthos, old aerial photos, topos
Historic watershed land use - land cover	1:5K orthos, old aerial photos, topos
Reach breaks	1:24K topos, 1:5K NHD
Riparian buffer width	1:5K orthos, recent coverages & photos, field obs.
River corridor development	1:24K topos, 1:5K orthos, files
Stream type	1:24K topos
Towns that reaches are in	1:24K topos
Valley length	SGAT automated
Valley side slopes	1:24K topos, soils slope data
Valley walls	1:24K topos
Valley width	SGAT automated
Groundwater and small tributary inputs	1:24K topos, 1:5K NHD, NWI maps
Wavelength	1:5K NHD, 1:5K orthos
Watershed delineations	1:24K topos, 1:5K NHD
Watershed land use - land cover data	Land use - land cover (2002 statewide)

Otter Creek Tributaries Phase 1 QA Worksheet							
		QA Team Leader:	Dori Barton				
		ANR Team Leader:	Shannon Hill				
		Project kick-off:	- July 11, 2006				
SGA Step	**Sub step**	**Title**	**FIT/GIS data created**	**QA comments**	**Date completed**	**Confidence**	**Notes**
1	1	Reach Description				high	
	2	Town				high	
	3	Lat/Long				high	
2	1-9	**SGAT** Processing	SGAT			high	
	10	Confinement				high	
	11	Reference stream type			Fall 2006	high	
3	1	Alluvial Fan				high	
	2	Grade Control	FIT			moderate-high	only field verified where visible from access points
	3	Geologic Material	SGAT			high	
	4	Valley Side Slopes	GIS			high	Slopes derived from 1:24k DEM and averaged
	5	Soil Properties	SGAT		Fall 2006	high	
4	1	Watershed Landcover-Historic		1960s aerials from VT ANR	January 2007	moderate-high	
		Watershed Landcover-Current	SGAT	2002 lclu		moderate	accuracy of landcover data used by SGAT is suspect
	2	Corridor LandCover-Historic		1960s aerials from VT ANR	January 2007	moderate-high	
		Corridor LandCover-Current	SGAT	2002 lclu		moderate	accuracy of landcover data used by SGAT is suspect
	3	Buffer Width	GIS		Winter 2006/07	high	
	4	Goundwater Inputs	GIS		Winter 2006/07	high	NDH streams and VSWI wetlands
5	1	Flow Regulation	FIT		Winter 2006/07	high	
	2	Bridge & Culvert	GIS		Winter 2006/07	high	
	3	Armoring/Revetments	FIT		Winter 2006/07	moderate-high	
	4	Straightening	FIT		Winter 2006/07	moderate-high	only field verified where visible from access points
	5	Dredging Mining	FIT		Winter 2006/07	moderate-low	insufficient information

Otter Creek Tributaries Phase 1 QA Worksheet							
		QA Team Leader:	Dori Barton				
		ANR Team Leader:	Shannon Hill				
		Project kick-off:	- July 11, 2006				
SGA Step	**Sub step**	**Title**	**FIT/GIS data created**	**QA comments**	**Date completed**	**Confidence**	**Notes**
6	1	Berms & Roads	FIT		Winter 2006/07	moderate-high	high for roads, slightly lower for berms
	2	Corridor Development	GIS	utiltized E-911 data & orthos	Winter 2006/07	high	
	3	Depositional Features	GIS		Winter 2006/07	moderate-low	Not much visible on aerial imagery
	4	Meander Migration	GIS		Winter 2006/07	high	
	5	Meander Width Ratio	GIS	GIS processing	Winter 2006/07	high	
	6	Wavelength Ratio	GIS	GIS processing	Winter 2006/07	high	
7	**(Windshield Survey)**						
	1	Bedform/Material			February 2007	high	where accessible
	2	Erosion	FIT		February 2007	moderate	only field verified where visible from access points
	3	Ice jam/Debris			February 2007	moderate	only field verified where visible from access points

Phase 1 - Step 1. Reach Locations

Note: Reaches with SGAT steps only not shown.

Reach ID	Stream name	Town	Description
R20T1.01	Clarendon River	Rutland Town, West Rutland	Mouth of Clarendon River at Otter Creek in Rutland
R20T1.02	Clarendon River	West Rutland	.8 miles West on Rte4 from Otter Creek
R20T1.02S2.01	Tributary to Clarendon River	West Rutland	.3 Miles Southeast of intersection of Rte 4 and Rte 4A- mouth of trib
R20T1.02S2.02	Tributary to Clarendon River	West Rutland	.2 Miles West of US4 overpass VT133
R20T1.03	Clarendon River	West Rutland	.3 Miles Southeast of intersection of Rte 4 and Rte 4A- US of trib
R20T1.03S2.01	Tributary to Clarendon River	West Rutland	.4 Miles SE of US4 overpass of VT133, mouth of trib
R20T1.03S2.02	Tributary to Clarendon River	Ira, West Rutland	.2 Miles West on Dewey Avenue from VT133
R20T1.04	Clarendon River	Clarendon, West Rutland	.4 Miles SE of US4 overpass of VT133-upstream of trib
R20T1.05	Clarendon River	Clarendon	.2 Miles Northeast of intersection of VT133 and Walker Mountain Road
R20T1.05S3.01	Ira Brook	Clarendon, Ira	.4 Miles south of VT133 on Walker Mountain Rd, mouth of Ira Brook
R20T1.05S3.02	Ira Brook	Ira	1.4 Miles on VT133 from Walker Mountain Road
R20T1.05S3.02t3.01	Tributary to Ira Brook	Ira	2.4 Miles on VT133 from Walker Mountain Road- mouth of trib
R20T1.05S3.02t3.02	Tributary to Ira Brook	Ira	.6 Miles up West Road from VT133
R20T1.05S3.02t3.02s3.01	Trib to Trib to Ira Brook	Ira	1.7 Miles up West Road from intersection w/ VT133, mouth of tributary
R20T1.05S3.02t3.03	Tributary to Ira Brook	Ira	1.7 Miles up West Road from intersection w/ VT133, Upstream of tributary
R20T1.05S3.03	Ira Brook	Ira	2.4 miles up VT133 from Walker Mountain Road, upstream of tributary
R20T1.05S3.03t1.01	Tributary to Ira Brook	Ira	Just north of Toppin Road crossing, mouth of tributary
R20T1.05S3.03t1.02	Tributary to Ira Brook	Ira	800 feet west of VT133
R20T1.05S3.03t1.02s2.01	Trib to Trib to Ira	Ira, Middletown	2300 feet west of VT133, mouth of tributary

Reach ID	Stream name	Town	Description
	Brook	Springs	
R20T1.05S3.03t1.03	Tributary to Ira Brook	Ira, Middletown Springs	2300 feet west of VT133, upstream of tributary
R20T1.05S3.04	Ira Brook	Ira	700 feet downstream of Toppin Road crossing, upstream of tributary
R20T1.05S3.05	Ira Brook	Ira	3600 feet downstream of Toppin Road crossing
R20T1.05S3.06	Ira Brook	Ira	1.4 Miles on VT133 South from Toppin Road
R20T1.06	Clarendon River	Clarendon	.4 Miles south of intersection with VT133 on Walker Mountain Road, upstream of Ira Brook.
R20T1.07	Clarendon River	Clarendon	Opposite School House Hill Road on Walker Mountain Road
R20T1.07S3.01	Tributary to Clarendon River	Clarendon	.7 Miles south of School House Hill Road on Walker Mountain Road, mouth of trib
R20T1.07S3.02	Tributary to Clarendon River	Clarendon	750 feet up Hier Road from Walker Mountain Road
R20T1.08	Clarendon River	Clarendon	.7 Miles south of School House Hill Road on Walker Mountain Road, upstream of trib.
R20T1.09	Clarendon River	Clarendon	West of Quarterline Road, 1 Mile north of intersection with Walker Mountain Road
R20T1.10	Clarendon River	Clarendon	West of Quarterline Road, .4 Mile north of intersection with Walker Mountain Road
R20T1.11	Clarendon River	Clarendon	1000 feet south of Walker Mountian Road on Quarterline Road
R20T1.12	Clarendon River	Clarendon, Tinmouth	1800 feet west of W Tinmouth Road, .8 miles north of intersection with N End Road
R20T1.13	Clarendon River	Tinmouth	Just downstream of North End Road crossing Clarendon River
R20T1.14	Clarendon River	Tinmouth	1400 Feet downstream of Route 140 crossing
R20T1.15	Clarendon River	Tinmouth	300 feet upstream of Channel Drive Crossing
R20T1.16	Clarendon River	Tinmouth	3500 Feet upstream of Channel Drive crossing
R20T1.17	Clarendon River	Tinmouth	6000 feet downstream of East Road Crossing
R20T1.18	Clarendon River	Tinmouth	3800 feet downstream of East Road crossing
R20T1.19	Clarendon River	Tinmouth	1000 feet downstream of East Road crossing
R20T1.20	Clarendon River	Tinmouth	Outlet of Chipman Lake
R20T1.21	Clarendon River	Tinmouth	Inlet of Chipman Lake, off Tinmouth Pond Road

Reach ID	Stream name	Town	Description
R33T3.01	Mill Brook	Danby, Mount Tabor	At confluence with Otter Creek, North of Brooklyn Road
R33T3.02	Mill Brook	Danby	400 Feet west of S Main Street
R33T3.02S4.01	Tributary to Mill Brook	Danby	1.3 Miles west on Brook Road from Danby Hill Road- mouth of tributary
R33T3.03	Mill Brook	Danby	1.3 Miles west on Brook Road from Danby Hill Road, upstream of trib
R33T3.04	Mill Brook	Danby	Intersection of Keeler Road and Brook Road
R33T3.04S3.01	Tributary to Mill Brook	Danby	Mouth of Trib, confluence of 2 tribs, North of Keeler Road, South of Smokey house Road
R33T3.04S3.01t1.01	Trib to Trib to Mill Brook	Danby	1300 feet due west of Danby Four Corners, mouth of trib
R33T3.04S3.02	Tributary to Mill Brook	Danby	1300 feet due west of Danby Four Corners, upstream of trib
R33T3.04S4.01	Tributary to Mill Brook	Danby	Mouth of Trib, confluence of 2 tribs, North of Keeler Road, South of Smokey house Road
R33T3.04S4.02	Tributary to Mill Brook	Danby	Approx. 2700 feet upstream of Edmunds Road crossing
R33T3.05	Mill Brook	Danby	Mouth of Trib, confluence of 2 tribs, North of Keeler Road, South of Smokey house Road- just upstream of tribs
R33T3.06	Mill Brook	Danby	Approx 2200 feet East of intersection of Danby Mountain Road and Currier Road, North of Danby Mountain Road
R33T3.07	Mill Brook	Danby	Approx 2200 feet East of intersection of Danby Mountain Road and Currier Road, East of Currier Road

Phase 1 - Step 2. Preliminary Reference Stream Type

Step	2.1		2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	2.1		2.11	
Reach ID	Elevation		Valley Length (ft.)	Valley Slope (%)	Channel Length (ft.)	Channel Slope (%)	Sinuosity	Watershed Area (sq. mi.)	Channel Width (ft.)	Valley Width (ft.)	Confinement		Ref Strm Type	Bedform
	Up (ft.)	Down (ft.)									Ratio	Type		
R20T1.01	479	478	4363	0.02	5025	0.02	1.15	48.13	72	656	9.1	BD	C	Riffle-Pool
R20T1.02	498	479	3909	0.49	5422	0.35	1.39	47.59	71.7	1159	16.2	VB	C	Dune-Ripple
R20T1.02S2.01	577	498	3731	2.12	3776	2.09	1.01	1.6	16.1	497	30.9	VB	C	Riffle-Pool
R20T1.02S2.02	1653	577	10110	10.64	10872	9.9	1.08	1.31	14.7			NC	A	Step-Pool
R20T1.03	504	498	2100	0.29	2170	0.28	1.03	44.31	69.5	841	12.1	VB	C	Riffle-Pool
R20T1.03S2.01	605	507	2752	3.56	3182	3.08	1.16	1.97	17.7	789	44.7	VB	C	Riffle-Pool
R20T1.03S2.02	1991	605	15110	9.17	16131	8.59	1.07	1.64	16.3			NC	A	Step-Pool
R20T1.04	543	504	7714	0.51	10121	0.39	1.31	41.82	67.7	1030	15.2	VB	C	Riffle-Pool
R20T1.05	588	543	3192	1.41	3952	1.14	1.24	39.16	65.8	731	11.1	VB	C	Riffle-Pool
R20T1.05S3.01	732	581	6550	2.31	7202	2.1	1.1	13.21	40.8	100	2.5	SC	B	Step-Pool
R20T1.05S3.02	835	732	6079	1.69	6553	1.57	1.08	12.33	39.6	459	11.6	VB	C	Riffle-Pool
R20T1.05S3.02t3.01	952	829	4184	2.94	4486	2.74	1.07	2.89	20.9	461	22.1	VB	C	Plane Bed
R20T1.05S3.02t3.02	1216	952	6000	4.4	6446	4.1	1.07	2.69	20.2	200	9.9	BD	B	Step-Pool
R20T1.05S3.02t3.02s3.01	1622	1210	4300	9.58	4500	9.16	1.05	0.92	12.6			NC	A	Step-Pool
R20T1.05S3.02t3.03	2109	1216	6700	13.33	7122	12.54	1.06	0.83	12.1			NC	A	Cascade
R20T1.05S3.03	863	835	5746	0.49	5877	0.48	1.02	5.98	28.8	1050	36.5	VB	C	Dune-Ripple
R20T1.05S3.03t1.01	908	862	2100	2.19	2106	2.18	1	1.95	17.6	650	37	VB	C	Plane Bed
R20T1.05S3.03t1.02	1037	908	1540	8.38	1720	7.5	1.12	1.78	16.9			NC	A	Step-Pool
R20T1.05S3.03t1.02s2.01	1890	1005	4900	18.06	5156	17.16	1.05	0.27	7.4			NC	A	Cascade

Step	2.1		2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	2.1		2.11	
Reach ID	Elevation		Valley Length (ft.)	Valley Slope (%)	Channel Length (ft.)	Channel Slope (%)	Sinuosity	Watershed Area (sq. mi.)	Channel Width (ft.)	Valley Width (ft.)	Confinement		Ref Strm Type	Bedform
	Up (ft.)	Down (ft.)									Ratio	Type		
R20T1.05S3.03t1.03	1833	1037	8300	9.59	8565	9.29	1.03	1.11	13.7			NC	A	Step-Pool
R20T1.05S3.04	897	863	4459	0.76	4762	0.71	1.07	2.87	20.8	1027	49.3	VB	C	Dune-Ripple
R20T1.05S3.05	1136	897	4200	5.69	4395	5.44	1.05	1.25	14.5	175	12.1	VB	B	Step-Pool
R20T1.05S3.06	1188	1136	2532	2.05	2913	1.79	1.15	0.47	9.4	745	79	VB	C	Dune-Ripple
R20T1.06	631	588	2400	1.79	2547	1.69	1.06	25.25	54.2	180	3.3	SC	B	Plane Bed
R20T1.07	685	631	4331	1.25	5589	0.97	1.29	25.06	54.1	625	11.6	VB	C	Riffle-Pool
R20T1.07S3.01	882	685	7543	2.61	9054	2.18	1.2	2.48	19.5	636	32.6	VB	C	Riffle-Pool
R20T1.07S3.02	1331	882	4100	10.95	4688	9.58	1.14	0.65	10.8			NW	A	Step-Pool
R20T1.08	795	685	4832	2.28	5528	1.99	1.14	21.28	50.3	424	8.4	BD	C	Plane Bed
R20T1.09	821	795	2827	0.92	3141	0.83	1.11	20.72	49.7	279	5.6	NW	B	Step-Pool
R20T1.10	854	821	3612	0.91	4562	0.72	1.26	20.08	49	1171	23.9	VB	E	Plane Bed
R20T1.11	1004	854	7080	2.12	7756	1.93	1.1	19.24	48.1	330	6.9	BD	B	Step-Pool
R20T1.12	1043	1004	5760	0.68	6729	0.58	1.17	17.1	45.7	523	11.4	VB	C	Riffle-Pool
R20T1.13	1050	1043	14403	0.05	22397	0.03	1.56	16.37	44.8	2189	48.8	VB	E	Dune-Ripple
R20T1.14	1093	1050	4569	0.94	5073	0.85	1.11	8.7	33.9	551	16.2	VB	C	Plane Bed
R20T1.15	1103	1093	3747	0.27	4155	0.24	1.11	8.05	32.8	1341	40.9	VB	E	Dune-Ripple
R20T1.16	1111	1103	5024	0.16	6649	0.12	1.32	6.03	28.9	1761	61	VB	E	Dune-Ripple
R20T1.17	1124	1111	2179	0.6	2866	0.45	1.32	3.29	22.1	1551	70.2	VB	E	Dune-Ripple
R20T1.18	1136	1124	2221	0.54	3146	0.38	1.42	2.49	19.6	2335	119.4	VB	E	Dune-Ripple
R20T1.19	1190	1136	2351	2.3	2848	1.9	1.21	1.07	13.5	391	29	VB	B	Step-Pool
R20T1.21	1533	1221	3360	9.29	3589	8.69	1.07	0.19	6.3			SC	A	Step-Pool
R33T3.01	744	668	2800	2.71	2858	2.66	1.02	13.94	41.8	636	15.2	VB	C	Plane Bed
R33T3.02	1010	744	8220	3.24	8667	3.07	1.05	13.85	41.6			NC	B	Step-Pool
R33T3.02S4.01	2389	1010	7040	19.59	7410	18.61	1.05	0.6	10.5			NC	A	Step-Pool
R33T3.03	1244	1010	6814	3.43	7649	3.06	1.12	12.49	39.8	200	5	NW	B	Step-Pool

Step	2.1		2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	2.1		2.11	
Reach ID	Elevation		Valley Length (ft.)	Valley Slope (%)	Channel Length (ft.)	Channel Slope (%)	Sinuosity	Watershed Area (sq. mi.)	Channel Width (ft.)	Valley Width (ft.)	Confinement		Ref Strm Type	Bedform
	Up (ft.)	Down (ft.)									Ratio	Type		
R33T3.04	1272	1244	2668	1.05	2933	0.95	1.1	11.01	37.6	572	15.2	VB	C	Riffle-Pool
R33T3.04S3.01	1388	1272	5550	2.09	5897	1.97	1.06	3.35	22.3	345	15.5	VB	C	Plane Bed
R33T3.04S3.01t1.01	1882	1377	10920	4.62	11900	4.24	1.09	0.81	12			SC	B	Step-Pool
R33T3.04S4.01	1483	1273	4755	4.42	5103	4.12	1.07	2.04	17.9	457	25.5	VB	B	Step-Pool
R33T3.04S4.02	3074	1483	7200	22.1	7393	21.52	1.03	1.68	16.5			NC	A	Step-Pool
R33T3.05	1371	1272	6083	1.63	7443	1.33	1.22	4.83	26.2	744	28.4	VB	C	Plane Bed
R33T3.06	1494	1371	6071	2.03	6784	1.81	1.12	2.72	20.3	727	35.7	VB	C	Dune-Ripple
R33T3.07	2584	1494	6780	16.08	7353	14.82	1.08	0.7	11.2			SC	A	Step-Pool

Phase 1 - Step 3. Basin Characteristics: Geology

Step	3.1	3.2	3.3 Geologic Materials			3.4 Valley Side Slope	
Reach ID	Alluvial Fan	Grade Control	Dominant	%	Sub-Dominant	Left	Right
R20T1.01	Yes	None	Ice-Contact	53	Till	Steep	Steep
R20T1.02		None	Alluvial	73	Till	Steep	Steep
R20T1.02S2.01	Yes	None	Ice-Contact	49	Glacial Lake	Very Steep	Steep
R20T1.02S2.02		None	Till	87	Ice-Contact	Very Steep	Extremely Steep
R20T1.03		None	Glacial Lake	48	Alluvial	Very Steep	Very Steep
R20T1.03S2.01	Yes	None	Ice-Contact	55	Glacial Lake	Hilly	Very Steep
R20T1.03S2.02		Dam	Till	87	Ice-Contact	Very Steep	Extremely Steep
R20T1.04		None	Alluvial	83	Ice-Contact	Very Steep	Steep
R20T1.05		None	Ice-Contact	45	Other	Very Steep	Steep
R20T1.05S3.01		None	Till	93	Ice-Contact	Very Steep	Very Steep
R20T1.05S3.02		None	Ice-Contact	44	Till	Very Steep	Very Steep
R20T1.05S3.02t3.01		None	Ice-Contact	94	Till	Very Steep	Very Steep
R20T1.05S3.02t3.02		None	Ice-Contact	68	Till	Very Steep	Very Steep
R20T1.05S3.02t3.02s3.01		None	Till	99	---	Very Steep	Very Steep
R20T1.05S3.02t3.03		None	Till	100	---	Extremely Steep	Extremely Steep
R20T1.05S3.03		None	Alluvial	40	Other	Very Steep	Very Steep
R20T1.05S3.03t1.01		None	Ice-Contact	90	Till	Very Steep	Steep
R20T1.05S3.03t1.02		None	Till	100	---	Very Steep	Extremely Steep
R20T1.05S3.03t1.02s2.01			Till	100	---	Extremely Steep	Extremely Steep
R20T1.05S3.03t1.03			Till	99	---	Very Steep	Very Steep

Step	3.1	3.2	3.3 Geologic Materials			3.4 Valley Side Slope	
Reach ID	Alluvial Fan	Grade Control	Dominant	%	Sub-Dominant	Left	Right
R20T1.05S3.04		None	Glacial Lake	48	Ice-Contact	Extremely Steep	Extremely Steep
R20T1.05S3.05		None	Till	69	Ice-Contact	Extremely Steep	Extremely Steep
R20T1.05S3.06		None	Ice-Contact	66	Till	Extremely Steep	Very Steep
R20T1.06		None	Till	51	Ice-Contact	Very Steep	Very Steep
R20T1.07		None	Ice-Contact	37	Other	Very Steep	Steep
R20T1.07S3.01	Yes	None	Till	49	Ice-Contact	Very Steep	Steep
R20T1.07S3.02		None	Till	99	Ice-Contact	Extremely Steep	Very Steep
R20T1.08	Yes	None	Till	62	Alluvial	Steep	Very Steep
R20T1.09			Till	55	Alluvial	Steep	Very Steep
R20T1.10		None	Alluvial	58	Till	Steep	Steep
R20T1.11		None	Till	89	Other	Steep	Steep
R20T1.12			Till	76	Other	Steep	Steep
R20T1.13		None	Other	84	Till	Very Steep	Steep
R20T1.14		None	Other	42	Till	Steep	Hilly
R20T1.15			Alluvial	53	Ice-Contact	Very Steep	Steep
R20T1.16			Other	83	Alluvial	Very Steep	Steep
R20T1.17			Other	66	Ice-Contact	Very Steep	Hilly
R20T1.18			Other	78	Ice-Contact	Very Steep	Steep
R20T1.19		None	Till	63	Other	Hilly	Steep
R20T1.21			Till	99	---	Very Steep	Steep
R33T3.01	Yes	None	Ice-Contact	64	Alluvial	Hilly	Steep
R33T3.02		None	Till	46	Ice-Contact	Very Steep	Extremely Steep
R33T3.02S4.01		None	Till	92	Ice-Contact	Extremely Steep	Extremely Steep
R33T3.03	Yes	None	Till	61	Other	Steep	Very Steep
R33T3.04		None	Other	48	Ice-Contact	Steep	Steep
R33T3.04S3.01		None	Ice-Contact	60	Till	Steep	Very Steep

Step	3.1	3.2	3.3 Geologic Materials			3.4 Valley Side Slope	
Reach ID	Alluvial Fan	Grade Control	Dominant	%	Sub-Dominant	Left	Right
R33T3.04S3.01t1.01		None	Till	92	Ice-Contact	Steep	Very Steep
R33T3.04S4.01		None	Ice-Contact	64	Till	Very Steep	Steep
R33T3.04S4.02			Till	82	Ice-Contact	Extremely Steep	Extremely Steep
R33T3.05	Yes	None	Ice-Contact	41	Alluvial	Steep	Extremely Steep
R33T3.06	Yes	None	Other	69	Ice-Contact	Extremely Steep	Extremely Steep
R33T3.07		None	Till	71	Ice-Contact	Extremely Steep	Extremely Steep

Phase 1 - Step 3. Basin Characteristics: Soils

	3.5 Soil Properties									
	Hydrologic				Water Table					
Reach ID	Group	%	Flooding	%	Deep	%	Shallow	%	Erodibility	%
R20T1.01	A	53	None/Rare	83	6	61	6	54	Moderate	40
R20T1.02	B	57	Occasional	57	5	30	3	30	Slight	16
R20T1.02S2.01	A	49	None/Rare	100	6	49	6	49	Moderate	33
R20T1.02S2.02	B	75	None/Rare	100	6	90	6	90	Very Severe	99
R20T1.03	D	41	None/Rare	71	0	40	-1	40	Moderate	30
R20T1.03S2.01	A	55	None/Rare	89	6	61	6	61	Very Severe	89
R20T1.03S2.02	C	83	None/Rare	100	6	94	6	94	Very Severe	97
R20T1.04	B	51	Occasional	47	2	47	1.5	47	Slight	15
R20T1.05	A	45	None/Rare	64	6	58	6	58	Severe	63
R20T1.05S3.01	C	85	None/Rare	100	6	98	6	98	Very Severe	99
R20T1.05S3.02	B	45	None/Rare	74	2	43	1.5	57	Moderate	30
R20T1.05S3.02t3.01	A	77	None/Rare	99	6	82	6	82	Moderate	38
R20T1.05S3.02t3.02	A	68	None/Rare	100	6	100	6	100	Very Severe	99
R20T1.05S3.02t3.02s3.01	C	52	None/Rare	100	3	48	1.5	48	Very Severe	99
R20T1.05S3.02t3.03	B	98	None/Rare	100	6	100	6	100	Very Severe	99
R20T1.05S3.03	C	46	Frequent	72	1.5	40	0	41	Slight	7
R20T1.05S3.03t1.01	A	88	None/Rare	100	6	92	6	92	Slight	17
R20T1.05S3.03t1.02	B	56	None/Rare	100	6	100	6	100	Very Severe	99
R20T1.05S3.03t1.02s2.01	D	56	None/Rare	100	6	100	6	100	Very Severe	99
R20T1.05S3.03t1.03	B	72	None/Rare	100	6	85	6	85	Very Severe	99

	3.5 Soil Properties									
	Hydrologic				Water Table					
Reach ID	Group	%	Flooding	%	Deep	%	Shallow	%	Erodibility	%
R20T1.05S3.04	C	71	None/Rare	87	2	55	0	60	Severe	54
R20T1.05S3.05	C	43	None/Rare	100	6	74	6	74	Severe	74
R20T1.05S3.06	C	58	None/Rare	100	6	51	6	51	Severe	65
R20T1.06	C	51	None/Rare	92	2.5	50	1.5	50	Very Severe	76
R20T1.07	A	30	None/Rare	68	6	35	6	35	Moderate	50
R20T1.07S3.01	C	40	None/Rare	80	6	40	6	40	Very Severe	79
R20T1.07S3.02	B	70	None/Rare	100	6	72	6	72	Very Severe	99
R20T1.08	C	68	None/Rare	74	6	48	6	48	Severe	73
R20T1.09	C	76	None/Rare	56	1.5	43	0	43	Severe	53
R20T1.10	C	92	Frequent	58	1.5	67	0	58	Moderate	34
R20T1.11	C	89	None/Rare	89	2.5	89	1.5	89	Very Severe	89
R20T1.12	C	77	None/Rare	77	2.5	54	1.5	62	Very Severe	77
R20T1.13	D	84	None/Rare	100	0	84	-1	84	Slight	14
R20T1.14	Not Rated	42	None/Rare	57	3	37	1.5	37	Severe	52
R20T1.15	C	53	Frequent	66	1.5	53	0	53	Moderate	29
R20T1.16	D	95	None/Rare	88	0	83	-1	83	Slight	4
R20T1.17	Not Rated	61	Frequent	61	6	17	6	17	Moderate	32
R20T1.18	Not Rated	60	None/Rare	94	0	18	-1	18	Slight	19
R20T1.19	C	63	None/Rare	100	6	36	1.5	38	Severe	74
R20T1.21	C	93	None/Rare	100	6	85	6	85	Very Severe	99
R33T3.01	B	41	None/Rare	64	6	64	6	64	Severe	64
R33T3.02	D	46	None/Rare	88	6	88	6	88	Very Severe	87
R33T3.02S4.01	C	57	None/Rare	100	6	100	6	100	Very Severe	99
R33T3.03	B	41	None/Rare	71	6	71	6	71	Severe	71
R33T3.04	Not Rated	48	None/Rare	51	6	51	6	51	Severe	51
R33T3.04S3.01	A	60	None/Rare	98	6	98	6	98	Very Severe	97

	3.5 Soil Properties									
	Hydrologic				Water Table					
Reach ID	Group	%	Flooding	%	Deep	%	Shallow	%	Erodibility	%
R33T3.04S3.01t1.01	B	80	None/Rare	100	6	80	6	80	Very Severe	92
R33T3.04S4.01	B	64	None/Rare	95	6	60	6	60	Very Severe	80
R33T3.04S4.02	B	49	None/Rare	100	6	100	6	100	Very Severe	99
R33T3.05	D	38	None/Rare	67	0.5	30	0	30	Slight	22
R33T3.06	Not Rated	58	Frequent	58	2	17	1.5	25	Slight	12
R33T3.07	D	33	None/Rare	100	6	99	6	99	Very Severe	98

Phase 1 - Step 4. Land Cover - Reach Hydrology

Step	4.1 Watershed Land Cover - Land Use							4.2 Corridor Land Cover - Land Use							4.3 Riparian Buffer			4.4
		Current							Current						Width (ft.)			
Reach ID	Historic	Dom.	%	Sub-D.	Urban	Crop	Impact	Historic	Dom.	%	Sub-D.	Urban	Crop	Impact	L Bank	R Bank	Impact	Grndwater Inputs
R20T1.01	Field	Forest	67	Urban	11	9	High	Commercial	Urban	60	Forest	60	0	High	0-25	0-25	Low	Abundant
R20T1.02	Field	Forest	67	Urban	10	9	High	Field	Forest	58	Urban	20	0	High	0-25	>100	Low	Abundant
R20T1.02S2.01	Urban	Forest	67	Urban	15	8	High	Residential	Urban	74	Forest	74		High	0-25	0-25	High	Minimal
R20T1.02S2.02	Forest	Forest	75	Crop	7	9	High	Forest	Forest	51	Crop	2	4	Low	>100	>100	N.S.	Minimal
R20T1.03	Field	Forest	69	Urban	10	9	High	Field	Urban	56	Forest	56	1	High	0-25	>100	High	Minimal
R20T1.03S2.01	Forest	Forest	67	Urban	16	6	High	Field	Urban	60	---	60		High	0-25	0-25	High	Minimal
R20T1.03S2.02	Forest	Forest	74	Urban	9	7	High	Forest	Forest	54	Urban	11	1	High	>100	>100	N.S.	Abundant
R20T1.04	Field	Forest	69	Crop	9	9	High	Field	Forest	33	Urban	16	7	High	0-25	0-25	High	Abundant
R20T1.05	Field	Forest	69	Crop	9	9	High	Field	Forest	36	Urban	32		High	26-50	>100	Low	Minimal
R20T1.05S3.01	Forest	Forest	75	Crop	5	10	High	Forest	Forest	49	Urban	14	0	High	51-100	>100	N.S.	Minimal
R20T1.05S3.02	Field	Forest	75	Crop	5	10	High	Field	Forest	33	Urban	29	1	High	26-50	>100	Low	Minimal
R20T1.05S3.02t3.01	Field	Forest	72	Crop	5	13	High	Field	Forest	26	Urban	16	10	High	>100	26-50	N.S.	None
R20T1.05S3.02t3.02	Forest	Forest	73	Crop	3	13	High	Forest	Forest	35	Urban	20	1	High	>100	>100	N.S.	Minimal
R20T1.05S3.02t3.02s3.01	Forest	Forest	80	Crop	3	12	High	Forest	Forest	50	Urban	23		High	>100	>100	N.S.	Minimal
R20T1.05S3.02t3.03	Forest	Forest	73	Crop		19	High	Forest	Forest	63	Crop	0	5	Low	>100	>100	N.S.	Minimal
R20T1.05S3.03	Forest	Forest	78	Crop	4	8	High	Field	Forest	49	Field	1	1	Low	0-25	0-25	High	Abundant
R20T1.05S3.03t1.01	Field	Forest	79	Crop	3	11	High	Field	Urban	42	Forest	42	1	High	26-50	26-50	N.S.	None
R20T1.05S3.03t1.02	Forest	Forest	82	Crop	0	10	High	Forest	Forest	44	Urban	1		N.S.	>100	>100	N.S.	Minimal
R20T1.05S3.03t1.02s2.01	Forest	Forest	84	Crop		7	Low	Forest	Forest	64	---			N.D.	>100	>100	N.S.	None

Step	4.1 Watershed Land Cover - Land Use							4.2 Corridor Land Cover - Land Use							4.3 Riparian Buffer			4.4
		Current							Current						Width (ft.)			
Reach ID	Historic	Dom.	%	Sub-D.	Urban	Crop	Impact	Historic	Dom.	%	Sub-D.	Urban	Crop	Impact	L Bank	R Bank	Impact	Grndwater Inputs
R20T1.05S3.03t1.03	Forest	Forest	83	Crop	0	9	Low	Forest	Forest	57	Crop		1	N.S.	>100	>100	N.S.	Minimal
R20T1.05S3.04	Forest	Forest	79	Crop	4	7	High	Field	Forest	27	Urban	19	4	High	0-25	0-25	High	Abundant
R20T1.05S3.05	Forest	Forest	80	Crop	4	8	High	Forest	Forest	49	Urban	8	0	Low	0-25	>100	Low	Minimal
R20T1.05S3.06	Forest	Forest	71	Crop	6	12	High	Field	Crop	21	Forest	1	21	High	0-25	0-25	High	Abundant
R20T1.06	Shrub	Forest	66	Urban	10	9	High	Shrub	Urban	38	Forest	38		High	>100	26-50	Low	Abundant
R20T1.07	Field	Forest	66	Urban	10	9	High	Field	Forest	41	Urban	28	1	High	26-50	>100	N.S.	Abundant
R20T1.07S3.01	Shrub	Forest	65	Urban	13	8	High	Shrub	Urban	38	Forest	38	5	High	0-25	0-25	Low	Minimal
R20T1.07S3.02	Shrub	Forest	77	Crop	3	9	High	Forest	Forest	45	Crop	4	4	Low	>100	>100	N.S.	Minimal
R20T1.08	Forest	Forest	67	Urban	10	9	High	Forest	Forest	75	Urban	0		N.S.	>100	>100	N.S.	Abundant
R20T1.09	Forest	Forest	67	Crop	10	10	High	Forest	Forest	56	Urban	4	2	Low	>100	>100	N.S.	Minimal
R20T1.10	Field	Forest	66	Crop	10	10	High	Field	Urban	52	Forest	52	4	High	0-25	0-25	Low	Minimal
R20T1.11	Field	Forest	67	Crop	9	10	High	Forest	Forest	48	Urban	19		High	>100	>100	N.S.	Abundant
R20T1.12	Shrub	Forest	67	Crop	8	11	High	Forest	Forest	64	Urban	0		N.S.	>100	>100	N.S.	Minimal
R20T1.13	Forest	Forest	67	Crop	8	11	High	Wetland	Forest	92	Wetland	0	0	N.S.	>100	>100	N.S.	Abundant
R20T1.14	Field	Forest	63	Crop	10	12	High	Forest	Forest	68	Urban	16	0	High	>100	>100	Low	Abundant
R20T1.15	Field	Forest	62	Crop	9	13	High	Shrub	Forest	81	Wetland	3	3	Low	>100	>100	N.S.	Abundant
R20T1.16	Forest	Forest	65	Crop	9	10	High	Wetland	Forest	79	Wetland		0	N.S.	>100	>100	N.S.	Abundant
R20T1.17	Field	Forest	65	Urban	11	8	High	Forest	Forest	95	Crop		1	N.S.	>100	>100	N.S.	Abundant
R20T1.18	Forest	Forest	70	Urban	11	5	High	Wetland	Forest	86	Wetland			N.D.	>100	>100	N.S.	Abundant
R20T1.19	Forest	Forest	61	Urban	10	5	High	Forest	Forest	37	Urban	14	6	High	>100	>100	N.S.	None
R20T1.21	Forest	Forest	80	Crop	0	7	Low	Shrub	Forest	67	Urban	1		N.S.	>100	>100	N.S.	Minimal
R33T3.01	Urban	Forest	65	Crop	8	10	High	Residential	Urban	52	Forest	52	6	High	26-50	0-25	Low	None
R33T3.02	Forest	Forest	65	Crop	8	10	High	Forest	Urban	38	Forest	38	1	High	0-25	>100	Low	Minimal
R33T3.02S4.01	Forest	Forest	84	Urban	4	0	Low	Forest	Forest	55	Urban	17		High	>100	>100	N.S.	None
R33T3.03	Field	Forest	64	Crop	8	11	High	Shrub	Forest	33	Urban	31		High	>100	>100	Low	Abundant
R33T3.04	Shrub	Forest	67	Crop	7	10	High	Shrub	Forest	34	Urban	17	0	High	>100	>100	Low	Minimal

Step	4.1 Watershed Land Cover - Land Use							4.2 Corridor Land Cover - Land Use							4.3 Riparian Buffer			4.4
		Current							Current						Width (ft.)			
Reach ID	Historic	Dom.	%	Sub-D.	Urban	Crop	Impact	Historic	Dom.	%	Sub-D.	Urban	Crop	Impact	L Bank	R Bank	Impact	Grndwater Inputs
R33T3.04S3.01	Field	Forest	54	Crop	13	13	High	Shrub	Forest	29	Urban	24	1	High	0-25	0-25	High	Abundant
R33T3.04S3.01t1.01	Field	Forest	68	Crop	9	9	High	Shrub	Forest	45	Urban	5	4	Low	>100	51-100	N.S.	None
R33T3.04S4.01	Field	Forest	87	Field	1	1	Low	Field	Forest	17	Urban	15	10	High	0-25	26-50	High	Minimal
R33T3.04S4.02	Forest	Forest	93	Crop	0	0	N.S.	Forest	Forest	82	---			N.D.	>100	>100	N.S.	Abundant
R33T3.05	Forest	Forest	71	Crop	3	14	High	Forest	Forest	46	Urban	11	2	High	0-25	26-50	Low	Abundant
R33T3.06	Forest	Forest	69	Crop	2	19	High	Forest	Forest	79	Crop	1	1	Low	>100	>100	N.S.	Abundant
R33T3.07	Forest	Forest	72	Crop	5	18	High	Forest	Forest	64	Crop	4	6	High	>100	>100	N.S.	None

Phase 1 - Step 4. Riparian Condition Summary

Reach ID	Riparian Corridor				Riparian Buffer										Buffer Width Impact
					Left Bank					Right Bank					
	Dominant Corridor Land Cover	Urban %	Crop %	Corridor Land Cover Impact	Buffer Width	Percent of each Buffer Width				Buffer Width	Percent of each Buffer Width				
						0-25	26-50	51-100	>100		0-25	26-50	51-100	>100	
R20T1.01	Urban	60	0	High	0-25	40	35	20	5	0-25	50	20	20	10	Low
R20T1.02	Forest	20	0	High	0-25	40	0	20	40	>100	25	0	0	75	Low
R20T1.02S2.01	Urban	74		High	0-25	90	10	0	0	0-25	75	20	5	0	High
R20T1.02S2.02	Forest	2	4	Low	>100	10	0	0	90	>100	10	0	0	90	N.S.
R20T1.03	Urban	56	1	High	0-25	100	0	0	0	>100	40	0	0	60	High
R20T1.03S2.01	Urban	60		High	0-25	80	10	10	0	0-25	90	0	0	10	High
R20T1.03S2.02	Forest	11	1	High	>100	10	0	0	90	>100	5	0	0	95	N.S.
R20T1.04	Forest	16	7	High	0-25	70	20	10	0	0-25	80	0	15	5	High
R20T1.05	Forest	32		High	26-50	30	50	20	0	>100	0	0	10	90	Low
R20T1.05S3.01	Forest	14	0	High	51-100	10	35	40	15	>100	0	2	0	98	N.S.
R20T1.05S3.02	Forest	29	1	High	26-50	35	50	10	5	>100	30	20	0	50	Low
R20T1.05S3.02t3.01	Forest	16	10	High	>100	10	30	20	40	26-50	5	75	15	5	N.S.
R20T1.05S3.02t3.02	Forest	20	1	High	>100	0	40	0	60	>100	20	0	0	80	N.S.
R20T1.05S3.02t3.02s3.01	Forest	23		High	>100	0	0	0	100	>100	0	0	0	100	N.S.
R20T1.05S3.02t3.03	Forest	0	5	Low	>100	0	2	0	98	>100	0	0	0	100	N.S.
R20T1.05S3.03	Forest	1	1	Low	0-25	90	5	0	5	0-25	50	0	10	40	High
R20T1.05S3.03t1.01	Urban	42	1	High	26-50	5	90	0	5	26-50	5	90	3	2	N.S.
R20T1.05S3.03t1.02	Forest	1		N.S.	>100	0	0	0	100	>100	0	0	0	100	N.S.

Reach ID	Riparian Corridor				Riparian Buffer										
					Left Bank					Right Bank					Buffer Width Impact
	Dominant Corridor Land Cover	Urban %	Crop %	Corridor Land Cover Impact	Buffer Width	Percent of each Buffer Width				Buffer Width	Percent of each Buffer Width				
						0-25	26-50	51-100	>100		0-25	26-50	51-100	>100	
R20T1.05S3.03t1.02s2.01	Forest			N.D.	>100	0	0	0	100	>100	0	0	0	100	N.S.
R20T1.05S3.03t1.03	Forest		1	N.S.	>100	0	0	0	100	>100	0	0	0	100	N.S.
R20T1.05S3.04	Forest	19	4	High	0-25	80	10	0	10	0-25	75	0	5	20	High
R20T1.05S3.05	Forest	8	0	Low	0-25	40	10	10	40	>100	5	0	0	95	Low
R20T1.05S3.06	Crop	1	21	High	0-25	70	15	0	15	0-25	80	0	10	10	High
R20T1.06	Urban	38		High	>100	5	0	5	90	26-50	25	50	15	10	Low
R20T1.07	Forest	28	1	High	26-50	20	60	10	10	>100	10	20	20	50	N.S.
R20T1.07S3.01	Urban	38	5	High	0-25	40	20	20	20	0-25	60	0	20	20	Low
R20T1.07S3.02	Forest	4	4	Low	>100	0	0	0	100	>100	0	0	0	100	N.S.
R20T1.08	Forest	0		N.S.	>100	10	0	0	90	>100	0	0	0	100	N.S.
R20T1.09	Forest	4	2	Low	>100	0	0	0	100	>100	0	0	0	100	N.S.
R20T1.10	Urban	52	4	High	0-25	50	0	0	50	0-25	50	40	10	0	Low
R20T1.11	Forest	19		High	>100	20	10	20	50	>100	20	0	0	80	N.S.
R20T1.12	Forest	0		N.S.	>100	0	0	0	100	>100	0	0	0	100	N.S.
R20T1.13	Forest	0	0	N.S.	>100	0	0	0	100	>100	0	0	0	100	N.S.
R20T1.14	Forest	16	0	High	>100	30	0	10	60	>100	10	0	10	80	Low
R20T1.15	Forest	3	3	Low	>100	0	0	10	90	>100	0	10	0	90	N.S.
R20T1.16	Forest		0	N.S.	>100	20	0	0	80	>100	0	10	0	90	N.S.
R20T1.17	Forest		1	N.S.	>100	0	0	0	100	>100	0	0	0	100	N.S.
R20T1.18	Forest			N.D.	>100	0	0	0	100	>100	0	0	0	100	N.S.
R20T1.19	Forest	14	6	High	>100	20	0	20	60	>100	20	0	0	80	N.S.
R20T1.21	Forest	1		N.S.	>100	0	0	0	100	>100	0	0	0	100	N.S.
R33T3.01	Urban	52	6	High	26-50	10	40	20	30	0-25	70	10	10	10	Low
R33T3.02	Urban	38	1	High	0-25	30	10	30	30	>100	10	10	10	70	Low
R33T3.02S4.01	Forest	17		High	>100	0	0	0	100	>100	0	0	0	100	N.S.

Reach ID	Riparian Corridor				Riparian Buffer										Buffer Width Impact
					Left Bank					Right Bank					
	Dominant Corridor Land Cover	Urban %	Crop %	Corridor Land Cover Impact	Buffer Width	Percent of each Buffer Width				Buffer Width	Percent of each Buffer Width				
						0-25	26-50	51-100	>100		0-25	26-50	51-100	>100	
R33T3.03	Forest	31		High	>100	30	10	10	50	>100	5	0	15	80	Low
R33T3.04	Forest	17	0	High	>100	15	0	0	85	>100	40	0	10	50	Low
R33T3.04S3.01	Forest	24	1	High	0-25	80	0	10	10	0-25	50	0	0	50	High
R33T3.04S3.01t1.01	Forest	5	4	Low	>100	5	5	10	80	51-100	15	5	40	40	N.S.
R33T3.04S4.01	Forest	15	10	High	0-25	80	0	0	20	26-50	30	65	0	5	High
R33T3.04S4.02	Forest			N.D.	>100	0	0	0	100	>100	0	0	0	100	N.S.
R33T3.05	Forest	11	2	High	0-25	50	10	0	40	26-50	20	30	20	30	Low
R33T3.06	Forest	1	1	Low	>100	10	0	0	90	>100	20	0	0	80	N.S.
R33T3.07	Forest	4	6	High	>100	15	0	5	80	>100	5	0	0	95	N.S.

Phase 1 - Step 5. Instream Channel Modification

Step	5.1 Flow Regulation		5.2 Bridges - Culverts				5.3 Bank Armoring			5.4 Channel Straightening			5.5 Dredging History	
Reach ID	Type	Impact	Number	Length	Percent	Impact	Length	Percent	Impact	Length	Percent	Impact	Type	Impact
R20T1.01		Unk.	1	153	3	Low	1544	15.4	Low	0	0	N.S.	Not Evaluated	N.D.
R20T1.02		Unk.	1	69	1.3	Low	370	3.4	N.S.	993	18.3	Low	Not Evaluated	N.D.
R20T1.02S2.01		Unk.	3	666	17.6	Low	966	12.8	Low	1507	39.9	High	Not Evaluated	N.D.
R20T1.02S2.02		Unk.	1	46	0.4	Low	0	0	N.S.	0	0	N.S.	Not Evaluated	N.D.
R20T1.03		Unk.	2	404	18.6	Low	0	0	N.S.	1042	48	High	Not Evaluated	N.D.
R20T1.03S2.01		Unk.	1	72	2.3	Low	0	0	N.S.	0	0	N.S.	Not Evaluated	N.D.
R20T1.03S2.02	Impoundment	High	2	167	1	Low	0	0	N.S.	597	3.7	Low	Not Evaluated	N.D.
R20T1.04		Unk.	1	45	0.4	Low	0	0	N.S.	1090	10.8	Low	Not Evaluated	N.D.
R20T1.05		Unk.	1	67	1.7	Low	0	0	N.S.	0	0	N.S.	Not Evaluated	N.D.
R20T1.05S3.01		Unk.	2	81	1.1	Low	1448	10.1	Low	476	6.6	Low	Not Evaluated	N.D.
R20T1.05S3.02		Unk.	2	118	1.8	Low	1099	8.4	N.S.	0	0	N.S.	Not Evaluated	N.D.
R20T1.05S3.02t3.01		Unk.	2	190	4.2	Low	0	0	N.S.	0	0	N.S.	Not Evaluated	N.D.
R20T1.05S3.02t3.02		Unk.	1	44	0.7	Low	74	0.6	N.S.	0	0	N.S.	Not Evaluated	N.D.
R20T1.05S3.02t3.02s3.01		Unk.	2	43	1	Low	0	0	N.S.	0	0	N.S.	Not Evaluated	N.D.
R20T1.05S3.02t3.03		Unk.	1	47	0.7	Low	0	0	N.S.	0	0	N.S.	Not Evaluated	N.D.
R20T1.05S3.03		Unk.	0	0	0	N.S.	0	0	N.S.	1120	19.1	Low	Not Evaluated	N.D.
R20T1.05S3.03t1.01		Unk.	1	60	2.8	Low	208	4.9	N.S.	1081	51.3	High	Not Evaluated	N.D.
R20T1.05S3.03t1.02		Unk.	0	0	0	N.S.	0	0	N.S.	0	0	N.S.	Not Evaluated	N.D.
R20T1.05S3.03t1.02s2.01		Unk.				Unk.			Unk.			Unk.	Not Evaluated	N.D.

Step	5.1 Flow Regulation		5.2 Bridges - Culverts				5.3 Bank Armoring			5.4 Channel Straightening			5.5 Dredging History	
Reach ID	Type	Impact	Number	Length	Percent	Impact	Length	Percent	Impact	Length	Percent	Impact	Type	Impact
R20T1.05S3.03t1.03		Unk.				Unk.			Unk.			Unk.	Not Evaluated	N.D.
R20T1.05S3.04		Unk.	1	38	0.8	Low	0	0	N.S.	1896	39.8	High	Not Evaluated	N.D.
R20T1.05S3.05		Unk.	0	0	0	N.S.	1258	14.3	Low	0	0	N.S.	Not Evaluated	N.D.
R20T1.05S3.06		Unk.	0	0	0	N.S.	0	0	N.S.	0	0	N.S.	Not Evaluated	N.D.
R20T1.06		Unk.	0	0	0	N.S.	0	0	N.S.	0	0	N.S.	Not Evaluated	N.D.
R20T1.07		Unk.	2	86	1.5	Low	89	0.8	N.S.	530	9.5	Low	Not Evaluated	N.D.
R20T1.07S3.01		Unk.	9	549	6.1	Low	0	0	N.S.	452	5	Low	Not Evaluated	N.D.
R20T1.07S3.02		Unk.	1	37	0.8	Low	0	0	N.S.	0	0	N.S.	Not Evaluated	N.D.
R20T1.08		Unk.	0	0	0	N.S.	0	0	N.S.	0	0	N.S.	Not Evaluated	N.D.
R20T1.09		Unk.				Unk.			Unk.			Unk.	Not Evaluated	N.D.
R20T1.10		Unk.	2	77	1.7	Low	0	0	N.S.	0	0	N.S.	Not Evaluated	N.D.
R20T1.11		Unk.	1	33	0.4	Low	281	1.8	N.S.	533	6.9	Low	Not Evaluated	N.D.
R20T1.12		Unk.				Unk.			Unk.			Unk.	Not Evaluated	N.D.
R20T1.13		Unk.	1	56	0.3	Low	0	0	N.S.	1732	7.7	Low	Not Evaluated	N.D.
R20T1.14		Unk.	2	96	1.9	Low	0	0	N.S.	0	0	N.S.	Not Evaluated	N.D.
R20T1.15		Unk.				Unk.			Unk.			Unk.	Not Evaluated	N.D.
R20T1.16		Unk.				Unk.			Unk.			Unk.	Not Evaluated	N.D.
R20T1.17		Unk.				Unk.			Unk.			Unk.	Not Evaluated	N.D.
R20T1.18		Unk.				Unk.			Unk.			Unk.	Not Evaluated	N.D.
R20T1.19		Unk.	1	44	1.6	Low	0	0	N.S.	0	0	N.S.	Not Evaluated	N.D.
R20T1.21		Unk.				Unk.			Unk.			Unk.	Not Evaluated	N.D.
R33T3.01		Unk.	2	167	5.8	Low	413	7.2	N.S.	600	21	High	Not Evaluated	N.D.
R33T3.02		Unk.	3	164	1.9	Low	1271	7.3	N.S.	0	0	N.S.	Not Evaluated	N.D.
R33T3.02S4.01		Unk.	1	39	0.5	Low	0	0	N.S.	0	0	N.S.	Not Evaluated	N.D.

Step	5.1 Flow Regulation		5.2 Bridges - Culverts				5.3 Bank Armoring			5.4 Channel Straightening			5.5 Dredging History	
Reach ID	Type	Impact	Number	Length	Percent	Impact	Length	Percent	Impact	Length	Percent	Impact	Type	Impact
R33T3.03		Unk.	2	116	1.5	Low	296	1.9	N.S.	0	0	N.S.	Not Evaluated	N.D.
R33T3.04		Unk.	0	0	0	N.S.	100	1.7	N.S.	0	0	N.S.	Not Evaluated	N.D.
R33T3.04S3.01		Unk.	2	76	1.3	Low	0	0	N.S.	0	0	N.S.	Not Evaluated	N.D.
R33T3.04S3.01t1.01		Unk.	4	254	2.1	Low	0	0	N.S.	0	0	N.S.	Not Evaluated	N.D.
R33T3.04S4.01		Unk.	2	78	1.5	Low	0	0	N.S.	0	0	N.S.	Not Evaluated	N.D.
R33T3.04S4.02		Unk.				Unk.			Unk.			Unk.	Not Evaluated	N.D.
R33T3.05		Unk.	2	86	1.1	Low	0	0	N.S.	0	0	N.S.	Not Evaluated	N.D.
R33T3.06		Unk.	1	80	1.2	Low	0	0	N.S.	0	0	N.S.	Not Evaluated	N.D.
R33T3.07		Unk.	1	58	0.8	Low	280	1.9	N.S.	0	0	N.S.	Not Evaluated	N.D.

Phase 1 - Step 6. Floodplain Modification and Planform Changes

Step	6.1 Berms & Roads			6.2 Corridor Development			6.3 Depositional Features		6.4 Meander Migration		6.5 Meander Width Ratio			6.6 Wavelength Ratio		
Reach ID	Length	Percent	Impact	Length	Percent	Impact	Type	Impact	Type	Impact	Width	Ratio	Impact	Length	Ratio	Impact
R20T1.01	6140	122.2	High	4751.2	94.6	High	Point	N.S.	Avulsion	Low	137	1.9	High	474	6.6	Low
R20T1.02	5561	102.6	High	1980.1	36.5	High	Point	N.S.	Avulsion	High	122	1.7	High	414	5.8	High
R20T1.02S2.01	720	19.1	Low	2123	56.2	High	No Data	N.D.	None	N.S.	116	7.2	N.S.	1588	98.6	High
R20T1.02S2.02	0	0	N.S.	101	0.9	N.S.	No Data	N.D.	No Data	N.D.	Not Applicable		Unk.	Not Applicable		Unk.
R20T1.03	1290	59.4	High	1919.8	88.5	High	No Data	N.D.	Avulsion	Low	152	2.2	High	871	12.5	N.S.
R20T1.03S2.01	324	10.2	Low	1032.1	32.4	High	No Data	N.D.	Avulsion	Low	43	2.4	High	245	13.9	N.S.
R20T1.03S2.02	1080	6.7	Low	1507.4	9.3	Low	No Data	N.D.	No Data	N.D.	Not Applicable		Unk.	Not Applicable		Unk.
R20T1.04	3073	30.4	High	2143.6	21.2	High	Point	N.S.	Avulsion	High	129	1.9	High	388	5.7	High
R20T1.05	1209	30.6	High	2715.8	68.7	High	No Data	N.D.	Avulsion	Low	184	2.8	High	469	7.1	Low
R20T1.05S3.01	2371	32.9	High	2465.7	34.2	High	No Data	N.D.	None	N.S.	Not Applicable		Unk.	Not Applicable		Unk.
R20T1.05S3.02	3741	57.1	High	4124.5	62.9	High	No Data	N.D.	None	N.S.	144	3.6	Low	644	16.3	High
R20T1.05S3.02t3.01	510	11.4	Low	354.1	7.9	Low	No Data	N.D.	None	N.S.	126	6	N.S.	502	24	High
R20T1.05S3.02t3.02	307	4.8	N.S.	2562	39.7	High	No Data	N.D.	No Data	N.D.	Not Applicable		Unk.	Not Applicable		Unk.
R20T1.05S3.02t3.02s3.01	0	0	N.S.	0	0	N.S.	No Data	N.D.	No Data	N.D.	Not Applicable		Unk.	Not Applicable		Unk.
R20T1.05S3.02t3.03	0	0	N.S.	205.6	2.9	N.S.	No Data	N.D.	No Data	N.D.	Not Applicable		Unk.	Not Applicable		Unk.
R20T1.05S3.03	0	0	N.S.	0	0	N.S.	No Data	N.D.	Avulsion	Low	96	3.3	Low	210	7.3	Low
R20T1.05S3.03t1.01	0	0	N.S.	868	41.2	High	No Data	N.D.	None	N.S.	79	4.5	Low	727	41.4	High
R20T1.05S3.03t1.02	0	0	N.S.	141.6	8.2	Low	No Data	N.D.	No Data	N.D.	Not Applicable		Unk.	Not Applicable		Unk.
R20T1.05S3.03t1.02s2.01			Unk.			Unk.	No Data	N.D.	No Data	N.D.	Not Applicable		Unk.	Not Applicable		Unk.
R20T1.05S3.03t1.03			Unk.			Unk.	No Data	N.D.	No Data	N.D.	Not Applicable		Unk.	Not Applicable		Unk.

Step	6.1 Berms & Roads			6.2 Corridor Development			6.3 Depositional Features		6.4 Meander Migration		6.5 Meander Width Ratio			6.6 Wavelength Ratio		
Reach ID	Length	Percent	Impact	Length	Percent	Impact	Type	Impact	Type	Impact	Width	Ratio	Impact	Length	Ratio	Impact
R20T1.05S3.04	0	0	N.S.	75.3	1.6	N.S.	No Data	N.D.	None	N.S.	173	8.3	Low	276	13.2	N.S.
R20T1.05S3.05	1464	33.3	High	1399.8	31.9	High	No Data	N.D.	None	N.S.	Not Applicable		Unk.	Not Applicable		Unk.
R20T1.05S3.06	0	0	N.S.	357.1	12.3	Low	No Data	N.D.	None	N.S.	138	14.6	High	373	39.6	High
R20T1.06	2238	87.9	High	2174	85.4	High	No Data	N.D.	None	N.S.	45	0.8	High	850	15.7	Low
R20T1.07	1320	23.6	High	2936.1	52.5	High	No Data	N.D.	None	N.S.	266	4.9	Low	396	7.3	Low
R20T1.07S3.01	5285	58.4	High	6006.8	66.3	High	No Data	N.D.	None	N.S.	Not Applicable		Unk.	Not Applicable		Unk.
R20T1.07S3.02	0	0	N.S.	79.9	1.7	N.S.	No Data	N.D.	No Data	N.D.	Not Applicable		Unk.	Not Applicable		Unk.
R20T1.08	0	0	N.S.	0	0	N.S.	No Data	N.D.	None	N.S.	156	3.1	Low	353	7	Low
R20T1.09			Unk.			Unk.	No Data	N.D.	None	N.S.	124	2.5	High	522	10.5	N.S.
R20T1.10	1327	29.1	High	2406.1	52.7	High	No Data	N.D.	None	N.S.	109	2.2	High	195	4	High
R20T1.11	326	4.2	N.S.	1700.8	21.9	High	No Data	N.D.	None	N.S.	143	3	High	829	17.2	High
R20T1.12			Unk.			Unk.	No Data	N.D.	None	N.S.	179	3.9	Low	459	10	N.S.
R20T1.13	0	0	N.S.	91.4	0.4	N.S.	No Data	N.D.	Multiple	High	343	7.7	N.S.	403	9	N.S.
R20T1.14	0	0	N.S.	149.3	2.9	N.S.	No Data	N.D.	None	N.S.	91	2.7	High	282	8.3	N.S.
R20T1.15			Unk.			Unk.	No Data	N.D.	None	N.S.	119	3.6	Low	459	14	N.S.
R20T1.16			Unk.			Unk.	No Data	N.D.	None	N.S.	155	5.4	N.S.	245	8.5	N.S.
R20T1.17			Unk.			Unk.	No Data	N.D.	None	N.D.	133	6	N.S.	274	12.4	N.S.
R20T1.18			Unk.			Unk.	No Data	N.D.	None	N.S.	66	3.4	Low	219	11.2	N.S.
R20T1.19	0	0	N.S.	104.8	3.7	N.S.	No Data	N.D.	None	N.S.	Not Applicable		Unk.	Not Applicable		Unk.
R20T1.21			Unk.			Unk.	No Data	N.D.	No Data	N.D.	Not Applicable		Unk.	Not Applicable		Unk.
R33T3.01	578	20.2	High	1268.7	44.4	High	No Data	N.D.	None	N.S.	138	3.3	Low	639	15.3	Low
R33T3.02	5530	63.8	High	8289.3	95.6	High	No Data	N.D.	Migration	Low	Not Applicable		Unk.	Not Applicable		Unk.
R33T3.02S4.01	0	0	N.S.	88.8	1.2	N.S.	No Data	N.D.	No Data	N.D.	Not Applicable		Unk.	Not Applicable		Unk.
R33T3.03	4172	54.5	High	5509.8	72	High	No Data	N.D.	None	N.S.	Not Applicable		Unk.	Not Applicable		Unk.
R33T3.04	888	30.3	High	954.4	32.5	High	No Data	N.D.	None	N.S.	148	3.9	Low	457	12.1	N.S.
R33T3.04S3.01	1488	25.2	High	2309.3	39.2	High	No Data	N.D.	None	N.D.	115	5.2	N.S.	335	15	Low
R33T3.04S3.01t1.01	535	4.5	N.S.	929.9	7.8	Low	No Data	N.D.	No Data	N.D.	Not Applicable		Unk.	Not Applicable		Unk.

Step	6.1 Berms & Roads			6.2 Corridor Development			6.3 Depositional Features		6.4 Meander Migration		6.5 Meander Width Ratio			6.6 Wavelength Ratio		
Reach ID	Length	Percent	Impact	Length	Percent	Impact	Type	Impact	Type	Impact	Width	Ratio	Impact	Length	Ratio	Impact
R33T3.04S4.01	831	16.3	Low	1260.4	24.7	High	No Data	N.D.	None	N.S.	Not Applicable		Unk.	Not Applicable		Unk.
R33T3.04S4.02			Unk.			Unk.	No Data	N.D.	No Data	N.D.	Not Applicable		Unk.	Not Applicable		Unk.
R33T3.05	184	2.5	N.S.	380.8	5.1	Low	No Data	N.D.	Avulsion	High	136	5.2	N.S.	317	12.1	N.S.
R33T3.06	0	0	N.S.	147.1	2.2	N.S.	No Data	N.D.	No Data	N.D.	139	6.8	N.S.	359	17.6	High
R33T3.07	636	8.7	Low	622.5	8.5	Low	No Data	N.D.	No Data	N.D.	Not Applicable		Unk.	Not Applicable		Unk.

Phase 1 - Step 7. Bed and Bank Windshield Survey

Step	7.1 Stream Type					7.2 Bank Erosion - Bank Height			7.3 Ice & Debris Jam Potential	
Reach ID	Reference Stream Type	Mod. Ref. Stream Type	Dominant Bedform	Subclass Slope	Dominant Bed Material	Bank Erosion	Bank Height	Impact	Type	Impact
R20T1.01	C	No	Riffle-Pool		Gravel	Low	Medium	Unk.	None	N.S.
R20T1.02	C	No	Dune-Ripple		Sand	None	No Data	Unk.	None	N.S.
R20T1.02S2.01	C	No	Riffle-Pool	b	No Data	None	No Data	Unk.	None	N.S.
R20T1.02S2.02	A	No	Step-Pool		No Data	None	No Data	Unk.	No Data	N.D.
R20T1.03	C	No	Riffle-Pool		Gravel	Low	Medium	Unk.	None	N.S.
R20T1.03S2.01	C	No	Riffle-Pool	b	No Data	None	No Data	Unk.	No Data	N.D.
R20T1.03S2.02	A	No	Step-Pool		Cobble	None	No Data	Unk.	None	N.S.
R20T1.04	C	No	Riffle-Pool		Gravel	Low	Medium	Unk.	None	N.S.
R20T1.05	C	No	Riffle-Pool		Cobble	None	No Data	Unk.	None	N.S.
R20T1.05S3.01	B	No	Step-Pool		Cobble	Low	Low	Unk.	None	N.S.
R20T1.05S3.02	C	No	Riffle-Pool		Cobble	Low	Low	Unk.	None	N.S.
R20T1.05S3.02t3.01	C	No	Plane Bed	b	Cobble	Low	Medium	Unk.	None	N.S.
R20T1.05S3.02t3.02	B	No	Step-Pool	a	Cobble	Low	Medium	Unk.	None	N.S.
R20T1.05S3.02t3.02s3.01	A	No	Step-Pool		Not Evaluated	None	No Data	Unk.	Not Evaluated	N.D.
R20T1.05S3.02t3.03	A	No	Cascade		Not Evaluated	None	No Data	Unk.	Not Evaluated	N.D.
R20T1.05S3.03	C	No	Dune-Ripple		No Data	None	No Data	Unk.	No Data	N.D.
R20T1.05S3.03t1.01	C	No	Plane Bed	b	No Data	None	No Data	Unk.	Bridge	Low
R20T1.05S3.03t1.02	A	No	Step-Pool		Not Evaluated	None	No Data	Unk.	Not Evaluated	N.D.
R20T1.05S3.03t1.02s2.01	A	No	Cascade		Not Evaluated			Unk.	Not Evaluated	N.D.
R20T1.05S3.03t1.03	A	No	Step-Pool		Not Evaluated			Unk.	Not Evaluated	N.D.

Step	7.1 Stream Type					7.2 Bank Erosion - Bank Height			7.3 Ice & Debris Jam Potential	
Reach ID	Reference Stream Type	Mod. Ref. Stream Type	Dominant Bedform	Subclass Slope	Dominant Bed Material	Bank Erosion	Bank Height	Impact	Type	Impact
R20T1.05S3.04	C	No	Dune-Ripple		Not Evaluated	None	No Data	Unk.	None	N.S.
R20T1.05S3.05	B	No	Step-Pool	a	Cobble	None	No Data	Unk.	None	N.S.
R20T1.05S3.06	C	No	Dune-Ripple		Not Evaluated	None	No Data	Unk.	None	N.S.
R20T1.06	B	Yes	Plane Bed	c	Cobble	None	No Data	Unk.	None	N.S.
R20T1.07	C	No	Riffle-Pool		Gravel	None	No Data	Unk.	None	N.S.
R20T1.07S3.01	C	Yes	Riffle-Pool	b	Gravel	None	No Data	Unk.	None	N.S.
R20T1.07S3.02	A	No	Step-Pool		No Data	None	No Data	Unk.	No Data	N.D.
R20T1.08	C	No	Plane Bed	b	Not Evaluated	None	No Data	Unk.	Not Evaluated	N.D.
R20T1.09	B	Yes	Step-Pool	c	Cobble			Unk.	None	N.S.
R20T1.10	E	No	Plane Bed		Cobble	None	No Data	Unk.	None	N.S.
R20T1.11	B	Yes	Step-Pool		Cobble	None	No Data	Unk.	None	N.S.
R20T1.12	C	No	Riffle-Pool		Cobble			Unk.	None	N.S.
R20T1.13	E	No	Dune-Ripple		No Data	None	No Data	Unk.	No Data	N.D.
R20T1.14	C	No	Plane Bed		Cobble	None	No Data	Unk.	None	N.S.
R20T1.15	E	No	Dune-Ripple		No Data			Unk.	No Data	N.D.
R20T1.16	E	No	Dune-Ripple		Not Evaluated			Unk.	Not Evaluated	N.D.
R20T1.17	E	No	Dune-Ripple		Not Evaluated			Unk.	Not Evaluated	N.D.
R20T1.18	E	No	Dune-Ripple		Not Evaluated			Unk.	Not Evaluated	N.D.
R20T1.19	B	No	Step-Pool		Gravel	None	No Data	Unk.	None	N.S.
R20T1.21	A	No	Step-Pool		Not Evaluated			Unk.	Not Evaluated	N.D.
R33T3.01	C	No	Plane Bed	b	Cobble	None	No Data	Unk.	Bridge	Low
R33T3.02	B	Yes	Step-Pool		Cobble	Low	Medium	Unk.	None	N.S.
R33T3.02S4.01	A	No	Step-Pool		Not Evaluated	None	No Data	Unk.	Not Evaluated	N.D.
R33T3.03	B	No	Step-Pool		Cobble	None	No Data	Unk.	None	N.S.
R33T3.04	C	No	Riffle-Pool		Gravel	None	No Data	Unk.	None	N.S.

Step	7.1 Stream Type					7.2 Bank Erosion - Bank Height			7.3 Ice & Debris Jam Potential	
Reach ID	Reference Stream Type	Mod. Ref. Stream Type	Dominant Bedform	Subclass Slope	Dominant Bed Material	Bank Erosion	Bank Height	Impact	Type	Impact
R33T3.04S3.01	C	No	Plane Bed		Cobble	None	No Data	Unk.	None	N.S.
R33T3.04S3.01t1.01	B	No	Step-Pool		Cobble	None	No Data	Unk.	None	N.S.
R33T3.04S4.01	B	No	Step-Pool	a	Cobble	None	No Data	Unk.	None	N.S.
R33T3.04S4.02	A	No	Step-Pool		Not Evaluated			Unk.	Not Evaluated	N.D.
R33T3.05	C	No	Plane Bed		Cobble	Low	Low	Unk.	None	N.S.
R33T3.06	C	No	Dune-Ripple	b	Sand	None	No Data	Unk.	None	N.S.
R33T3.07	A	No	Step-Pool		Cobble	None	No Data	Unk.	None	N.S.

Phase 1 - Step 7. Channelization Report

Step	2.5	2.11 (also 7.1) Stream Type				5.4 Channel Straightening			6.5 Meander Width Ratio			6.6 Wavelength Ratio		
	Channel Slope	Reference Stream Type	Dominant Bedform	Subclass Slope	Dominant Bed Material	Length	Percent	Impact	Width	Ratio	Impact	Length	Ratio	Impact
R20T1.01	0.02	C	Riffle-Pool		Gravel	0	0	N.S.	137	1.9	High	474	6.6	Low
R20T1.02	0.35	C	Dune-Ripple		Sand	993	18.3	Low	122	1.7	High	414	5.8	High
R20T1.02S2.01	2.09	C	Riffle-Pool	b	No Data	1507	39.9	High	116	7.2	N.S.	1588	98.6	High
R20T1.02S2.02	9.9	A	Step-Pool		No Data	0	0	N.S.			Unk.			Unk.
R20T1.03	0.28	C	Riffle-Pool		Gravel	1042	48	High	152	2.2	High	871	12.5	N.S.
R20T1.03S2.01	3.08	C	Riffle-Pool	b	No Data	0	0	N.S.	43	2.4	High	245	13.9	N.S.
R20T1.03S2.02	8.59	A	Step-Pool		Cobble	597	3.7	Low			Unk.			Unk.
R20T1.04	0.39	C	Riffle-Pool		Gravel	1090	10.8	Low	129	1.9	High	388	5.7	High
R20T1.05	1.14	C	Riffle-Pool		Cobble	0	0	N.S.	184	2.8	High	469	7.1	Low
R20T1.05S3.01	2.1	B	Step-Pool		Cobble	476	6.6	Low			Unk.			Unk.
R20T1.05S3.02	1.57	C	Riffle-Pool		Cobble	0	0	N.S.	144	3.6	Low	644	16.3	High
R20T1.05S3.02t3.01	2.74	C	Plane Bed	b	Cobble	0	0	N.S.	126	6	N.S.	502	24	High
R20T1.05S3.02t3.02	4.1	B	Step-Pool	a	Cobble	0	0	N.S.			Unk.			Unk.
R20T1.05S3.02t3.02s3.01	9.16	A	Step-Pool		Not Evaluated	0	0	N.S.			Unk.			Unk.
R20T1.05S3.02t3.03	12.54	A	Cascade		Not Evaluated	0	0	N.S.			Unk.			Unk.
R20T1.05S3.03	0.48	C	Dune-Ripple		No Data	1120	19.1	Low	96	3.3	Low	210	7.3	Low
R20T1.05S3.03t1.01	2.18	C	Plane Bed	b	No Data	1081	51.3	High	79	4.5	Low	727	41.4	High
R20T1.05S3.03t1.02	7.5	A	Step-Pool		Not Evaluated	0	0	N.S.			Unk.			Unk.
R20T1.05S3.03t1.02s2.01	17.16	A	Cascade		Not Evaluated			Unk.			Unk.			Unk.

Step	2.5	2.11 (also 7.1) Stream Type				5.4 Channel Straightening			6.5 Meander Width Ratio			6.6 Wavelength Ratio		
	Channel Slope	Reference Stream Type	Dominant Bedform	Subclass Slope	Dominant Bed Material	Length	Percent	Impact	Width	Ratio	Impact	Length	Ratio	Impact
R20T1.05S3.03t1.03	9.29	A	Step-Pool		Not Evaluated			Unk.			Unk.			Unk.
R20T1.05S3.04	0.71	C	Dune-Ripple		Not Evaluated	1896	39.8	High	173	8.3	Low	276	13.2	N.S.
R20T1.05S3.05	5.44	B	Step-Pool	a	Cobble	0	0	N.S.			Unk.			Unk.
R20T1.05S3.06	1.79	C	Dune-Ripple		Not Evaluated	0	0	N.S.	138	14.6	High	373	39.6	High
R20T1.06	1.69	B	Plane Bed	c	Cobble	0	0	N.S.	45	0.8	High	850	15.7	Low
R20T1.07	0.97	C	Riffle-Pool		Gravel	530	9.5	Low	266	4.9	Low	396	7.3	Low
R20T1.07S3.01	2.18	C	Riffle-Pool	b	Gravel	452	5	Low			Unk.			Unk.
R20T1.07S3.02	9.58	A	Step-Pool		No Data	0	0	N.S.			Unk.			Unk.
R20T1.08	1.99	C	Plane Bed	b	Not Evaluated	0	0	N.S.	156	3.1	Low	353	7	Low
R20T1.09	0.83	B	Step-Pool	c	Cobble			Unk.	124	2.5	High	522	10.5	N.S.
R20T1.10	0.72	E	Plane Bed		Cobble	0	0	N.S.	109	2.2	High	195	4	High
R20T1.11	1.93	B	Step-Pool		Cobble	533	6.9	Low	143	3	High	829	17.2	High
R20T1.12	0.58	C	Riffle-Pool		Cobble			Unk.	179	3.9	Low	459	10	N.S.
R20T1.13	0.03	E	Dune-Ripple		No Data	1732	7.7	Low	343	7.7	N.S.	403	9	N.S.
R20T1.14	0.85	C	Plane Bed		Cobble	0	0	N.S.	91	2.7	High	282	8.3	N.S.
R20T1.15	0.24	E	Dune-Ripple		No Data			Unk.	119	3.6	Low	459	14	N.S.
R20T1.16	0.12	E	Dune-Ripple		Not Evaluated			Unk.	155	5.4	N.S.	245	8.5	N.S.
R20T1.17	0.45	E	Dune-Ripple		Not Evaluated			Unk.	133	6	N.S.	274	12.4	N.S.
R20T1.18	0.38	E	Dune-Ripple		Not Evaluated			Unk.	66	3.4	Low	219	11.2	N.S.
R20T1.19	1.9	B	Step-Pool		Gravel	0	0	N.S.			Unk.			Unk.
R20T1.21	8.69	A	Step-Pool		Not Evaluated			Unk.			Unk.			Unk.
R33T3.01	2.66	C	Plane Bed	b	Cobble	600	21	High	138	3.3	Low	639	15.3	Low
R33T3.02	3.07	B	Step-Pool		Cobble	0	0	N.S.			Unk.			Unk.
R33T3.02S4.01	18.61	A	Step-Pool		Not Evaluated	0	0	N.S.			Unk.			Unk.
R33T3.03	3.06	B	Step-Pool		Cobble	0	0	N.S.			Unk.			Unk.

Step	2.5	2.11 (also 7.1) Stream Type				5.4 Channel Straightening			6.5 Meander Width Ratio			6.6 Wavelength Ratio		
	Channel Slope	Reference Stream Type	Dominant Bedform	Subclass Slope	Dominant Bed Material	Length	Percent	Impact	Width	Ratio	Impact	Length	Ratio	Impact
R33T3.04	0.95	C	Riffle-Pool		Gravel	0	0	N.S.	148	3.9	Low	457	12.1	N.S.
R33T3.04S3.01	1.97	C	Plane Bed		Cobble	0	0	N.S.	115	5.2	N.S.	335	15	Low
R33T3.04S3.01t1.01	4.24	B	Step-Pool		Cobble	0	0	N.S.			Unk.			Unk.
R33T3.04S4.01	4.12	B	Step-Pool	a	Cobble	0	0	N.S.			Unk.			Unk.
R33T3.04S4.02	21.52	A	Step-Pool		Not Evaluated			Unk.			Unk.			Unk.
R33T3.05	1.33	C	Plane Bed		Cobble	0	0	N.S.	136	5.2	N.S.	317	12.1	N.S.
R33T3.06	1.81	C	Dune-Ripple	b	Sand	0	0	N.S.	139	6.8	N.S.	359	17.6	High
R33T3.07	14.82	A	Step-Pool		Cobble	0	0	N.S.			Unk.			Unk.

Phase 1 - Step 8. Stream and Watershed Impact Rating,

High ranking->7

Reach ID	Stream Type				Confinement Type	Watershed Area	Total Score	Priority Ranking
	Stream Type	Bed Material	Subclass Slope	Bed Feature				
R20T1.01	C	Gravel		Riffle-Pool	BD	48.1	15	
R20T1.02	C	Sand		Dune-Ripple	VB	47.6	17	
R20T1.02S2.01	C	No Data	b	Riffle-Pool	VB	1.6	15	
R20T1.02S2.02	A	No Data		Step-Pool	NC	1.3	4	
R20T1.03	C	Gravel		Riffle-Pool	VB	44.3	16	
R20T1.03S2.01	C	No Data	b	Riffle-Pool	VB	2	13	
R20T1.03S2.02	A	Cobble		Step-Pool	NC	1.6	10	
R20T1.04	C	Gravel		Riffle-Pool	VB	41.8	18	
R20T1.05	C	Cobble		Riffle-Pool	VB	39.2	14	
R20T1.05S3.01	B	Cobble		Step-Pool	SC	13.2	11	
R20T1.05S3.02	C	Cobble		Riffle-Pool	VB	12.3	13	
R20T1.05S3.02t3.01	C	Cobble	b	Plane Bed	VB	2.9	9	
R20T1.05S3.02t3.02	B	Cobble	a	Step-Pool	BD	2.7	7	
R20T1.05S3.02t3.02s3.01	A	Not Evaluated		Step-Pool	NC	0.9	5	
R20T1.05S3.02t3.03	A	Not Evaluated		Cascade	NC	0.8	4	
R20T1.05S3.03	C	No Data		Dune-Ripple	VB	6	9	
R20T1.05S3.03t1.01	C	No Data	b	Plane Bed	VB	1.9	13	
R20T1.05S3.03t1.02	A	Not Evaluated		Step-Pool	NC	1.8	3	

Reach ID	Stream Type				Confinement Type	Watershed Area	Total Score	Priority Ranking
	Stream Type	Bed Material	Subclass Slope	Bed Feature				
R20T1.05S3.03t1.02s2.01	A	Not Evaluated		Cascade	NC	0.3	1	
R20T1.05S3.03t1.03	A	Not Evaluated		Step-Pool	NC	1.1	1	
R20T1.05S3.04	C	Not Evaluated		Dune-Ripple	VB	2.9	10	
R20T1.05S3.05	B	Cobble	a	Step-Pool	VB	1.2	9	
R20T1.05S3.06	C	Not Evaluated		Dune-Ripple	VB	0.5	11	
R20T1.06	B	Cobble	c	Plane Bed	SC	25.3	12	
R20T1.07	C	Gravel		Riffle-Pool	VB	25.1	12	
R20T1.07S3.01	C	Gravel	b	Riffle-Pool	VB	2.5	11	
R20T1.07S3.02	A	No Data		Step-Pool	NW	0.6	4	
R20T1.08	C	Not Evaluated	b	Plane Bed	BD	21.3	4	
R20T1.09	B	Cobble	c	Step-Pool	NW	20.7	5	
R20T1.10	E	Cobble		Plane Bed	VB	20.1	14	
R20T1.11	B	Cobble		Step-Pool	BD	19.2	12	
R20T1.12	C	Cobble		Riffle-Pool	VB	17.1	3	
R20T1.13	E	No Data		Dune-Ripple	VB	16.4	6	
R20T1.14	C	Cobble		Plane Bed	VB	8.7	8	
R20T1.15	E	No Data		Dune-Ripple	VB	8	4	
R20T1.16	E	Not Evaluated		Dune-Ripple	VB	6	2	
R20T1.17	E	Not Evaluated		Dune-Ripple	VB	3.3	2	
R20T1.18	E	Not Evaluated		Dune-Ripple	VB	2.5	3	
R20T1.19	B	Gravel		Step-Pool	VB	1.1	5	
R20T1.21	A	Not Evaluated		Step-Pool	SC	0.2	1	
R33T3.01	C	Cobble	b	Plane Bed	VB	13.9	15	
R33T3.02	B	Cobble		Step-Pool	NC	13.8	11	
R33T3.02S4.01	A	Not Evaluated		Step-Pool	NC	0.6	4	
R33T3.03	B	Cobble		Step-Pool	NW	12.5	10	

Reach ID	Stream Type				Confinement Type	Watershed Area	Total Score	Priority Ranking
	Stream Type	Bed Material	Subclass Slope	Bed Feature				
R33T3.04	C	Gravel		Riffle-Pool	VB	11	10	
R33T3.04S3.01	C	Cobble		Plane Bed	VB	3.4	12	
R33T3.04S3.01t1.01	B	Cobble		Step-Pool	SC	0.8	5	
R33T3.04S4.01	B	Cobble	a	Step-Pool	VB	2	9	
R33T3.04S4.02	A	Not Evaluated		Step-Pool	NC	1.7	0	
R33T3.05	C	Cobble		Plane Bed	VB	4.8	9	
R33T3.06	C	Sand	b	Dune-Ripple	VB	2.7	6	
R33T3.07	A	Cobble		Step-Pool	SC	0.7	7	

Phase 1 - Step 8. Summary of Categorical Impacts

Reach ID	Stream or Tributary	Stream Type					Step 4	Step 5	Step 6	Step 7
		Stream Type	Bed Material	Subclass Slope	Bedform	Total (out of 32)	Land Use (out of 6)	Instream Modification (out of 10)	Floodplain Modification (out of 12)	Bed & Bank Survey (out of 4)
R20T1.01	Clarendon River	C	Gravel		Riffle-Pool	15	5	2	8	0
R20T1.02	Clarendon River	C	Sand		Dune-Ripple	17	5	2	10	0
R20T1.02S2.01	Tributary to Clarendon River	C	No Data	b	Riffle-Pool	15	6	4	5	0
R20T1.02S2.02	Tributary to Clarendon River	A	No Data		Step-Pool	4	3	1	0	0
R20T1.03	Clarendon River	C	Gravel		Riffle-Pool	16	6	3	7	0
R20T1.03S2.01	Tributary to Clarendon River	C	No Data	b	Riffle-Pool	13	6	1	6	0
R20T1.03S2.02	Tributary to Clarendon River	A	Cobble		Step-Pool	10	4	4	2	0
R20T1.04	Clarendon River	C	Gravel		Riffle-Pool	18	6	2	10	0
R20T1.05	Clarendon River	C	Cobble		Riffle-Pool	14	5	1	8	0
R20T1.05S3.01	Ira Brook	B	Cobble		Step-Pool	11	4	3	4	0
R20T1.05S3.02	Ira Brook	C	Cobble		Riffle-Pool	13	5	1	7	0
R20T1.05S3.02t3.01	Tributary to Ira Brook	C	Cobble	b	Plane Bed	9	4	1	4	0
R20T1.05S3.02t3.02	Tributary to Ira Brook	B	Cobble	a	Step-Pool	7	4	1	2	0
R20T1.05S3.02t3.02s3.01	Trib to Trib to Ira Brook	A	Not Evaluated		Step-Pool	5	4	1	0	0

Reach ID	Stream or Tributary	Stream Type					Step 4	Step 5	Step 6	Step 7
		Stream Type	Bed Material	Subclass Slope	Bedform	Total (out of 32)	Land Use (out of 6)	Instream Modification (out of 10)	Floodplain Modification (out of 12)	Bed & Bank Survey (out of 4)
R20T1.05S3.02t3.03	Tributary to Ira Brook	A	Not Evaluated		Cascade	4	3	1	0	0
R20T1.05S3.03	Ira Brook	C	No Data		Dune-Ripple	9	5	1	3	0
R20T1.05S3.03t1.01	Tributary to Ira Brook	C	No Data	b	Plane Bed	13	4	3	5	1
R20T1.05S3.03t1.02	Tributary to Ira Brook	A	Not Evaluated		Step-Pool	3	2	0	1	0
R20T1.05S3.03t1.02s2.01	Trib to Trib to Ira Brook	A	Not Evaluated		Cascade	1	1	0	0	0
R20T1.05S3.03t1.03	Tributary to Ira Brook	A	Not Evaluated		Step-Pool	1	1	0	0	0
R20T1.05S3.04	Ira Brook	C	Not Evaluated		Dune-Ripple	10	6	3	1	0
R20T1.05S3.05	Ira Brook	B	Cobble	a	Step-Pool	9	4	1	4	0
R20T1.05S3.06	Ira Brook	C	Not Evaluated		Dune-Ripple	11	6	0	5	0
R20T1.06	Clarendon River	B	Cobble	c	Plane Bed	12	5	0	7	0
R20T1.07	Clarendon River	C	Gravel		Riffle-Pool	12	4	2	6	0
R20T1.07S3.01	Tributary to Clarendon River	C	Gravel	b	Riffle-Pool	11	5	2	4	0
R20T1.07S3.02	Tributary to Clarendon River	A	No Data		Step-Pool	4	3	1	0	0
R20T1.08	Clarendon River	C	Not Evaluated	b	Plane Bed	4	2	0	2	0
R20T1.09	Clarendon River	B	Cobble	c	Step-Pool	5	3	0	2	0
R20T1.10	Clarendon River	E	Cobble		Plane Bed	14	5	1	8	0
R20T1.11	Clarendon River	B	Cobble		Step-Pool	12	4	2	6	0
R20T1.12	Clarendon River	C	Cobble		Riffle-Pool	3	2	0	1	0
R20T1.13	Clarendon River	E	No Data		Dune-Ripple	6	2	2	2	0

Reach ID	Stream or Tributary	Stream Type					Step 4	Step 5	Step 6	Step 7
		Stream Type	Bed Material	Subclass Slope	Bedform	Total (out of 32)	Land Use (out of 6)	Instream Modification (out of 10)	Floodplain Modification (out of 12)	Bed & Bank Survey (out of 4)
R20T1.14	Clarendon River	C	Cobble		Plane Bed	8	5	1	2	0
R20T1.15	Clarendon River	E	No Data		Dune-Ripple	4	3	0	1	0
R20T1.16	Clarendon River	E	Not Evaluated		Dune-Ripple	2	2	0	0	0
R20T1.17	Clarendon River	E	Not Evaluated		Dune-Ripple	2	2	0	0	0
R20T1.18	Clarendon River	E	Not Evaluated		Dune-Ripple	3	2	0	1	0
R20T1.19	Clarendon River	B	Gravel		Step-Pool	5	4	1	0	0
R20T1.21	Clarendon River	A	Not Evaluated		Step-Pool	1	1	0	0	0
R33T3.01	Mill Brook	C	Cobble	b	Plane Bed	15	5	3	6	1
R33T3.02	Mill Brook	B	Cobble		Step-Pool	11	5	1	5	0
R33T3.02S4.01	Tributary to Mill Brook	A	Not Evaluated		Step-Pool	4	3	1	0	0
R33T3.03	Mill Brook	B	Cobble		Step-Pool	10	5	1	4	0
R33T3.04	Mill Brook	C	Gravel		Riffle-Pool	10	5	0	5	0
R33T3.04S3.01	Tributary to Mill Brook	C	Cobble		Plane Bed	12	6	1	5	0
R33T3.04S3.01t1.01	Trib to Trib to Mill Brook	B	Cobble		Step-Pool	5	3	1	1	0
R33T3.04S4.01	Tributary to Mill Brook	B	Cobble	a	Step-Pool	9	5	1	3	0
R33T3.04S4.02	Tributary to Mill Brook	A	Not Evaluated		Step-Pool	0	0	0	0	0
R33T3.05	Mill Brook	C	Cobble		Plane Bed	9	5	1	3	0
R33T3.06	Mill Brook	C	Sand	b	Dune-Ripple	6	3	1	2	0
R33T3.07	Mill Brook	A	Cobble		Step-Pool	7	4	1	2	0
					Total Scores	434	202	60	170	2
					Percent of Each Impact Category		46.50%	13.80%	39.20%	0.50%

Phase 1 - Step 9. Adjustment Process and Reach Condition

Reach ID	Confinement Type	Stream Type				Watershed Area	Total Impact	9.1 Predicted Adjustment Scores				9.2 Reach Condition		9.3
		Stream Type	Bed Material	Subclass Slope	Bedform			Degrad.	Aggrad.	Widen.	Planf.	Project	Statewide	Reach Sensitivity
R20T1.01	BD	C	Gravel		Riffle-Pool	48.13	15	9	7	5	7	Fair	Good	High
R20T1.02	VB	C	Sand		Dune-Ripple	47.59	17	12	9	5	10	Poor	Fair	High
R20T1.02S2.01	VB	C	No Data	b	Riffle-Pool	1.6	15	9	8	7	11	Poor	Fair	
R20T1.02S2.02	NC	A	No Data		Step-Pool	1.31	4	5	5	5	0	Good	Good	
R20T1.03	VB	C	Gravel		Riffle-Pool	44.31	16	11	8	7	11	Poor	Fair	High
R20T1.03S2.01	VB	C	No Data	b	Riffle-Pool	1.97	13	7	8	7	9	Fair	Fair	
R20T1.03S2.02	NC	A	Cobble		Step-Pool	1.64	10	8	8	7	0	Fair	Good	High
R20T1.04	VB	C	Gravel		Riffle-Pool	41.82	18	12	10	7	12	Poor	Fair	High
R20T1.05	VB	C	Cobble		Riffle-Pool	39.16	14	9	7	5	7	Fair	Good	Moderate
R20T1.05S3.01	SC	B	Cobble		Step-Pool	13.21	11	10	6	5	5	Fair	Good	Moderate
R20T1.05S3.02	VB	C	Cobble		Riffle-Pool	12.33	13	11	7	5	7	Fair	Fair	Moderate
R20T1.05S3.02t3.01	VB	C	Cobble	b	Plane Bed	2.89	9	5	6	5	5	Fair	Good	Moderate
R20T1.05S3.02t3.02	BD	B	Cobble	a	Step-Pool	2.69	7	7	6	5	7	Fair	Good	Moderate
R20T1.05S3.02t3.02s3.01	NC	A	Not Evaluated		Step-Pool	0.92	5	5	6	5	0	Good	Good	
R20T1.05S3.02t3.03	NC	A	Not Evaluated		Cascade	0.83	4	5	5	5	0	Good	Good	
R20T1.05S3.03	VB	C	No Data		Dune-Ripple	5.98	9	5	7	7	7	Fair	Good	
R20T1.05S3.03t1.01	VB	C	No Data	b	Plane Bed	1.95	13	9	6	5	9	Fair	Fair	
R20T1.05S3.03t1.02	NC	A	Not Evaluated		Step-Pool	1.78	3	4	2	2	0	Good	Reference	
R20T1.05S3.03t1.02s2.01	NC	A	Not Evaluated		Cascade	0.27	1	2	1	0	0	Reference	Reference	

Reach ID	Confinement Type	Stream Type				Watershed Area	Total Impact	9.1 Predicted Adjustment Scores				9.2 Reach Condition		9.3
		Stream Type	Bed Material	Subclass Slope	Bedform			Degrad.	Aggrad.	Widen.	Planf.	Project	Statewide	Reach Sensitivity
R20T1.05S3.03t1.03	NC	A	Not Evaluated		Step-Pool	1.11	1	2	1	0	0	Reference	Reference	
R20T1.05S3.04	VB	C	Not Evaluated		Dune-Ripple	2.87	10	5	8	7	9	Fair	Fair	
R20T1.05S3.05	VB	B	Cobble	a	Step-Pool	1.25	9	8	6	5	6	Fair	Good	Moderate
R20T1.05S3.06	VB	C	Not Evaluated		Dune-Ripple	0.47	11	4	6	6	4	Fair	Good	
R20T1.06	SC	B	Cobble	c	Plane Bed	25.25	12	9	7	5	3	Fair	Good	Moderate
R20T1.07	VB	C	Gravel		Riffle-Pool	25.06	12	8	6	5	8	Fair	Good	High
R20T1.07S3.01	VB	C	Gravel	b	Riffle-Pool	2.48	11	10	7	5	8	Fair	Fair	High
R20T1.07S3.02	NW	A	No Data		Step-Pool	0.65	4	5	5	5	5	Fair	Good	
R20T1.08	BD	C	Not Evaluated	b	Plane Bed	21.28	4	4	2	2	0	Good	Reference	
R20T1.09	NW	B	Cobble	c	Step-Pool	20.72	5	4	3	2	0	Good	Reference	Moderate
R20T1.10	VB	E	Cobble		Plane Bed	20.08	14	9	7	5	7	Fair	Good	Moderate
R20T1.11	BD	B	Cobble		Step-Pool	19.24	12	10	6	5	8	Fair	Fair	Moderate
R20T1.12	VB	C	Cobble		Riffle-Pool	17.1	3	4	2	2	0	Good	Reference	Moderate
R20T1.13	VB	E	No Data		Dune-Ripple	16.37	6	4	2	2	4	Good	Reference	
R20T1.14	VB	C	Cobble		Plane Bed	8.7	8	5	7	5	5	Fair	Good	Moderate
R20T1.15	VB	E	No Data		Dune-Ripple	8.05	4	4	3	2	0	Good	Reference	
R20T1.16	VB	E	Not Evaluated		Dune-Ripple	6.03	2	2	2	2	0	Reference	Reference	
R20T1.17	VB	E	Not Evaluated		Dune-Ripple	3.29	2	2	2	2	0	Reference	Reference	
R20T1.18	VB	E	Not Evaluated		Dune-Ripple	2.49	3	4	2	2	0	Good	Reference	
R20T1.19	VB	B	Gravel		Step-Pool	1.07	5	5	6	5	5	Fair	Good	Moderate
R20T1.21	SC	A	Not Evaluated		Step-Pool	0.19	1	2	1	0	0	Reference	Reference	
R33T3.01	VB	C	Cobble	b	Plane Bed	13.94	15	12	7	5	9	Poor	Fair	Moderate
R33T3.02	NC	B	Cobble		Step-Pool	13.85	11	9	7	5	0	Fair	Good	Moderate

Reach ID	Confinement Type	Stream Type				Watershed Area	Total Impact	9.1 Predicted Adjustment Scores				9.2 Reach Condition		9.3
		Stream Type	Bed Material	Subclass Slope	Bedform			Degrad.	Aggrad.	Widen.	Planf.	Project	Statewide	Reach Sensitivity
R33T3.02S4.01	NC	A	Not Evaluated		Step-Pool	0.6	4	3	3	0	0	Reference	Reference	
R33T3.03	NW	B	Cobble		Step-Pool	12.49	10	9	7	5	7	Fair	Good	Moderate
R33T3.04	VB	C	Gravel		Riffle-Pool	11.01	10	8	7	5	6	Fair	Good	High
R33T3.04S3.01	VB	C	Cobble		Plane Bed	3.35	12	8	8	7	9	Poor	Fair	Moderate
R33T3.04S3.01t1.01	SC	B	Cobble		Step-Pool	0.81	5	5	5	5	2	Fair	Good	Moderate
R33T3.04S4.01	VB	B	Cobble	a	Step-Pool	2.04	9	5	7	5	9	Fair	Good	Moderate
R33T3.04S4.02	NC	A	Not Evaluated		Step-Pool	1.68	0	2	0	0	0	Reference	Reference	
R33T3.05	VB	C	Cobble		Plane Bed	4.83	9	5	9	5	7	Fair	Good	Moderate
R33T3.06	VB	C	Sand	b	Dune-Ripple	2.72	6	5	5	5	5	Fair	Good	High
R33T3.07	SC	A	Cobble		Step-Pool	0.7	7	5	6	5	2	Fair	Good	High