

Butternut Creek Watershed Assessment



Prepared for:
Upper Susquehanna Coalition
183 Corporate Drive
Owego, NY 13827
607.972.2348

By:
Otsego County Soil and Water Conservation District
967 County Hwy 33
Cooperstown, NY 13326
607.547.8337 Ext. 4

January 2021

Contents

1. Introduction	1
1.1 Partners.....	1
1.2 Watershed.....	1
2. Background	7
3. Methods.....	11
3.1 Project Timeline	11
3.2 Outreach	11
3.3 Stream Corridor Assessment	12
3.3.1 BEHI.....	14
3.3.2 Prioritization.....	14
3.4 Stream Crossing Assessment	14
4. Results.....	15
4.1 Stream Corridor Assessment	15
4.1.1 Erosion	16
4.1.2 Deposition	23
4.1.3 Buffer Potential.....	29
4.1.4 Instream Structures	35
4.1.5 Stream Crossings.....	41
4.1.6 Bedrock	43
4.1.7 Floodplain access	44
4.1.8 Invasive Species.....	46
4.1.9 Other Observations.....	51
4.1.10 Priority Sites	53
4.2 Stream Crossing Assessment	61
5. Summary	72
5.1 Prioritization.....	75
5.1.1 Objectives and Strategies.....	75
6. References.....	78
Appendix A. Outreach Summary - Butternut Assessment Meetings/Trainings	81
Appendix B. Observation Categories from Stream Corridor Assessment	82
Appendix C. Examples of Field Data Sheets for Stream Corridor Assessment	85
Appendix D. List of Streams in Butternut Creek Watershed	90
Appendix E. BEHI description.....	93

Appendix F. Summary of Stream Corridor Assessment.....	96
Appendix G. Summary Maps combining Stream Corridor Assessment and Stream Crossing Assessment.....	100
G.1 Upper Butternut Creek Watershed Figures.....	100
G.2 Middle Butternut Creek Watershed Figures	115
G.3 Lower Butternut Creek Watershed Figures.....	130
Appendix H. Triage Report of Restoration Scenarios for Subset of Priority Sites.....	143
Appendix I. Summary of NAACC Stream Crossing Assessment Data by Town	161

Cover photo: Basswood Creek - Otsego County Conservation Association

This Project and its accomplishments has been made possible through the sponsorship and support of the Upper Susquehanna Coalition, the Otsego County Soil and Water Conservation District, the Butternut Valley Alliance, Otsego County Conservation Organization, and SUNY Oneonta through funding provided by the U.S. Environmental Protection Agency through the National Fish and Wildlife Foundation.



Chesapeake Bay Stewardship Fund



1. Introduction

The purpose of this report is to summarize the Watershed Assessment of Butternut Creek as part of a project developed by the Upper Susquehanna Coalition (USC) and funded by the National Fish and Wildlife Foundation (NFWF) referred to as the I-4 project. The project was facilitated by the Otsego County Soil and Water Conservation District (OCSWCD) in collaboration with Otsego County Conservation Association (OCCA), Butternut Valley Alliance (BVA), SUNY Oneonta, USC, and numerous volunteers. The I-4 project represents an approach to watershed conservation and management that builds on four principal components: Information, Investigation, Implementation, and Integration. The Watershed Assessment combined with the *Butternut Creek Watershed Background Report* will provide a valuable tool to evaluate and prioritize future restoration in the watershed which was identified as a goal of the Information and Investigation components of the I-4 project. It will also supply essential information to support the Implementation and Integration components of the I-4 project.

1.1 Partners

The Upper Susquehanna Coalition provided funding for the project from the National Fish and Wildlife Foundation, training, technical expertise. Otsego County Soil and Water Conservation District provided technical expertise, project coordination, public outreach, data collection and management, and report writing. The Butternut Valley Alliance (BVA), Otsego County Conservation Association (OCCA), and SUNY Oneonta collaborated on project development, implementation, provided technical expertise, public outreach and volunteer recruitment for data collection as well as volunteering extensively for data collection.

1.2 Watershed

Butternut Creek originates at the headwaters on Angel Hill in the Town of Burlington, Otsego County, NY (Peterson 2017). Butternut Creek and its contributing tributaries flow through eight towns and two villages, Burlington, Butternuts, Exeter, Village of Gilbertsville, Laurens, Morris, Village of Morris, New Lisbon, Pittsfield, and Unadilla, before joining the Unadilla River in the Town of Butternuts near Mount Upton. The course of the mainstem covers approximately 43 miles (Figure 1). Butternut Creek is one of the headwater streams contributing to the Upper Susquehanna watershed and ultimately the Chesapeake Bay watershed where the Susquehanna enters the Bay at Havre de Grace, Maryland. The elevation difference between Angel Hill, 2087 ft., and the confluence with the Unadilla, 1000 ft., is 1087 ft., with an average stream gradient of 25.3 ft./mile, and 89% of the watershed over 1198 ft. elevation (USGS 2020). Butternut Creek starts as a high gradient stream for the first five miles before transitioning to a more moderate gradient after five miles (Stensland 2002).

The Butternut Creek watershed is divided in three 12-digit sub-watershed Hydrologic Unit Codes (HUC), the Lower (20501010910), Middle (20501010803), and Upper (20501010802). The combined area of the three sub watersheds contributing to the entire Butternut Creek watershed is 130.17 mi² (83,331 acres). The sub-watersheds increase in size going from upstream to downstream. The Upper Butternut watershed has a drainage area of 33.92 mi² (21,709 acres) and consists of mostly unnamed tributaries with a size range from 1 mi² to 3 mi² (Figure 2). The Middle Butternut watershed has a drainage area of 44.10 mi² (28,222 acres) and consists of tributaries with a size range from 1 mi² to 5 mi², some of which are named (Figure 3). The Lower Butternut watershed is the largest of the three sub-watersheds with a drainage area of 52.16 mi² (33,380 acres). The Lower Butternut has several small tributaries of 1 mi² but also several larger tributaries ranging in size from 2 mi² (Helbert Brook and Coye Brook) to 6 mi² (Cahoon Creek) (Figure 4).

The land use in the Butternut Creek watershed is dominated by a mix of past/present agriculture and forest. According to the *Atlas of Otsego County* from 1868, 38 mills were documented in the watershed at that time

including, sawmills, cider, grist, cotton, shingles, and hemp (Beers et al. 1868). Some of the mill dams spanned the mainstem with several along the tributaries as well. Currently, there are no active mills in the watershed. Historic land clearing for agriculture and to support the numerous mills in the watershed continue to have legacy impacts today including absent or degraded riparian habitat and stream obstructions from remnant dams. There is currently a diverse array of farms in the watershed including beef, dairy, goat, sheep, horse, and crop farms (OCSWCD 2020).

The Butternut Creek watershed is host to biologically significant species including the Eastern hellbender (*Cryptobranchus alleganiensis alleganiensis*), a NY State Species of Special Concern, Yellow lampmussel (*Lampsilis cariosa*) and swallowtail shiner (*Notropis procne*) both NY State High Priority Species of Greatest Conservation Need, and Brook trout (*Salvelinus fontinalis*). Brook trout are not a listed species but are widely regarded as indicator species due to their overall high water quality requirements for survival. The NYSDEC recognizes the stream as a key brook trout stream because it maintains cooler temperatures during summer months which is important for several aquatic species, in particular Brook trout (Wells 2016a). The NYSDEC has discontinued stocking brown trout, a competitive species for Brook trout as of 2012 to see how the Brook trout population responds (Pokorny 2016, Wells 2016b). Butternut Creek itself is classified as a warm water fisheries for the lower 15 miles and shifts to a cold water fishery at approximately 1,200 ft. elevation for 16 miles upstream (Angell 2017, NYSDEC 2009). There are a wide variety of aquatic habitats in Butternut Creek including ranging from rocky, fast moving, shallow riffles to deep, slow moving pools. The diversity of habitats supports different species of fish. A recent survey of fish species in Butternut Creek found 18 different species with the greatest diversity found at a site downstream of New Lisbon (Angell 2017). Another fish survey in 2018 found 12 different species at one location on Butternut Creek (Coney and Lord 2019). Compared to the other sites in the Upper Susquehanna Watershed surveyed as part of this survey, Butternut Creek was one of the sites with the highest species diversity. Butternut Creek has also been one of the streams in the Upper Susquehanna Watershed targeted as part of the American Eel (*Anguilla rostrata*) restoration efforts. In 2019 an estimated 6,000+ elvers were released into Butternut Creek with future releases planned for subsequent years (Coney and Lord 2020).

The Butternut Creek watershed is one piece of a complex regional watershed as part of the headwaters to the Chesapeake Bay. In 2010, the Chesapeake Bay Total Maximum Daily Load (TMDL) was established by the United States Environmental Protection Agency (EPA) to address water quality issues in the Chesapeake Bay caused by excessive nutrients and sediment (NYSDEC 2020a). New York and six other jurisdictions with land in the Chesapeake Bay watershed covered under the TMDL each have pollution reduction targets for nitrogen, phosphorus, and sediment set by EPA (NYSDEC 2020a). The Chesapeake Bay Program (CBP) is a multi-state/federal voluntary partnership that has been working towards restoring the Bay since 1983. The Chesapeake Bay Program developed the Watershed Model, a computer modeling tool, to understand how changes in management actions could affect water quality and evaluate progress toward pollution reduction targets (CBP 2018). The Watershed Model has informed New York State's Watershed Implementation Plan (WIP), which outlines the goals and actions for meeting the pollution reduction targets (NYSDEC 2020a). The Butternut Creek watershed being at the top of the Upper Susquehanna watershed is the headwaters to the Chesapeake Bay. The status and trends of water quality in the Butternut Creek watershed have important downstream impacts. Understanding the conditions at the local watershed level of Butternut Creek is critical to improving water quality at a regional level.

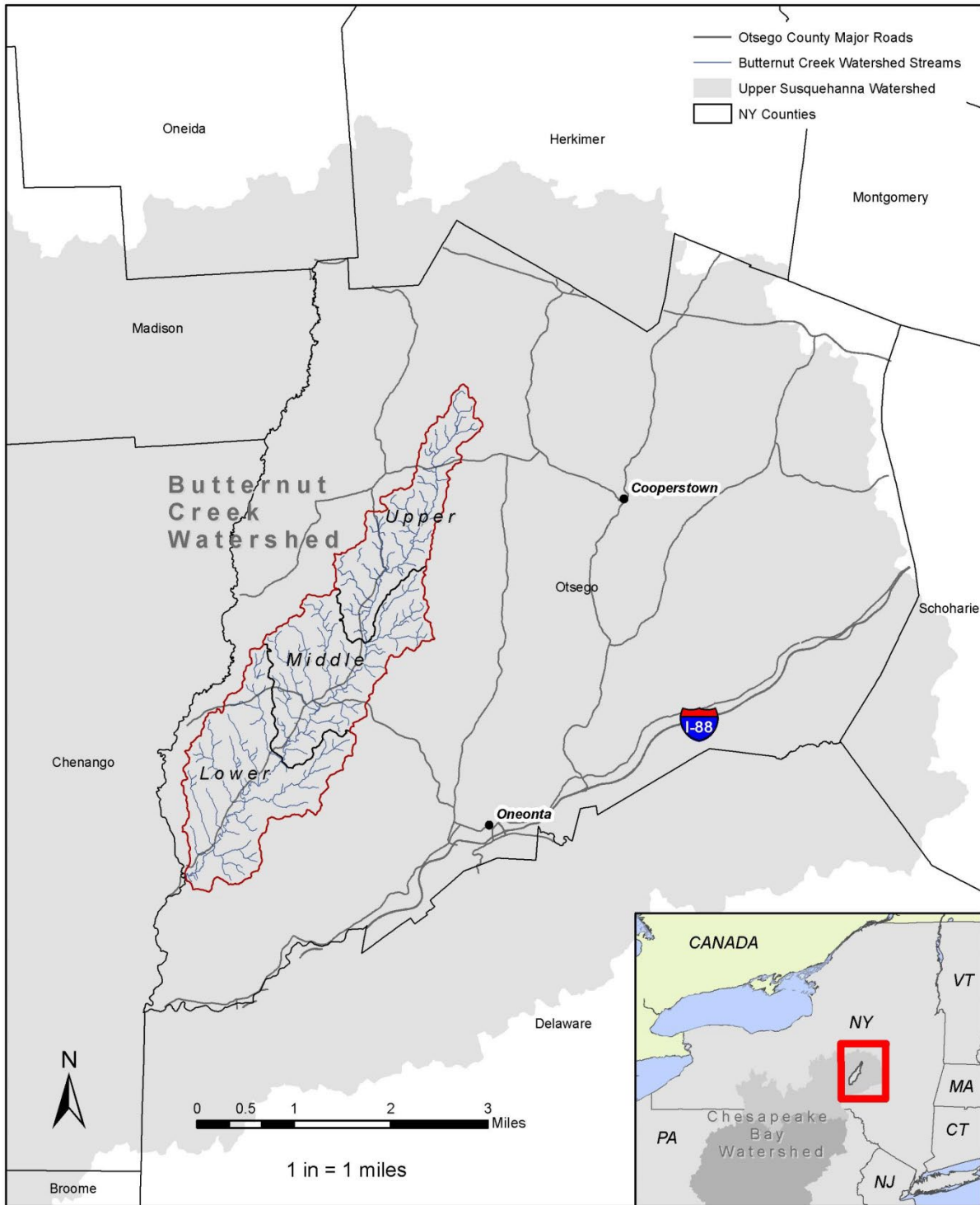


Figure 1. Overview of the Butternut Creek Watershed.

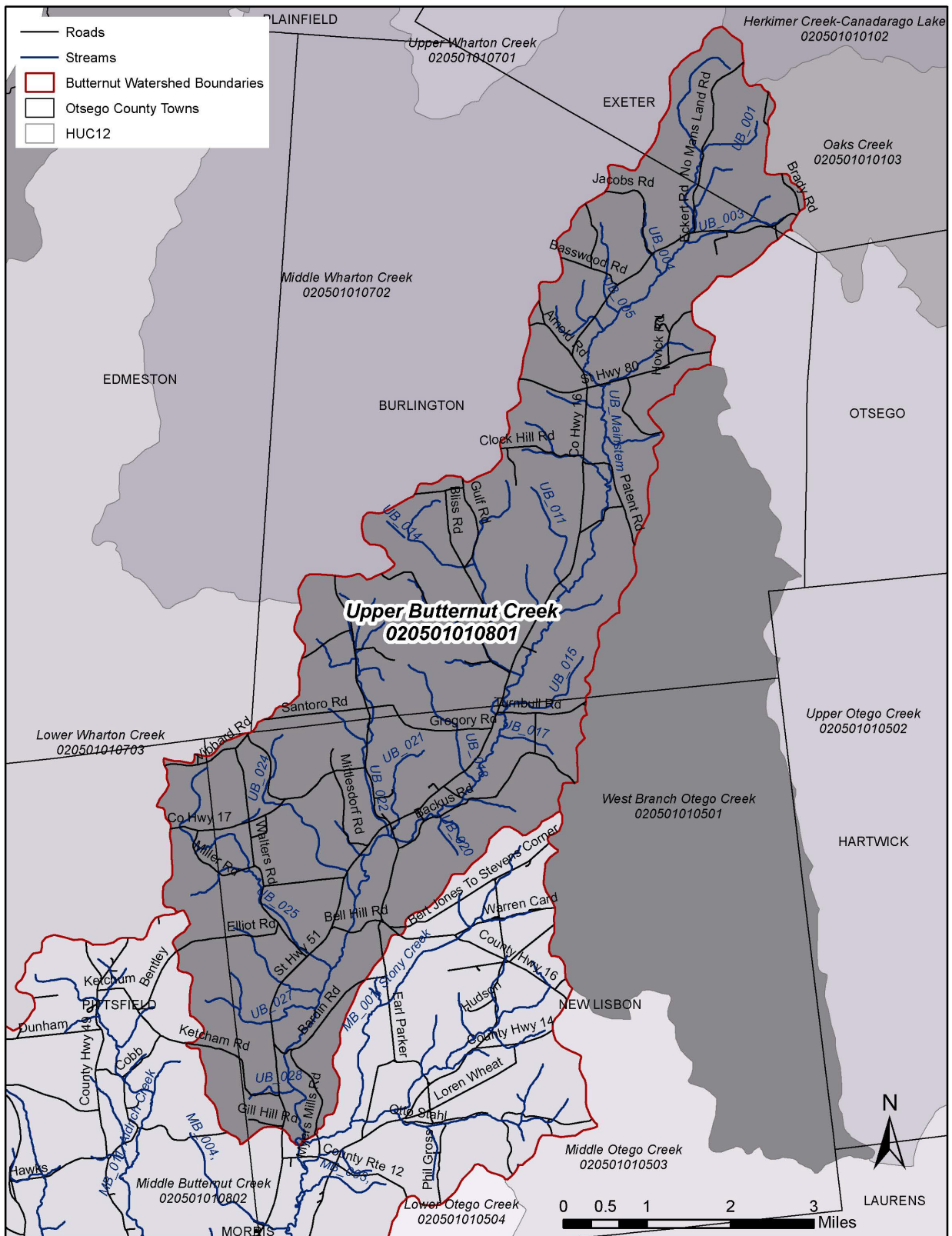


Figure 2. The Upper Butternut Creek Watershed, HUC-12# 020501010801.

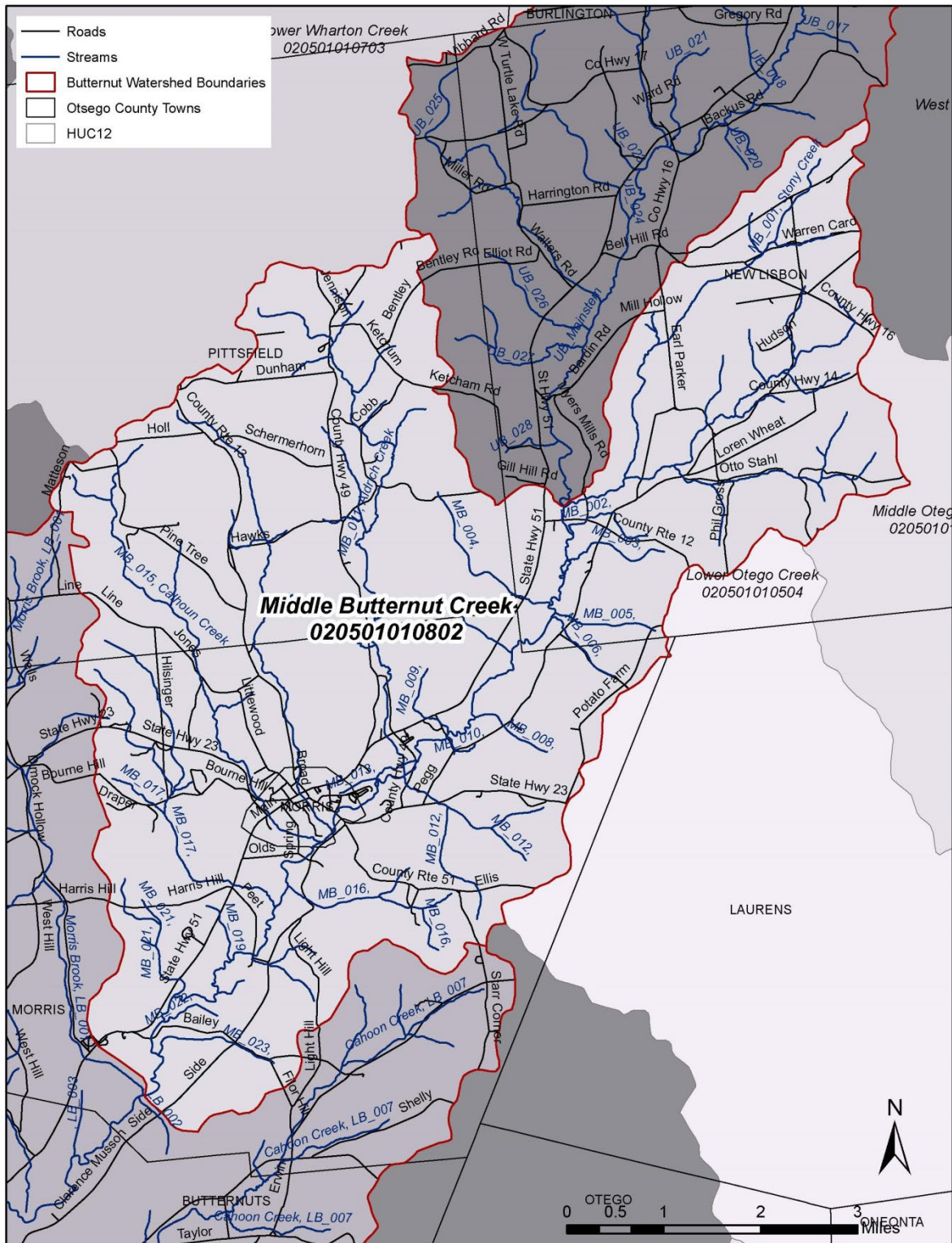


Figure 3. The Middle Butternut Creek Watershed, HUC-12# 020501010802.

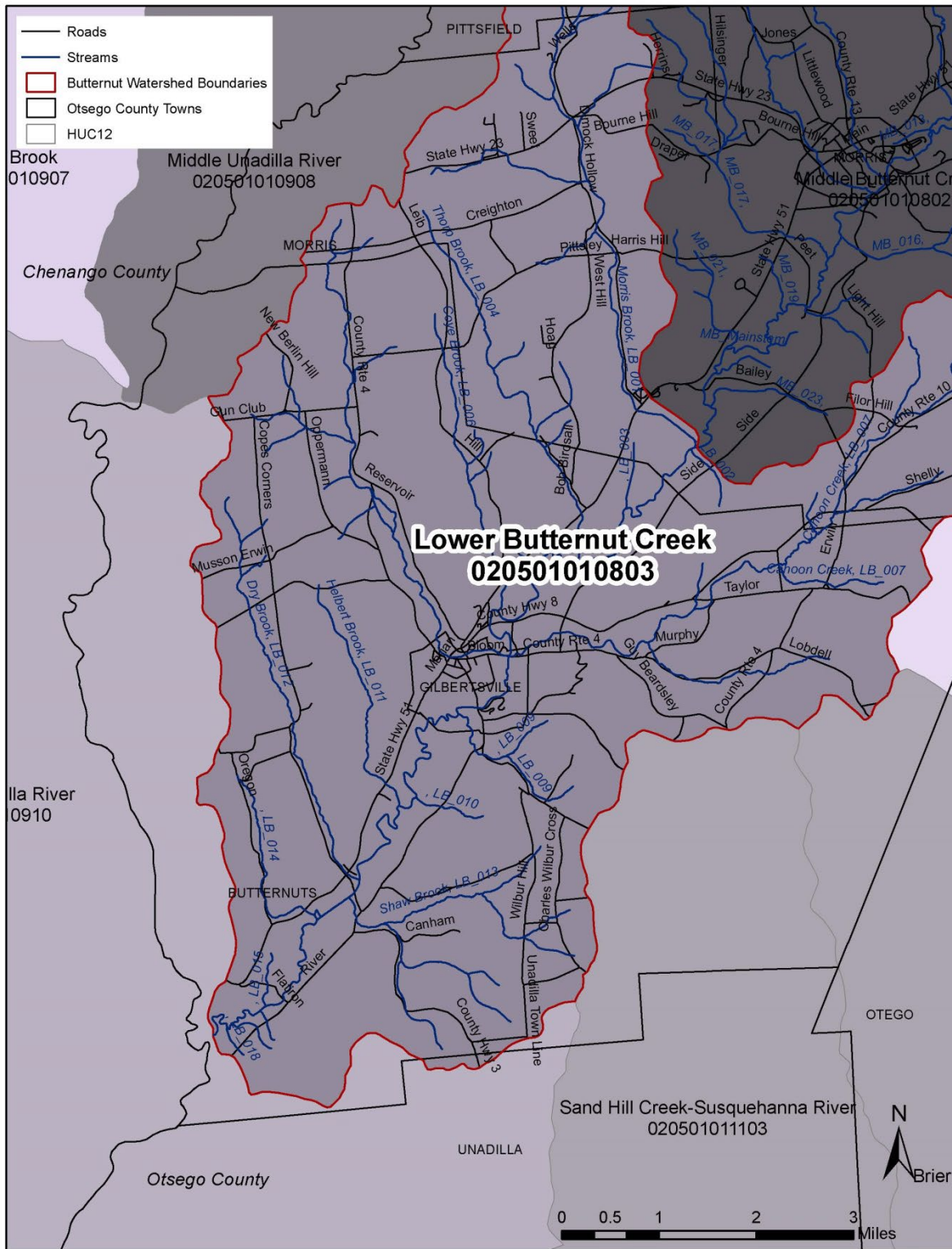


Figure 4. The Lower Butternut Creek Watershed, HUC-12# 020501010803.

2. Background

The stream corridor includes the: the active stream channel, the stream channel banks, the floodplain, the riparian zone, and the immediate areas upland that directly impact the corridor (USC 2017). The stream corridor components work together to moderate stream flows (normal and flood flow events) and provide balanced transport of sediment and water. Figure 5 is an example of the complexities of a stream corridor.

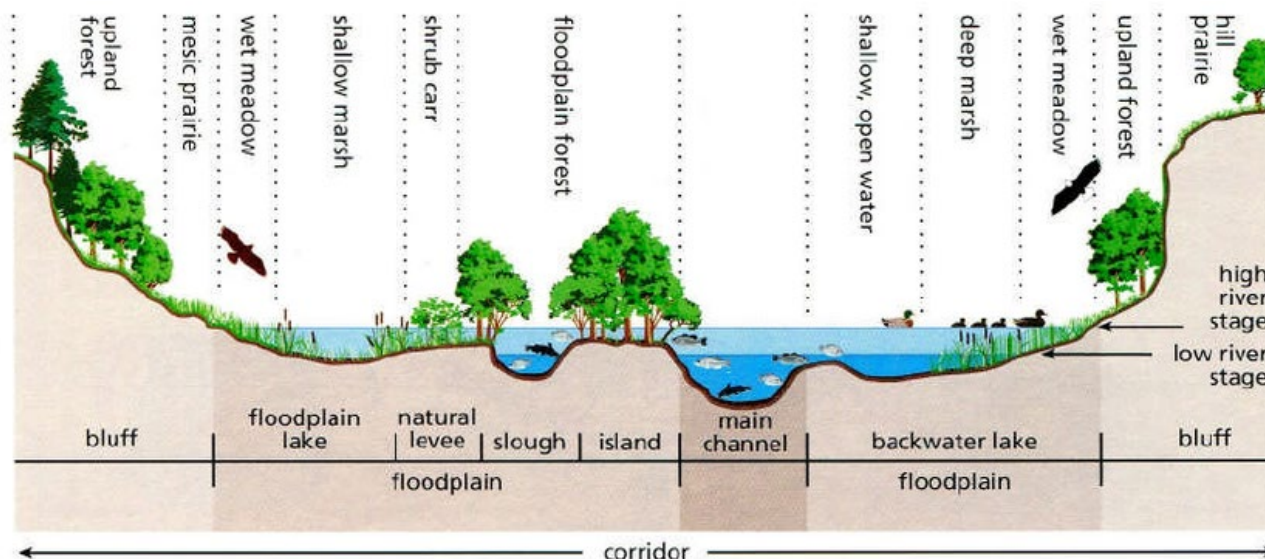


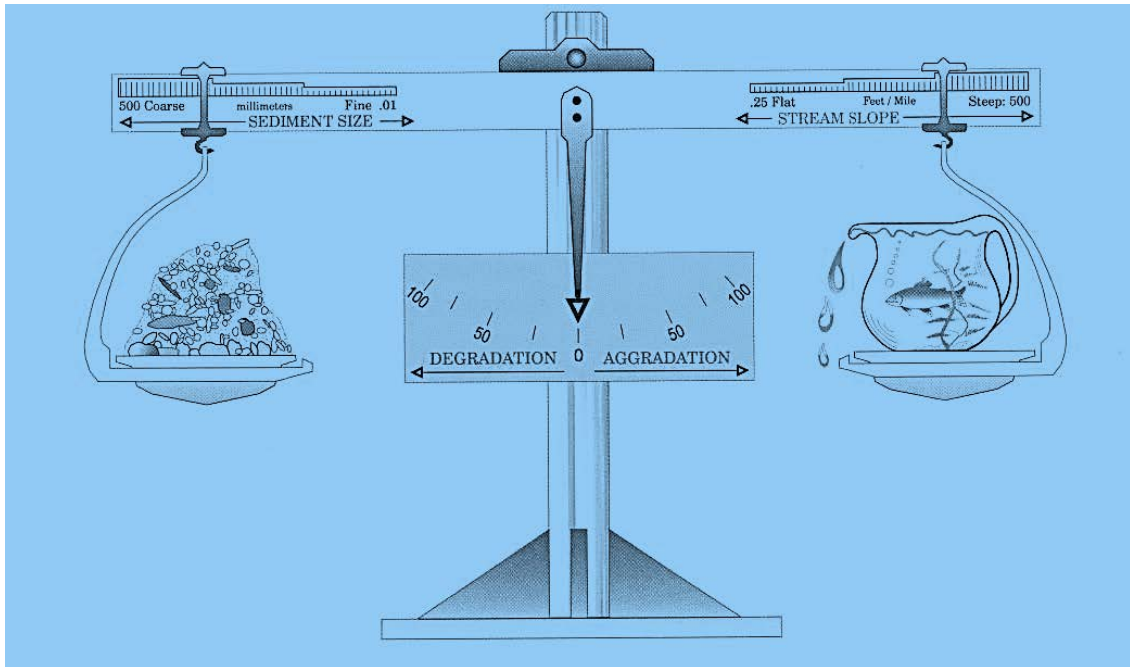
Figure 5. Example of stream corridor (Federal Interagency Stream Restoration Working Group 1998).

A stable stream can maintain its channel dimension, pattern, and profile geometry over time while effectively transporting the water and sediment supply without aggrading (depositing or building up), degrading (down cutting), or eroding its banks (Rosgen 1996, FWR et al. 2012). That is not to say that a stable stream does not change. Dynamic equilibrium is a term used to describe a stable as there are lateral adjustments that can erode banks, cause migration across the floodplain, and create small-scale adjustments in the formation of the channel (FWR et al. 2012). These changes typically occur over decades or even generations and are driven by fluctuations in water and sediment inputs caused by small and large flood events (FWR et al. 2012). A stream can become unstable when a management activity alters the stream's ability to move its water and sediment effectively (DCSWCD 2014). The condition of the stream corridor has an impact on the landscape the stream corridor flows through and alternatively land use management activities on the landscape have direct impacts on the health and stability of the stream (USC 2017). The placement of roads, culverts and bridges, berms, animal access, crop fields, structures in the stream corridor can have a negative impact to the stream through increasing flooding, decreased channel and bank stability, as well as degradations to water quality and aquatic habitat (DCSWCD 2014, USC 2017). There are legacy impacts to the stream corridor that are still evolving today caused by a combination of watershed, floodplain, and channel modifications over the past 150 years (FWR et al. 2012).

Over time a stream develops a pattern with which it manages the sediment load passing through (FWR et al. 2012). In order to balance the variable energy from flow, the stream meanders, transports and deposits their load of sediments (FWR et al. 2012). The stream sediment balance and channel characteristics are determined by four primary physical variables (sediment size, sediment load, stream discharge, and stream slope) and two processes (stream bed aggradation and degradation) (DCSWCD 2014). A scale is one of the common analogies to describe how the changes in the physical variables cause changes in the process variables. Figure 6 illustrates this concept. Erosion of the bed and banks (degradation) occurs when the stream becomes steeper or is deepened and has more energy than is needed through increased discharge to transport the available sediment (Figure 6a). The added sediment volume to the channel causes the streambed to rise which spreads water out, eroding laterally resulting in a widening the channel (FWR et al. 2012). When a stream is slowed down, backed up, or spread out, a loss of energy occurs that may cause sediments to drop out of the stream flow (deposition/aggradation) (Figure 6b). Stream bank erosion is a natural process that occurs as a stream is balancing the sediment load. However, excessive erosion is a major source of sediment to stream that has negative effects on the physical and biological function of the stream (WVDEP 2008).

LOAD

DISCHARGE



STREAM EFFECT

Figure 6. Sediment Balance (Sediment LOAD) x (Sediment SIZE) is proportional to (Stream SLOPE) x (Stream DISCHARGE) (Rosgen 1996).

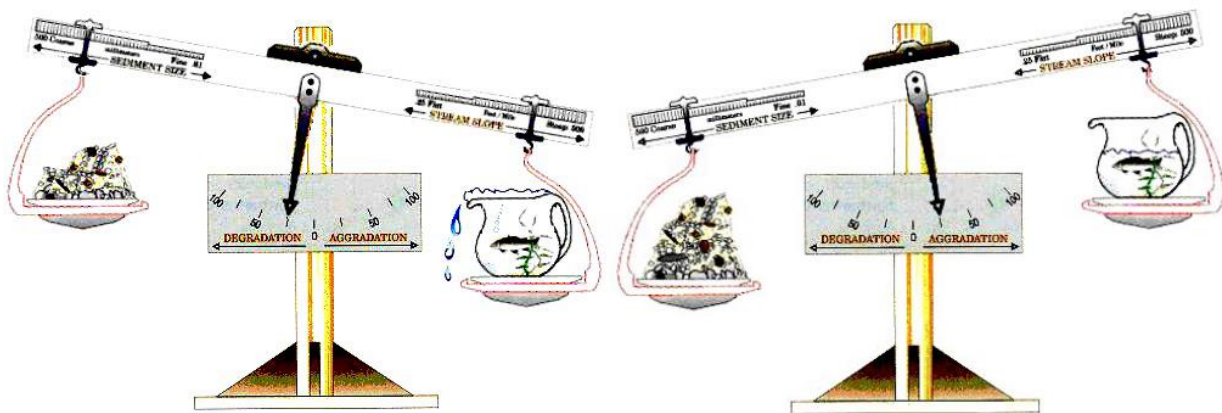


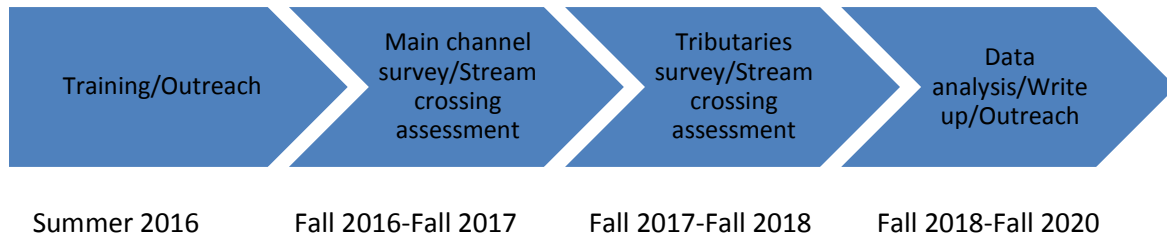
Figure 6a (left). If the supply of sediment decreases or the supply of water increases, the stream will begin to erode the stream bed or degrade (Rosgen 1996).

Figure 6b (right). If the supply of sediment increases or the supply of water decreases, the stream will begin to fill in with gravel or aggrade (Rosgen 1996)

Disturbance to the stream and watershed can disrupt the balance of a stream in multiple ways. Human disturbance often has a long lasting impact on stream function and dramatically alters natural conditions compared to natural disturbance (DCSWCD 2014). Disturbance can be localized to the stream such as dredging while other stream impacting disturbances can occur in the stream corridor and uplands such as deforestation in the uplands or degradation of the riparian area. Other examples include logging practices, livestock overgrazing, cropping practices, construction and maintenance of highway infrastructure, real estate development, gravel mining, channelization, berming, bank armoring, and introduction of non-native species in the riparian corridor (OCSWCD 2014). A forested landscape absorbs precipitation and reduces the rate and amount of water flowing in to a stream. The loss of vegetative cover in the uplands and riparian areas can increase sediment in the stream through overland flow as well increased erosion adding sediment from the bed and banks. The initial clearing of forests in the 19th century, resulted in increased sediment in streams that was often deposited in the channel and floodplain. Current stream channel adjustments may still be linked to deforestation centuries ago (FWR et al. 2012). While the intent of dredging a stream channel was often to improve flow in a channel and control flooding through digging out sediments in the stream, it often increase flooding damage. Dredging a section of stream can cause a steep drop (or headcut) at the upstream end of excavation (FWR et al. 2012). This increase in slope increases the flow speed which continues to down-cut or degrade the channel shifting the headcut more and more upstream while eroding downstream of the dredged area (DCSWCD 2014). Often dredging is coupled with channel straightening (channelization) which adds to the deepening of the channel through increased stream velocities. Bank armoring through installation of most commonly riprap or large rocks helps protect the bank in one area but can deflect the stream's energy away from the eroding streambank and cause erosion on the opposite bank or downstream of the site (FWR et al. 2012). Bridges and culverts can constrict stream flow if improperly sized creating erosion around them or typically downstream. They can also cause debris accumulation most often upstream of the structure and a large scour pool downstream of the structure. The impact of a stream crossing can degrade aquatic habitat and create a barrier for movement (FWR et al. 2012).

3. Methods

3.1 Project Timeline



- Training/Outreach – Training in office and field of volunteers. Public outreach including public meetings, press releases, mailings and telephone calls.
- Main channel survey – physical survey of main channel - First outing was October 21, 2016
- Tributaries survey - physical survey of tributaries – Last outing was September 18, 2018
- Stream Crossing assessment – culvert assessment using NAACC protocol
- Summary - report writing, public outreach, public and stakeholder presentations

3.2 Outreach

Community outreach included sending postcards to landowners, hosting public meetings before, during, and after the project, calling landowners, and knocking on doors to obtain stream access. See Appendix A for summary of meetings/outreach events. The intentions of the outreach efforts were to explain the project intent and recruit local volunteers to participate in the physical assessment.

OCSWCD held workshops with a lecture component and field training to train volunteers on project protocol. This was an ongoing process and new volunteers were trained as they were recruited. There were 7-10 volunteers from BVA, OCCA, and SUNY Oneonta, many of whom are also residents in the Butternut Creek watershed community. OCSWCD designated one staff member to the project and a rotating intern assisted as well. Les Hasbargen, Professor of Geomorphology and Geology at SUNY Oneonta and a director of BVA, incorporated physical assessment outings into coursework at SUNY Oneonta. Some of the students volunteered on additional outings and research beyond their coursework.



Photo: OCWCD

3.3 Stream Corridor Assessment

The physical assessment included two components, the *Stream Corridor Assessment* and the *Stream Crossing Assessment*. The *Stream Corridor Assessment* involved walking the stream corridor throughout the watershed and assessing the condition of the stream through recorded observations related to resource concerns. The main channel of Butternut Creek was walked or boated in its entirety. Tributaries with a drainage area of greater than or equal to 1 mi² were walked. This included 24 tributaries walked up to the first order or higher if observations warranted further investigation.



Photo: OCSWCD

The *Stream Corridor Assessment Guide* developed by the Upper Susquehanna Coalition was used as a basis for training the volunteers on stream corridor processes and how to identify resource concerns and opportunities (USC 2017). Volunteers noted areas of interest on an outing log, which included the observation, a minimum of one photo, and a GPS location. A primary resource concern in the watershed prior to the physical assessment was erosion. At areas of active erosion additional measurements were taken following the Bank Erosion Hazard Index (BEHI) protocol on a separate data sheet. One site could have observations in multiple categories. Observations included the following categories:

- Deposition
- Erosion
- BEHI measurements
- Instream Structures
- Stream crossings – noted with photographs but not surveyed
- Bedrock

- Floodplain access
- Buffer potential - Included recent plantings because not all buffers created equally, needed increased width and or maintenance
- Invasive species
- Other noteworthy features recorded in observations: dredging, quality riparian/instream habitat, cold water influences, salt storage, road runoff, wetlands, excessive garbage, etc.

Certain observations yielded a negative result confirming the absence of a category and some observations did not indicate presence or absence of a feature resulting in certain categories having results including: yes, no, blank, or N/A. A result of N/A, indicating not available, was reserved for sites that indicated a feature but was missing additional descriptors. For example an observation may have recorded erosion but did not mark the bank side or it was not apparent from the photos and aerial imagery. Details of observation categories can be found in Appendix B. Initially field crews recorded reach assessment ranking as part of the *USC Stream Corridor Assessment Guide* methodology. However, it proved too time consuming given the scale of the assessment. Some of the early notes have reach breaks denoted in the notes.



Photo: OCSWCD

Results were compiled and a QA/QC process was provided by the OCSWCD staff to verify locations, match photos, review BEHI measurements for completeness and accuracy, and parse data into categories. Examples of data sheets are included as Appendix C. Each group was assigned a section of stream prior to an outing. Equipment used for each outing included: stadia rod, measuring tape, gps, maps, camera, and rangefinder. The GPS units used in the survey were not precision instruments and had an accuracy of approximately +/- 10m. Additional post processing included filling in data gaps such as identifying bank erosion side through looking at photos and aerial imagery. For the BEHI sites, each site was evaluated for buffer potential through looking at photos and aerial imagery if it was not already indicated on the data sheets.

Due to the large number of unnamed tributaries in the watershed, a brief alphanumeric abbreviation was generated for each stream. The first part uses two letters to indicate subwatershed (UB – Upper Butternut, MB- Middle Butternut, LB- Lower Butternut) and the second part includes two-three numbers to identify the stream with numbering starting in the upper watershed for each subwatershed. A list of all streams in the watershed with associated identifications can be found in Appendix D.

A large volume of photos were catalogued as part of this project. Photos are organized in folders by date. Correlation from notes on observation log uses last digits of photo id as keys. The inclusion of a finger in the photo is used to denote looking upstream. Not every observer used this code.

3.3.1 BEHI

The Bank Erosion Hazard Index (BEHI) was used to assess stream bank erosion condition and potential. The BEHI was created by Dave Rosgen of Wildland Hydrology, Inc. (Rosgen 2001), and is one of several procedures for assessing stream bank erosion condition and potential (WVDEP 2008). The BEHI provides an overall score for bank condition that can be used to inventory stream bank condition over large areas, prioritize eroding banks for remedial actions, etc. (WVDEP 2008). Point values are assigned based on measurements for: Bank Height, Root Depth, Root Density, Bank Angle, Surface Cover, Bank Material, Bank Layers, generating a BEHI Rating from low to high (Very low, Low, Moderate, High, Very High, Extreme). Near Bank Stress (NBS) is also evaluated generating a rating from low to high (Very low, Low, Moderate, High, Very High, Extreme). The BEHI and NBS Ratings are used to predict an annual streambank erosion rate (ft/yr) (WVDEP 2008). A description of variables used in the BEHI calculations can be found in Appendix E.

3.3.2 Prioritization

Priority sites include any site with erosion measured by BEHI. Certain sites were also included as Priority Sites that were not measured for erosion hazard but were included because the erosion has been increasing over time or landowners have expressed concerns about the erosion. Other significant features of note were included as Priority Sites for reasons such as dredging, extensive garbage (ex tires), exceptional habitat, noticeable berms, gravel pits, or invasive species. The category Significant Feature describes broadly why a site was included as a Priority Site.

3.4 Stream Crossing Assessment

The physical assessment included a separate survey of road and stream crossings referred to as the *Stream Crossing Assessment*. OCSWCD conducted the stream crossing assessment with the assistance of volunteers. The analysis followed the North Atlantic Aquatic Connectivity Collaboration (NAACC) protocol (Abbott and Jackson 2019). The NAACC protocol is a standardized protocol that uploads data into a publically available database (https://naacc.org/naacc_search_crossing.cfm) across a thirteen-state region, from Maine to West Virginia for analyzing aquatic connectivity. Data can be collected on paper or on a tablet. Data collected includes location information, culvert condition, culvert dimensions and interaction with stream (See Appendix C for an example data sheet). Field equipment is similar to the gear used for the physical assessment: stadia rod, measuring tape, gps, maps, camera, and rangefinder. A tablet was used as much as possible in the field because it decreased the amount of time needed to enter and upload the data and has in field validation to ensure data is not missing. Q-GIS, open source GIS software, was used on the tablet for navigation. Prior to field work, we downloaded a GIS shapefile of the expected stream crossings to guide the field work. Each road was driven in its entirety and all culverts and bridges were surveyed on the road that included an aquatic feature. Road drainage culverts were not surveyed as part of this assessment as it was beyond the scope of this project.

The NAACC protocol assigns each structure a value that defines the structures ability to move aquatic organisms, scores range from 0 (no aquatic passability) to 1 (full aquatic organism passage). The data collected using the NAACC protocol can be used for additional analysis that looks at each culverts capacity, or ability to move water. The Cornell Capacity Model developed by the New York State Water Resources Institute (NYS WRI) at Cornell University can incorporate stream crossing data collected using NAACC protocol to evaluate the structure's flow capacity. Additionally, at the time of the assessment, a subset of the culverts was also evaluated using the draft Culvert Condition Assessment Manual (NAACC 2017). At the time of the survey this add on feature was not officially incorporated into the Stream Continuity Database but the information was collected on paper data sheets with the idea that they could be entered into the database later as the feature was developed. The primary survey does not detail crossing condition beyond, Ok, Poor, New, and Unknown. This additional condition assessment details structure condition and can provide valuable information to resource managers.

4. Results

4.1 Stream Corridor Assessment

The fieldwork for the stream corridor component of the physical assessment took approximately 100 days. The survey encompassed 142 miles of stream walked or boated including 42 miles of mainstem and 100 miles of tributaries. The total estimated duration of fieldwork included 4,105 hours, broken out into 1,814 volunteer hours and 2,291 hours for OCSWCD staff. The mainstem survey rate was approximately 1/4 mi/hr. The tributaries survey rate was approximately 1 mi/hr.

The survey yielded over 3,000 observations of the stream corridor (Table 1). Of the 3,119 observations, 742 noted locations of active erosion. A total of 192 erosion sites were measured to evaluate the BEHI of the site. The tributaries had more observations than the mainstem, as well as erosion sites and measured erosion sites. The Upper Butternut Creek watershed had the most observations of the three subwatersheds followed by the Middle Butternut Creek watershed and the Lower Butternut Creek watershed. The Lower Butternut Creek watershed had the most erosion sites overall at 277 sites compared to the Middle and Lower watershed, 269 sites and 196 sites respectively. The three subwatersheds had similar measured erosion sites, with the Middle Butternut Creek watershed having the most sites at 66 sites.

Table 1. Summary of *Stream Corridor Assessment* overall observations and erosion observations in the Butternut Creek watershed.

Category	Overall	Mainstem	Tributaries	Upper	Middle	Lower
Observations	3119	1083	2036	1168	1002	949
Erosion Sites	742	231	511	196	269	277
Minor Erosion Sites (no BEHI)	550	156	394	132	204	214
Measured Erosion Sites (BEHI)	192	75	117	64	66	62
Observations Without Erosion	2377	852	1525	972	733	672

4.1.1 Erosion

The BEHI or Bank Erosion Hazard Index generates a value that is then categorized into Bank Erosion Potential, ranging from Low to Extreme. All of the erosion sites measured fell into four categories ranging from Moderate to Extreme. None of the sites were categorized as the lowest two categories of Low and Very Low, presumably because those sites were recorded as erosion sites and documented with a GPS location and photos but not measured to calculate BEHI. Figure 7 illustrates two different sites, where one was measured for erosion and the other was just noted in the observations. Overall, most sites fell into the Very High category, followed closely by the Extreme category, High, and then Moderate (Table 2). The Lower Butternut Creek watershed and the Upper Butternut Creek watershed followed a similar trend of distributions between categories. However, the Middle Butternut Creek watershed had more sites in the Extreme category. Figures 8, 9, and 10 show the distribution of observations and erosion sites in the Upper Butternut, Middle Butternut, and Lower Butternut Creek watersheds respectively.

Table 2. Summary of Bank Erosion Potential from BEHI measurements in the Butternut Creek Watershed.

Bank Erosion Potential	Upper Butternut			Middle Butternut			Lower Butternut			Overall		
	Tributaries	Mainstem	Total	Tributaries	Mainstem	Total	Tributaries	Mainstem	Total	Tributaries	Mainstem	Total
Extreme	6	18	24	15	12	27	14	5	19	35	35	70
Very High	14	13	27	19	2	21	30	6	36	63	21	84
High	2	7	9	10	6	16	2	2	4	14	15	29
Moderate	0	4	4	1	0	1	4	0	4	5	4	9
No BEHI ¹	65	67	132	160	44	204	169	45	214	394	156	550
Total	87	109	196	205	64	269	219	58	277	511	231	742

¹No BEHI – Erosion documented but not measured for BEHI calculations.



Figure 7. Left: An example of a site where Bank Erosion Potential was identified as Extreme through BEHI measurements. Right: The site is approximately 1.5 miles downstream and was noted for erosion and exposed bank but No BEHI measurements were taken. Both sites are in the Middle Butternut Creek watershed (Photo credits: Ed Lentz, 5/26/2017).

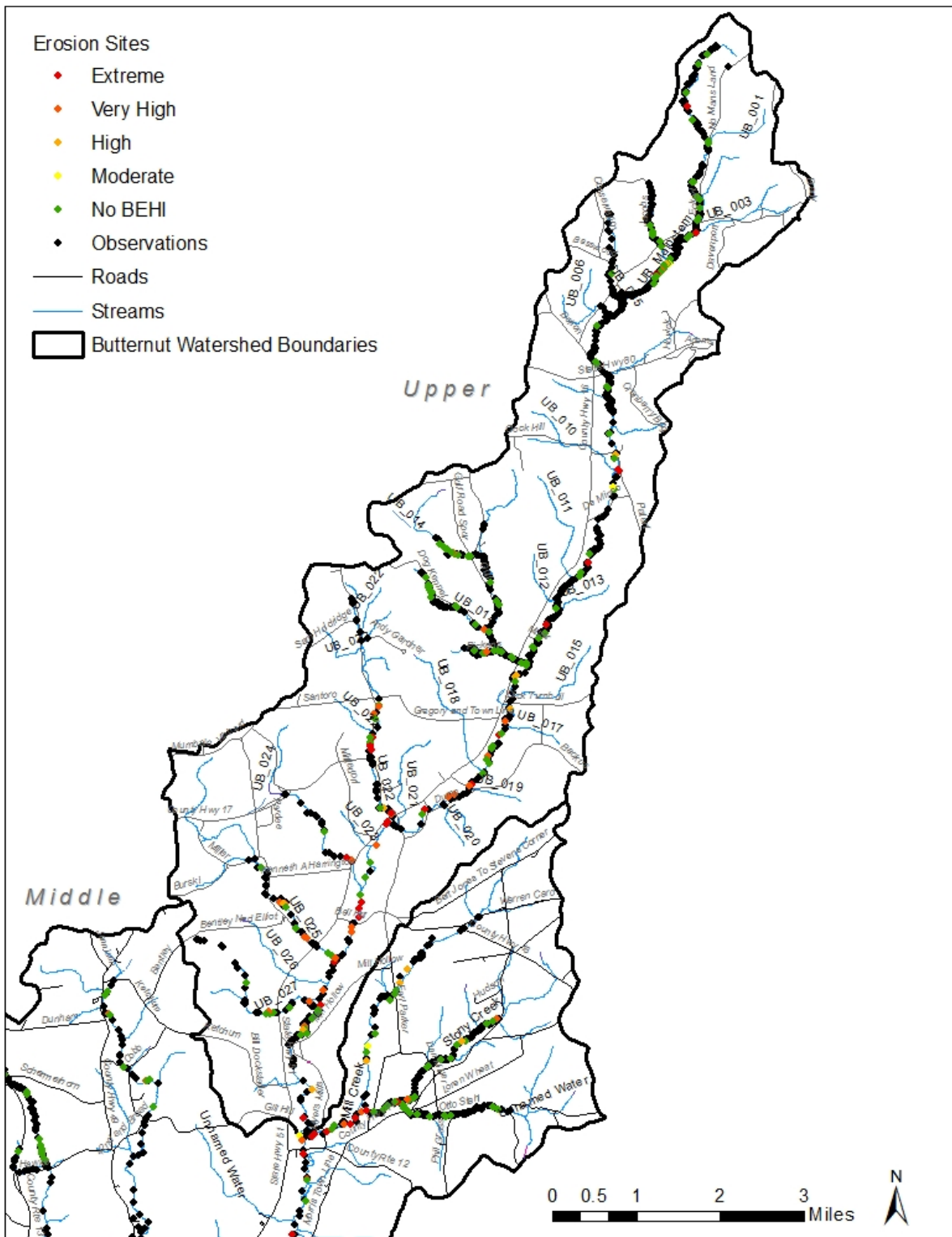


Figure 8. Overall observations and BEHI evaluations for erosion sites in the Upper Butternut Creek watershed.

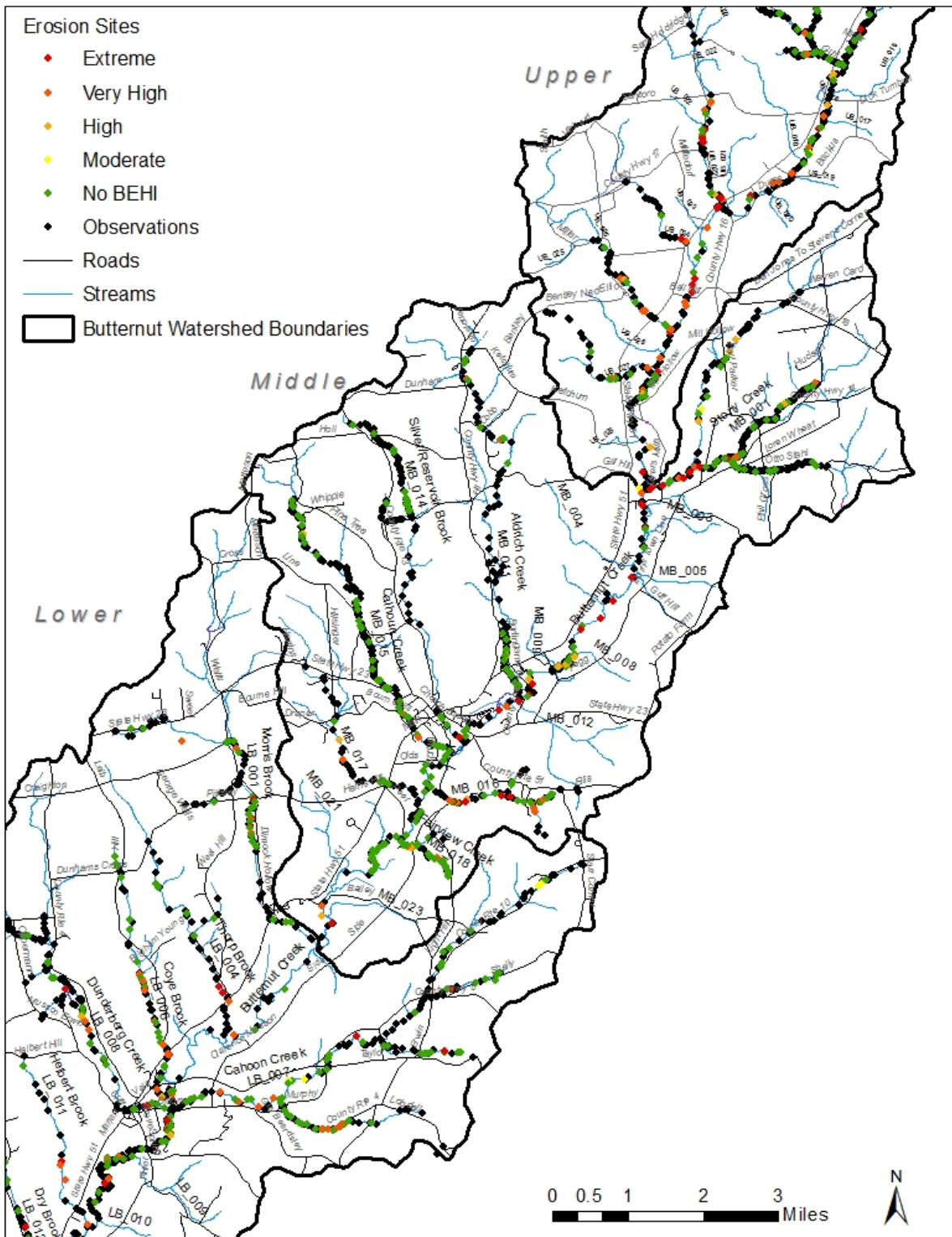


Figure 9. Overall observations and BEHI evaluations for erosion sites in the Middle Butternut Creek watershed.

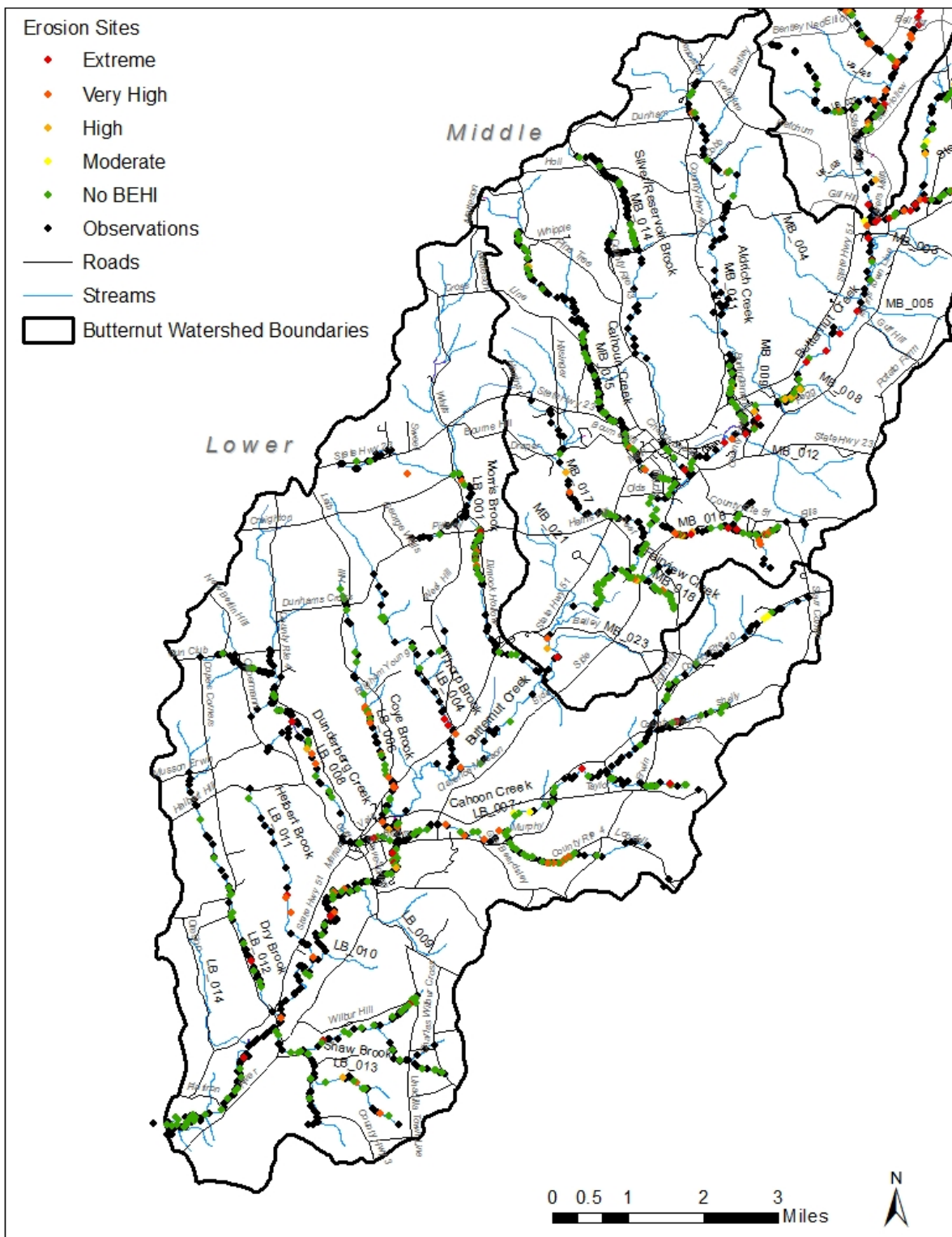


Figure 10. Overall observations and BEHI evaluations for erosion sites in the Lower Butternut Creek watershed.

BEHI also generates a quantity for estimated tons of sediment lost per year from the measured erosion site. This is quantity generated by a model which is an estimation that likely is not accurate enough to inform policy decisions on nutrient loading. However, it provides a broad estimate that can give an idea of the quantity of sediment leaving a site. The sites can also be compared to each other relatively by using the same method to measure erosion. In total from all sites measures, 9,776 estimated tons of sediment is being lost from the watershed per year (Table 3). The mainstem is contributing more than half of the sediment to this value, with the Middle Butternut Creek watershed mainstem contributing the most, at over 3,000 estimated tons of sediment per year (Table 3). The Lower Butternut Creek watershed had the lowest amount of sediment from erosion along the mainstem amongst the three subwatersheds but maintained the largest contributing sediment load from tributaries. It is not surprising that the Lower Butternut tributaries contributed the most sediment because the tributaries are larger in the Lower Butternut Creek watershed. It is unexpected that the Lower Butternut mainstem had the lowest contribution of sediment. In the Lower Butternut Creek watershed high exposed banks are common and it is difficult to discern at times if active erosion is occurring. These values could be an underestimate for the Lower Butternut Creek watershed mainstem. It was anticipated that the Upper Butternut Creek watershed would have a lower sediment load in the tributaries because fewer miles of stream were surveyed due to smaller tributary drainage sizes. The Middle Butternut Creek watershed tributaries contributed slightly less but still a substantial amount of sediment, almost as much as the Upper Butternut Creek mainstem, 1,476 est. tons/year compared to 1,604 est. tons/year (Table 3).

Table 3. Estimated Tons of Sediment Lost per Year from BEHI calculations in the Butternut Creek watershed.

Subwatershed	Tributaries	Mainstem	Total
Upper Butternut	488	1,604	2,092
Middle Butternut	1,476	3,317	4,793
Lower Butternut	1,831	1,061	2,891
Overall	3,794	5,982	9,776

Looking at which tributaries contribute sediment to the watershed from erosion, in the Upper Butternut Creek watershed, UB_022 is contributing almost half the amount of measured sediment for the total sediment load from Upper Butternut Creek tributaries, 239 est. tons/year (Table 4). In the Middle Butternut Creek watershed, Stony Creek, is contributing the majority of erosion derived sediment amongst the tributaries measured and compared to the overall watershed, with 1,023 est. tons/year. In the Lower Butternut Creek watershed, Cahoon Creek is contributing a similar amount of sediment, 1,057 est. tons/year. Stony Creek and Cahoon Creek are the largest drainages in their respective subwatershed. The sediment estimate for Dry Brook in the Lower Butternut Creek watershed is an underestimate because a storm event in August of 2016 caused massive debris flows and erosion starting approximately 0.6 miles up from the confluence with Butternut Creek. The survey documented

this area as one site and did not measure any areas to calculate BEHI as the erosion was extensive and follow up was required.

Table 4. Estimated Tons of Sediment Lost per Year calculated from BEHI calculations for each subwatershed by tributary surveyed and mainstem in the Butternut Creek watershed.

Subwatershed	Stream Name	Estimated Tons of Sediment Lost per Year
Upper	Unnamed tributary - UB_004	--
	Unnamed Tributary/Basswood Creek - UB_005	--
	Unnamed tributary - UB_006	--
	Unnamed tributary - UB_014	26
	Unnamed tributary - UB_022	239
	Unnamed tributary - UB_024	84
	Unnamed tributary - UB_025	65
	Unnamed tributary - UB_027	74
	Butternut Creek – Upper Mainstem	1,604
Middle	Aldrich Creek - MB_011	66
	Calhoun Creek - MB_015	41
	Diversion Channel - MB_013A2	--
	Fairview Creek - MB_018	41
	Harris Brook - MB_017	9
	Reservoir/Silver Brook - MB_014	3
	Stony Creek - MB_001	1,023
	Unnamed tributary - MB_012	--
	Unnamed Tributary - MB_016	293
Butternut Creek – Middle Mainstem	3,317	
Lower	Cahoon Creek - LB_007	1,057
	Coye Brook - LB_006	265
	Dry Brook/Copes Brook - LB_012	36
	Dunderberg Creek - LB_008	114
	Halbert Brook - LB_011	75
	Morris Brook - LB_001	86
	Shaw Brook - LB_013	128
	Thorp Brook - LB_004	71
	Butternut Creek – Lower Mainstem	1,061
	Total	9,776
	Total Tributaries	3,794
	Total Mainstem	5,982

4.1.2 Deposition

Deposition is a natural stream process. The assessment documented areas where the deposition was notable or creating a blockage in the channel including both sediment and large woody debris. A healthy stream corridor can typically adjust to varying load accumulations. However, excessive deposition can be an indicator of instability in the stream corridor.

The most common depositional feature in the watershed was gravel bar (Table 5). Often there was large woody debris or smaller pieces of wood categorized as debris associated with the gravel bar. Frequently the bars were associated with erosion. Figure 11 provides examples of various depositional features found during the survey. Overall the Upper Butternut Creek watershed had the most deposition associated with the stream, followed by the Lower Butternut Creek watershed and then the Middle Butternut Creek watershed. In the Upper Butternut Creek watershed there were more depositional features on the mainstem compared to the tributaries whereas the Middle Butternut and Lower Butternut each had more depositional features associated with the tributaries compared to the mainstem. Looking at the watershed as a whole, the tributaries accounted for more than half of the depositional features mostly in the Gravel bar, LWD, or Gravel bar/LWD categories. The majority of observations noted depositional features but do not quantify the size of the features. A summary of observations for tributaries surveyed including deposition can be found in Appendix F. Figures 12, 13, and 14 show the distribution of deposition sites in the Upper Butternut, Middle Butternut, and Lower Butternut Creek watersheds respectively.

Table 5. Summary of depositional features identified during the *Stream Corridor Assessment* in the Butternut Creek watershed.

Deposition feature	Upper Butternut			Middle Butternut			Lower Butternut			Overall		
	Tributaries	Mainstem	Total	Tributaries	Mainstem	Total	Tributaries	Mainstem	Total	Tributaries	Mainstem	Total
Beaver Dam	19	47	66	34	0	34	28	0	28	81	47	128
Debris	4	20	24	3	0	3	0	4	4	7	24	31
Grasses	0	1	1	0	0	0	0	0	0	0	1	1
Gravel bar	25	67	92	63	20	83	46	29	75	134	116	250
Gravel bar/Beaver Dam	0	2	2	0	0	0	0	0	0	0	2	2
Gravel bar/Debris	0	4	4	0	0	0	1	0	1	1	4	5
Gravel bar/LWD	12	6	18	25	2	27	36	10	46	73	18	91
Gravel bar/LWD/Beaver dam	0	0	0	1	0	1	0	0	0	1	0	1
LWD	20	28	48	57	12	69	44	36	80	121	76	197
Sediment	1	0	1	0	0	0	0	0	0	1	0	1
Sediment/Debris	1	1	2	0	0	0	0	0	0	1	1	2
N/A	2	4	6	1	0	1	0	0	0	3	4	7
No	4	0	4	8	0	8	9	0	9	21	0	21
Grand Total	88	180	268	192	34	226	164	79	243	444	293	737



Figure 11. Upper Left: Beaver dam on the mainstem Butternut in Upper Butternut Creek (Photo: Ed Lentz, 10/30/2016), Upper Right: Large woody debris on the mainstem Butternut in Middle Butternut Creek (Photo: Les Hasbargen, 6/14/2017), Middle Left: Gravel bar and debris in Shaw Brook (Photo: Maggie Brenner and Tom Washbon, 7/27/2018). Middle Right: Gravel bar upstream of Peet Rd bridge Middle Butternut Creek mainstem (Photo: Les Hasbargen, 6/28/2017). Lower Left: Gravel bar on the Upper Butternut Creek Mainstem (Photo: OCSWCD, 6/30/2017), Lower Right: Mid channel bar with vegetation on the Middle Butternut Creek mainstem (Photo: Les Hasbargen, 6/28/2017).

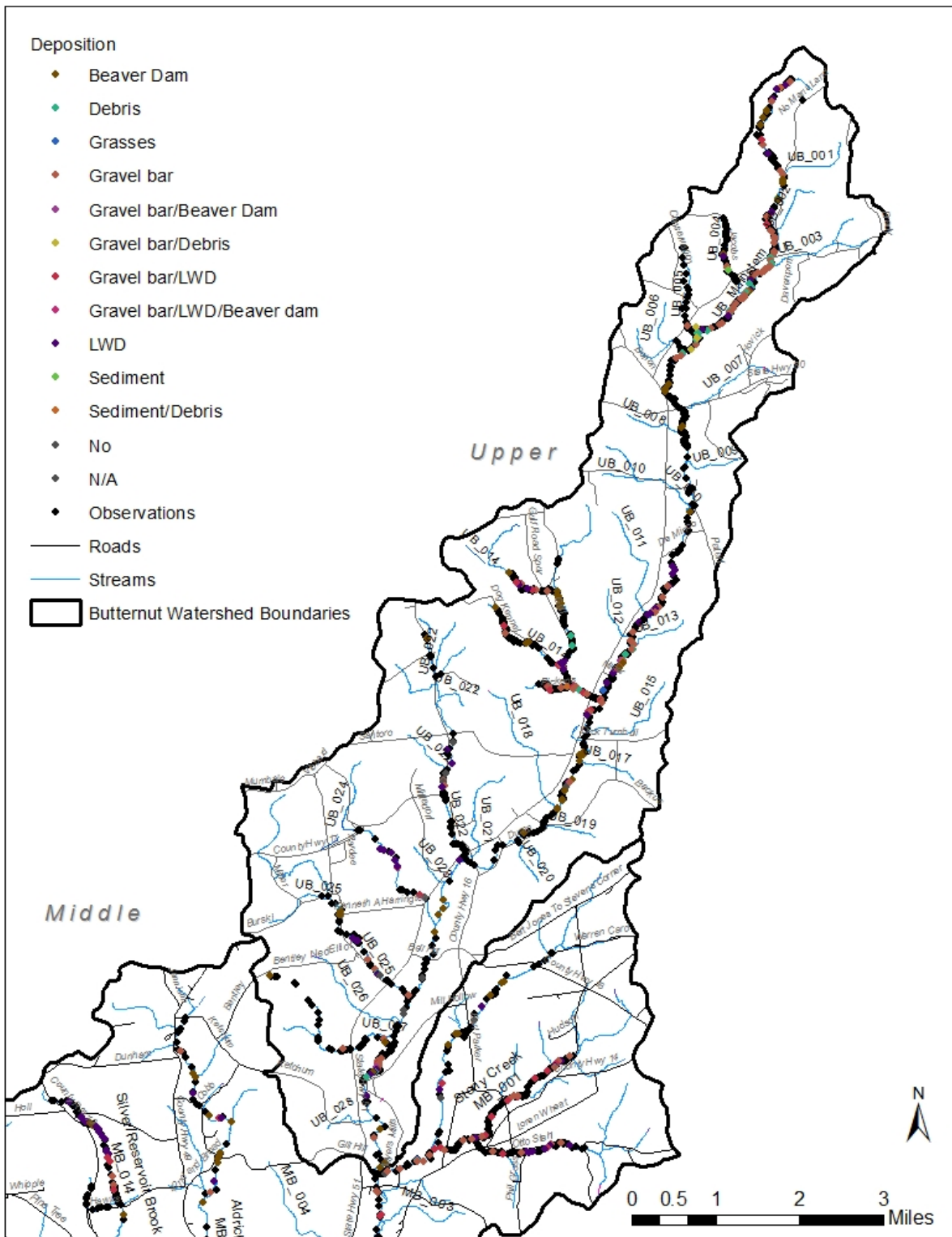


Figure 12. Summary of deposition observations in the Upper Butternut Creek watershed.

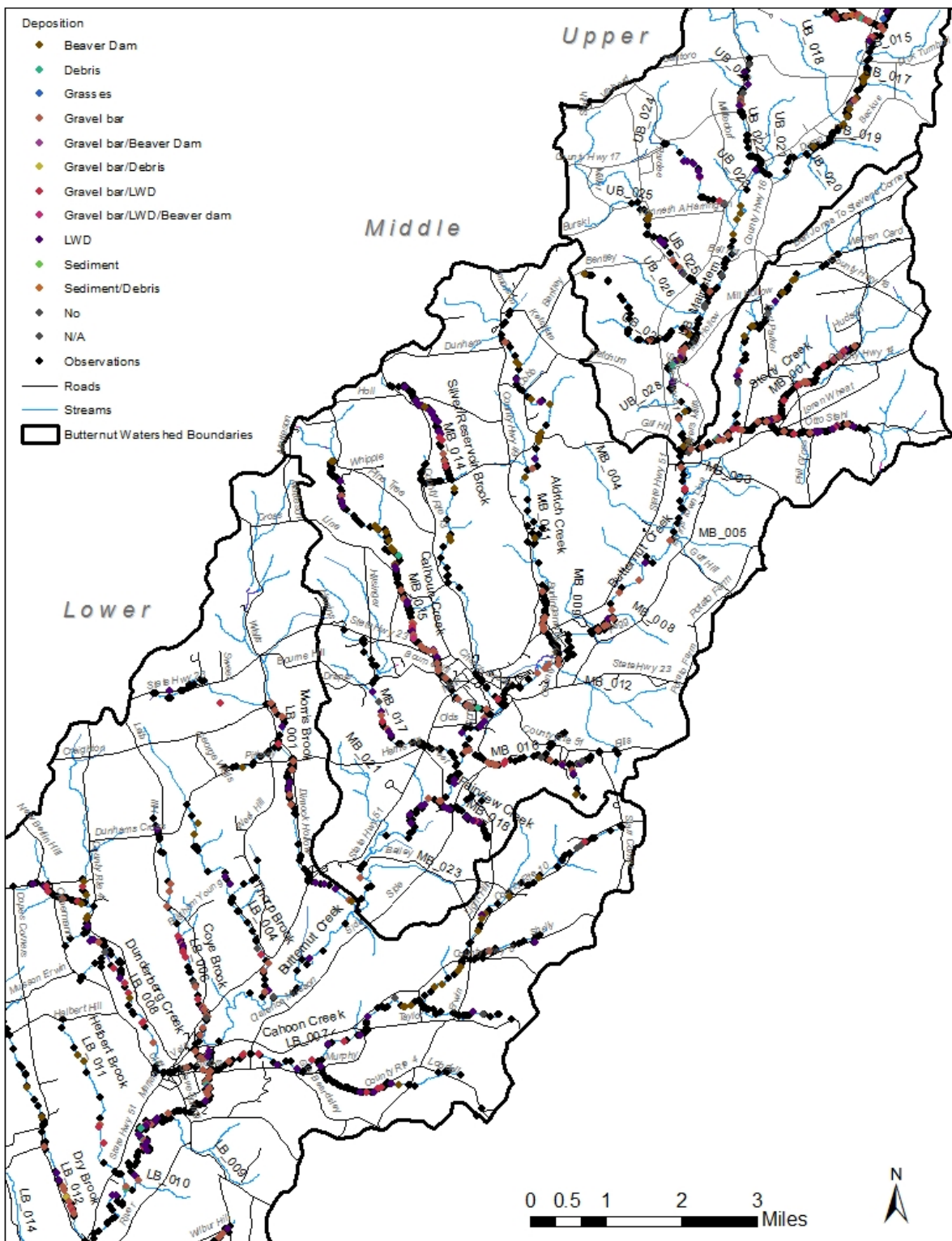


Figure 13. Summary of deposition observations in the Middle Butternut Creek watershed.

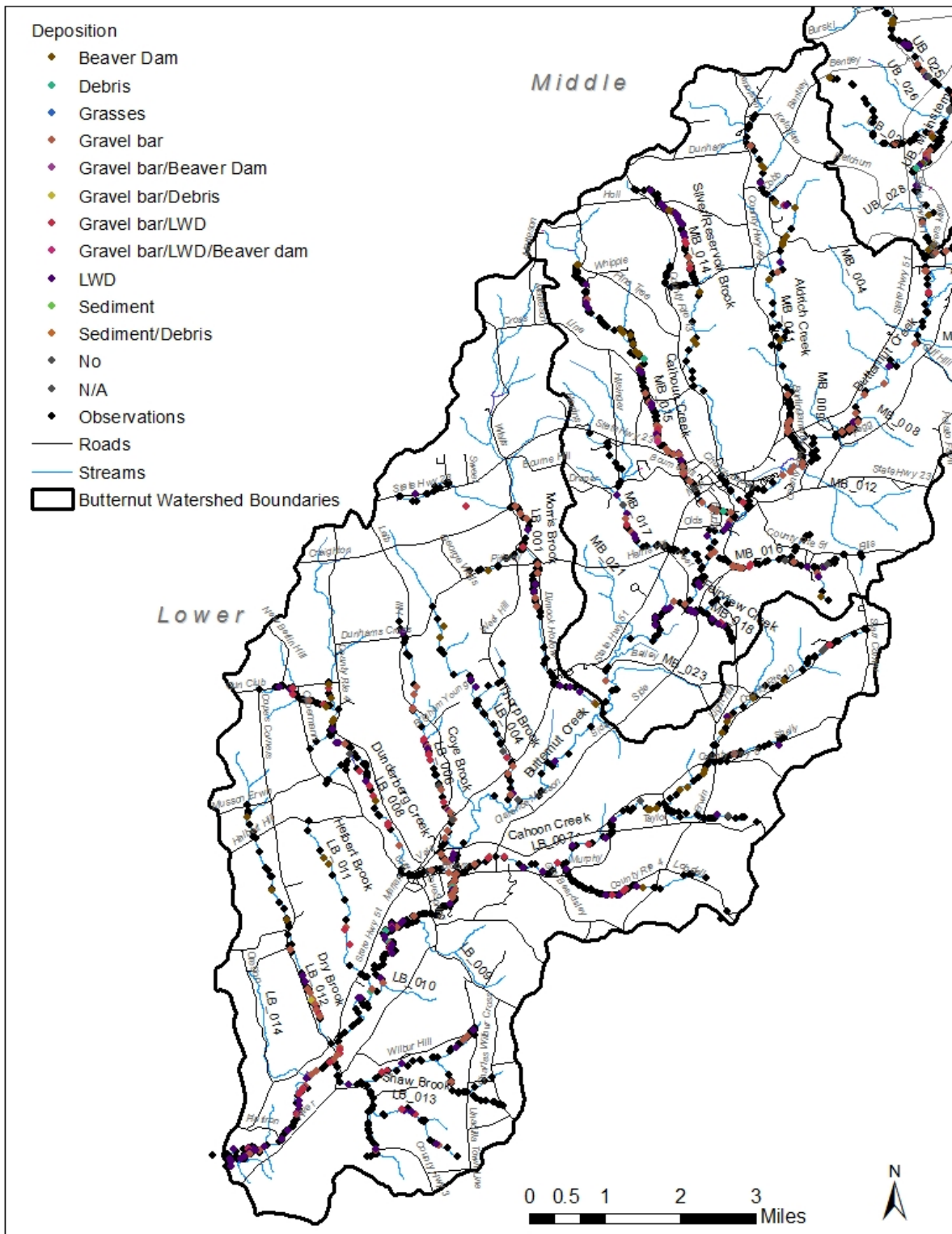


Figure 14. Summary of deposition observations in the Lower Butternut Creek watershed.

4.1.3 Buffer Potential

The observations identified 241 buffer opportunities throughout the watershed encompassing 93, 86, and 62 opportunities in the Upper, Middle, and Lower Butternut Creek watershed respectively (Table 6). With the exception of the Middle Butternut Creek watershed, there were more buffer opportunities on the mainstem compared to tributaries. In the Middle Butternut Creek watershed, Stony Creek, Calhoun Creek, and Unnamed Tributary, MB_016 all had a high count of buffer potential sites (Appendix F). Generally, the tributaries are more forested than the mainstem. Figure 15 shows examples of various buffer potential sites summarized in the survey, including recently planted areas. Figures 16, 17, and 18 show the distribution of buffer potential sites in the Upper Butternut, Middle Butternut, and Lower Butternut Creek watersheds respectively.

The sites identified do not represent a comprehensive summary of buffer potential throughout the watershed as riparian vegetation condition was not always noted. The count of buffer potential does not represent available acreage or linear footage. However, the findings indicate there is extensive buffer potential in the watershed and an increase in riparian cover is needed. The observations represent a starting point for areas to target for riparian buffer restoration and can be coupled with previous remote riparian assessments in the watershed to expand beyond the survey sites. Each site that was measured for erosion was also evaluated for buffer potential either in the field or during post processing steps utilizing satellite imagery and photos. Therefore the bulk of the sites summarized here are associated with active erosion and are high priority for targeting restoration efforts. At certain sites, erosion was actively cutting into the planting areas and a multi-pronged restoration strategy may be required to stabilize the stream channel and associated bank/riparian area. Recent plantings were included in the buffer potential category because the plantings need to be evaluated for success and to determine if maintenance or increased width is needed.

Table 6. Summary of riparian buffer potential identified in the *Stream Corridor Assessment* in the Butternut Creek watershed.

Category	Upper			Middle			Lower			Overall		
	Tribs ¹	MS ²	Total	Tribs	MS	Total	Tribs	MS	Total	Tribs	MS	Total
N/A	4	2	6	5	1	6	2	0	2	11	3	14
No	9	12	21	15	2	17	35	1	36	59	15	74
Recent planting	0	6	6	1	4	5	1	1	2	2	11	13
Yes	19	67	86	61	20	81	21	39	60	101	126	227
Yes/Recent planting ³	0	1	1	0	0	0	0	0	0	0	1	1
Total	32	88	120	82	27	109	59	41	100	173	156	329
Opportunities ⁴	19	74	93	62	24	86	22	40	62	103	138	241

¹Tribs - Tributaries

²MS - Mainstem

³Yes/Recent planting - refers to site with recent planting on one bank and buffer potential on the other.

⁴Opportunities - Includes Recent planting, Yes, Yes/Recent planting



Figure 15. Upper Right: Narrow band of recently planted trees in riparian buffer on the mainstem Butternut Creek in the Upper Butternut Creek watershed (Photo: OCSWCD, 6/12/17). Upper Right and Lower right: Lack of riparian vegetation on the mainstem Butternut Creek in the Middle Butternut Creek watershed (Photos: Ed Lentz, 5/26/2017), Lower Left – Recent Trees for Tributaries planting on the mainstem Butternut in the Upper butternut (Photos: Les Hasbargen, 6/12/17).

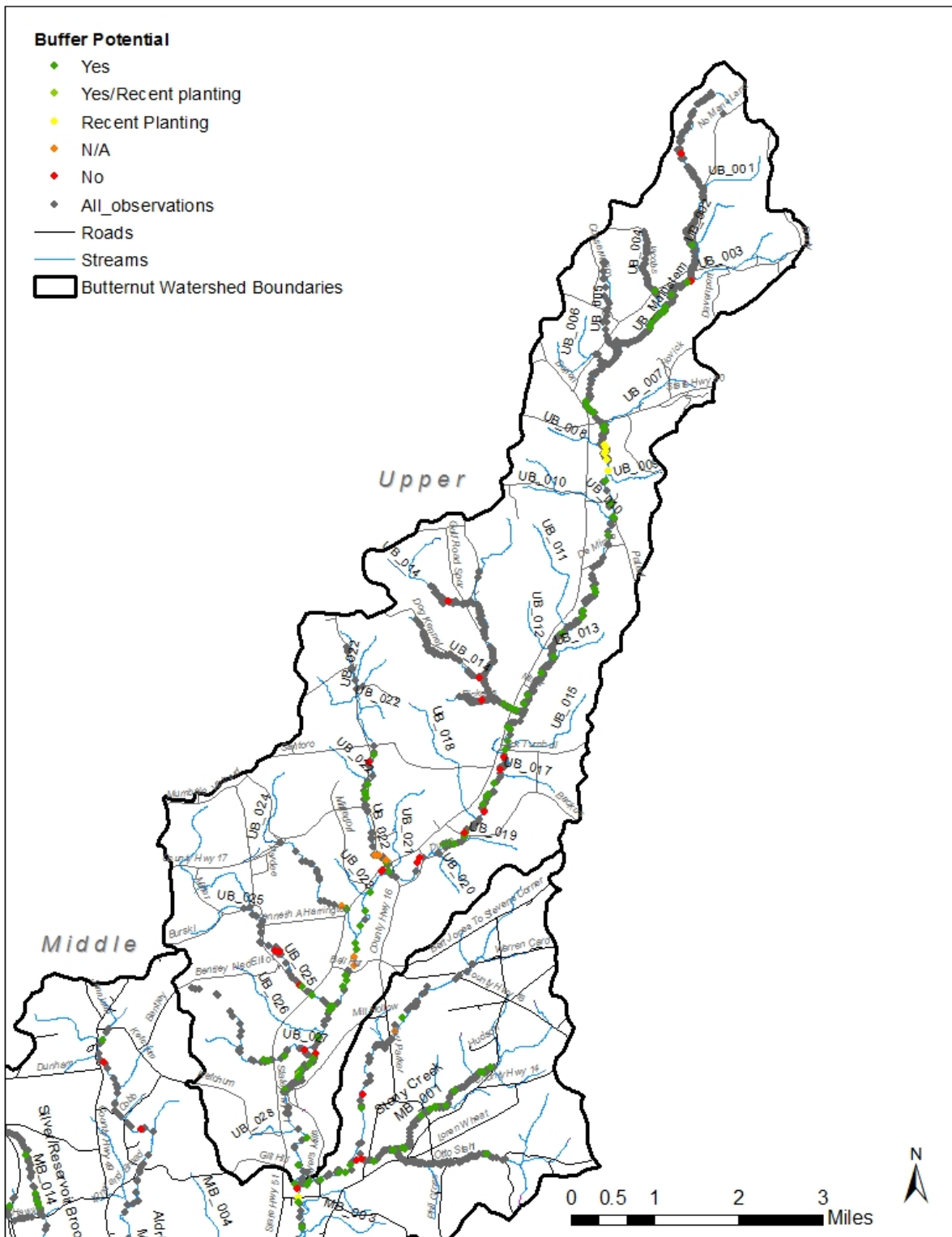


Figure 16. Summary of Buffer Potential in the Upper Butternut Creek watershed.

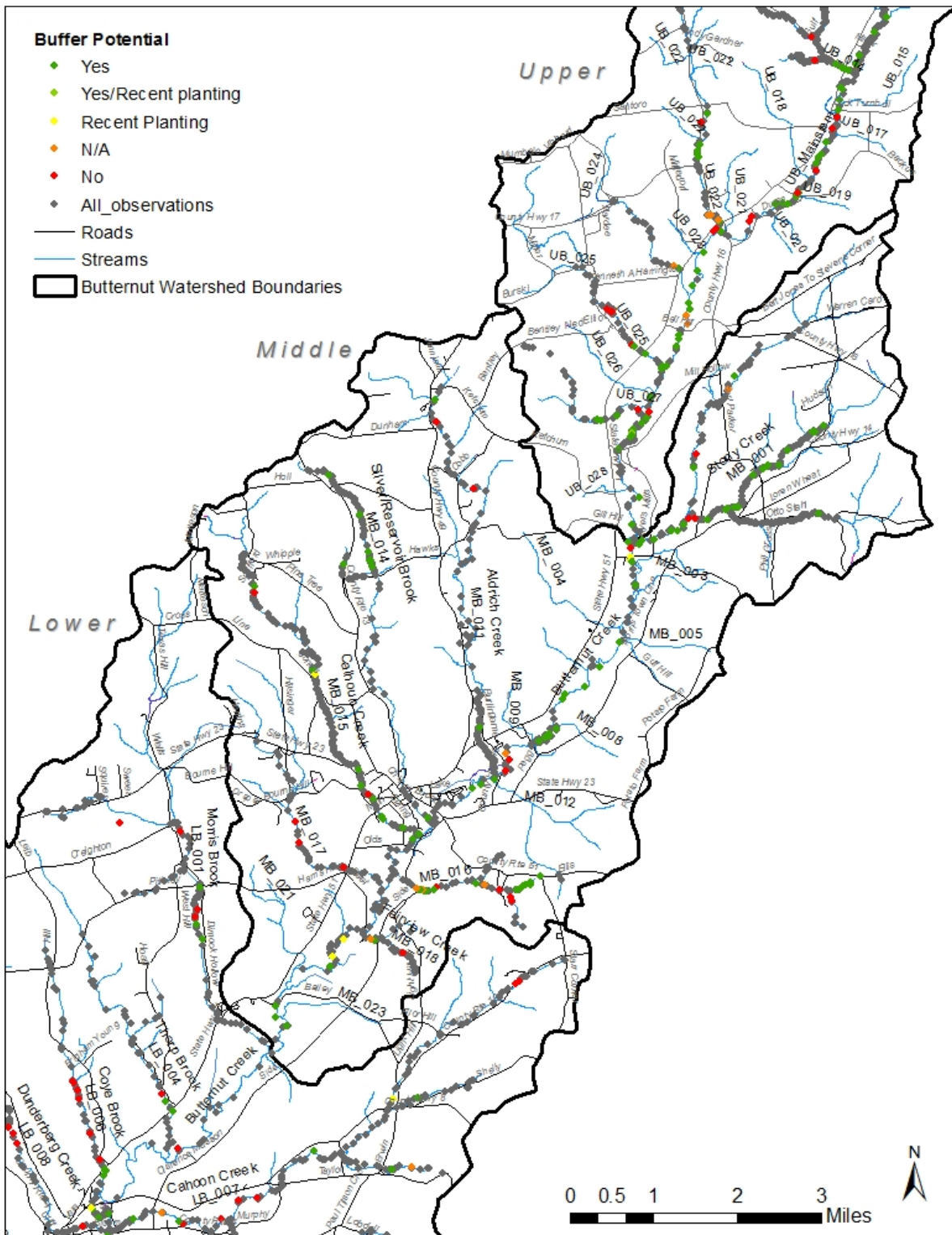


Figure 17. Summary of Buffer Potential in the Middle Butternut Creek watershed.

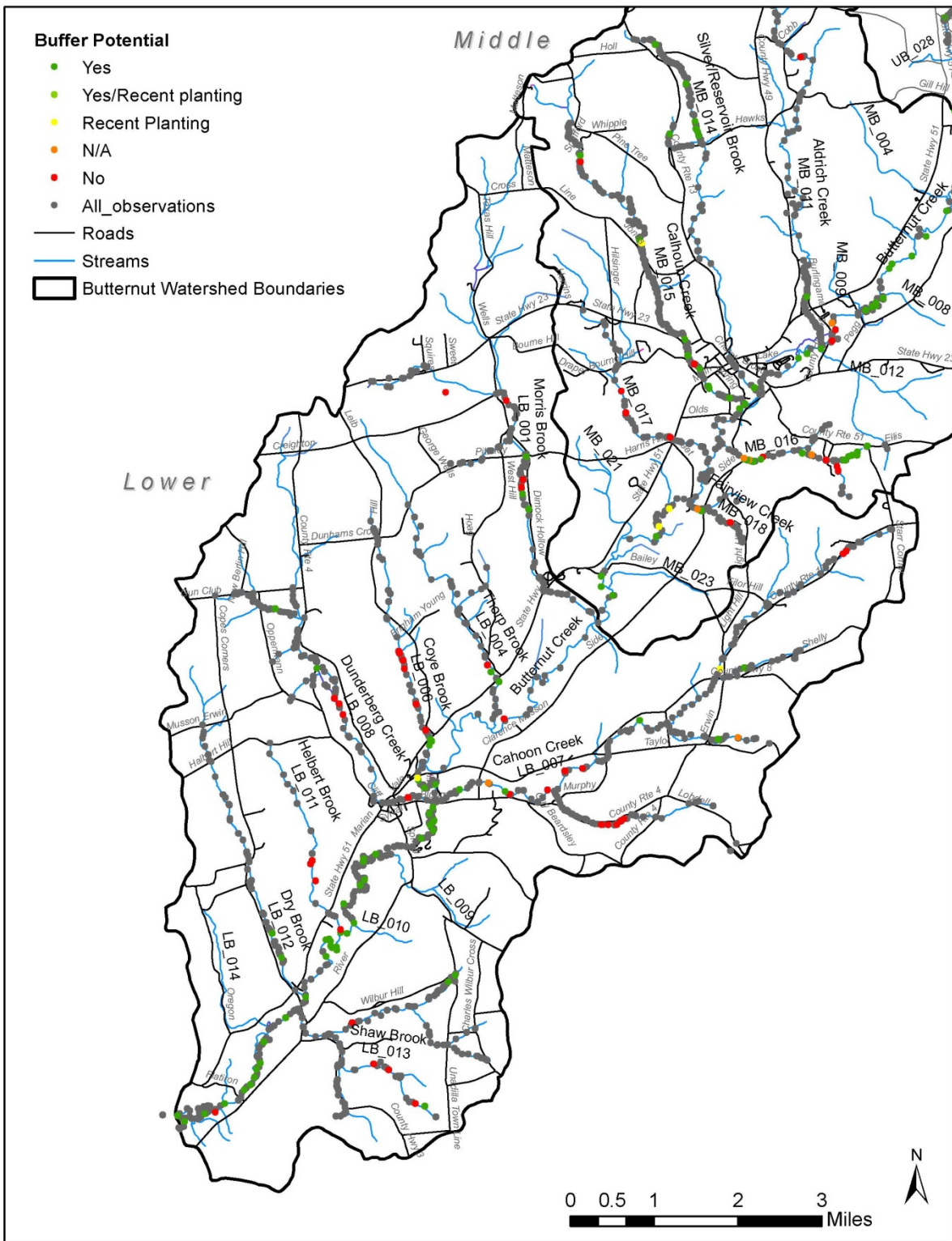


Figure 18. Summary of Buffer Potential in the Lower Butternut Creek watershed.

4.1.4 Instream Structures

Structures in the stream or on the banks noted during the *Stream Corridor Assessment* ranged from rock rip rap to fencing across the stream (Table 7). The most common structure encountered was rock rip rap installed as bank armoring, followed by old dam remnants, and then fencing. The Lower Butternut Creek watershed had the most instream structures identified, followed by the Middle Butternut Creek watershed, and then the Upper Butternut Creek watershed. The Villages of Gilbertsville and Morris have heavily armored banks to protect infrastructure that is close to the stream edge. Fencing was a common structure found crossing the stream in the Upper Butternut Creek watershed where the stream width is considerably less than the lower two subwatersheds and pastures cross the stream. Old dam remnants were a common features in the tributaries surveyed. Vegetation and steep banks combined with increased channel width in the lower reaches of the mainstem could have obscured bank structures from observation during the survey and resulted in an underestimating of structures such as bank armoring. Figure 19 highlights some of the instream structures observed during the survey. The distribution of instream structures observed in the Upper Butternut, Middle Butternut, and Lower Butternut Creek watersheds can be found in Figures 20, 21, and 22 respectively.

Table 7. Summary of instream structures identified in the *Stream Corridor Assessment* in the Butternut Creek watershed.

Instream Structure	Upper	Middle	Lower	Total
Berm	2	3	2	7
Concrete bank armor	2			2
Dam	2	2	7	11
Dam/Pond		1		1
Dike			1	1
Dike with concrete wall			1	1
Fence	16	8	3	27
Gabian Baskets		1		1
Hay Armor			1	1
Levee			1	1
Old Bridge Abutments	4	3	1	8
Old Dam		5		5
Old Dam Remnants	3	15	22	40
Old Diversion		1		1
Pipeline			5	5
Pond Dam			1	1
Power line	1	1	5	7
Rock Rip Rap	29	31	23	83
Rock Rip Rap/Old Bridge Abutments		1		1
Sheet Piling			1	1
Stone fence	1		2	3
Synthetic brick mats			1	1
Wood grade control	1	1		2
Total	61	73	77	211



Figure 19 continued



Figure 19. Upper Left: Old dam remnants on Silver Creek (Photo: Ed Lentz, 11/08/2017), Upper Right: Rock rip rap on the mainstem Butternut Creek in the Middle Butternut Creek watershed (Photo: Les Hasbargen, 6/14/2017), Middle Upper Left and Upper Right: Old bridge abutments, left bank and right bank, on the mainstem in the Middle Butternut Creek watershed (Photo: Ed Lentz, 5/26/2017), Middle Lower Left: Fencing across stream with debris caught in it on the mainstem Butternut Creek in the Upper Butternut Creek watershed (Photo: OCSWCD), Middle Lower Right: Dam on Morris Brook (Photo: Ed Lentz, 6/3/2018), Lower Left: Gas pipeline right of way on the Lower Butternut Creek mainstem (Photo: Ed Lentz, 4/24/17). Lower Right: Gabion Baskets with erosion on Reservoir/Silver Brook in the Village of Morris (Photo: OCSWCD, 5/21/2017).

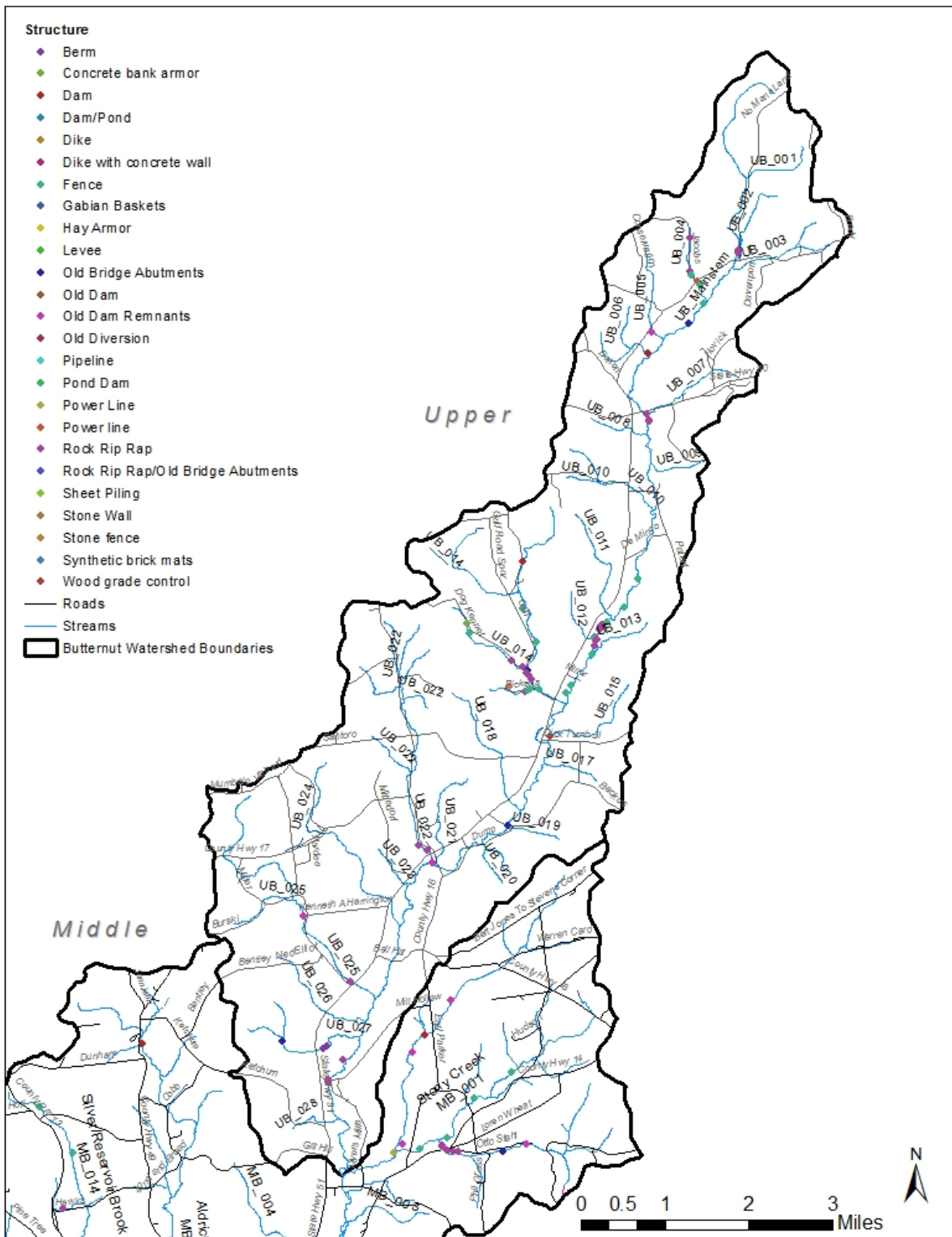


Figure 20. Summary of Instream Structures in the Upper Butternut Creek watershed.

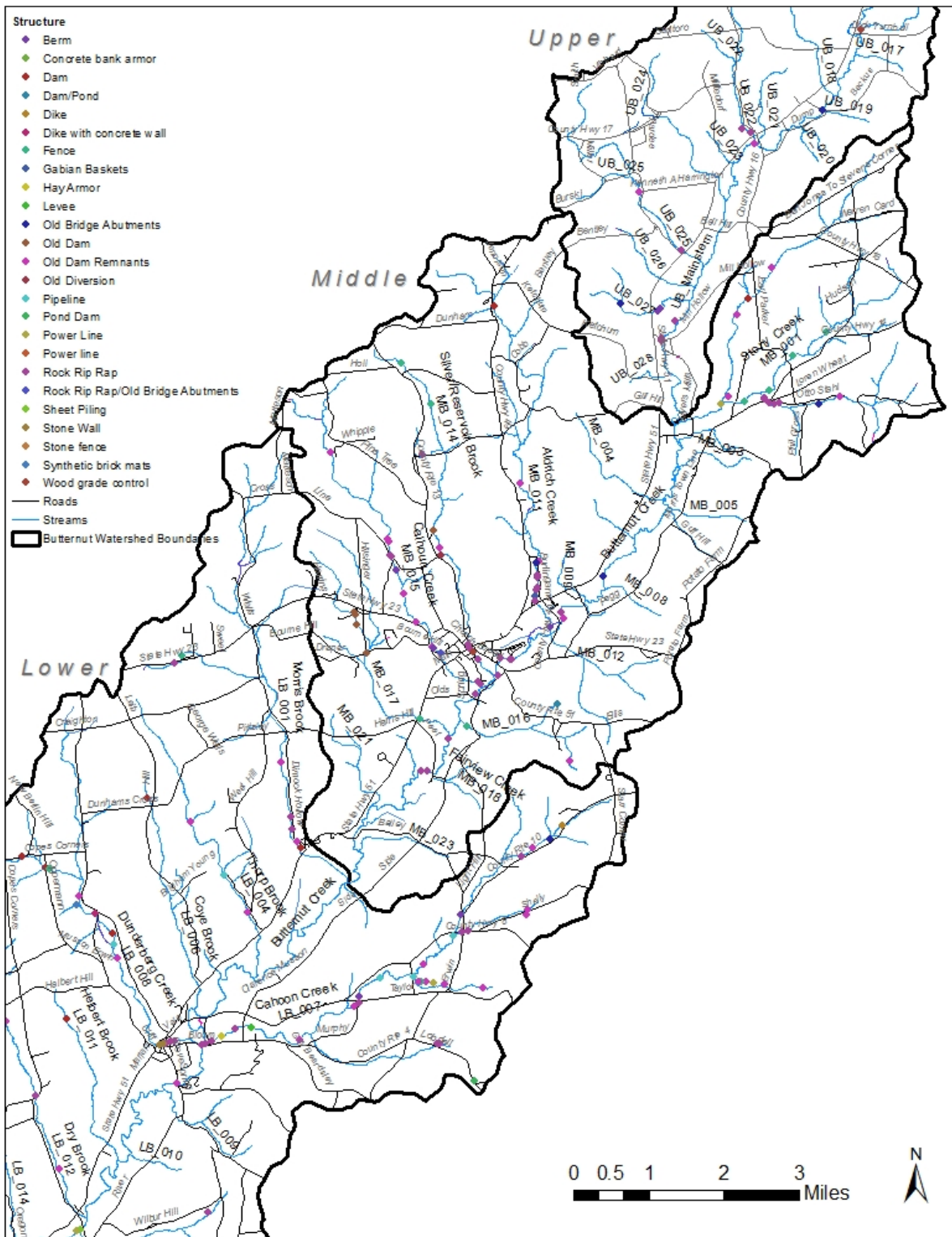


Figure 21. Summary of Instream Structures in the Middle Butternut Creek watershed.

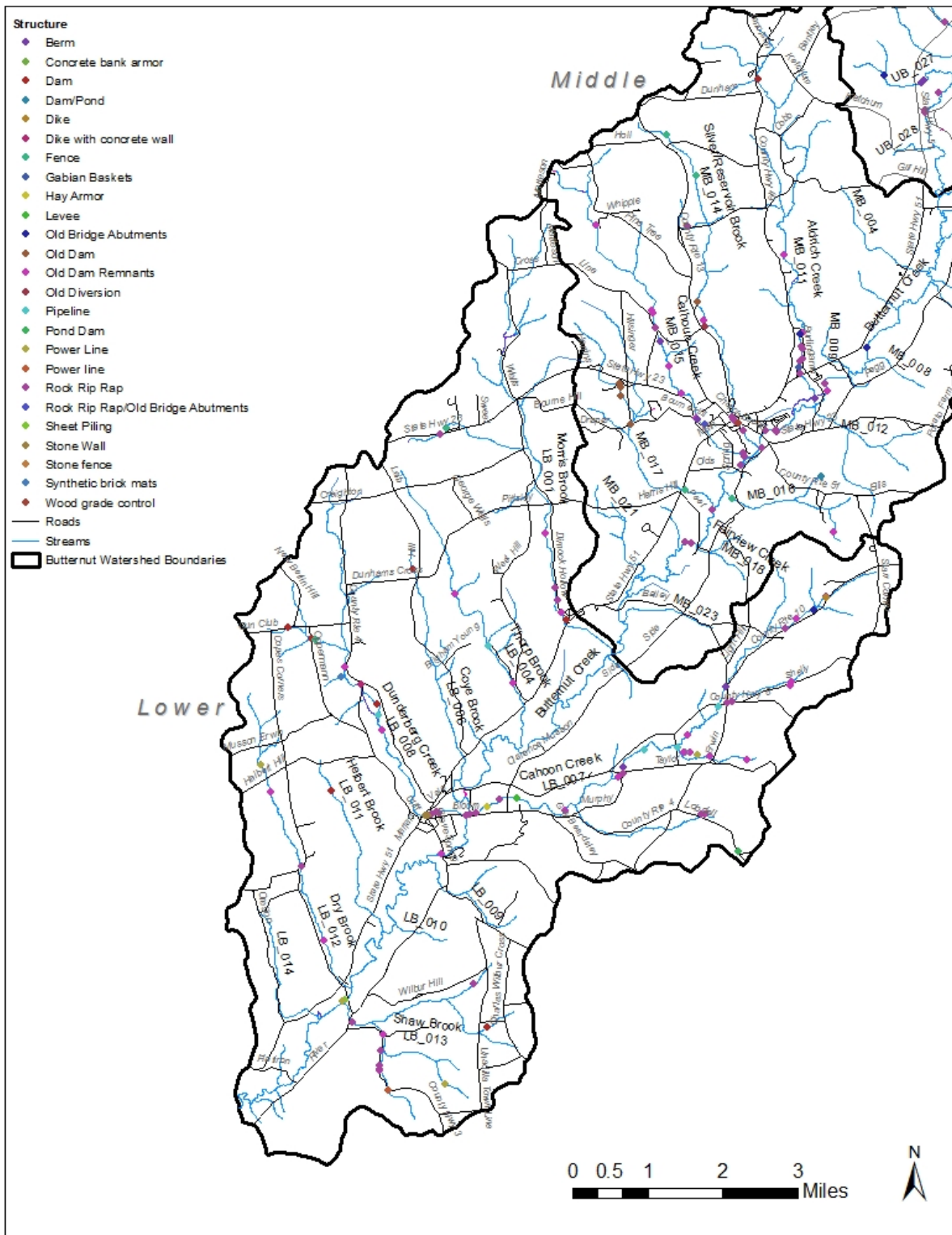


Figure 21. Summary of Instream Structures in the Lower Butternut Creek watershed.

4.1.5 Stream Crossings

Stream crossings were noted during the *Stream Corridor Assessment* but not measured (Table 8). Refer to the Section 4.2: *Stream Crossing Assessment* for a detailed analysis of stream crossings. The *Stream Corridor Assessment* identified more fords, livestock crossings, and footbridges compared with *Stream Crossing Assessment*. These features are not typically identified in the *Stream Crossing Assessment* which is done from public drivable roads and fords, livestock crossings, and footbridges are often part of private lands. Fords and livestock crossings can be contributors of sediment and nutrients to the stream despite their low profile in the stream. Livestock crossings were counted as fords if it appeared to be used by both vehicles and livestock. Figure 23 illustrates some of the stream crossings noted during the *Stream Corridor Assessment* that were not observed during the *Stream Crossing Assessment*. Due to the overlap with the *Stream Crossing Assessment*, locations of stream crossings identified in the *Stream Corridor Assessment* can be found in Appendix G on detailed maps of the tributaries and the mainstem outlining multiple parameters from both components of the physical assessment.

Table 8. Stream crossings observed during the *Stream Corridor Assessment* in the Butternut Creek watershed.

Stream Crossing	Total	Upper	Middle	Lower
Bridge	55	22	16	17
Culvert	166	46	49	71
Footbridge	13	6	7	0
Ford	76	28	25	23
Livestock crossing	3	0	1	2
Total	313	102	98	113



Figure 23. Upper Left: Ford across Butternut Creek in the Upper Butternut Creek watershed (Photo: OCSWCD, 6/30/2017), Upper Right: Livestock crossing on Stony Creek in the Middle Butternut Creek watershed (Photo: OCSWCD, 10/19/2017). Lower Left: Footbridge across Butternut Creek in the Middle Butternut Creek (Photo: OCSWCD, 7/16/2017), Lower Right: Footbridge or snowmobile bridge on Unnamed tributary - UB_025 (Photo: Ed Lentz, 10/12/2017).

4.1.6 Bedrock

Bedrock was minimally recorded despite presence in the watershed. There were 34 observations recorded of bedrock in the watershed, 32 of which were in tributaries. This is not a comprehensive summary of the presence of bedrock in the watershed. Examples of bedrock observed during the survey can be found in Figure 24.



Figure 24. Examples of bedrock observed in Shaw Brook (Photos: OCSWCD, 8/1/2018).

4.1.7 Floodplain access

Overall, 58 areas were identified with floodplain reconnection potential (Table 9, Figure 25). The mainstem had the most sites in the Upper and Lower Butternut Creek watersheds with 13 and 12 sites respectively. The Middle Butternut Creek watershed did not have any mainstem sites identified but had the most sites in tributaries identified at 30 sites. The sites identified are either experiencing active floodplain connection or are potential reconnection areas to explore. Figure 26 highlights some of the areas of floodplain access observed. Floodplain access was difficult to evaluate at times in the stream corridor especially in the Lower Butternut Creek watershed where the stream banks are high and vegetation was dense in areas at the time of survey. Future research is needed to identify more areas of potential floodplain access because access to floodplain can reduce flooding risks. Remote assessment methodologies could be useful for future research or examining specific instability. The areas where observers were able to identify areas where the floodplain was engaged or had the potential to be engaged through restoration are important areas to revisit for future restoration opportunities. An example can be seen in Figure 27, where it appears the channel has been straightened but there is potentially a low spot where the channel is interacting with the floodplain forest on the north side of the channel at higher flows. There could be opportunities to increase engagement here depending on adjacent landuse and upstream and downstream factors. The surface model generated from LiDAR reveals the historic movement of the channel to the area north of the stream or the right bank.

Table 9. Floodplain access areas identified during the *Stream Corridor Assessment* in the Butternut Creek watershed.

Floodplain Access	Upper			Middle			Lower			Overall		
	Tribs	MS	Total	Tribs	MS	Total	Tribs	MS	Total	Tribs	MS	Total
	2	13	15	30	0	30	1	12	13	31	25	58



Figure 26. Floodplain Access - Upper Left: Upper Butternut Creek watershed mainstem (Photo: OCSWCD, 6/13/2017), Upper Right: Lower Butternut Creek watershed mainstem (Photo: OCSWCD, 8/9/2017), Middle Left: Lower Butternut Creek watershed mainstem (Photo: OCSWCD, 8/24/2017), Middle Right: Stony Creek (10/19/2017 – OCSWCD), Lower Left: Cahoon Creek (Photo: Tom Washbon and Maggie Brenner, 8/24/2018), Lower Right: Calhoun Creek (Photo: OCSWCD, 11/17/2017).

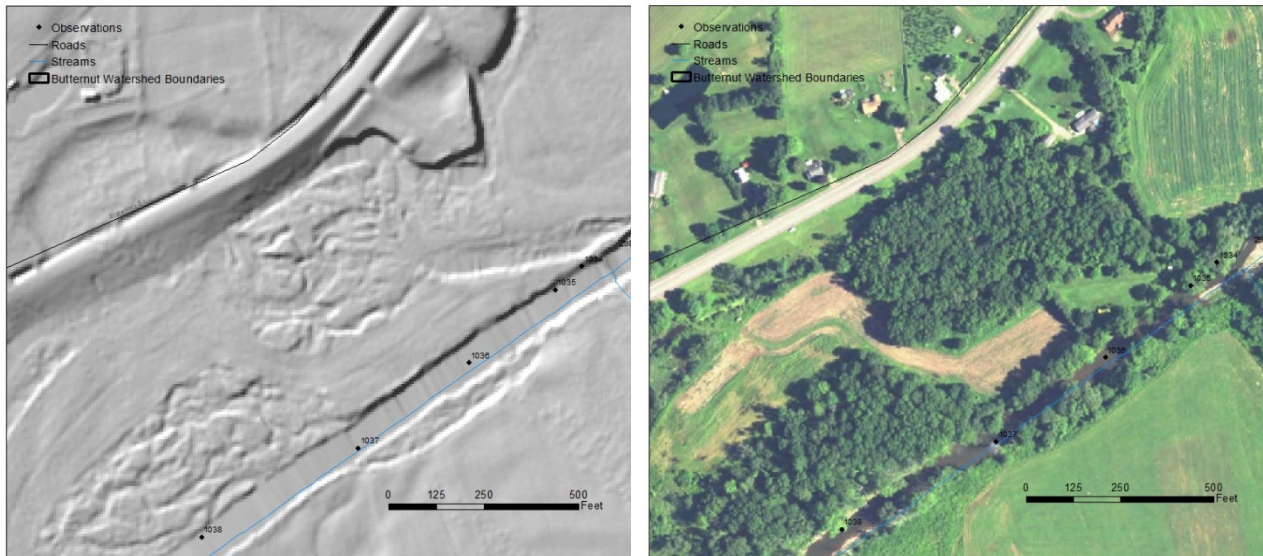


Figure 27. Area of floodplain access potential in the Lower Butternut Creek watershed. Left: LiDAR surface model 2012, Right: Aerial imagery NAIP 2015.

4.1.8 Invasive Species

Invasive species were noted in each subwatershed (Table 10). However, invasive species presence was not always noted during observations especially in the Middle Butternut Creek watershed and Lower Butternut Creek watershed where knotweed is extensive along the mainstem Butternut. There was minimal knotweed found in the Upper Butternut Creek watershed. The observations are critical for documenting upstream presence and for management implications to limit the spread further upstream. Other species noted were: Barberry (*Berberis thunbergii*), Honeysuckle (*Lonicera spp.*), Multiflora Rose (*Rosa multiflora*), Wild Parsnip (*Pastinaca sativa*), Russian Olive (*Elaeagnus angustifolia*), and a few potential Giant Hogweed (*Heracleum mantegazzianum*) observations that are possibly Angelica (*Angelica atropurpurea* L.). Examples of invasive species found during the survey can be seen in Figure 28. The Upper Butternut Creek watershed has the fewest number of invasives noted out of the three subwatersheds. Overall, slightly more observations of invasive species were made on the tributaries compared to the mainstem, in particular in the Middle Butternut Creek watershed. The distribution of invasive species observed in the Upper Butternut, Middle Butternut, and Lower Butternut Creek watersheds can be found in Figures 29, 30, and 31 respectively.

Table 10. Invasive species occurrences identified during the *Stream Corridor Assessment* in the Butternut Creek watershed.

Invasive species occurrences	Upper			Middle			Lower			Overall		
	Tribs	MS	Total	Tribs	MS	Total	Tribs	MS	Total	Tribs	MS	Total
	0	9	9	39	10	49	27	41	68	66	60	126



Figure 28. Upper Left: Small patch of knotweed on the mainstem Butternut Creek in the Upper Butternut watershed (Photo: OCSWCD, 6/12/17), Upper Right: Knotweed on the mainstem Butternut Creek in the Upper Butternut watershed (Photo: OCSWCD, 7/19/17), Lower Left: Multiflora rose overhanging bank on Cahoon Creek (Tom Washbon and Maggie Brenner, Photo: 8/6/2018), Lower Right: Extensive knotweed with large chunk falling in stream on the mainstem Butternut Creek in the Middle Butternut Creek watershed (Photo: Les Hasbargen, 6/14/17).

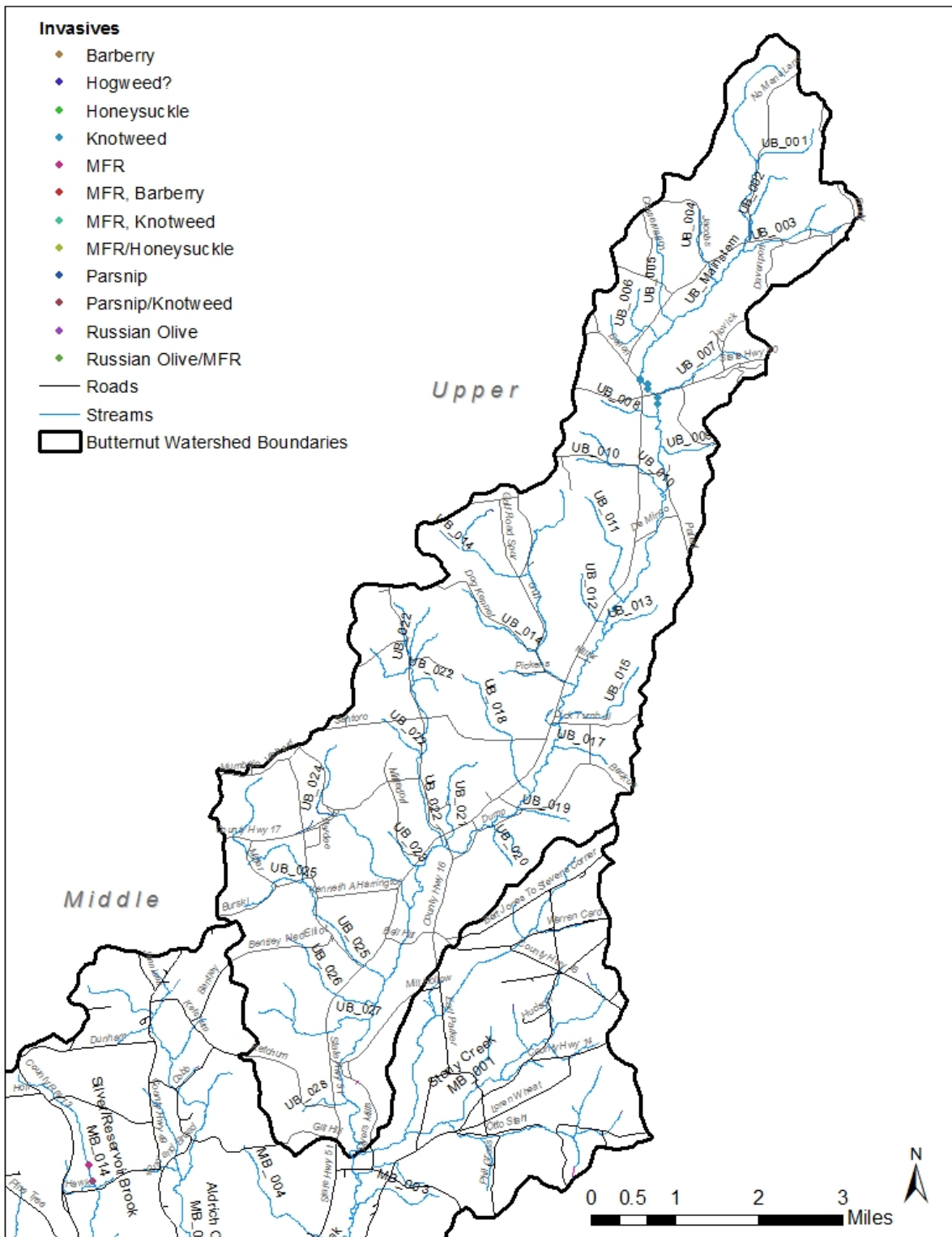


Figure 29. Summary of Invasive species observations in the Upper Butternut Creek watershed.

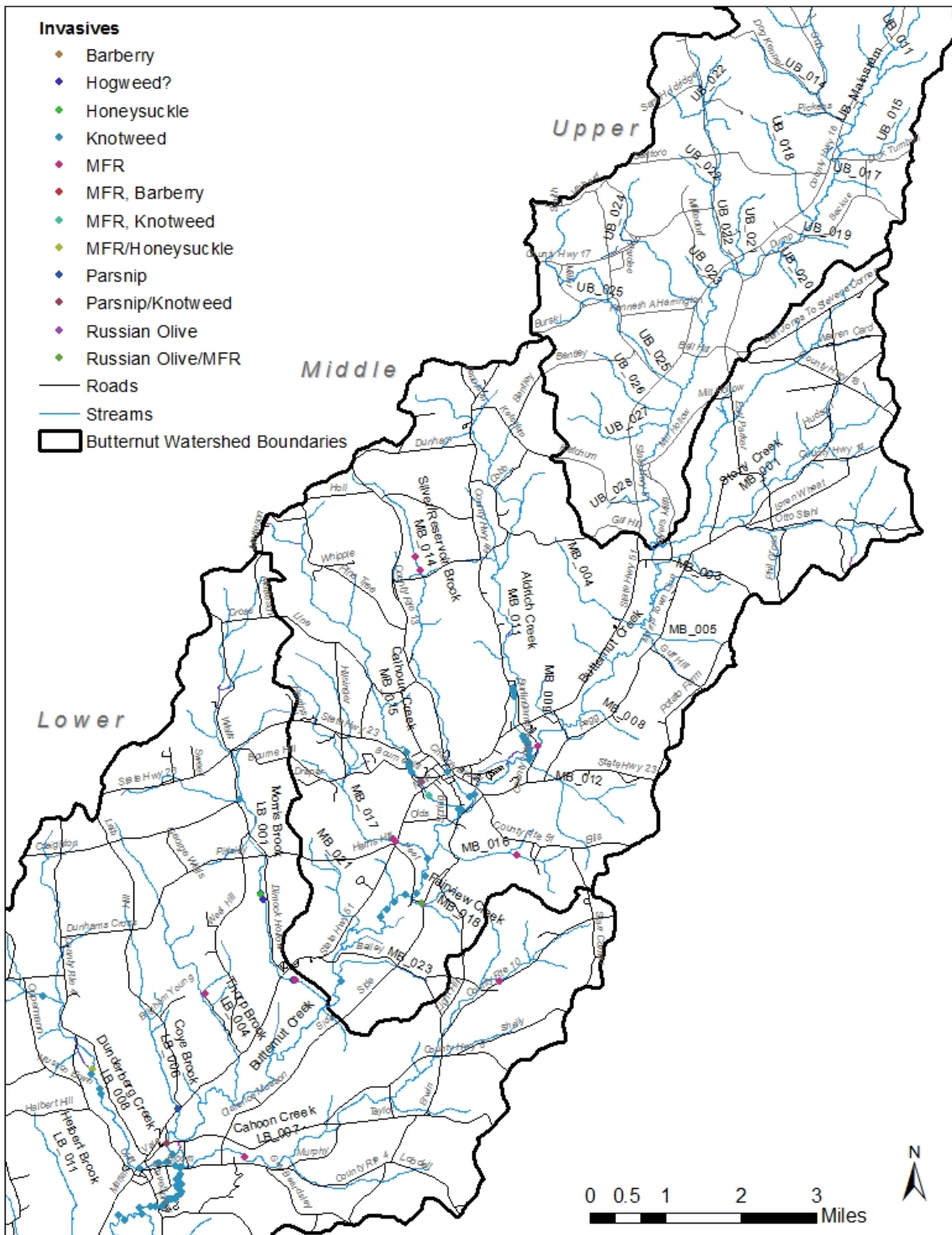


Figure 30. Summary of Invasive species observations in the Middle Butternut Creek watershed.

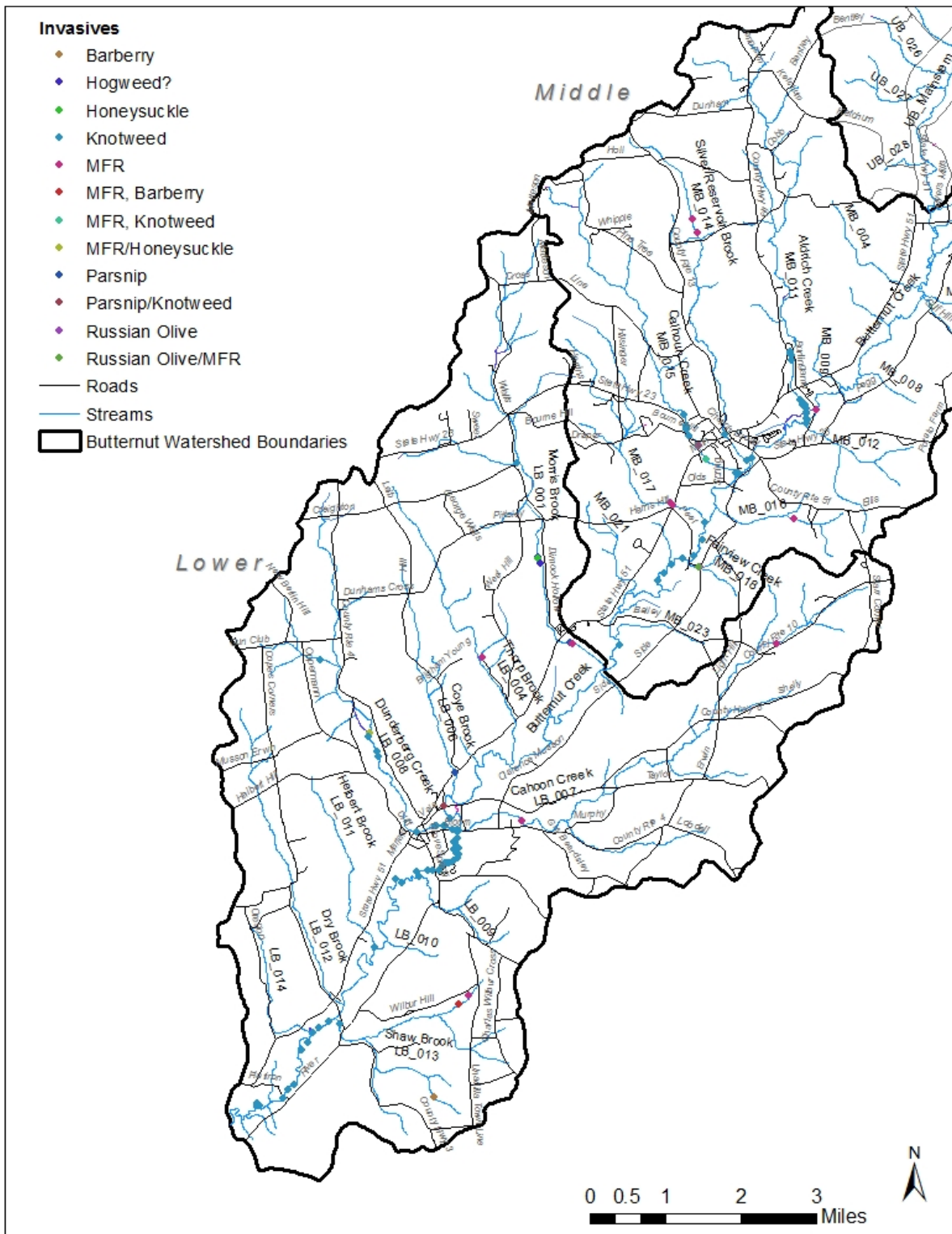


Figure 31. Summary of Invasive species observations in the Lower Butternut Creek watershed.

4.1.9 Other Observations

The remainder of observations that did not fit into the above mentioned eight categories are included with descriptive notes, GPS locations and photos in the database. Other noteworthy features include dredging, quality riparian habitat, cold water influences, salt storage, road runoff, wetlands, excessive garbage, aquatic species, and more. Examples of some of the features noted can be seen in Figure 32.

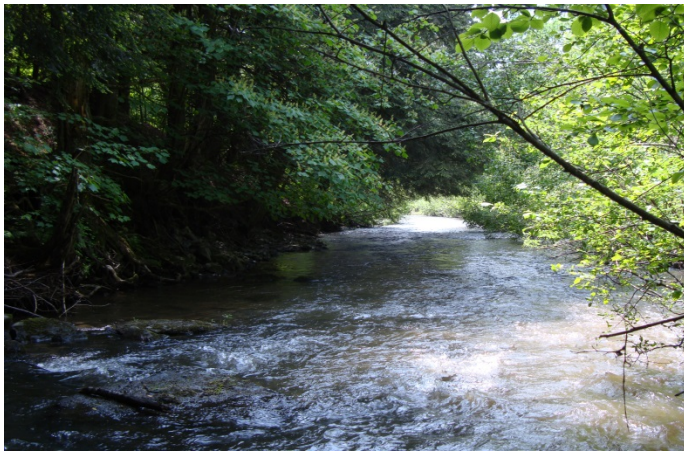


Figure 32. Upper Left – Nice deep pool with riparian cover on the mainstem in the Upper Butternut Creek watershed (Photo: Les Hasbargen, 6/12/17), Upper Right: Nice deep pool with riparian cover on the mainstem in the Upper Butternut Creek watershed (Photo: OCSWCD, 6/12/17), Middle Left: Nice riparian cover on mainstem in the Upper Butternut Creek watershed (Photo: OCSWCD, 6/12/17), Middle Right: Garbage and gravel mine on Stony Creek (Photo: Ed Lentz, 9/27/17), Lower Left: Freshwater mussel found on the mainstem Butternut Creek in the Lower Butternut Creek watershed, species needs to be verified (Photo: OCSWCD, 8/9/2017), Lower Right: Painted turtle found in the mainstem Butternut Creek in the Middle Butternut Creek watershed (Photo: Les Hasbargen, 6/14/17).

4.1.10 Priority Sites

Priority sites include at a minimum any site with erosion measured by BEHI. Certain sites were also included as Priority Sites that were not measured for erosion hazard but were included because the erosion has been increasing over time or landowners have expressed concerns about the erosion. Other Significant Features of note were included as Priority Sites for reasons such as dredging, extensive garbage (ex. tires), exceptional habitat, noticeable berms, gravel pits, or invasive species.

Overall 215 Priority Sites were identified throughout the entire watershed. The Middle Butternut Creek watershed has the most Priority Sites, followed by the Upper Butternut Creek watershed, and then the Lower Butternut Creek watershed (Table 11). The Upper Butternut Creek watershed has the most sites on the mainstem at 49 sites, while conversely the Middle Butternut Creek watershed and Lower Butternut Creek watershed have more sites located on the tributaries compared to the mainstem Butternut Creek, 52 sites each. The distribution of Priority Sites observed in the Upper Butternut, Middle Butternut, and Lower Butternut Creek watersheds can be found in Figures 33, 34, and 35 respectively.

Table 11. Summary of Priority Sites identified during the *Stream Corridor Assessment* in the Butternut Creek watershed.

Sub-watershed	Priority Sites	Mainstem	Tributaries
Upper	71	49	22
Middle	74	22	52
Lower	70	18	52
Overall	215	89	126

A subset of Priority Sites was analyzed by the Upper Susquehanna Coalition to evaluate restoration scenarios. Due to the timing of the project, the sites were selected based on severity of erosion and community concern. This included a total of 16 sites. A full description of the sites and restoration alternatives is included in Appendix H.

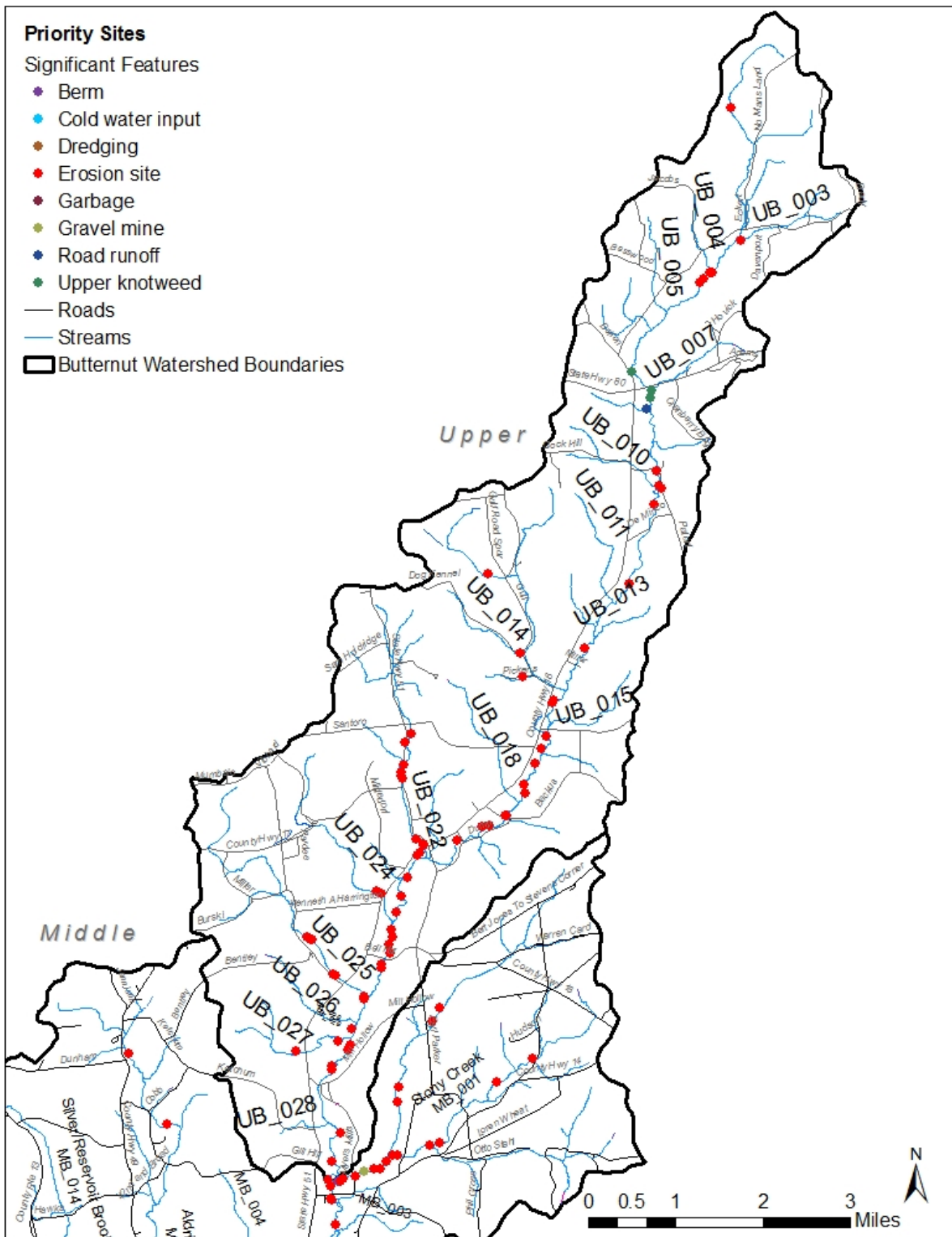


Figure 33. Summary of Priority Sites in the Upper Butternut Creek watershed.

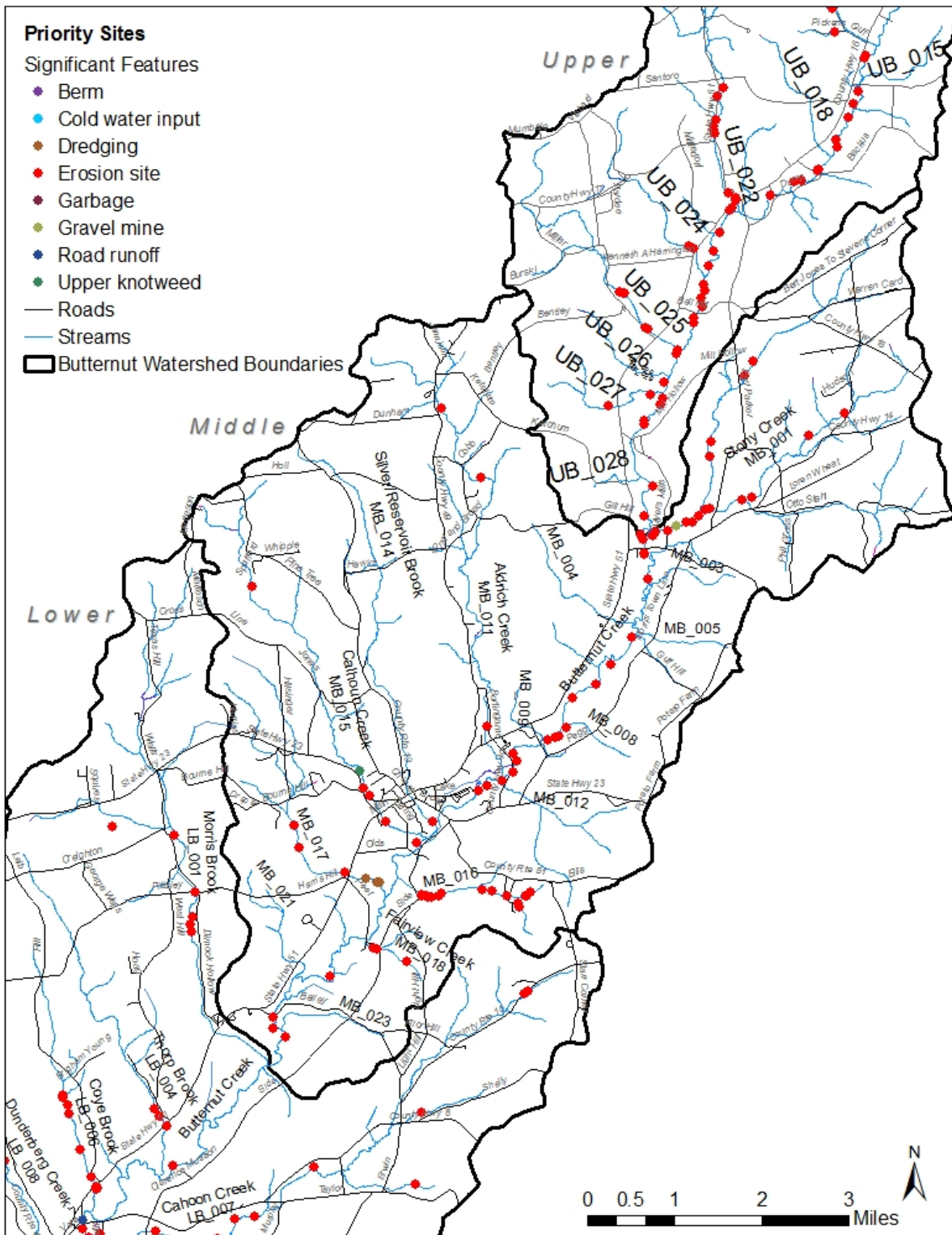


Figure 34. Summary of Priority Sites in the Middle Butternut Creek watershed.

4.1.10.1 Significant Feature

Associated with each Priority Site is a Significant Feature that describes the reasons for prioritization. The categories include: berm, cold water input, dredging, erosion site, gravel mine, road runoff, garbage, and knotweed. Knotweed is prevalent throughout the watershed but was included as a Priority Site if it was towards the upper limit of its extent either on the mainstem or a tributary. The majority of sites in all subwatersheds were erosion sites, 94% (Table 12). Most of the erosion sites are located on tributaries with the exception of the Upper Butternut Creek watershed (Table 12). In the Upper Butternut Creek watershed, Unnamed tributary – UB_022 had the most erosion sites followed by Unnamed tributary – UB_025 (Table 13, Figure 33). Other Significant Features identified in the Upper Butternut Creek watershed include road runoff and knotweed. While only 3 sites were identified as priority sites with knotweed in the Upper Butternut Creek watershed, they are significant because there is limited presence of knotweed in the watershed. Stony Creek and Unnamed tributary – MB_016 had the most erosion sites in the Middle Butternut Creek watershed, 16 and 15 sites respectively (Table 13, Figure 34). The second most common Significant Feature in the Middle Butternut Creek watershed was dredging. Other Significant Features identified in the Middle Butternut Creek watershed were Knotweed, berm, dredging, and a gravel mine. The two tributaries in the Lower Butternut Creek watershed with the most erosion sites were Cahoon Creek and Coye Brook, 15 and 9 respectively (Table 13, Figure 35). Road runoff, cold water input, and garbage were the other Significant Features identified in the Lower Butternut Creek watershed. Note, estimates of volume of sediment from sections of stream can be found in Table 4. Detailed maps of each tributary surveyed and the mainstem highlighting multiple observations can be found in Appendix G. Figure 36 highlights some of the Significant Features.

Table 12. Summary of Significant Features associated with Priority Sites identified during the *Stream Corridor Assessment* in the Butternut Creek watershed.

Sub-watershed	Stream Name	Erosion Site	Road Runoff	Upper knotweed	Berm	Dredging	Gravel Mine	Cold water input	Garbage	Total
Upper	Mainstem Butternut	45	1	3	-	-	-	-	-	49
	Tributaries	22	-	-	-	-	-	-	-	22
	Total	67	1	3	-	-	-	-	-	71
Middle	Mainstem Butternut	22	-	-	-	-	-	-	-	22
	Tributaries	46	-	1	1	3	1	-	-	52
	Total	68	-	1	1	3	1	-	-	74
Lower	Mainstem Butternut	16	1	-	-	-	-	1	-	18
	Tributaries	50	-	-	-	-	-	-	2	52
	Total	66	1	-	-	-	-	1	2	70
Overall	Mainstem Butternut	83	2	3	-	-	-	1	-	89
	Tributaries	118	-	1	1	3	1	-	1	126
	Total	201	2	4	1	3	1	1	1	215

Table 13. Summary of Significant Features associated with Priority Sites identified summarized by tributary surveyed and mainstem subwatershed during the *Stream Corridor Assessment* in the Butternut Creek watershed.

Sub-watershed	Stream Name	Erosion Site	Road Runoff	Upper extent Knotweed	Berm	Dredging	Gravel Mine	Cold water input	Garbage	Total
Upper	Butternut Creek	45	1	3	-	-	-	-	-	49
	Unnamed tributary - UB_004	-	-	-	-	-	-	-	-	-
	Unnamed Tributary/Basswood Creek - UB_005	-	-	-	-	-	-	-	-	-
	Unnamed tributary - UB_006	-	-	-	-	-	-	-	-	-
	Unnamed tributary - UB_014	3	-	-	-	-	-	-	-	3
	Unnamed tributary - UB_022	9	-	-	-	-	-	-	-	9
	Unnamed tributary - UB_024	2	-	-	-	-	-	-	-	2
	Unnamed tributary - UB_025	6	-	-	-	-	-	-	-	6
	Unnamed tributary - UB_027	2	-	-	-	-	-	-	-	2
Middle	Butternut Creek	22	-	-	-	-	-	-	-	22
	Aldrich Creek - MB_011	3	-	-	-	-	-	-	-	3
	Calhoun Creek - MB_015	4	-	1	-	-	-	-	-	5
	Diversion Channel - MB_013A2	-	-	-	-	-	-	-	-	-
	Fairview Creek - MB_018	4	-	-	-	-	-	-	-	4
	Harris Brook - MB_017	3	-	-	-	3	-	-	-	6
	Reservoir/Silver Brook - MB_014	1	-	-	-	-	-	-	-	1
	Stony Creek - MB_001	16	-	-	1	-	1	-	-	18
	Unnamed Tributary - MB_012	-	-	-	-	-	-	-	-	-
Unnamed Tributary - MB_016	15	-	-	-	-	-	-	-	15	
Lower	Butternut Creek	16	1	-	-	-	-	1	-	18
	Cahoon Creek - LB_007	15	-	-	-	-	-	-	-	15
	Coye Brook - LB_006	9	-	-	-	-	-	-	-	9
	Dry Brook/Copes Brook - LB_012	2	-	-	-	-	-	-	-	2

Table 13. continued

Sub-watershed	Stream Name	Erosion Site	Road Runoff	Upper extent Knotweed	Berm	Dredging	Gravel Mine	Cold water input	Garbage	Total
	Dunderberg Creek - LB_008	5	-	-	-	-	-	-	-	5
	Halbert Brook - LB_011	4	-	-	-	-	-	-	-	4
	Morris Brook - LB_001	6	-	-	-	-	-	-	-	6
	Shaw Brook - LB_013	5	-	-	-	-	-	-	2	7
	Thorp Brook - LB_004	4	-	-	-	-	-	-	-	4
Overall	Total	201	2	4	1	3	1	1	2	215



Figure 36. Significant Features: Upper Left: Tires in Shaw Brook (Photo: Maggie Brenner and Tom Washbon, 9/7/2018), Upper Right: Dredging on Harris Brook (Photo: Maggie Brenner and Tom Washbon, 9/17/2018), Lower Left: Cold water pool on mainstem Butternut Creek in Lower Butternut Creek watershed (Photo: OCSWCD, 8/28/2017), Lower Right: Erosion on mainstem Butternut Creek in Lower Butternut Creek Watershed (Photo: OCSWCD, 2/4/2018).

4.2 Stream Crossing Assessment

A total of 462 crossings were surveyed over 95 days of surveying (Table 14). Each day averaged 1-2 people surveying. Based on the measurements in the field an aquatic passability score was given to each structure. The NAACC Score Category with the largest percentage of crossings was Severe Barriers, the most extreme ranking, with 30% of the crossings (Table 15). Grouping the top three categories, Severe barrier, Significant barrier, and Moderate barrier, yields 56% of the crossings. The Middle Butternut Creek watershed has the most structures evaluated as Severe barriers, followed by the Lower Butternut Creek watershed, and then the Upper Butternut Creek watershed (Table 15, Figure 37). A sampling of stream crossings observed during the Stream Crossing Assessment is shown in Figure 38. The distribution of stream crossings observed in the Upper Butternut, Middle Butternut, and Lower Butternut Creek watersheds can be found in Figures 39, 40, and 41 respectively.

Table 14. Summary of survey efforts for the *Stream Crossing Assessment*.

Subwatershed	Total surveyed	# days surveyed¹
Upper	165	35
Middle	156	32
Lower	141	28
Total	462	95

¹Each day 1-2 people surveying

Table 15. Summary of NAACC Evaluation Score for the *Stream Crossing Assessment* in the Butternut Creek watershed.

NAACC Evaluation Score Category	Upper Butternut	Middle Butternut	Lower Butternut	Total	Percent of crossings
Severe barrier	37	57	44	138	30.3%
Significant barrier	14	16	11	41	9.0%
Moderate barrier	34	23	17	74	16.2%
Minor barrier	39	28	40	107	23.5%
Insignificant barrier	23	23	23	69	15.1%
No barrier	10	3	1	14	3.1%
No score - missing data ¹	6	6	1	13	2.9%
Total	163	156	137	456 ²	

¹No score - missing data – calculations can't be completed with available data

²Total 456 - structures evaluated, 7 structures with issues that need follow up

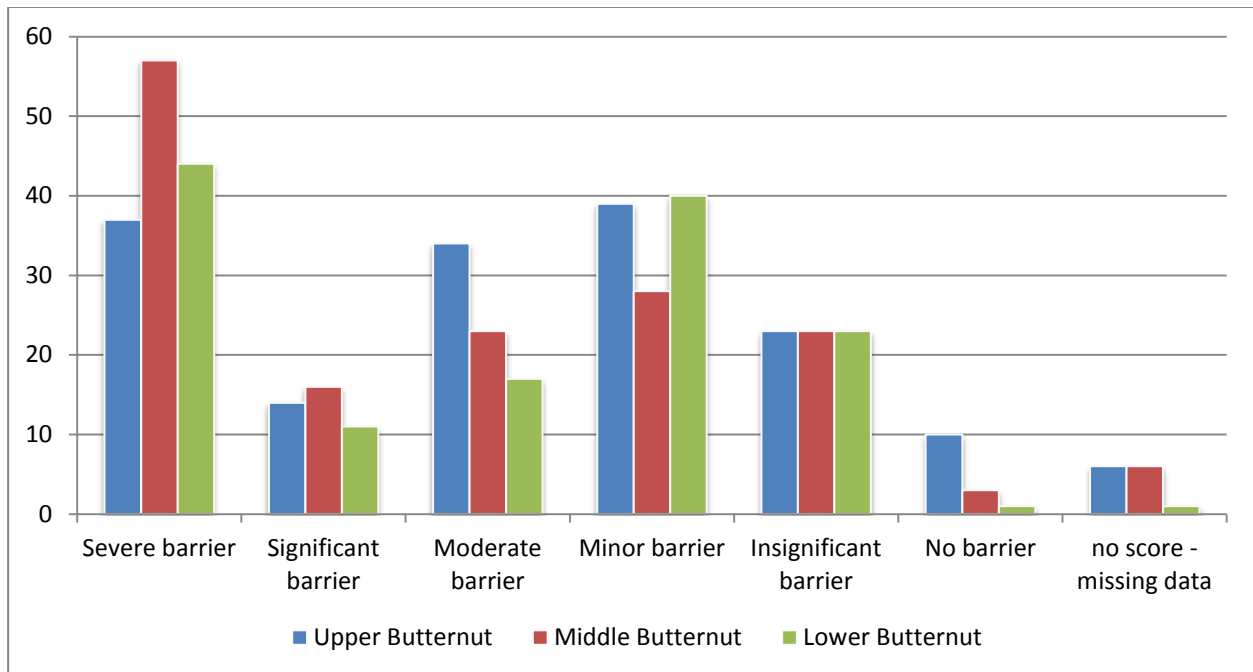


Figure 37. Distribution of aquatic barriers by subwatershed for *Stream Crossing Assessment* in Butternut Creek watershed.

The mainstem Butternut Creek does not have any aquatic barriers to connectivity with the exception of the upper reaches. There are large stretches of the mainstem where there are no road and stream intersections and where crossings exist they provide adequate aquatic passage. The Upper Butternut Creek watershed has more stream crossings on the mainstem, there are 14 compared to the Middle and Lower Butternut, 6 and 5 respectively (Table 16, Table 17, Table 18). In the mainstem sections of the Lower Butternut Creek watershed and the Middle Butternut Creek watershed all stream crossings were evaluated as Insignificant barriers. In addition to having more crossings, in stream crossings in the Upper Butternut Creek watershed ranged from No barrier to Significant barrier. The one significant barrier was located on No Man’s Land Rd and two moderate barriers were in the upper reaches of the watershed as well (Figure 39). This is not unexpected because the upper reaches of the mainstem are more similar in features to other tributaries in terms of size and proximity to roads. It is important to note that the stream crossing assessment includes aquatic features that may not be mapped with the traditional stream mapping. Detailed maps of the mainstem and each tributary surveyed combined with observations from the *Stream Corridor Assessment* can be found in Appendix G.

In the Upper Butternut Creek watershed, Unnamed tributary - UB_014 has the most stream crossings and the most severe barriers compared to other tributaries in this subwatershed (Table 16). Unnamed tributary - UB_022 and Unnamed tributary - UB_025 also have a large number of stream crossings, however fewer severe barriers than UB_014. Fortunately, most of the crossings on UB_022 are minor barriers. UB_025 has a severe barrier approximately halfway up the tributary (Figure 39). Resolving issues at this crossing would increase connectivity throughout this tributary as the upper and lower half are disconnected at this point due to the barrier. There are several other severe and significant barriers that should be addressed to improve connectivity and flow in the Upper Butternut Creek watershed. The distribution of barriers is important to note because a severe barrier towards the mouth of a stream

could block off almost the whole tributary from access for aquatic organisms and should be prioritized for restoration. Also, a severe barrier is typically an undersized structure for the stream and likely does not have the capacity to pass adequate stream volume at high flows and potentially low flows while generating erosion issues.

In the Middle Butternut Creek watershed, Stony Creek has the most stream crossings with 18 crossings evaluated as severe and significant barriers as the largest tributary in the subwatershed (Table 17, Figure 40). These results coupled with the extensive erosion in the Stony Creek watershed suggest this area should be a priority for restoration. There is a severe barrier on Dan Miller Rd approximately two miles from the mouth of the tributary that cuts off additional habitat in the upper reaches of Stony Creek. Unnamed Tributary – UB_006 also has multiple severe barriers. This is a smaller stream but with close proximity to the road. This tributary was not surveyed during the *Stream Corridor Assessment* because the drainage area was less than 1 mi². However, the high density of severe barriers indicates there is erosion along this stream due to the undersized culverts and confinement of the stream and road in a narrow valley. Aldrich Creek, Calhoun Creek and Unnamed Tributary - MB_016 also had a high density of severe and significant barriers (Figure 40). Most of the barriers on Aldrich Creek are towards the top of the tributary compared with Calhoun Creek where there are two barriers towards the mouth of the stream. Addressing the two barriers at the bottom of Calhoun Creek should be a priority in order to increase connectivity to the upstream stretches of Calhoun Creek and reduce erosion in the lower reaches of Calhoun Creek.

Morris Creek, Cahoon Creek, and Dunderberg Creek all have a high density of stream crossings as well as severe and significant barriers amongst the crossings in the Lower Butternut Creek watershed (Table 18, Figure 41). The first stream crossing upstream from the mouth of Morris Creek located on State Highway 51 is a severe barrier. Restoring connectivity at this crossing would not increase connectivity with upstream habitat because there is a large dam immediately upstream of this structure. However, there is extensive erosion associated with this structure. Increasing the capacity of this structure would improve downstream stability and associated erosion. Several of the other severe barriers on Morris Creek are for small drainages into the main stream. These are of lower priority for habitat connectivity but are important to review as they increase erosion and sediment supply into the stream system while degrading the road corridor. Dunderberg Creek also has a severe barrier towards the bottom of the tributary at the intersection with Marion Ave in Gilbertsville (Figure 41). A summary of stream crossings surveyed during the *Stream Crossing Assessment* organized by township can be found in Appendix I.



Figure 38. Stream Crossings - Upper Left: Narrow culvert on Stony Creek (Photo: OCSWCD, 11/7/17), Upper Right: Culvert with large scour pool on Calhoun Creek (Photo: OCSWCD, 11/17/17), Middle Left: Culvert with large drop and scour pool on Fairview Creek (Photo: Tom Washbon and Maggie Brenner, 5/12/2018), Middle Right: Culvert on Morris Brook (Photo: OCSWCD, 8/7/2018), Lower Left: Culvert on unnamed tributary – UB_014 with debris at outlet (Photo: OCSWCD, 9/8/2017), Lower Right: Culvert on tributary to Stony Creek (Photo: OCSWCD, 11/8/2018).

Table 16. NAACC Evaluation Rating for Stream Crossings in Upper Butternut Creek watershed.

Stream	No barrier	Insignificant barrier	Minor barrier	Moderate barrier	Significant barrier	Severe barrier	no score - missing data	Total
Unnamed tributary - UB_001					1			1
Unnamed tributary - UB_002				2				2
Unnamed tributary - UB_003			1					1
Unnamed tributary - UB_004		4	1	4	1			10
Unnamed Tributary/Basswood Creek - UB_005					1	1		2
Unnamed tributary - UB_006				1				1
Unnamed tributary - UB_007	1					2		3
Unnamed tributary - UB_008			1					1
Unnamed tributary - UB_009								0
Unnamed tributary - UB_010		2		1		2		5
Unnamed tributary - UB_011				1				1
Unnamed tributary - UB_012				1				1
Unnamed tributary - UB_013								0
Unnamed tributary - UB_014	8	2	4	3	2	5		24
Unnamed tributary - UB_015								0
Unnamed tributary - UB_016				1				1
Unnamed tributary - UB_017				2		2	1	5
Unnamed tributary - UB_018			2			1		3
Unnamed tributary - UB_019			1					1
Unnamed tributary - UB_020						1		1
Unnamed tributary - UB_021			2	1				3
Unnamed tributary - UB_022		2	10	2	1	1	2	18
Unnamed tributary - UB_023					1	2		3
Unnamed tributary - UB_024		2	2	3	1	1		9
Unnamed tributary - UB_025		2	5	2		3	1	13
Unnamed tributary - UB_026		1			1	2		4
Unnamed tributary - UB_027		1						1
Unnamed tributary - UB_028				1		2		3
Butternut Creek (mainstem) ¹	1	7	3	2	1			14
Total Tributaries	9	16	29	25	9	25	4	117
Total Mainstem and Tribs	10	23	32	27	10	25	4	131 ²

¹Missing crossing on Coles Bridge Rd

²22 additional stream crossings on aquatic features not mapped as streams, see database and maps

Table 17. NAACC Evaluation Rating for Stream Crossings in Middle Butternut Creek watershed.

Stream	No barrier	Insignificant barrier	Minor barrier	Moderate barrier	Significant barrier	Severe barrier	no score - missing data	Total
Stony Creek - MB_001		4	12	8	6	12	3	45
Unnamed Tributary - MB_002						3		3
Unnamed Tributary - MB_003						1		1
Unnamed Tributary - MB_004	1		1			1		3
Unnamed Tributary - MB_005				3				3
Unnamed Tributary - MB_006			2			6	1	9
Unnamed Tributary - MB_007						1		1
Unnamed Tributary - MB_008						2		2
Unnamed Tributary - MB_009				1	1			2
Unnamed Tributary - MB_010				1	1			2
Aldrich Creek - MB_011		4	3	2	2	3		14
Unnamed Tributary - MB_012		2				2		4
Diversion Channel - MB_013		1						1
Reservoir/Silver Brook - MB_014	1	2	1	3	2	1		10
Calhoun Creek - MB_015	1	2	2	1		5	1	12
Unnamed Tributary - MB_016			1	1	1	4		7
Harris Brook - MB_017			3	3	2			8
Fairview Creek - MB_018			1			2		3
Unnamed Tributary - MB_019 ¹								0
Unnamed Tributary - MB_020								0
Unnamed Tributary - MB_021		1				2		3
Unnamed Tributary - MB_022								0
Unnamed Tributary - MB_023					1	1		2
Butternut Creek (mainstem)		6						6
Total Tributaries	3	16	26	23	16	46	5	135
Total Mainstem and Tribs	3	22	26	23	16	46	5	141 ²

¹missing culvert on 51

²35 additional stream crossings on aquatic features not mapped as streams, see database and maps

Table 18. NAACC Evaluation Rating for Stream Crossings in Lower Butternut Creek watershed.

Stream	No barrier	Insignificant barrier	Minor barrier	Moderate barrier	Significant barrier	Severe barrier	no score - missing data	Total
Morris Brook - LB_001		4	11	5	3	10		33
Unnamed Tributary - LB_002						1		1
Unnamed Tributary - LB_003								0
Thorp Brook - LB_004		1	2	1				4
Unnamed Tributary - LB_005			1					1
Coye Brook - LB_006		1	1		3	1		6
Cahoon Creek - LB_007	1	7	9	5	1	10	1	34
Dunderberg Creek - LB_008		2	6	3	2	8		21
Unnamed Tributary - LB_009		1		1		2		4
Unnamed Tributary - LB_010						1		1
Helbert Brook - LB_011			1		1			2
Dry Brook/Copes Brook - LB_012			4	2	1	1		8
Shaw Brook - LB_013		1	3			5		9
Unnamed Tributary - LB_014		1	1			2		4
Unnamed Tributary - LB_015			1					1
Unnamed Tributary - LB_016						1		1
Unnamed Tributary - LB_017 ¹								0
Unnamed Tributary - LB_018 ²								0
Butternut Creek (mainstem)		5						5
Total Tributaries	1	18	40	17	11	42	1	130
Total Mainstem and Tribs	1	23	40	17	11	42	1	135 ³

¹ missing culvert on River Rd

² missing culvert on River Rd

³ 36 additional stream crossings on aquatic features not mapped as streams, see database and maps

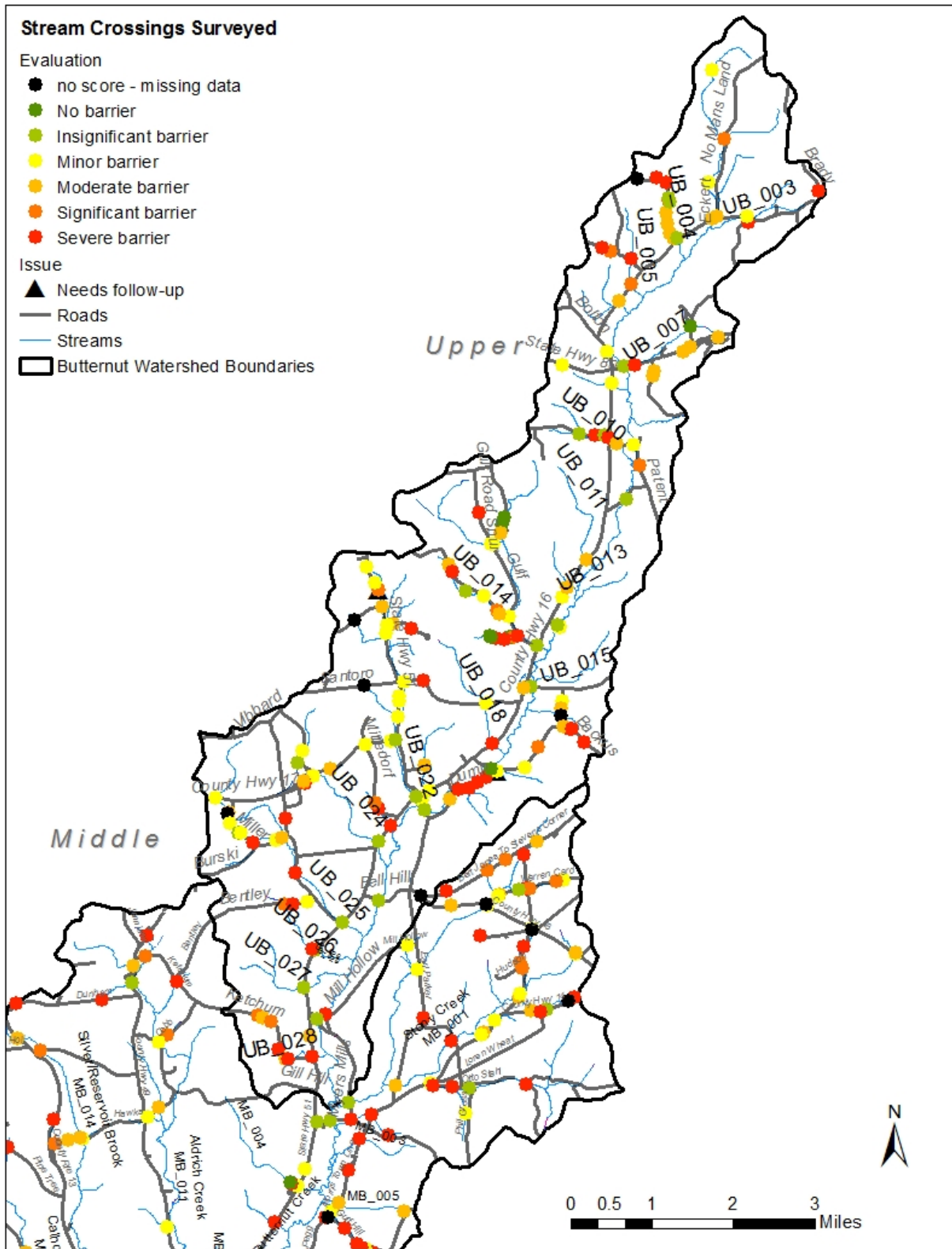


Figure 39. Summary of NAACC stream crossings in the Upper Butternut Creek Watershed.

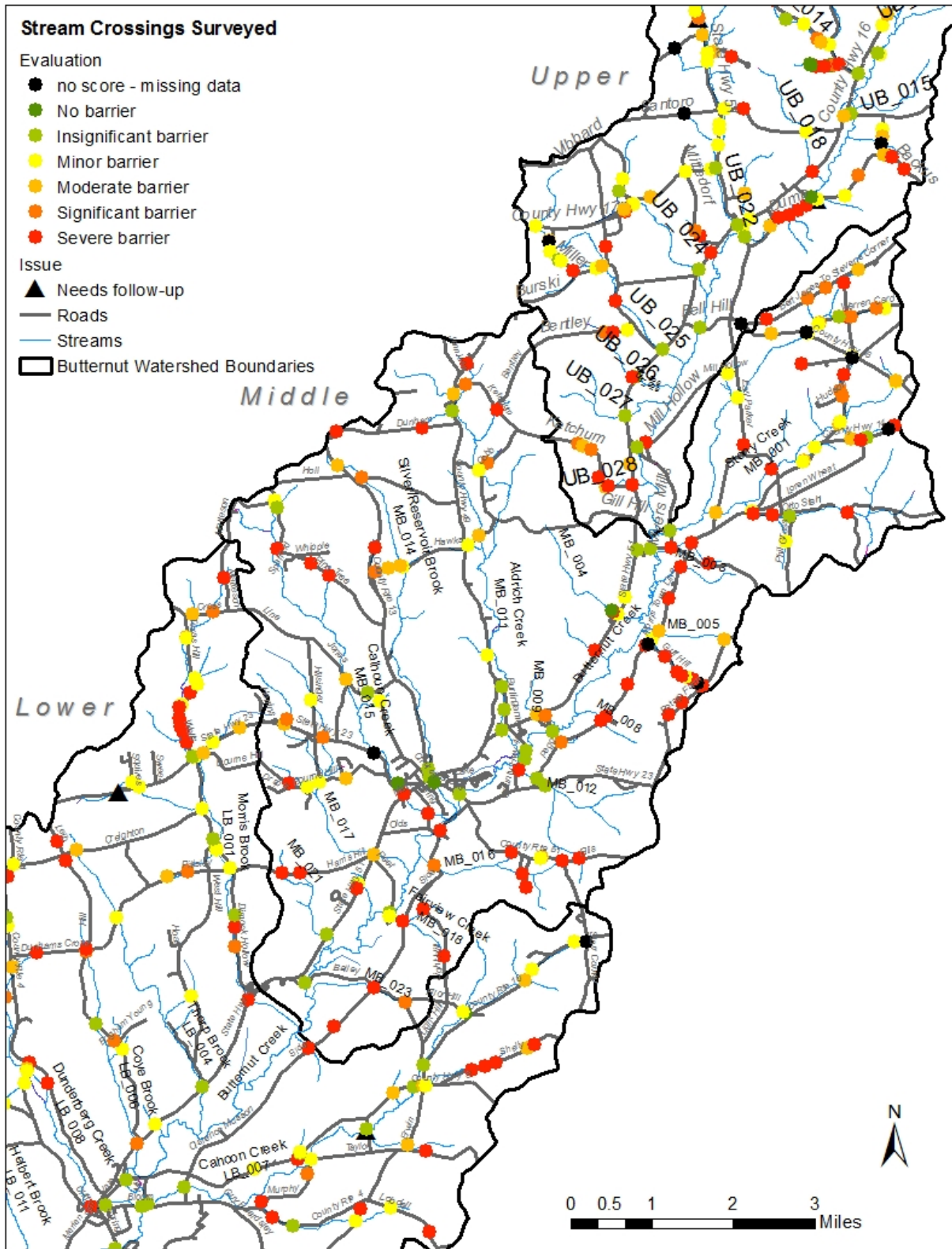


Figure 40. Summary of NAACC stream crossings in the Middle Butternut Creek Watershed.

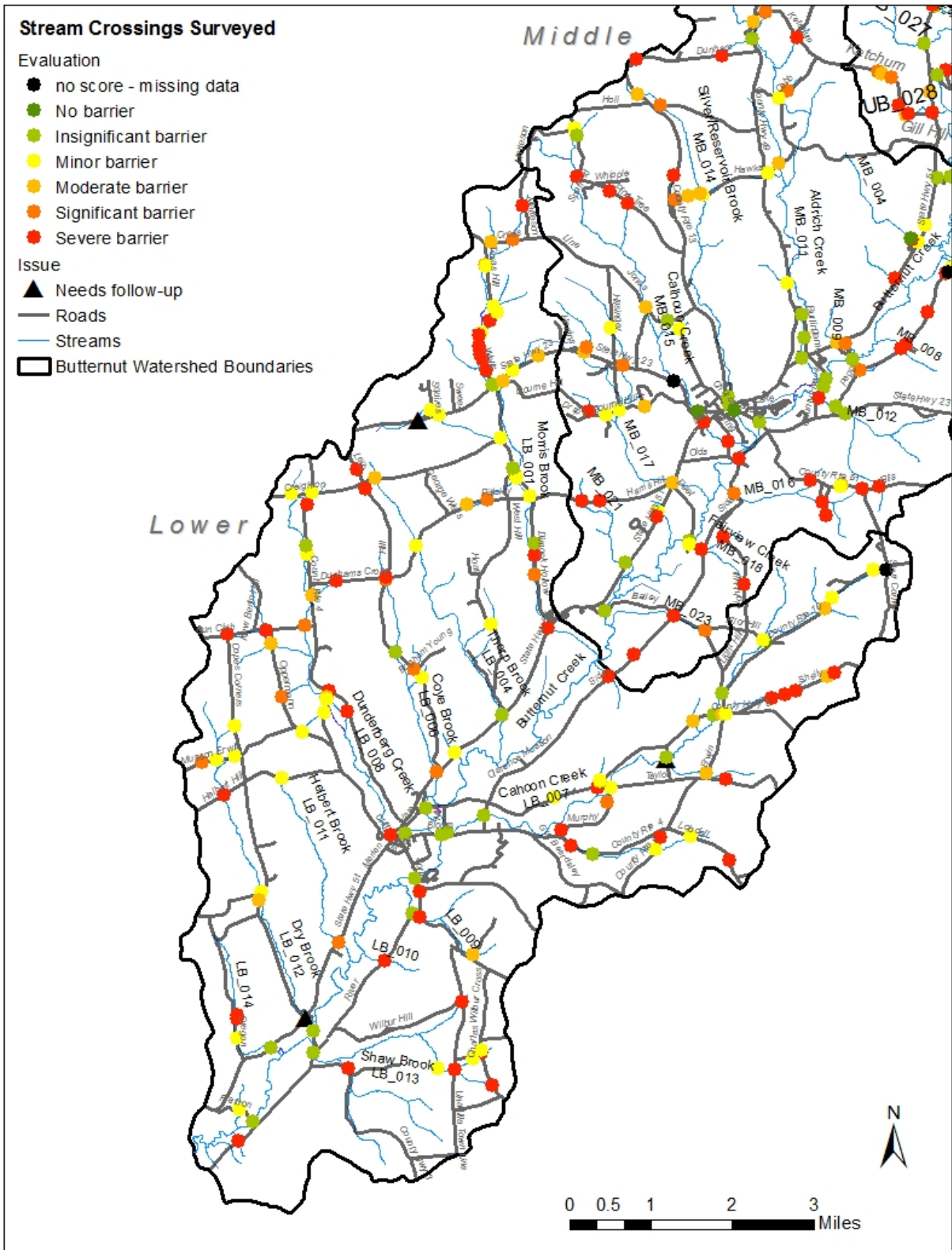


Figure 41. Summary of NAACC stream crossings in the Lower Butternut Creek Watershed.

5. Summary

The Watershed Assessment is a snapshot in time of conditions in the Butternut Creek watershed. However, the comprehensive survey identified resource concern trends through the observation of current conditions that require addressing to restore watershed health and increase resiliency. Primarily, locations of erosion were identified extensively throughout the watershed. This was partly due to the survey focusing on cataloging and quantifying erosion occurring throughout the watershed as a pre-identified resource concern. While extensive erosion was found along the mainstem, there was also considerable erosion found along tributaries. Many of the tributaries have regained or maintained forested conditions over the last century either throughout or in the upper reaches. However, the tributaries frequently exhibited narrow, steep sections where the stream and road are often in close proximity. This contrast coupled with undersized stream crossings is likely a driver of erosion in some areas of the streams. Additionally, when the tributaries meet the valley floor of Butternut Creek, the gradient decreases and sediment deposition occurs as is common in these alluvial fan areas. However, this is where development either residential or agricultural is typically located. There is frequently lack of riparian forest in these lower reaches, undersized stream crossings, and channel confinement which create additional erosion scenarios. Some of the erosion has been occurring for decades as in the example of Wheeler cutbank which has been migrating laterally about 0.1- 1.0 m per year since the early 1990s (Hasbargen et al. 2015). A riparian planting completed here in 2012 has mostly succumbed to the erosion. Along the tributaries, old mill remnants were a common feature noted. Some of the remaining structures are constricting the channel and could be considered for removal to increase conveyance and decrease associated erosion. The larger tributaries throughout the watershed had the majority of erosion issues. In particular Stony Creek and Cahoon Creek are both losing over 1,000 Estimated Tons of Sediment Lost per Year according to the BEHI for erosion sites, which is considerably higher than any other tributary in the watershed and closer in magnitude to the estimated loss along the mainstem sections.

Due to the challenges of covering the stream on foot or boat, not all features were easily observed. For example, on the lower section of Morris Brook there is a large berm that was not identified due to incision in the stream and vegetative coverage limiting visibility. Typical survey teams were two to three individuals and due to the scope of the survey it was difficult to survey upland/riparian areas while traveling through the stream corridor. Vegetation and steep banks in particularly along the mainstem in the Lower Butternut Creek watershed combined with increased channel width could have obscured additional bank structures such as bank armoring from observation during the survey. Floodplain access was difficult to discern at times as well. It is possible that the differences in covering the stream on foot compared with boat craft have skewed the data to identify more erosion sites in the walkable sections compared with the boated areas.

Several areas of quality instream habitat and riparian habitat were identified through the survey. In particular, the Upper Butternut Creek watershed revealed a diversity of instream habitat such as large deep pools with cover along the mainstem. Many areas in the Upper Butternut Creek watershed maintained riparian buffer of varying widths. There is still ample opportunity to enhance and expand the riparian buffer. There is also limited knotweed in the Upper Butternut Creek watershed. The areas that have been identified should be treated as soon as possible to limit the spread of this aggressive invasive species. Monitoring and controlling the spread of knotweed in this watershed is critical to keeping the invasive species in check and protecting habitat in the Upper Butternut Creek watershed. Along several tributaries scenic cascades and waterfalls were also documented as unique features. In the Lower Butternut Creek watershed, along the mainstem there were pockets of riparian cover

providing shade to the wide stream corridor in particular in the section from Flatiron Bridge to the confluence. Efforts should be made to preserve and enhance these areas. A cold water input source on the mainstem in Lower Butternut Creek watershed was the only Significant Feature included as a Priority Site that was beneficial and warrants further exploration and protection. Butternut Creek maintains cooler temperatures in the summer compared to other streams in the region (Wells 2016b). Identifying additional cold water influence areas for protection is an important area to follow up on which could include installing temperature probes throughout the mainstem or a remote survey using airborne thermal remote sensing.

In terms of stream connectivity, the mainstem of Butternut Creek is fortunately free of barriers to upstream and downstream migration. That does not mean that every bridge or culvert across the mainstem is in pristine condition. For example, the culvert on the mainstem at Patent Rd is undersized, in poor condition, and has generated a large scour pool with erosion at the outlet. Despite not being an aquatic barrier, the structure is not adequately passing stream flow. Ideally, a stream crossing structure should be invisible to the stream corridor and any replacement structures on the mainstem will likely need to be increased in size to achieve this and accommodate future expected higher flows. Numerous aquatic barriers were identified along tributaries that should be also addressed to increase habitat connectivity to miles of tributary habitat as well as increase the capacity of the structures to higher flows safely through the system.

In the Middle and Lower Butternut Creek watershed there are sections of the stream along the mainstem with steep, exposed banks with erodible soil substrate. The channel has incised over time and is cut off from the floodplain in many of these areas. Restoring connectivity to floodplain areas where possible will increase stream stability over the long term by allowing the channel to meander and adjust to changes. Several of the larger tributaries, such as Calhoun Creek, have also been isolated from their floodplains either through channel incision over time or intentional straightening and bank armoring or berms to confine the channel through more developed areas. In certain areas, it may impossible to restore floodplain connectivity due to infrastructure such as roads or structures.

Despite localized development around village centers the overall trend of development in the Butternut Creek watershed is low. There is still active farmland in close proximity to streams, but there are also some areas that don't appear to be utilized for agriculture. These areas are excellent candidates to target for riparian restoration. Efforts to work with landowners to increase buffer width on active farmland should also be a priority for addressing erosion and preventing future erosion.

While there are gaps in documentation of riparian condition in this survey, there is vast potential for riparian restoration identified in the Butternut Creek watershed. Working through the known areas of degraded riparian condition provides a starting point which is often integrated into restoration of bank conditions at erosion sites. The benefits of forested riparian buffers are substantial including improvements to stream health and water quality by slowing runoff, filtering pollution, preventing soil erosion, contributing essential nutrients to the food chain through leaf litter, providing woody debris to the stream, and shade to keep waters cool (NYSDEC 2020a). Buffers can also mitigate flood waters by absorbing and slowing high flows. They are recognized as a cost-effective water quality practice and one of the most effective Best Management Practices (BMPs) to reduce nutrient and sediment pollution (NYSDEC 2020a). However, simply planting trees may not be sufficient in many of the Priority Sites due to the instability of the stream banks because trees take time to grow. As mentioned above, a riparian planting in 2012 along the mainstem, has been eroding into the stream because of the bank conditions with few trees remaining. Many of the riparian restoration scenarios will need to incorporate a reach

scale approach to addressing multiple issues in the reach. Existing or recent plantings should be evaluated for function and potential enhancement. Riparian buffer width recommendations have increased over the last decade to a recommended width of at least 100 feet to provide the minimum protection for water quality and stream protection. Maintenance recommendations have also changed to include intensive maintenance during establishment years whereas historically riparian buffers were planted and walked away from with either little time or funding for maintenance. There are current riparian restoration efforts underway in the watershed by USC and OCSWCD that the Priority Site list can be cross referenced with.

Extensive areas of deposition were documented throughout the watershed. However, it is difficult to discern at certain sites what is naturally occurring deposition within a stable stream section and what is a symptom of a larger issue. Certain sites show clear indicators of imbalance, such as lower Dry Creek which experienced flood events that led to massive deposition of wood and sediment in this reach as well as erosion of stream banks. This reach includes multiple Priority Sites that need to be addressed in the near future. Beaver dams were included as a depositional feature. On the mainstem in the Upper Butternut Creek watershed there were multiple areas with complex beaver dam systems spanning the channel. In certain areas, the beavers have caused undesired flooding of adjacent lands and landowners have attempted to remove the beavers. In the tributaries, beaver complexes were commonly found in low gradient sections of the stream and have developed large wetland complexes. Large wood or large woody debris (LWD), which is typically defined as a piece greater than 10 cm in diameter and 1 m in length, was noted as a depositional feature as well. Within forested stream ecosystems both large wood and beaver dams are fundamental components that support critical ecosystem services (Wohl et al. 2019). Due to active removal of wood and beavers for more than a century there is a perception that these features are relatively rare or even undesirable features in streams (Wohl et al. 2019). In certain restoration scenarios large wood and beavers are being reintroduced to stream systems. Wood is recruited to the stream from adjacent riparian forests. Larger mature trees provide stable key pieces that can benefit the stream by providing channel roughness to attenuate high flows both indirectly and directly, stabilizing banks, providing instream aquatic habitat, increasing floodplain/channel interactions, as well as other functions (Wohl et al. 2019). Similarly, beaver dams provide extensive habitat for numerous species, store sediment, can attenuate flooding and increase base flow, and more. Both beaver systems and large woody debris provide multiple benefits to the stream corridor but can also provide hazards to the stream and need to be evaluated critical in each situation. Wood recruitment from larger mature trees provides more stability to stream and increase habitat conditions. This survey did not measure specific pieces of wood in the stream but noted areas of accumulation but observationally much of the wood observed instream was on smaller side and appears mobile. It will take time for existing riparian forests to develop larger trees that can provide wood to the stream that is more stable. Pre-European settlement, old-growth forests dominated the landscape including riparian areas (Keeton et al. 2007). Current forest conditions the northeastern U.S. landscape are dominated by young to mature (e.g., 50-100 year old) forests which do not provide the same riparian function (Keeton et al. 2007, Lorimer 2001, Lorimer and White 2003). In addition to targeting areas without riparian forest for restoration, efforts should be made to encourage forest maturity and diversity in existing riparian stands through protection, enhancement, and invasive species management.

There was limited floodplain access potential identified during the survey but as discussed above this feature was difficult to discern at times in the corridor with extensive vegetation present. Access to the floodplain is vital to dissipate flood water energy which can help to reduce erosion. Follow up is recommend to investigate the areas that were identified and examining the mainstem in more detail utilizing LiDAR data coupled with aerial imagery or drone imagery to locate additional areas. Areas that

are currently engaging the floodplain are important to protect and finding new opportunities would be a big step to restoring the benefits of a functioning stream corridor. New opportunities could include removal of berms or bank armoring that is halting channel migration. In some areas the features may no longer be needed, are in poor condition, and could be causing upstream and/or downstream issues. Bank armoring was documented as a point feature. Follow up could include a low flow, leaf off survey to more easily see locations of bank armoring and document the length of each section. Development in the floodplain should be discouraged and any installation of bank armoring should be evaluated as the only alternative to protecting infrastructure or necessary land use. Restoration efforts should focus on natural channel design incorporating wood and boulder placement to restore stream stability, function, and habitat.

5.1 Prioritization

The *Stream Corridor Assessment* identified 215 Priority Sites. From this list restoration actions can be further ranked to meet community and stakeholder objectives. Treating each site in isolation may only move reach scale issues upstream or downstream. The BEHI does not replace the need for full site analysis before any restoration plan is developed and implemented. However, it provides a useful comparison to other sites that have been evaluated using the same methodology and can identify areas where there are multiple issues. It is recommended to look at larger sections of stream to integrate floodplain reconnection, riparian buffer restoration, and stream bank stabilization to increase the function of the stream corridor as a whole. As riparian restoration takes a long time to generate benefits, areas identified that do not have unstable banks, should be targeted for plantings as soon as possible. There are multiple stakeholders invested in restoring Butternut Creek for aquatic habitat specifically from Copes Corner to the confluence with Unadilla River. This area should be given additional prioritization for riparian buffer restoration and or stream bank stabilization to integrate with existing projects from other stakeholders such as USC, the Wetland Trust (TWT), and SUNY Oneonta. The subset of Priority Sites that have already been evaluated for restoration scenarios are ready for funding solicitation and project implementation (Appendix H).

Results from the *Stream Crossing Assessment* can be presented to the towns and villages in the watershed to get input on prioritization of stream crossing structures. The stakeholders involved in managing the roads, culverts, and bridges from an infrastructure standpoint likely have a list of problematic structures that can be overlain with aquatic barriers. There will be overlap that can further refine the list of structures to address for replacement or repair. Non-profit groups such as Trout Unlimited (TU) are also actively involved in identifying aquatic barriers for removal. Combining stakeholder groups can create access to different but overlapping funding sources to ultimately increase available funding. Additionally, the Cornell Capacity Model can be applied to the NAACC data to evaluate each structure's capacity to move different flows. The model can be utilized to look at different flow scenarios which can be useful for evaluating different future climate change regimes.

5.1.1 Objectives and Strategies

The findings presented in the Results section of this report have been refined into a list of objectives for addressing stream corridor health in the Butternut Creek watershed. Each objective includes specific strategies to achieve those objectives. This report documents areas of resource concern throughout the watershed that have created instability in the stream corridor thereby decreasing water quality and aquatic habitat. When evaluating the Priority Sites for restoration or identifying new project areas this

list of objectives and strategies can be referenced. Reversing stream degradation and restoring natural stream function will require short term and long term intervention, with the goal of a self-sustaining system in the future. The following objectives and strategies are intended to achieve this goal.

Objective 1: Improve water quality by reducing sediment/nutrient loading and increase stability/habitat in lower tributary reaches and along mainstem.

- Strategy 1.1. Plant riparian trees in buffer areas where forest is deficient to increase bank stability, moderate flood impacts, provide shade and increase LWD recruitment potential.
- Strategy 1.2. Address channel constriction from stream crossings and aquatic connectivity by replacing severe and significant barrier structures.
- Strategy 1.3. Stabilize eroding banks utilizing natural channel design methodologies.
- Strategy 1.4. Increase floodplain access through enhancing existing access or opening up historic access through removal of bank armoring, berms or addressing channel incision that is restricting interaction between floodplain and stream.

Objective 2: Restore riparian conditions watershed wide.

- Strategy 2.1. Plant riparian trees in buffer areas where forest is deficient to increase bank stability, moderate flood impacts, provide shade and increase LWD recruitment potential.
 - Strategy 2.1.1. Review past riparian restoration areas to determine effectiveness and maintenance needs.
- Strategy 2.2. Protect and enhance existing forested areas through conservation easements.
- Strategy 2.3. Stabilize eroding banks in critical planting areas utilizing natural channel design methodologies.
- Strategy 2.4. Remove Japanese knotweed in Upper Butternut Creek watershed, upper extents on tributaries, and in areas of existing maturing riparian forests.
- Strategy 2.5. Increase floodplain access where possible through enhancing existing access or opening up historic access through removal of bank armoring, berms or addressing channel incision that is restricting interaction between floodplain and stream.
- Strategy 2.6. Launch a community outreach campaign to emphasize importance of buffers, share funding opportunities, coordinate stakeholders, and find willing landowners.

Objective 3: Refine Priority Sites and stream crossings for restoration ranking based on stakeholder and community input.

- Strategy 3.1. Elevate observations to Priority Sites such as erosion sites that were not included as Priority Sites based on additional input or omission due to survey strategy.
- Strategy 3.2. Demote or reduce in ranking Priority Sites where erosion risk is minimal.
- Strategy 3.3. Identify other prioritization needs to create a ranked list of projects and project reaches. Examples include but are not limited to:
 - Strategy 3.3.1. Prioritize Priority Sites based on sediment loss.
 - Strategy 3.3.2. Prioritize Priority Sites or reaches based on adverse or beneficial impacts to aquatic species, such as elevating Lower Butternut watershed restoration projects based on proximity to aquatic habitat for sensitive species.
 - Strategy 3.3.3. Prioritize Priority Sites based on proximity to infrastructure.
 - Strategy 3.3.4. Prioritize Priority Sites based on active loss of farmland.

- Strategy 3.3.5. Prioritize stream crossings for restoration based on input from stakeholders such as Trout Unlimited.
- Strategy 3.4. Review stream crossings with towns, county, and state to identify stream crossings with aquatic connectivity issues and flooding and or condition issues.
 - Strategy 3.4.1. Prioritize stream crossings for restoration that rank high for both issues.
 - Strategy 3.4.2. Apply Cornell Capacity Model to stream crossings to identify structures ability to pass varying levels of flow; current conditions and potential future conditions.

Other areas of research/outreach recommended:

- An inventory of roads, roadside ditches and road maintenance materials storage facilities in the Butternut Creek watershed is recommended to develop a comprehensive road/road ditch maintenance program to improve water quality.
- Temperature monitoring to identify cold water influence areas for protection and habitat enhancement.
- Hydraulic modeling to look at channel incision and evaluate flooding impacts with removal of floodplain barriers.
- Historical aerial/LiDAR image and map analysis to look at historic channel occupancy. This can identify areas that have potential for floodplain reconnection.
- Digital Elevation Model (DEM) correction to increase the accuracy of surface models in the watershed.
- Utilizing drones to follow up on assessment conditions, either gaps in data or areas requiring additional reconnaissance. This may be useful during different flow and vegetation conditions.
- Targeted outreach to landowners for easement and riparian restoration potential.
- Signs for landowners to recognize restoration work, raise awareness, and recruit other landowner participation.

6. References

- Abbott, A. and S. D. Jackson. 2019. NAACC Stream Crossing Instruction Manual for Aquatic Passability Assessments in Non-tidal Stream and Rivers. North Atlantic Aquatic Connectivity Collaborative (NAACC), University of Massachusetts Amherst. June 2, 2019.
- Angell, N. 2017. Baseline fish survey of Butternut Creek. SUNY Oneonta Biological Field Station, Cooperstown, New York, USA.
- Beers, F.W., A.D. Ellis, and G.G. Soule. 1868. Atlas of Otsego County, NY. James Mc.Guigan, Philadelphia, Pennsylvania, USA.
- Chesapeake Bay Program (CBP). 2018. Quick Reference Guide for Best Management Practices (BMPs): Nonpoint Source BMPs to Reduce Nitrogen, Phosphorus, and Sediment Loads to the Chesapeake Bay and its Local Waters. CBP/TRS-323-18. https://www.chesapeakebay.net/documents/BMP-Guide_Full.pdf Accessed 16 June 2020
- Coney, S. and Lord, P. 2019. Re-introduction of the American Eel in the NY Portion of the Susquehanna River Activities and Results 2018. Report for NYSDEC. SUNY Oneonta, Oneonta, NY, USA.
- Coney, S. and Lord, P. 2020. Re-introduction of the American Eel in the NY Portion of the Susquehanna River Activities and Results 2019. Report for Tioga County SWCD. SUNY Oneonta, Oneonta, NY, USA.
- Delaware County Soil and Water Conservation District (DCSWCD) 2014. Post-Flood Emergency Stream Intervention Training Manual. Delaware County Soil and Water Conservation District, Walton, NY.
- FISRWG (10/1998). Stream Corridor Restoration: Principles, Processes, and Practices. By the Federal Interagency Stream Restoration Working Group (FISRWG)(15 Federal agencies of the US gov't). GPO Item No. 0120-A; SuDocs No. A 57.6/2:EN 3/PT.653. ISBN-0-934213-59-3.
- Friends of the Winooski River (FWR), White River Natural Resources Conservation District (WRNRCC), and Winooski Natural Resources Conservation District (WNRCD). 2012. Living in Harmony with Streams: A Citizen's Handbook to How Streams Work.
- Hasbargen, L., P.Booth, and D. Busby. 2015. Report on Migration of Butternut Creek in Wheeler's Field. SUNY Oneonta Biological Field Station, Cooperstown, New York, USA.
- Keeton, W.S., C.E.Kraft, and D.R.Warren. 2007. Mature and old growth riparian forests structure dynamics and effects on Adirondack stream habitats. Ecological Applications 17 (3) 852-868.
- Lorimer, C.G. 2001. Historical and ecological roles of disturbance in eastern North American forests: 9,000 years of change. Wildlife Society Bulletin 29:425-439.
- Lorimer, C.G., and A.S.White. 2003. Scale and frequency of natural disturbances in the northeastern U.S.: Implications for early-successional forest habitats and regional age distributions. Forest Ecology and Management 185:41-64.

North Atlantic Aquatic Connectivity Collaborative (NAACC). 2017. Culvert Condition Assessment Manual 2017 Edition.

NYSDEC. 2009. Public fishing Rights Map: Butternut Creek.
https://www.dec.ny.gov/docs/fish_marine_pdf/pfrbuternut.pdf Accessed 16 November 2016.

NYSDEC. 2020a. Final Phase III Watershed Implementation Plan, New York Chemung and Susquehanna River Basins. Division of Water, Bureau of Watershed Resource Management, Albany, New York, USA.

NYSDEC. 2020b. Riparian Buffers. New York State Department of Environmental Conservation.
<https://www.dec.ny.gov/chemical/106345.html> Accessed 09 November 2020

Otsego County Soil and Water Conservation District (OCSWCD). 2020. AEM participating producers 2004-2020. Otsego County Soil and Water Conservation District Cooperstown, New York, USA.

Peterson, J.E. 2017. Butternut Creek Biomonitoring. In 50th Ann. Rept (2017). SUNY Oneonta Biological Field Station, Cooperstown, New York, USA .

Pokorny, T. 2016. Biological Survey Unit Abstract. Survey 416030, FIN-SR-146-9 (Butternut Creek) – Brook Trout. NYS Department of Environmental Conservation, Region 4 Stamford, Bureau of Fisheries, Stamford, New York, USA.

Rosgen, D.L. 1996. Applied River Morphology. Wildland Hydrology, Pagosa Springs, CO.

Rosgen, D.L. 2001. A Practical Method of Computing Streambank Erosion Rate. Proceedings of the 7th Federal Interagency Sedimentation Conference, Vol. 2. Pp. 9-15, March 25,2001, Reno, NV. Available on the Wildland Hydrology website at: <http://www.wildlandhydrology.com/html/references.html> Accessed 15 October 2020

Stensland, M.F. 2002. Benthic Macroinvertebrate Survey of Butternut Creek Otsego County, New York. (Master's thesis). State University of New York at Oneonta, Oneonta, New York, USA.

U.S. Geological Survey (USGS). 2020a. Streamstats Report. <https://streamstats.usgs.gov/ss/>
Accessed 28 December 2020.

Wells, S. 2016a. Scott Wells, Warmwater Fisheries Biologist, NYSDEC Region 4 Stamford, NY personal communication 16 December 2016.

Wells, S. 2016b. Butternut Creek Survey 2011-2016 Summary. NYSDEC Region 4 Stamford – Fisheries, Stamford, NY.

West Virginia Department of Environmental Protection (WVDEP). 2008. Nonpoint Source program – Streambank/Sediment Monitoring – BEHI Overview.
<https://dep.wv.gov/WWE/getinvolved/sos/Documents/SOPs/BEHI-Overview.pdf> Accessed 06 November 2020

Wohl, E., D.N., Scott, S.E. Yochum. 2019. Managing for large wood and beaver dams in stream corridors. Gen. Tech. Rep. 404. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 137p

Appendix A. Outreach Summary - Butternut Assessment Meetings/Trainings

Date	Description	Location	# in attendance
7/20/2016	Coordinating Committee Meeting & USC	OCSWCD office	5
7/27/2016	Coordinating Committee Meetings	OSCWCD office	5
8/10/2016	Coordinating Committee Meetings	OSCWCD office	5
9/14/2016	Coordinating Committee Meetings	OSCWCD office	5
9/23/2016	Coordinating Committee Meetings	OSCWCD office	6
9/29/2016	Town Meeting presenting project	New Lisbon Town Hall	~30-35
10/5/2016	Physical Assessment Training - Part 1	Morris Fire Department	15
10/5/2016	Town Meeting presenting project	Morris Fire Department	~35-40
10/11/2016	Physical Assessment Training - Part 2	Field	15
10/17/2016	Coordinating Committee Meetings	OSCWCD office	7
10/26/2016	Coordinating Committee Meetings	OCSWCD office	7
11/3/2016	Presentations to Upper Susquehanna Watershed Forum	SUNY Oneonta	>50
11/18/2016	Volunteer Physical Assessment Training	OCSWCD office/field	5
12/2/2016	Coordinating Committee Meetings	OCSWCD office	5
4/14/2017	Coordinating Committee Meetings	OCSWCD office	7
4/20/2017	Coordinating Committee Meetings	OCSWCD office	6
5/11/2017	Town Meeting presenting project	Butternut Valley Grange	23
5/21/2017	Volunteer Physical Assessment Training	Morris Fire Hall/Field	10
8/17/2017	Butternut Harvest Festival	Morris, NY	NA*
9/20/2017	Coordinating Committee Meetings	OCSWCD office	10
9/21/2017	Presentations to Upper Susquehanna Watershed Forum	SUNY Binghamton	>50
11/20/2017	Coordinating Committee Meetings	OCSWCD office	6
3/29/2018	Coordinating Committee Meetings	OCSWCD office	11
8/16/2018	Butternut Harvest Festival	Morris, NY	NA*
6/12/2017	Project Presentation to students	SUNY Oneonta Biological Field Station	15
2/14/2018	Project Presentation to students	SUNY Oneonta Biological Field Station	15
2/22/2018	Town Meeting presenting project	Butternut Valley Grange	12
5/31/2018	Town Meeting presenting project	Butternut Valley Grange	15
10/18/2018	Presentations to Upper Susquehanna Watershed Forum	SUNY Binghamton	>50
4/10/2019	Town Meeting presenting project	New Lisbon Town Hall	20
11/8/2019	Coordinating Committee Meetings	SUNY Oneonta	7
<i>*Volunteer led booth with outreach materials</i>		Total	~500

Appendix B. Observation Categories from Stream Corridor Assessment

<i>GIS ID</i>	<i>DECFIN</i>	<i>Watershed</i>	<i>NHDRC</i>	<i>Other ID</i>
Numerical	NYSDEC FIN ID	Upper Butternut Middle Butternut Lower Butternut	NHD Reach ID	Tributary number system used for field work (watershed_number, ex UB_01)

<i>Date</i>	<i>Y-LAT</i>	<i>X-LON</i>	<i>Deposition</i>	<i>Deposition Feature</i>	<i>Debris</i>	<i>Dep_BankSide</i>
MM/DD/YYYY	Latitude	Longitude	TRUE	Beaver Dam	TRUE	Left
	XX.XXXXX	-XX.XXXXX	FALSE	Debris	FALSE	Right
				Grasses		Both
				Gravel		Channel spanning
				Gravel bar		Mid-channel
				Gravel bar/Beaver Dam		Mid-channel, Left
				Gravel bar/LWD		Mid-channel, Right
				LWD		N/A
				LWD/Gravel bar		N/A
				LWD/Gravel bar/Beaver dam		
				N/A		
				No		
				Sediment		
				Sediment/Debris		
				Unknown		

Land Use	Erosion	Bank_Erosion_Potential	Bank Side	Primary Cause of Instability	Structure	Structure continued
Wetlands	TRUE	Low	Right	Poor Vegetation	Berm	Power line
Forested Buffer	FALSE	Extreme	Left	Radius of Curvature Too Tight	Bridge	Rock Rip Rap
Grass Buffer		High	Both	Too Straight	Concrete bank armor	Rock Rip Rap/Old Bridge Abutments
Shrubland - Brush		Moderate	Mid-channel	Human Influences	Dam	Sheet Piling
Yard/Grass		No BEHI	N/A	High Bank	Dam/Pond	Stone fence
Hay/Crops		Very High		High W/D	Dike	Stone Wall
Pasture		Medium High		Low W/D	Dike with concrete wall	Synthetic brick mats
Barren				High Velocity	Fence	Wood grade control
Structures				Material Too Small	Gabian Baskets	
Impervious Roads/Structures				Other	Hay Armor	
Dirt/Gravel Road					Levee	
					Old Bridge Abutments	
					Old Dam	
					Old Dam Remnants	
					Old Diversion	
					Pipeline	
					Pond Dam	

<i>Stream Crossing</i>	<i>Bedrock</i>	<i>Headcut</i>	<i>Flood Plain Access</i>	<i>Buffer Potential</i>	<i>Invasives</i>
Bridge	TRUE	TRUE	TRUE	No	Barberry
Culvert	FALSE	FALSE	FALSE	Yes	Hogweed?
Footbridge				Recent planting	Honeysuckle
Ford				Yes/Recent planting	Knotweed
Livestock crossing				N/A	MFR
					MFR, Barberry
					MFR, Knotweed
					MFR/Honeysuckle
					Parsnip
					Parsnip/Knotweed
					Russian Olive
					Russian Olive/MFR

<i>BEHI ID</i>	<i>BEHI</i>	<i>Estimated_Tons_Lost_year</i>	<i>Priority Site</i>	<i>Significant Feature</i>	<i>Comment</i>	<i>PhotoID</i>
watershed/stream number/site number for day ex MB_001_1.1	Calculated	Calculated	TRUE	Berm	various observations, narrative	number associated with date
			FALSE	Cold water input		
				Dredging		
				Erosion Site		
				Gravel mine		
				Road Runoff		
				Tires		
				Upper Knotweed		

Appendix C. Examples of Field Data Sheets for Stream Corridor Assessment

Table C1. Log sheet for each outing

Watershed Assessment

Stream ID
 Date
 By
 Location

of Sites

WP	Date	Observers	Latitude	Longitude	Photo#	Description

Table C2. Example of Erosion Site Data Sheet for BEHI Calculations

Stream Section:		Assessment Type:		Butternut		Date:					
Site #:				Assessor:							
DA (sq.mi):		Chart		BF depth:		BF width:		Flood Plain Width:			
		Actual		BF depth:		BF width:		Flood Plain Width:			
Length of site:			Width:			Height:			Photo #s:		
Left Bank			Both Banks			Right Bank			Gravel Bar		
Erodibility Variables - only complete for erosion sites								<u>Opportunities</u>		Y/N	
Bank Height (ft)		Bankfull Height (ft)		Root Depth (ft)		% Root Density		Bank Angle		% Surface Protection	
Bank Material (0-10) 0=bedrock/10=sand:						Material Descr.					
Stratification (0-10) 0=no layering/10=high strat: Eroding from stratification?						Berm Removal:					
Est. Near Bank Stress (1 - 6) 1=very low/6=extreme:						Floodplain Reconnect:					
Depositional Features (Gravel Bars - describe, approx. size):											
Debris/Blockage (describe amt and type - tree, beaver dam, human):											
Land Use (Ag, residential, woodland):											
Instability Cause (Entrenched, Incised, Berm, Cut off from floodplain, headcut, human influence, etc..)(Length/Width/Height)											
Riparian Vegetation - Potential Buffers (describe existing conditions): (Length/Width)											
Livestock access (Y or N):				Structures present:				Invasives:			
Existing Cover (bare, tree, grass):								Buffer Opportunity:			
Notes and Comments:											



AQUATIC CONNECTIVITY Stream Crossing Survey DATA FORM

DATABASE ENTRY BY _____ ENTRY DATE _____

DATA ENTRY REVIEWED BY _____ REVIEW DATE _____

CROSSING DATA

Crossing Code _____ Local ID (Optional) _____

Date Observed (00/00/0000) _____ Lead Observer _____

Town/County _____ Stream _____

Road _____ Type MULTILANE PAVED UNPAVED DRIVEWAY TRAIL RAILROAD

GPS Coordinates (Decimal degrees) °N Latitude — °W Longitude

Location Description

Crossing Type BRIDGE CULVERT MULTIPLE CULVERT FORD NO CROSSING REMOVED CROSSING BURIED STREAM INACCESSIBLE PARTIALLY INACCESSIBLE NO UPSTREAM CHANNEL BRIDGE ADEQUATE **Number of Culverts/ Bridge Cells** _____

Photo IDs INLET _____ OUTLET _____ UPSTREAM _____ DOWNSTREAM _____ OTHER _____

Flow Condition NO FLOW TYPICAL-LOW MODERATE HIGH **Crossing Condition** OK POOR NEW UNKNOWN

Tidal Site YES NO UNKNOWN **Alignment** FLOW-ALIGNED SKEWED (>45°) **Road Fill Height** (Top of culvert to road surface; bridge = 0) _____

Bankfull Width (Optional) _____ **Confidence** HIGH LOW/ESTIMATED **Constriction** SEVERE MODERATE SPANS ONLY BANKFULL/ ACTIVE CHANNEL

Tailwater Scour Pool NONE SMALL LARGE SPANS FULL CHANNEL & BANKS

Crossing Comments _____

STRUCTURE 1

Structure Material METAL CONCRETE PLASTIC WOOD ROCK/STONE FIBERGLASS COMBINATION

OUTLET

Outlet Shape 1 2 3 4 5 6 7 FORD UNKNOWN REMOVED **Outlet Armoring** NONE NOT EXTENSIVE EXTENSIVE

Outlet Grade (Pick one) AT STREAM GRADE FREE FALL CASCADE FREE FALL ONTO CASCADE CLOGGED/COLLAPSED/SUBMERGED UNKNOWN

Outlet Dimensions **A. Width** _____ **B. Height** _____ **C. Substrate/Water Width** _____ **D. Water Depth** _____

Outlet Drop to Water Surface _____ **Outlet Drop to Stream Bottom** _____ **E. Abutment Height** (Type 7 bridges only) _____

L. Structure Length (Overall length from inlet to outlet) _____

INLET

Inlet Shape 1 2 3 4 5 6 7 FORD UNKNOWN REMOVED

Inlet Type PROJECTING HEADWALL WINGWALLS HEADWALL & WINGWALLS MITERED TO SLOPE OTHER NONE

Inlet Grade (Pick one) AT STREAM GRADE INLET DROP PERCHED CLOGGED/COLLAPSED/SUBMERGED UNKNOWN

Inlet Dimensions **A. Width** _____ **B. Height** _____ **C. Substrate/Water Width** _____ **D. Water Depth** _____

ADDITIONAL CONDITIONS

Slope % (Optional) _____ **Slope Confidence** HIGH LOW **Internal Structures** NONE BAFFLES/WEIRS SUPPORTS OTHER _____

Structure Substrate Matches Stream NONE COMPARABLE CONTRASTING NOT APPROPRIATE UNKNOWN

Structure Substrate Type (Pick one) NONE SILT SAND GRAVEL COBBLE BOULDER BEDROCK UNKNOWN

Structure Substrate Coverage NONE 25% 50% 75% 100% UNKNOWN

Physical Barriers (Pick all that apply) NONE DEBRIS/SEDIMENT/ROCK DEFORMATION FREE FALL FENCING DRY OTHER

Severity (Choose carefully based on barrier type(s) above) NONE MINOR MODERATE SEVERE

Water Depth Matches Stream YES NO-SHALLOWER NO-DEEPER UNKNOWN DRY

Water Velocity Matches Stream YES NO-FASTER NO-SLOWER UNKNOWN DRY

Dry Passage through Structure? YES NO UNKNOWN **Height above Dry Passage** _____

Comments _____

STRUCTURE 2

Structure Material METAL CONCRETE PLASTIC WOOD ROCK/STONE FIBERGLASS COMBINATION

OUTLET

Outlet Shape 1 2 3 4 5 6 7 FORD UNKNOWN REMOVED Outlet Armoring NONE NOT EXTENSIVE EXTENSIVE

Outlet Grade (Pick one) AT STREAM GRADE FREE FALL CASCADE FREE FALL ONTO CASCADE CLOGGED/COLLAPSED/SUBMERGED UNKNOWN

Outlet Dimensions A. Width _____ B. Height _____ C. Substrate/Water Width _____ D. Water Depth _____

Outlet Drop to Water Surface _____ Outlet Drop to Stream Bottom _____ E. Abutment Height (Type 7 bridges only) _____

L. Structure Length (Overall length from inlet to outlet) _____

INLET

Inlet Shape 1 2 3 4 5 6 7 FORD UNKNOWN REMOVED

Inlet Type PROJECTING HEADWALL WINGWALLS HEADWALL & WINGWALLS MITERED TO SLOPE OTHER NONE

Inlet Grade (Pick one) AT STREAM GRADE INLET DROP PERCHED CLOGGED/COLLAPSED/SUBMERGED UNKNOWN

Inlet Dimensions A. Width _____ B. Height _____ C. Substrate/Water Width _____ D. Water Depth _____

ADDITIONAL CONDITIONS

Slope % (Optional) _____ Slope Confidence HIGH LOW Internal Structures NONE BAFFLES/WEIRS SUPPORTS OTHER _____

Structure Substrate Matches Stream NONE COMPARABLE CONTRASTING NOT APPROPRIATE UNKNOWN

Structure Substrate Type (Pick one) NONE SILT SAND GRAVEL COBBLE BOULDER BEDROCK UNKNOWN

Structure Substrate Coverage NONE 25% 50% 75% 100% UNKNOWN

Physical Barriers (Pick all that apply) NONE DEBRIS/SEDIMENT/ROCK DEFORMATION FREE FALL FENCING DRY OTHER

Severity (Choose carefully based on barrier type(s) above) NONE MINOR MODERATE SEVERE

Water Depth Matches Stream YES NO-SHALLOWER NO-DEEPER UNKNOWN DRY

Water Velocity Matches Stream YES NO-FASTER NO-SLOWER UNKNOWN DRY

Dry Passage through Structure? YES NO UNKNOWN Height above Dry Passage _____

Comments

STRUCTURE 3

Structure Material METAL CONCRETE PLASTIC WOOD ROCK/STONE FIBERGLASS COMBINATION

OUTLET

Outlet Shape 1 2 3 4 5 6 7 FORD UNKNOWN REMOVED Outlet Armoring NONE NOT EXTENSIVE EXTENSIVE

Outlet Grade (Pick one) AT STREAM GRADE FREE FALL CASCADE FREE FALL ONTO CASCADE CLOGGED/COLLAPSED/SUBMERGED UNKNOWN

Outlet Dimensions A. Width _____ B. Height _____ C. Substrate/Water Width _____ D. Water Depth _____

Outlet Drop to Water Surface _____ Outlet Drop to Stream Bottom _____ E. Abutment Height (Type 7 bridges only) _____

L. Structure Length (Overall length from inlet to outlet) _____

INLET

Inlet Shape 1 2 3 4 5 6 7 FORD UNKNOWN REMOVED

Inlet Type PROJECTING HEADWALL WINGWALLS HEADWALL & WINGWALLS MITERED TO SLOPE OTHER NONE

Inlet Grade (Pick one) AT STREAM GRADE INLET DROP PERCHED CLOGGED/COLLAPSED/SUBMERGED UNKNOWN

Inlet Dimensions A. Width _____ B. Height _____ C. Substrate/Water Width _____ D. Water Depth _____

ADDITIONAL CONDITIONS

Slope % (Optional) _____ Slope Confidence HIGH LOW Internal Structures NONE BAFFLES/WEIRS SUPPORTS OTHER _____

Structure Substrate Matches Stream NONE COMPARABLE CONTRASTING NOT APPROPRIATE UNKNOWN

Structure Substrate Type (Pick one) NONE SILT SAND GRAVEL COBBLE BOULDER BEDROCK UNKNOWN

Structure Substrate Coverage NONE 25% 50% 75% 100% UNKNOWN

Physical Barriers (Pick all that apply) NONE DEBRIS/SEDIMENT/ROCK DEFORMATION FREE FALL FENCING DRY OTHER

Severity (Choose carefully based on barrier type(s) above) NONE MINOR MODERATE SEVERE

Water Depth Matches Stream YES NO-SHALLOWER NO-DEEPER UNKNOWN DRY

Water Velocity Matches Stream YES NO-FASTER NO-SLOWER UNKNOWN DRY

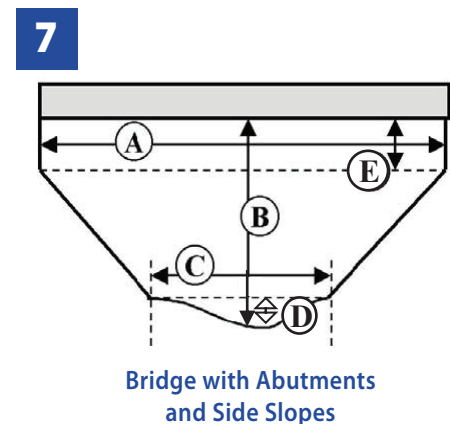
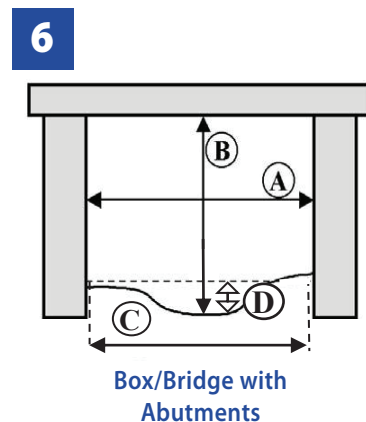
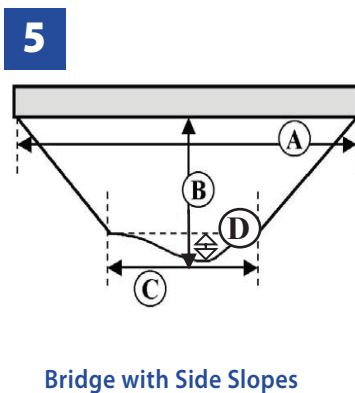
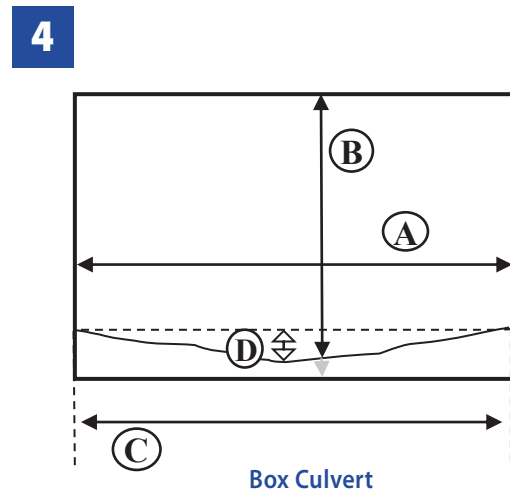
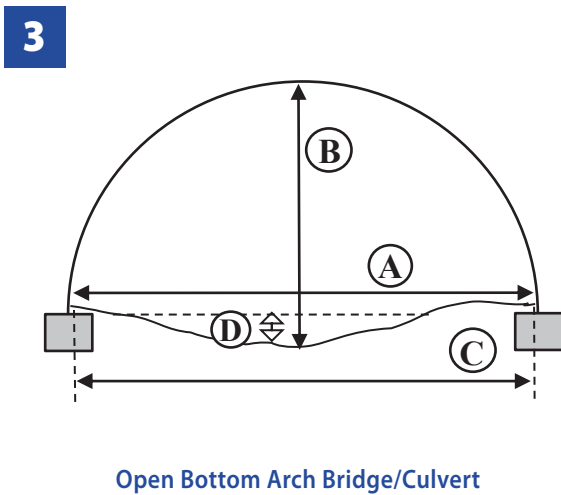
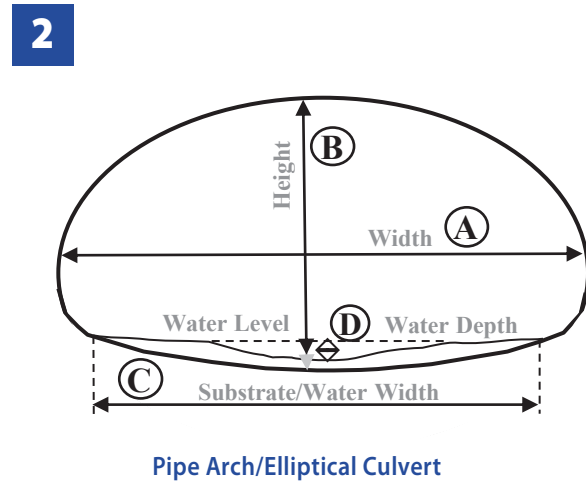
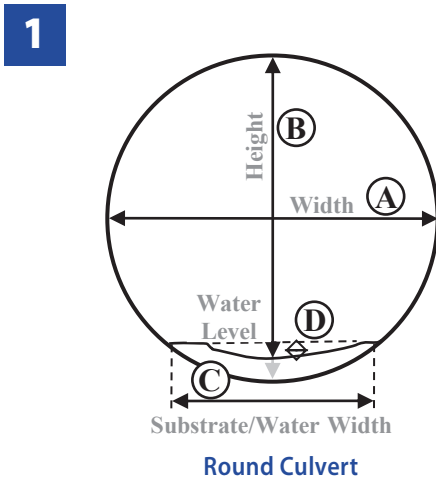
Dry Passage through Structure? YES NO UNKNOWN Height above Dry Passage _____

Comments

Structure Shape & Dimensions

- 1) Select the Structure Shape number from the diagrams below and record it on the form for Inlet and Outlet Shape.
- 2) Record on the form in the appropriate blanks dimensions **A**, **B**, **C** and **D** as shown in the diagrams;
C captures the width of water or substrate, whichever is wider; for dry culverts without substrate, C = 0.
D is the depth of water -- be sure to measure inside the structure; for dry culverts, D = 0.
- 3) Record Structure Length (**L**). (Record abutment height (**E**) only for Type 7 Structures.)
- 4) For multiple culverts, also record the Inlet and Outlet shape and dimensions for each additional culvert.

NOTE: Culverts 1, 2 & 4 may or may not have substrate in them, so height measurements (B) are taken from the level of the "stream bed", whether that bed is composed of substrate or just the inside bottom surface of a culvert (grey arrows below show measuring to bottom, black arrows show measuring to substrate).



Appendix D. List of Streams in Butternut Creek Watershed

Table D1. Streams in the Upper Butternut Creek Watershed.

Physical Assessment ID ¹	Name	FIN ²	Classification Standard ³	Order ⁴	Drainage Size (mi ²) ⁵	Length (mi)
UB_Mainstem*	Butternut Creek	SR-146-9	C(TS)	3	12	18.11
UB_001	Unnamed Water	SR-146-9-59	C	1	1	0.93
UB_002	Unnamed Water	SR-146-9-58	C(T)	1	1	1.12
UB_003	Unnamed Water	SR-146-9-57	C, C(T)	2	1	1.73
UB_004*	Unnamed Water	SR-146-9-56	C(TS)	1	1	1.02
UB_005*	Unnamed Water	SR-146-9-55	C(T)	1	1	1.23
UB_006*	Unnamed Water	SR-146-9-54	C, C(TS)	2	1	1.61
UB_007	Unnamed Water	SR-146-9-53	C(TS)	1	1	1.32
UB_008	Unnamed Water	SR-146-9-52	C	1	1	0.75
UB_009	Unnamed Water	SR-146-9-51A	C	1	1	0.73
UB_010	Unnamed Water	SR-146-9-51	C	2	1	1.83
UB_011	Unnamed Water	SR-146-9-49	C	1	1	1.55
UB_012	Unnamed Water	SR-146-9-47	C	1	1	0.74
UB_013	Unnamed Water	SR-146-9-46	C	1	1	0.80
UB_014*	Unnamed Water	SR-146-9-45	C, C(T), C(TS)	2	3	6.97
UB_015	Unnamed Water	SR-146-9-44	C	1	1	1.41
UB_016	Unnamed Water	SR-146-9-43	C(TS)	1	1	0.34
UB_017	Unnamed Water	SR-146-9-41	C(TS)	1	1	0.73
UB_018	Unnamed Water	SR-146-9-40	C, C(TS)	1	1	1.84
UB_019	Unnamed Water	SR-146-9-39	C	1	1	0.67
UB_020	Unnamed Water	SR-146-9-38A-1	C	1	2	1.07
UB_021	Unnamed Water	SR-146-9-38	C(T)	1	1	1.41
UB_022*	Unnamed Water	SR-146-9-37	C, C(T)	2	3	6.39
UB_023	Unnamed Water	SR-146-9-36A	C	1	1	0.60
UB_024*	Unnamed Water	SR-146-9-36	C, C(T)	2	2	3.15
UB_025*	Unnamed Water	SR-146-9-34	C, C(T)	2	2	5.08
UB_026	Unnamed Water	SR-146-9-33	C(T)	1	1	1.49
UB_027*	Unnamed Water	SR-146-9-32	C(T)	2	2	2.20
UB_028	Unnamed Water	SR-146-9-31	C(T)	1	1	0.66

¹ Stream ID used in 2016-2018 Butternut Creek Watershed Physical Assessment

² FIN – Fisheries Index Number, NYS Department of Environmental Conservation

³ Classification Standards – NYSDEC Protection of Waters Program, Article 15

⁴ Order – Based on Strahler 1957, 1964

⁵ Drainage Size – NYSDEC

*Indicates surveyed as part of *Stream Corridor Assessment*

Table D2. Streams in the Middle Butternut Creek Watershed.

Physical Assessment ID ¹	Name	FIN ²	Classification Standard ³	Order ⁴	Drainage Size (mi ²) ⁵	Length (mi)
MB_Mainstem*	Butternut Creek	SR-146-9	AA, C, C(T), C(TS)	4	14	10.90
MB_001*	Stony Creek	SR - 146-9-29	C, C(T), C(TS)	4	5	18.60
MB_002	Unnamed Water	SR-146-9-28	C	1	1	1.16
MB_003	Unnamed Water	SR-146-9-27	C(TS)	1	1	1.44
MB_004	Unnamed Water	SR-146-9-26	C	1	1	1.91
MB_005	Unnamed Water	SR-146-9-25	C(T)	1	1	1.09
MB_006	Unnamed Water	SR-146-9-24	C	1	1	0.96
MB_007	Unnamed Water	SR-146-9-23	C(TS)	1	1	0.80
MB_008	Unnamed Water	SR-146-9-21	C	1	1	0.90
MB_009	Unnamed Water	SR-146-9-20A	C	1	1	0.94
MB_010	Unnamed Water	SR-146-9-20	C(TS)	1	1	0.48
MB_011*	Aldrich Creek	SR - 146-9-18	C, C(T), C(TS)	3	4	12.29
MB_012*	Unnamed Water	SR-146-9-19	C	2	1	3.65
MB_013*	Unnamed Water	N/A	C	1	1	1.03
MB_014*	Reservoir Brook/Silver Creek	SR - 146-9-17	C, C(T), C(TS)	2	3	6.76
MB_015*	Calhoun Creek	SR - 146-9-16	C, C(T)	2	3	7.33
N/A	Unnamed Water	SR - 146-9-16A	N/A	1	1	0.62
MB_016*	Unnamed Water	SR-146-9-15	C	2	2	2.84
MB_017*	Harris Brook	SR-146-9-14	C	2	3	6.71
MB_018*	Fairview Creek	SR-146-9-13	C	2	1	1.47
MB_019	Unnamed Water	SR-146-9-12B	C	1	1	0.70
MB_020	Unnamed Water	SR-146-9-12A	C	1	1	0.35
MB_021	Unnamed Water	SR-146-9-12	C	2	1	2.28
MB_022	Unnamed Water	SR-146-9-11B	C	1	1	0.67
MB_023	Unnamed Water	SR-146-9-11A	C	1	1	1.42

¹ Stream ID used in 2016-2018 Butternut Creek Watershed Physical Assessment

² FIN –Fisheries Index Number, NYS Department of Environmental Conservation

³ Classification Standards – NYSDEC Protection of Waters Program, Article 15

⁴ Order – Based on Strahler 1957, 1964

⁵ Drainage Size – NYSDEC

*Indicates surveyed as part of *Stream Corridor Assessment*

Table D3. Streams in the Lower Butternut Creek Watershed.

Physical Assessment ID ¹	Name	FIN ²	Classification Standard ³	Order ⁴	Drainage Size (mi ²) ⁵	Length (mi)
LB_Mainstem*	Butternut Creek	SR-146-9	AA, B(T), C, C(T)	4	14	13.66
LB_001*	Morris Brook	SR-146-9-11	C, C(T)	3	5	13.26
LB_002	Unnamed Water	SR-146-9-10B	C	1	1	0.72
LB_003	Unnamed Water	SR-146-9-10A	C	1	1	0.68
LB_004*	Thorp Brook	SR-146-9-10	C, C(T)	2	3	6.26
LB_005	Unnamed Water	SR-146-9-9A	C	1	1	0.46
LB_006*	Coye Brook	SR-146-9-9	C, C(T)	2	2	4.20
LB_007*	Cahoon Creek	SR-146-9-8	C, C(TS)	2	6	15.47
LB_008*	Dunderberg Creek	SR-146-9-7	AA, AA(T), C, C(T)	3	4	10.49
LB_009	Unnamed Water	SR-146-9-6	C, C(T)	2	1	2.43
LB_010	Unnamed Water	SR-146-9-5	C	1	1	0.77
LB_011*	Helbert Brook	SR-146-9-4	C(TS)	1	2	2.71
LB_012*	Dry Brook/Copes Brook	SR-146-9-3	C, C(TS)	2	3	5.28
LB_013*	Shaw Brook	SR-146-9-2	C, C(T), C(TS)	3	3	7.91
LB_014	Unnamed Water	SR-146-9-1	C	1	1	2.13
LB_015	Unnamed Water	SR-146-9-D	C	1	1	0.60
LB_016	Unnamed Water	SR-146-9-C	C	1	1	0.35
LB_017	Unnamed Water	SR-146-9-B	C	1	1	0.56
LB_018	Unnamed Water	SR-146-9-A	C	1	1	0.34

¹ Stream ID used in 2016-2018 Butternut Creek Watershed Physical Assessment

² FIN –Fisheries Index Number, NYS Department of Environmental Conservation

³ Classification Standards – NYSDEC Protection of Waters Program, Article 15

⁴ Order – Based on Strahler 1957, 1964

⁵ Drainage Size – NYSDEC

*Indicates surveyed as part of *Stream Corridor Assessment*

Appendix E. BEHI description

The complete BEHI procedure consists of five metrics; four observational and one requiring measurements.

1. Ratio of bank height to bankfull height
2. Ratio of root depth to bank height
3. Root density, in percent
4. Bank angle, in degrees
5. Surface protection, in percent

1) Ratio of bank height to bankfull height: The ratio of bank height (BH) to bankfull height is the most challenging of the BEHI metrics, as requires accurate identification of bankfull indicators. Common bankfull indicators in stable streams include top of the bank, top of the point bars, and other changes in channel slope.

2) Ratio of root depth to bank height: Root depth (RDH) is the ratio of the average plant root depth to the bank height, expressed as a percent (e.g. roots extending 2 feet into a 4 foot tall bank = 0.50).

3) Root density: Root density (RD), expressed as a percent, is the proportion of the streambank surface covered (and protected) by plant roots (e.g. a bank whose slope is half covered with roots = 50 percent).

4) Surface protection: Surface protection (SP) is the percentage of the stream bank covered (and therefore protected) by plant roots, downed logs, branches, rocks, etc. In many streams surface protection and root density are synonymous.

5) Bank angle: Bank angle (BA) is the angle of the “lower bank” – the bank from the waterline at baseflow to the top of the bank, as opposed to benches that are higher than the floodplain. Bank angle can be measured with an inclinometer through given the broad bank angle categories, visual estimates are generally sufficient. Bank angle is perhaps the metric most often estimated incorrectly.

6) Bank Length and Near Bank Stress are also included in the evaluation.

Bank Material and Bank Stratification are two variables evaluated to factor in an adjustment value.

1) Bank Material Adjustment

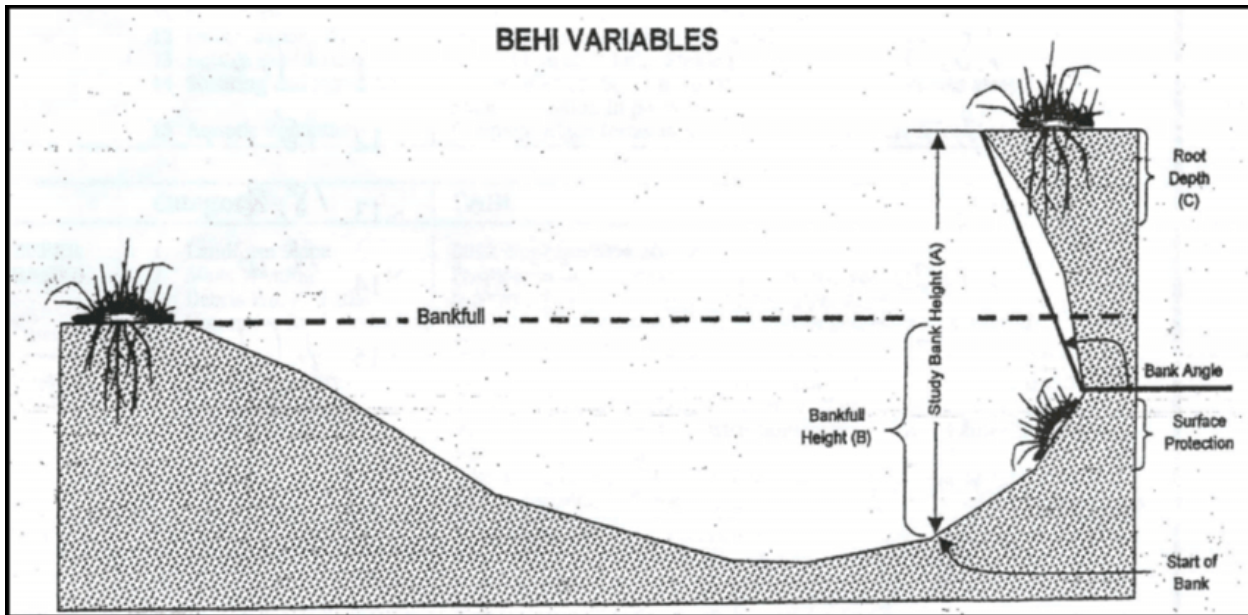
- Bedrock – Very Low BEHI
- Boulders – Very Low BEHI
- Cobble – Minus 10 Points
- Gravel – Add 5 to 10 Points
- Sand – Add 10 Points
- Silt/Clay – No Adjustment

2) Stratification Adjustment

- Based on presence of stratification – Add 5 to 10 points
- One layer – Add 5 points
- Multiple Layers – Add 10 Points

BEHI Values

Value	Description of Erodibility
5-10	Very Low
10-19.5	Low
20-29.5	Moderate
30-39.5	High
40-45	Very High
>45	Extreme



BANK EROSION POTENTIAL HIGH MODERATE LOW	L					
	M					
	H					
	BANK HEIGHT vs BANKFULL DEPTH	BANK ANGLE	DENSITY of ROOTS BANK SURFACE PROTECTION % of TOTAL BANK HEIGHT WITH ROOTS	SOIL STRATIFICATION	PARTICLE SIZE	

Appendix F. Summary of Stream Corridor Assessment

Table F1. Summary of Stream Corridor Assessment Categories for the Upper Butternut Creek watershed.

Upper Butternut Creek Watershed Stream	Observations	Erosion	BEHI Erosion Sites	Estimated Tons Lost year	Deposition	Buffer Potential	Floodplain Access	Invasives	Stream Crossings	Instream Structures	Priority Sites	Bedrock
Butternut Creek (mainstem)	696	109	42	1,603.84	180	88	13	7	41	30	49	2
Unnamed tributary - UB_004	47	6	0	0.00	6	1	0	0	8	6	0	4
Unnamed Tributary/Basswood Creek - UB_005	30	1	0	0.00	1	0	0	0	4	1	0	0
Unnamed tributary - UB_006	7	0	0	0.00	0	0	0	0	4	0	0	0
Unnamed tributary - UB_014	220	43	3	25.88	47	7	2	0	18	17	3	3
Unnamed tributary - UB_022	52	14	9	238.71	10	11	0	0	11	2	9	1
Unnamed tributary - UB_024	18	3	2	83.59	8	2	0	0	2	0	2	3
Unnamed tributary - UB_025	48	12	6	65.17	12	7	0	0	6	2	6	3
Unnamed tributary - UB_027	50	8	2	74.35	4	4	0	0	8	3	2	0
Total Tributaries	472	87	22	487.69	88	32	2	0	61	31	22	14
Total Tributaries and Mainstem	1,168	196	64	2,091.53	268	120	15	7	102	61	71	16

Table F2. Summary of Stream Corridor Assessment Categories for the Middle Butternut Creek watershed.

Middle Butternut Creek Watershed Stream	Observations	Erosion	BEHI Erosion Sites	Estimated Tons Lost Year	Deposition	Buffer Potential	Floodplain Access	Invasives	Stream Crossings	Instream Structures	Priority Sites	Bedrock
Butternut Creek (mainstem)	133	64	20	3,316.85	34	27	0	10	5	12	22	0
Aldrich Creek - MB_011	119	23	3	66.31	23	4	5	15	12	11	3	2
Calhoun Creek - MB_015	189	41	4	40.91	51	12	5	13	8	13	5	2
Diversion Channel - MB_013A2	4	0	0	0.00	0	0	0	1	2	0	0	0
Fairview Creek - MB_018	48	31	4	40.93	10	4	0	2	4	0	4	0
Harris Brook - MB_017	52	9	3	8.81	8	3	0	3	5	6	6	1
Reservoir/Silver Brook - MB_014	113	17	1	3.40	26	9	4	4	18	11	1	2
Stony Creek - MB_001	261	54	16	1,023.18	56	28	16	0	31	17	18	4
Unnamed Tributary - MB_012	2	0	0	0.00	0	0	0	0	1	0	0	0
Unnamed Tributary - MB_016	81	30	15	292.73	18	22	0	1	13	3	15	0
Total Tributaries	869	205	46	1,476.27	192	82	30	39	94	61	52	11
Total Tributaries and Mainstem	1,002	269	66	4,793.12	226	109	30	49	99	73	74	11

Table F3. Summary of Stream Corridor Assessment Categories for the Lower Butternut Creek watershed.

Lower Butternut Creek Watershed Stream	Observations	Erosion	BEHI Erosion Sites	Estimated Tons Lost Year	Deposition	Buffer Potential	Floodplain Access	Invasives	Stream Crossings	Instream Structures	Priority Sites	Bedrock
Butternut Creek (mainstem)	254	58	14	1,060.95	79	41	12	41	4	4	18	0
Cahoon Creek - LB_007	202	75	15	1,056.70	40	19	1	2	31	33	15	3
Coye Brook - LB_006	50	26	9	265.17	24	10	0	1	7	1	9	0
Dry Brook/Copes Brook - LB_012	55	13	1	35.79	16	2	0	0	10	4	2	1
Dunderberg Creek - LB_008	114	24	5	114.11	29	6	0	12	15	14	5	0
Halbert Brook - LB_011	18	5	4	74.61	6	4	0	1	2	1	4	0
Morris Brook - LB_001	98	29	6	85.74	22	7	0	6	15	7	6	1
Shaw Brook - LB_013	115	37	5	127.52	17	7	0	4	22	10	6	2
Thorp Brook - LB_004	43	10	4	70.82	10	4	0	1	7	3	4	0
Total Tributaries	695	219	49	1,830.46	164	59	1	27	109	73	51	7
Total Tributaries and Mainstem	949	277	63	2,891.41	243	100	13	68	113	77	69	7

Figure F4. Summary of Stream Corridor Assessment Categories for the Butternut Creek watershed separated by tributaries compared with the mainstem.

Stream Section	Subwatershed	Observations	Erosion	BEHI Erosion Sites	Estimated Tons Lost year	Deposition	Buffer Potential	Floodplain Access	Invasives	Stream Crossings	Instream Structures	Priority Sites	Bedrock
Tributaries	Upper	472	87	22	487.69	88	32	2	0	61	31	22	14
	Middle	869	205	46	1,476.27	192	82	30	39	94	61	52	11
	Lower	695	219	49	1,830.46	164	59	1	27	109	73	51	7
	Overall	2,036	511	117	3,794.42	444	173	33	66	264	165	125	32
Butternut Creek (mainstem)	Upper	696	109	42	1,603.84	180	88	13	7	41	30	49	2
	Middle	133	64	20	3,316.85	34	27	0	10	5	12	22	0
	Lower	254	58	14	1,060.95	79	41	12	41	4	4	18	0
	Overall	1,083	231	76	5,981.64	293	156	25	58	50	46	89	2

Appendix G. Summary Maps combining Stream Corridor Assessment and Stream Crossing Assessment

G.1 Upper Butternut Creek Watershed Figures

Upper Butternut Tributaries
 Unnamed Tributary/
 Basswood Creek - UB_005

Erosion Sites

- ◆ Extreme
- ◆ Very High
- ◆ High
- ◆ Moderate
- ◆ No BEH I

Significant Features

- ▲ Berm
- ▲ Cold water input
- ▲ Dredging
- ▲ Erosion site
- ▲ Garbage
- ▲ Gravel mine
- ▲ Road runoff
- ▲ Upper knotweed

Deposition

- Beaver Dam
- Debris
- Grasses
- Gravel bar
- Gravel bar/Beaver Dam
- Gravel bar/Debris
- Gravel bar/LWD
- Gravel bar/LWD/Beaver dam
- LWD
- Sediment
- Sediment/D ebris
- No
- N/A

Buffer Potential

- N/A
- No
- Recent Planting
- Yes
- Yes/Recent planting

Floodplain Reconnection Potential

- ★ Instream Structures

NAACC Stream Crossing Evaluation

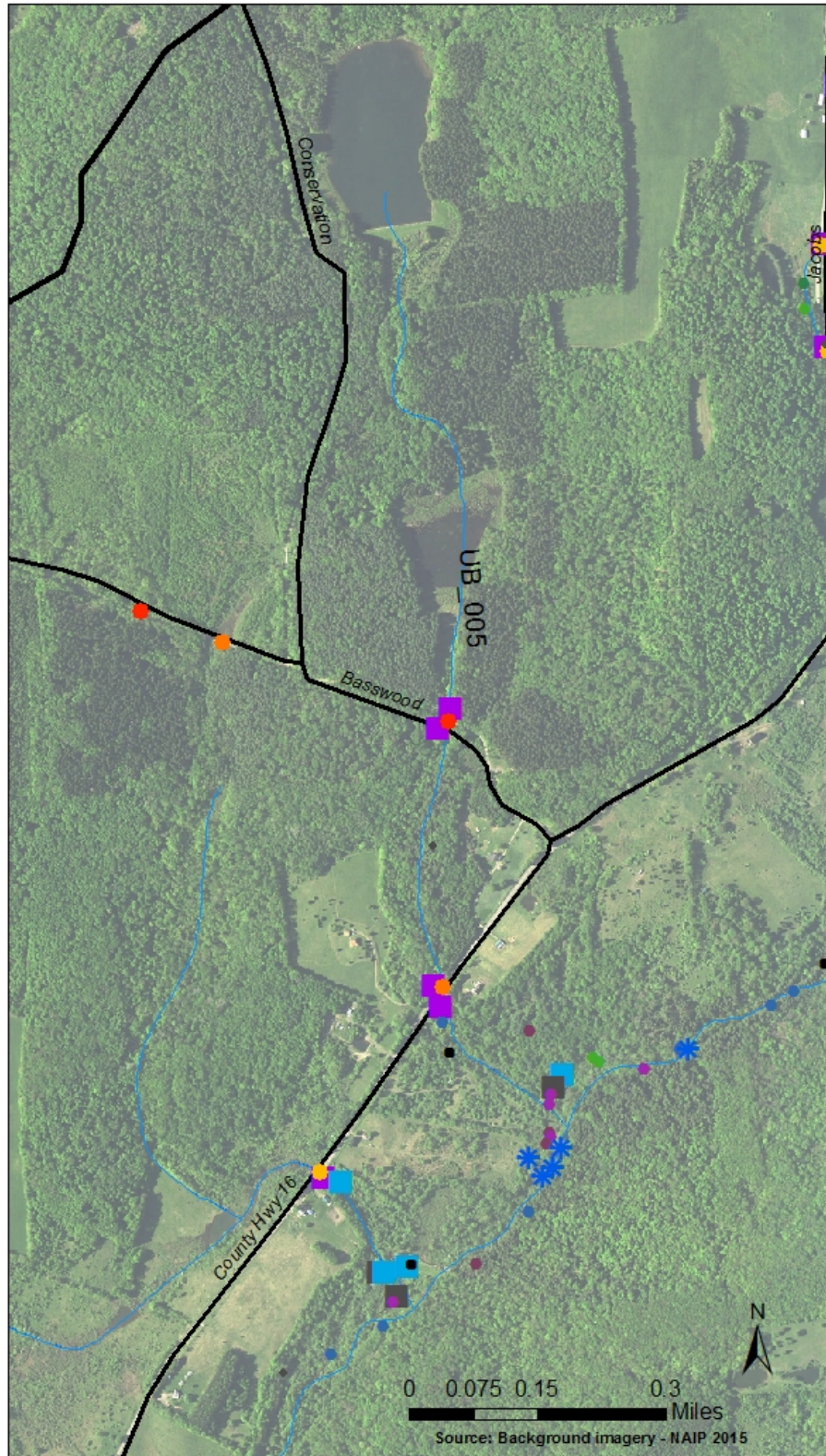
- no score - missing data
- No barrier
- Insignificant barrier
- Minor barrier
- Moderate barrier
- Significant barrier
- Severe barrier

Stream Crossings No NAACC

- Bridge
- Culvert
- Footbridge
- Ford
- Livestock crossing

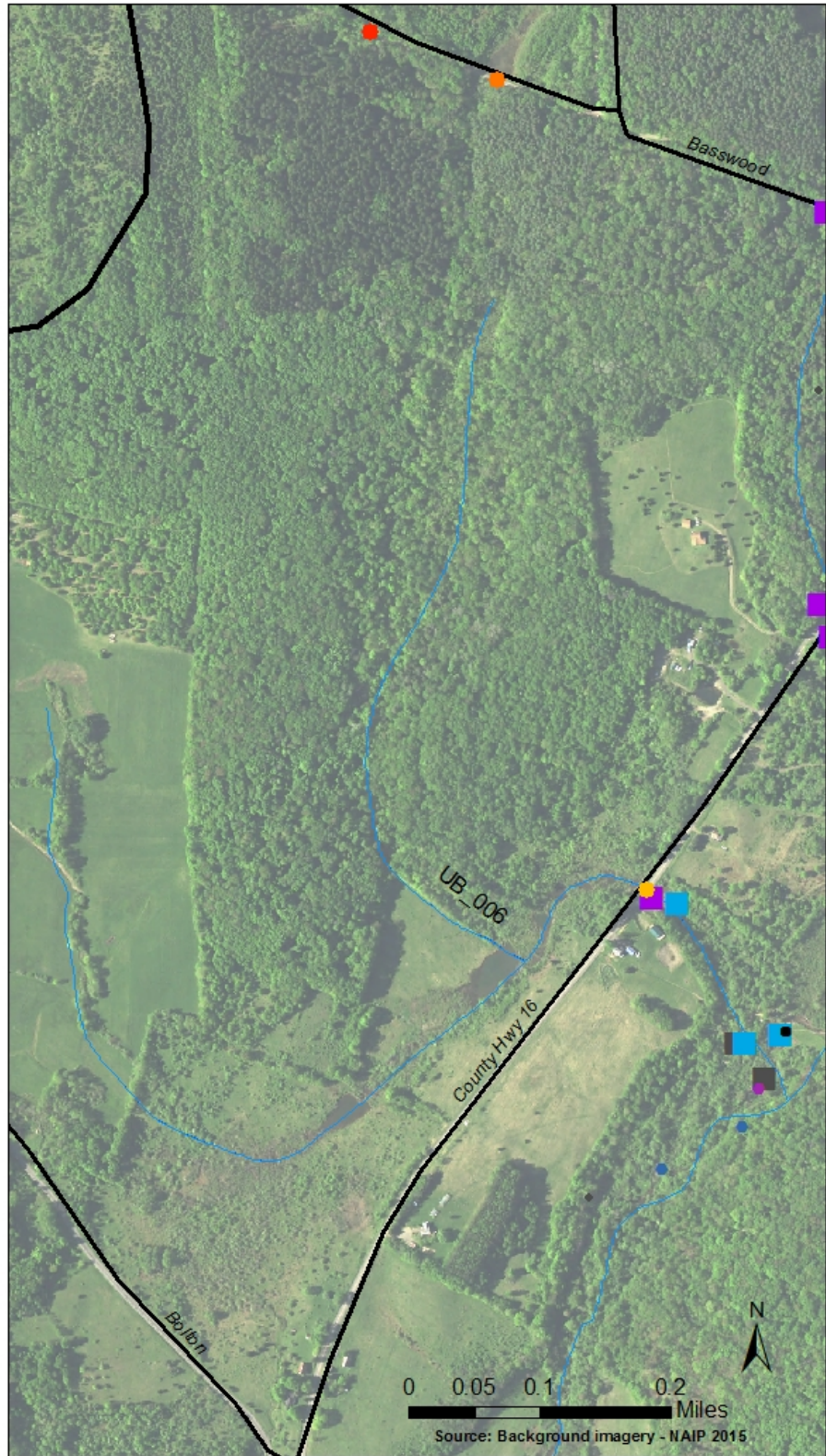
- Roads
- Streams

- ▭ Butternut Watershed Boundaries



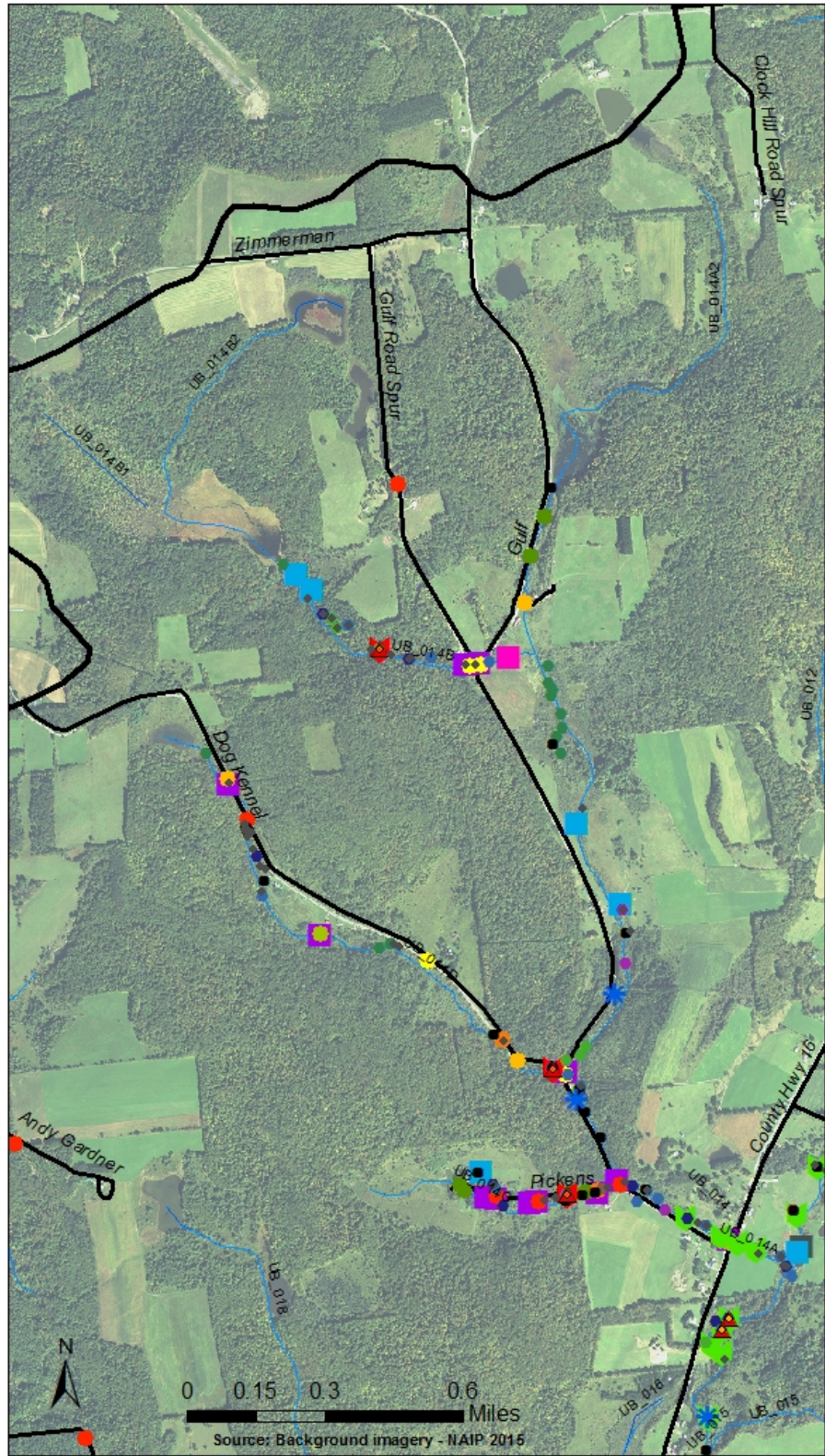
Upper Butternut Tributaries
 Unnamed Tributary/UB_006

- Erosion Sites**
- ◆ Extreme
- ◆ Very High
- ◆ High
- ◆ Moderate
- ◆ No BEH I
- Significant Features**
- ▲ Berm
- ▲ Cold water input
- ▲ Dredging
- ▲ Erosion site
- ▲ Garbage
- ▲ Gravel mine
- ▲ Road runoff
- ▲ Upper knotweed
- Deposition**
- Beaver Dam
- Debris
- Grasses
- Gravel bar
- Gravel bar/Beaver Dam
- Gravel bar/Debris
- Gravel bar/LWD
- Gravel bar/LWD/Beaver dam
- LWD
- Sediment
- Sediment/Debris
- No
- N/A
- Buffer Potential**
- N/A
- No
- Recent Planting
- Yes
- Yes/Recent planting
- ★ Floodplain Reconnection Potential
- Instream Structures
- NAACC Stream Crossing Evaluation**
- no score - missing data
- No barrier
- Insignificant barrier
- Minor barrier
- Moderate barrier
- Significant barrier
- Severe barrier
- Stream Crossings No NAACC**
- Bridge
- Culvert
- Footbridge
- Ford
- Livestock crossing
- Roads
- Streams
- ▭ Butternut Watershed Boundaries



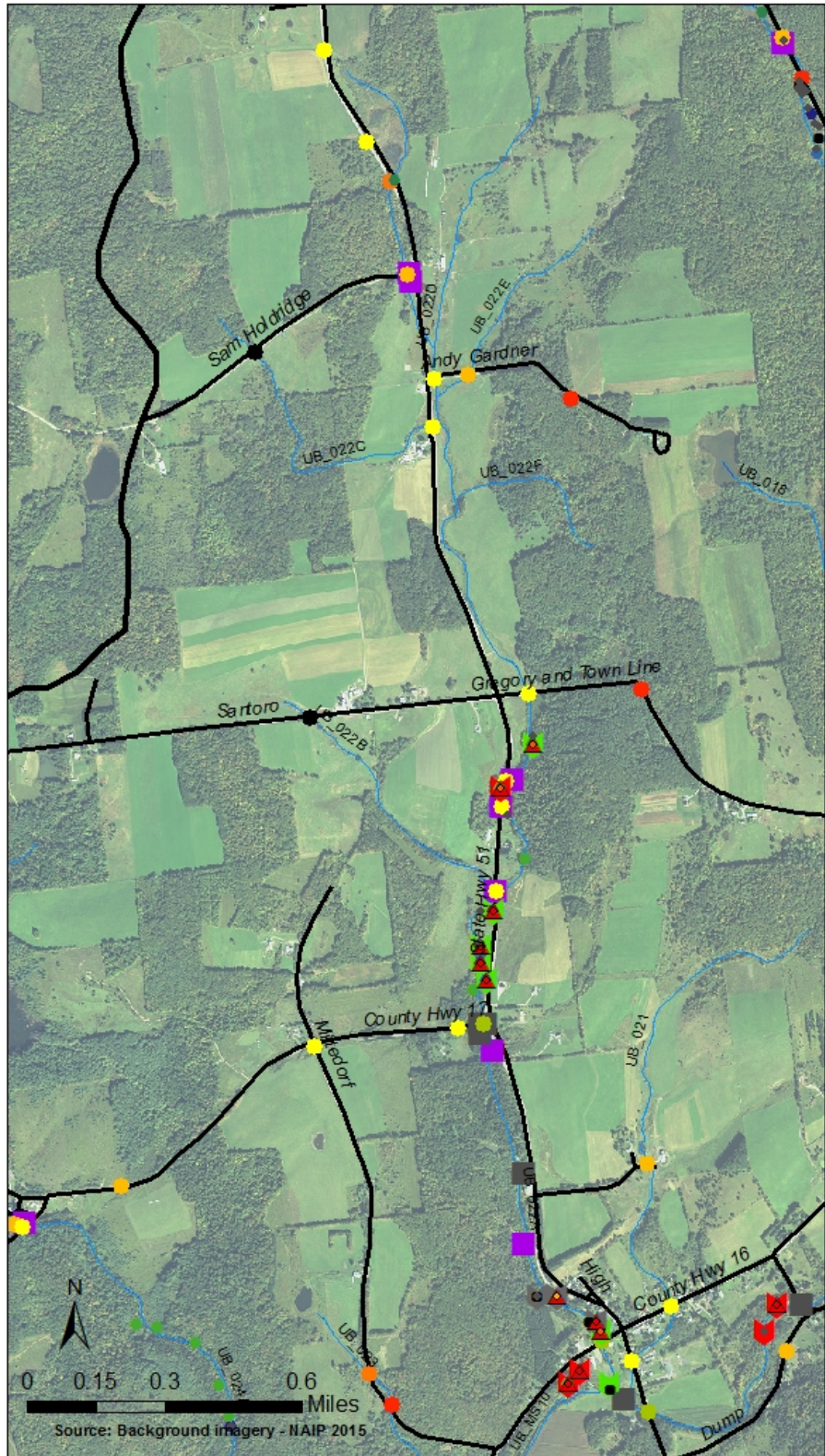
Upper Butternut Tributaries
Unnamed Tributary/UB_014

- Erosion Sites**
- ◆ Extreme
- ◆ Very High
- ◆ High
- ◆ Moderate
- ◆ No BEHI
- Significant Features**
- ▲ Berm
- ▲ Cold water input
- ▲ Dredging
- ▲ Erosion site
- ▲ Garbage
- ▲ Gravel mine
- ▲ Road runoff
- ▲ Upper knotweed
- Deposition**
- Beaver Dam
- Debris
- Grasses
- Gravel bar
- Gravel bar/Beaver Dam
- Gravel bar/Debris
- Gravel bar/LWD
- Gravel bar/LWD/Beaver dam
- LWD
- Sediment
- Sediment/Debris
- No
- N/A
- Buffer Potential**
- N/A
- No
- Recent Planting
- Yes
- Yes/Recent planting
- ★ Floodplain Reconnection Potential
- Instream Structures
- NAACC Stream Crossing Evaluation**
- no score - missing data
- No barrier
- Insignificant barrier
- Minor barrier
- Moderate barrier
- Significant barrier
- Severe barrier
- Stream Crossings No NAACC**
- Bridge
- Culvert
- Footbridge
- Ford
- Livestock crossing
- Roads
- Streams
- ▭ Butternut Watershed Boundaries



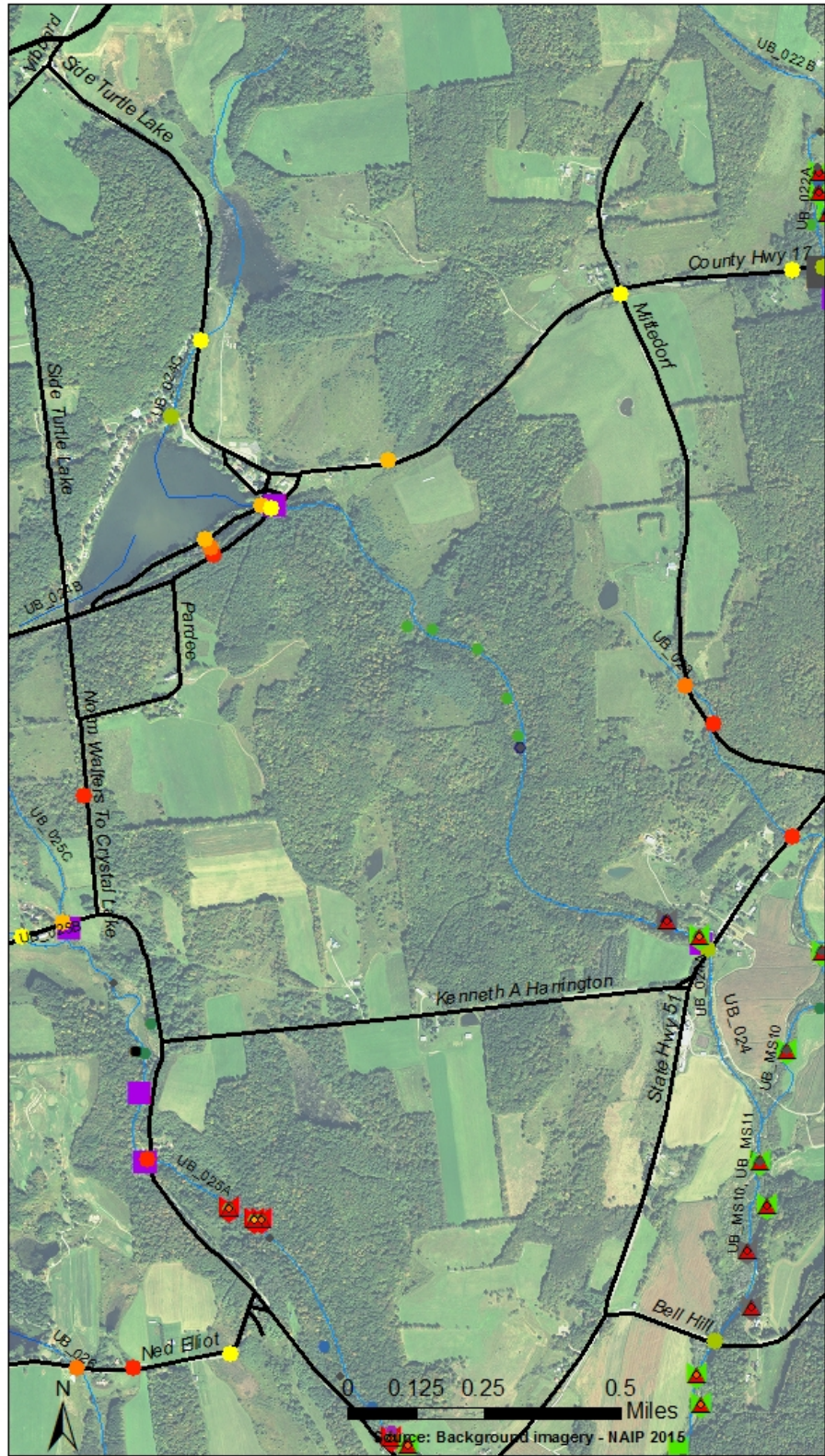
Upper Butternut Tributaries
 Unnamed Tributary/UB_022

- Erosion Sites**
 - ◆ Extreme
 - ◆ Very High
 - ◆ High
 - ◆ Moderate
 - ◆ No BEHI
- Significant Features**
 - ▲ Berm
 - ▲ Cold water input
 - ▲ Dredging
 - ▲ Erosion site
 - ▲ Garbage
 - ▲ Gravel mine
 - ▲ Road runoff
 - ▲ Upper knotweed
- Deposition**
 - Beaver Dam
 - Debris
 - Grasses
 - Gravel bar
 - Gravel bar/Beaver Dam
 - Gravel bar/Debris
 - Gravel bar/LWD
 - Gravel bar/LWD/Beaver dam
 - LWD
 - Sediment
 - Sediment/Debris
 - No
 - N/A
- Buffer Potential**
 - N/A
 - No
 - Recent Planting
 - Yes
 - Yes/Recent planting
- Floodplain Reconnection Potential**
 - ★
- Instream Structures**
 -
- NAACC Stream Crossing Evaluation**
 - no score - missing data
 - No barrier
 - Insignificant barrier
 - Minor barrier
 - Moderate barrier
 - Significant barrier
 - Severe barrier
- Stream Crossings No NAACC**
 - Bridge
 - Culvert
 - Footbridge
 - Ford
 - Livestock crossing
- Roads**
 -
- Streams**
 -
- Butternut Watershed Boundaries**
 -



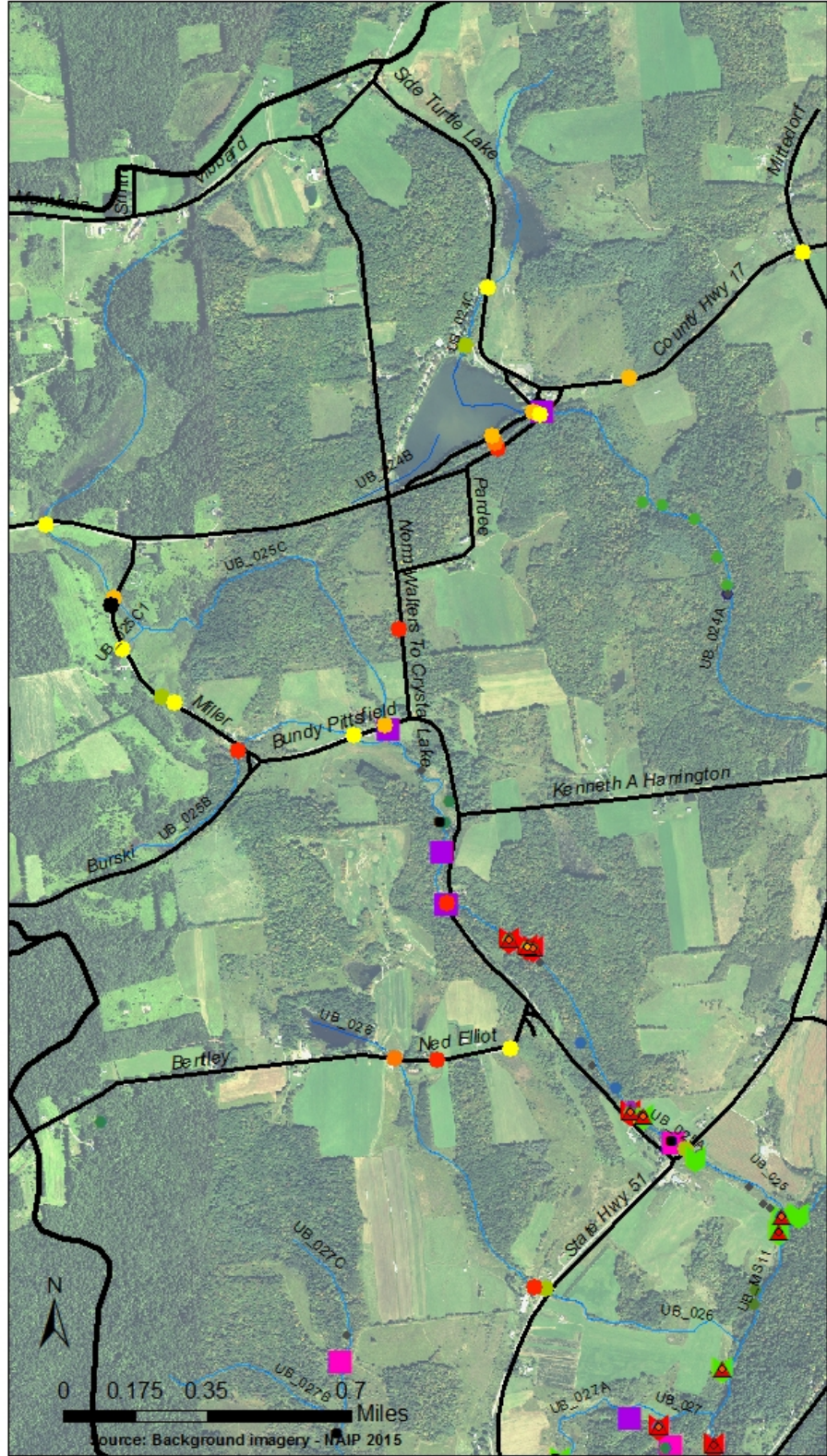
Upper Butternut Tributaries
 Unnamed Tributary/UB_024

- Erosion Sites**
- ◆ Extreme
- ◆ Very High
- ◆ High
- ◆ Moderate
- ◆ No BEHI
- Significant Features**
- ▲ Berm
- ▲ Cold water input
- ▲ Dredging
- ▲ Erosion site
- ▲ Garbage
- ▲ Gravel mine
- ▲ Road runoff
- ▲ Upper knotweed
- Deposition**
- Beaver Dam
- Debris
- Grasses
- Gravel bar
- Gravel bar/Beaver Dam
- Gravel bar/Debris
- Gravel bar/LWD
- Gravel bar/LWD/Beaver dam
- LWD
- Sediment
- Sediment/Debris
- No
- N/A
- Buffer Potential**
- N/A
- No
- Recent Planting
- Yes
- Yes/Recent planting
- ★ Floodplain Reconnection Potential
- Instream Structures
- NAACC Stream Crossing Evaluation**
- no score - missing data
- No barrier
- Insignificant barrier
- Minor barrier
- Moderate barrier
- Significant barrier
- Severe barrier
- Stream Crossings No NAACC**
- Bridge
- Culvert
- Footbridge
- Ford
- Livestock crossing
- Roads
- Streams
- ▭ Butternut Watershed Boundaries



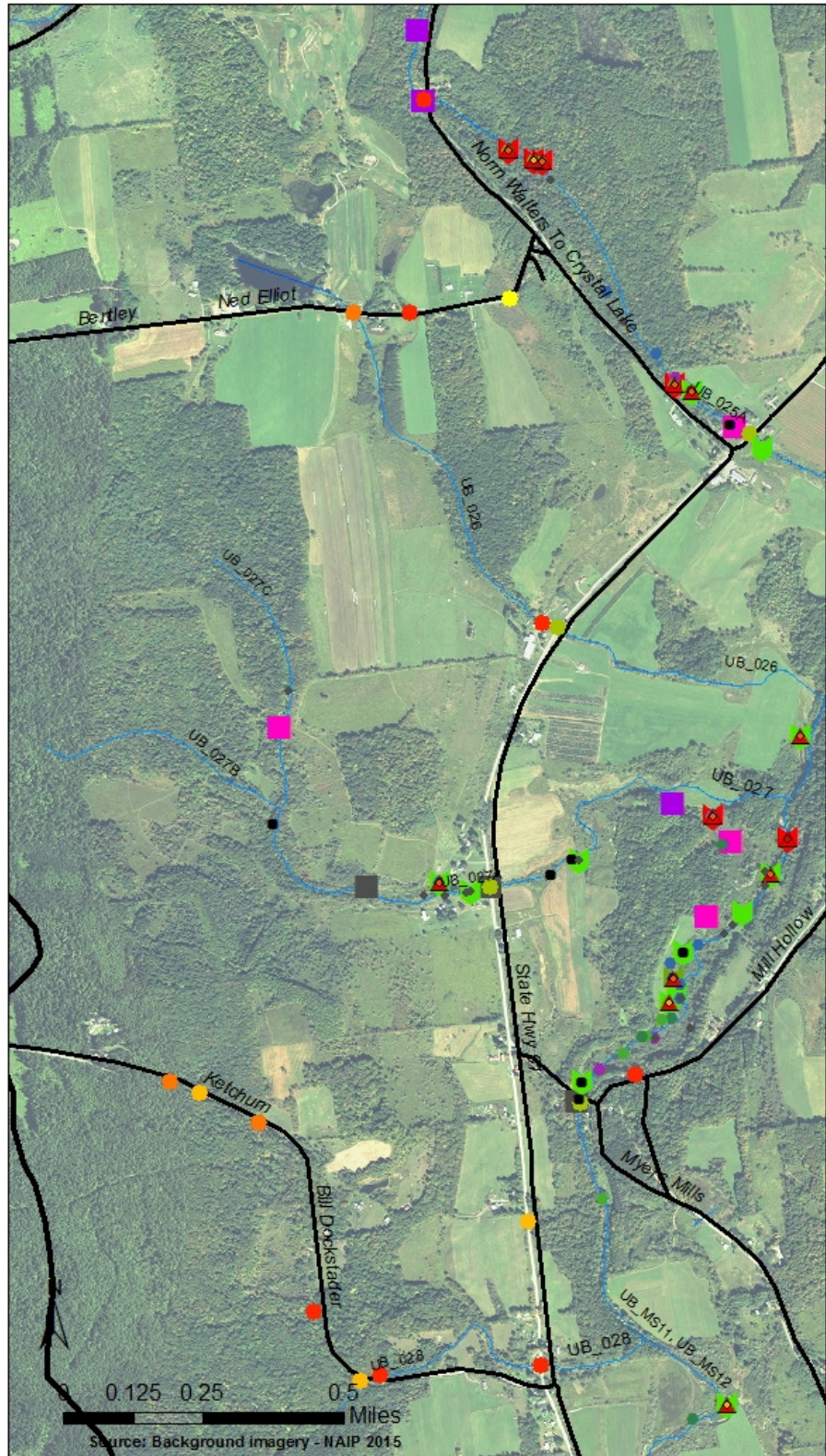
Upper Butternut Tributaries
Unnamed Tributary/UB_025

- Erosion Sites**
- ◆ Extreme
- ◆ Very High
- ◆ High
- ◆ Moderate
- ◆ No BEHI
- Significant Features**
- ▲ Berm
- ▲ Cold water input
- ▲ Dredging
- ▲ Erosion site
- ▲ Garbage
- ▲ Gravel mine
- ▲ Road runoff
- ▲ Upper knotweed
- Deposition**
- Beaver Dam
- Debris
- Grasses
- Gravel bar
- Gravel bar/Beaver Dam
- Gravel bar/Debris
- Gravel bar/LWD
- Gravel bar/LWD/Beaver dam
- LWD
- Sediment
- Sediment/Debris
- No
- N/A
- Buffer Potential**
- N/A
- No
- Recent Planting
- Yes
- Yes/Recent planting
- ★ Floodplain Reconnection Potential
- Instream Structures
- NAACC Stream Crossing Evaluation**
- no score - missing data
- No barrier
- Insignificant barrier
- Minor barrier
- Moderate barrier
- Significant barrier
- Severe barrier
- Stream Crossings No NAACC**
- Bridge
- Culvert
- Footbridge
- Ford
- Livestock crossing
- Roads
- Streams
- ▭ Butternut Watershed Boundaries



Upper Butternut Tributaries
Unnamed Tributary/UB_027

- Erosion Sites**
 - ◆ Extreme
 - ◆ Very High
 - ◆ High
 - ◆ Moderate
 - ◆ No BEHI
- Significant Features**
 - ▲ Berm
 - ▲ Cold water input
 - ▲ Dredging
 - ▲ Erosion site
 - ▲ Garbage
 - ▲ Gravel mine
 - ▲ Road runoff
 - ▲ Upper knotweed
- Deposition**
 - Beaver Dam
 - Debris
 - Grasses
 - Gravel bar
 - Gravel bar/Beaver Dam
 - Gravel bar/Debris
 - Gravel bar/LWD
 - Gravel bar/LWD/Beaver dam
 - LWD
 - Sediment
 - Sediment/Debris
 - No
 - N/A
- Buffer Potential**
 - N/A
 - No
 - Recent Planting
 - Yes
 - Yes/Recent planting
- Floodplain Reconnection Potential**
 - ★
- Instream Structures**
 -
- NAACC Stream Crossing Evaluation**
 - no score - missing data
 - No barrier
 - Insignificant barrier
 - Minor barrier
 - Moderate barrier
 - Significant barrier
 - Severe barrier
- Stream Crossings No NAACC**
 - Bridge
 - Culvert
 - Footbridge
 - Ford
 - Livestock crossing
- Roads**
 -
- Streams**
 -
- Butternut Watershed Boundaries**
 -



Upper Butternut Mainstem
No Mans Land to Cty Hwy 8

Erosion Sites

- ◆ Extreme
- ◆ Very High
- ◆ High
- ◆ Moderate
- ◆ No BEHI

Significant Features

- ▲ Berm
- ▲ Cold water input
- ▲ Dredging
- ▲ Erosion site
- ▲ Garbage
- ▲ Gravel mine
- ▲ Road runoff
- ▲ Upper knotweed

Deposition

- Beaver Dam
- Debris
- Grasses
- Gravel bar
- Gravel bar/Beaver Dam
- Gravel bar/Debris
- Gravel bar/LWD
- Gravel bar/LWD/Beaver dam
- LWD
- Sediment
- Sediment/Debris
- No
- N/A

Buffer Potential

- N/A
- No
- Recent Planting
- Yes
- Yes/Recent planting

Floodplain Reconnection Potential

- ★ Floodplain Reconnection Potential

NAACC Stream Crossing Evaluation

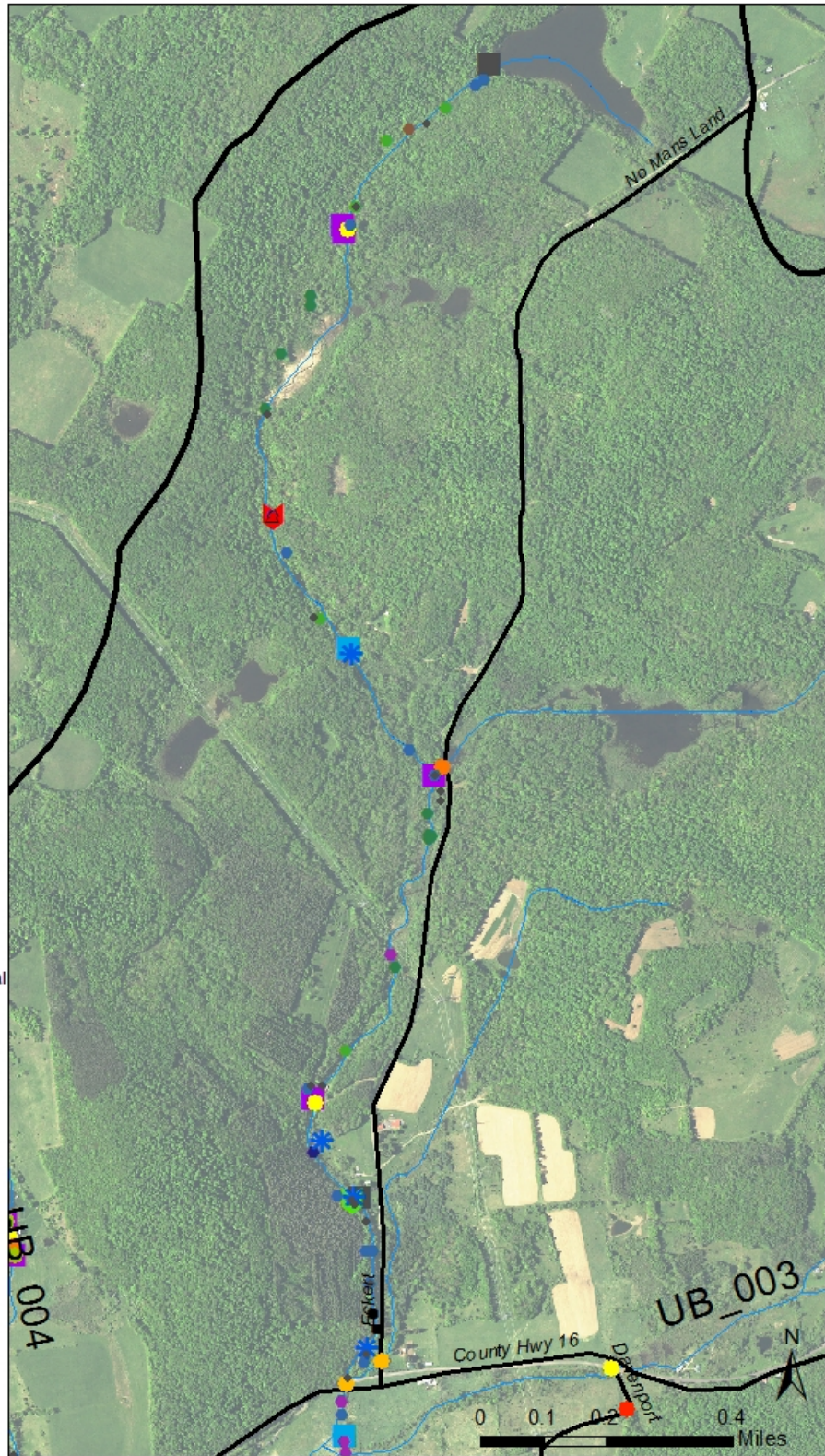
- no score - missing data
- No barrier
- Insignificant barrier
- Minor barrier
- Moderate barrier
- Significant barrier
- Severe barrier

Stream Crossings No NAACC

- Bridge
- Culvert
- Footbridge
- Ford
- Livestock crossing

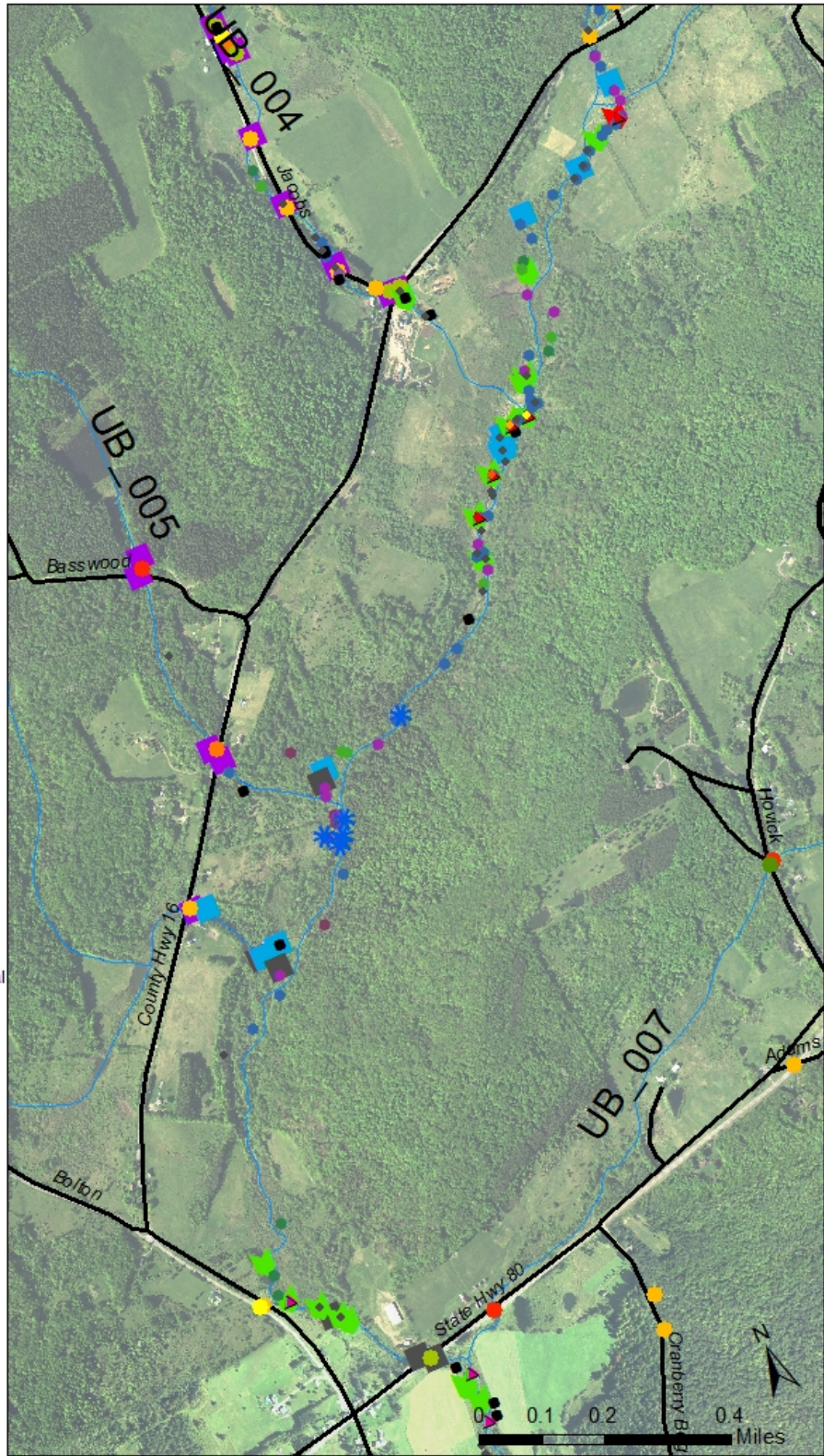
- Roads
- Streams

- ▭ Butternut Watershed Boundaries



Upper Butternut Mainstem
 Cty Hwy 16 to State Hwy 80
 Erosion Sites

- ◆ Extreme
- ◆ Very High
- ◆ High
- ◆ Moderate
- ◆ No BEHI
- ◆ Significant Features
 - ▲ Berm
 - ▲ Cold water input
 - ▲ Dredging
 - ▲ Erosion site
 - ▲ Garbage
 - ▲ Gravel mine
 - ▲ Road runoff
 - ▲ Upper knotweed
- ◆ Deposition
 - Beaver Dam
 - Debris
 - Grasses
 - Gravel bar
 - Gravel bar/Beaver Dam
 - Gravel bar/Debris
 - Gravel bar/LWD
 - Gravel bar/LWD/Beaver dam
 - LWD
 - Sediment
 - Sediment/Debris
 - No
 - N/A
- ◆ Buffer Potential
 - N/A
 - No
 - Recent Planting
 - Yes
 - Yes/Recent planting
 - ★ Floodplain Reconnection Potential
 - Instream Structures
- ◆ NAACC Stream Crossing Evaluation
 - no score - missing data
 - No barrier
 - Insignificant barrier
 - Minor barrier
 - Moderate barrier
 - Significant barrier
 - Severe barrier
- ◆ Stream Crossings No NAACC
 - Bridge
 - Culvert
 - Footbridge
 - Ford
 - Livestock crossing
- ◆ Roads
- ◆ Streams
- ◆ Butternut Watershed Boundaries



Upper Butternut Mainstem
State Hwy 80 to Deminco Rd

Erosion Sites

- Extreme
- Very High
- High
- Moderate
- ◆ No BEHI

Significant Features

- ▲ Berm
- ▲ Cold water input
- ▲ Dredging
- ▲ Erosion site
- ▲ Garbage
- ▲ Gravel mine
- ▲ Road runoff
- ▲ Upper knotweed

Deposition

- Beaver Dam
- Debris
- Grasses
- Gravel bar
- Gravel bar/Beaver Dam
- Gravel bar/Debris
- Gravel bar/LWD
- Gravel bar/LWD/Beaver dam
- LWD
- Sediment
- Sediment/Debris
- No
- N/A

Buffer Potential

- N/A
- No
- Recent Planting
- Yes
- Yes/Recent planting

Floodplain Reconnection Potential

- ★ Floodplain Reconnection Potential

NAACC Stream Crossing Evaluation

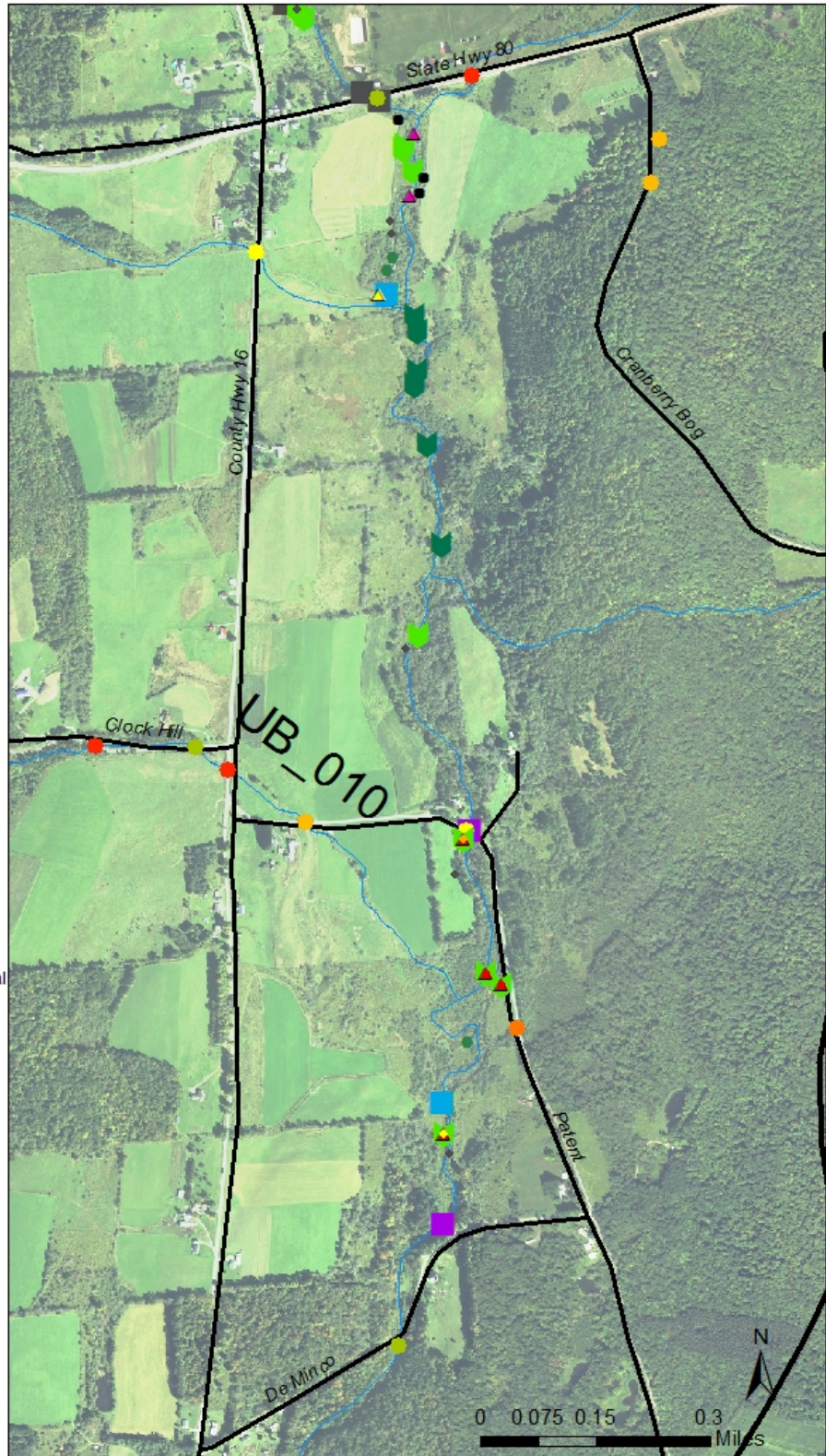
- no score - missing data
- No barrier
- Insignificant barrier
- Minor barrier
- Moderate barrier
- Significant barrier
- Severe barrier

Stream Crossings No NAACC

- Bridge
- Culvert
- Footbridge
- Ford
- Livestock crossing

- Roads
- Streams

- ▭ Butternut Watershed Boundaries



Upper Butternut Mainstem
Demingo Rd to Miller Rd

Erosion Sites

- ◆ Extreme
- ◆ Very High
- ◆ High
- ◆ Moderate
- ◆ No BEHI

Significant Features

- ▲ Berm
- ▲ Cold water input
- ▲ Dredging
- ▲ Erosion site
- ▲ Garbage
- ▲ Gravel mine
- ▲ Road runoff
- ▲ Upper knotweed

Deposition

- Beaver Dam
- Debris
- Grasses
- Gravel bar
- Gravel bar/Beaver Dam
- Gravel bar/Debris
- Gravel bar/LWD
- Gravel bar/LWD/Beaver dam
- LWD
- Sediment
- Sediment/Debris
- No
- N/A

Buffer Potential

- N/A
- No
- Recent Planting
- Yes
- Yes/Recent planting

Floodplain Reconnection Potential

- ★ Instream Structures

NAACC Stream Crossing Evaluation

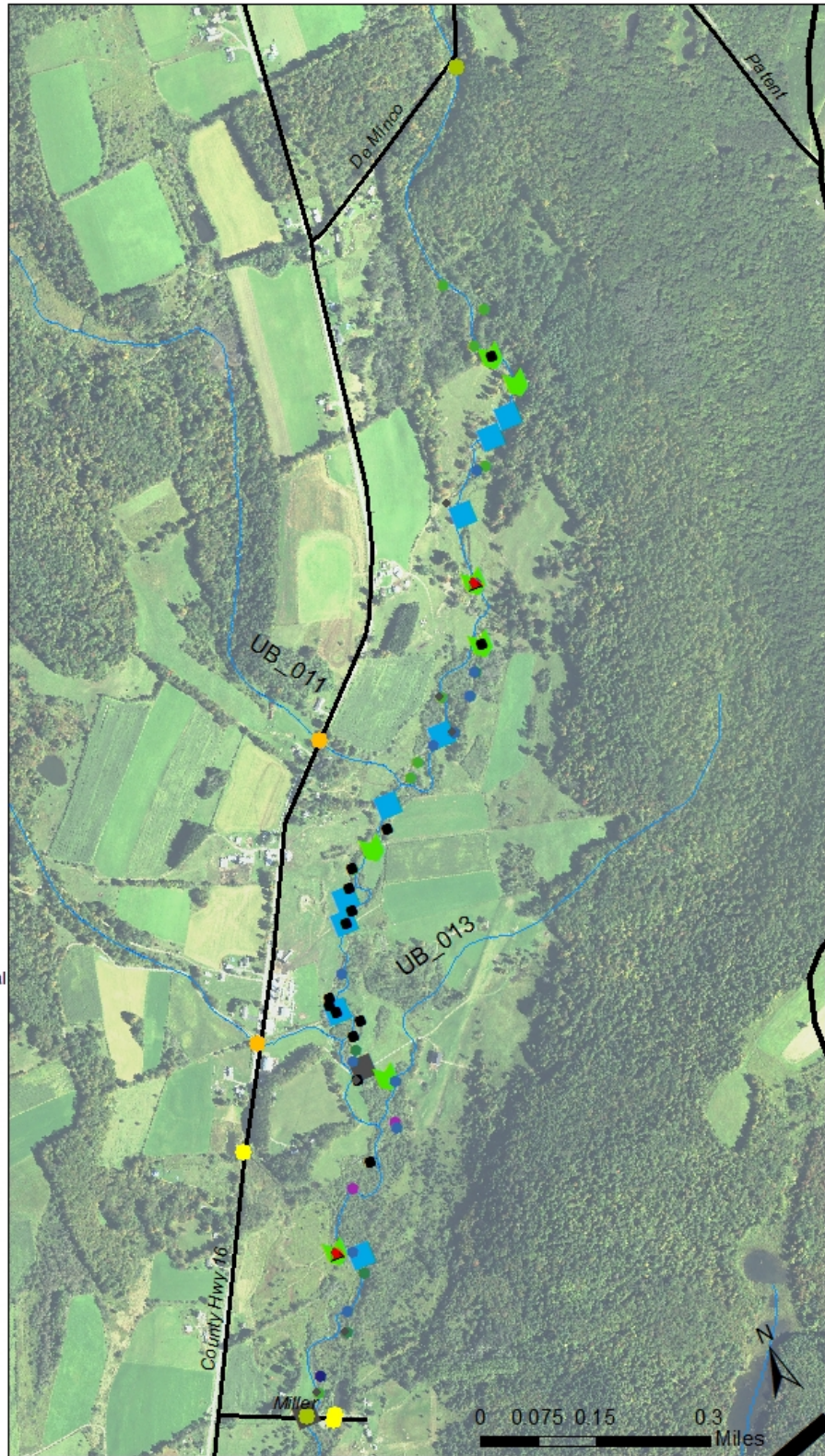
- no score - missing data
- No barrier
- Insignificant barrier
- Minor barrier
- Moderate barrier
- Significant barrier
- Severe barrier

Stream Crossings No NAACC

- Bridge
- Culvert
- Footbridge
- Ford
- Livestock crossing

- Roads
- Streams

- ▭ Butternut Watershed Boundaries



Upper Butternut Mainstem
Miller Rd to Backus Rd

Erosion Sites

- ◆ Extreme
- ◆ Very High
- ◆ High
- ◆ Moderate
- ◆ No BEHI

Significant Features

- ▲ Berm
- ▲ Cold water input
- ▲ Dredging
- ▲ Erosion site
- ▲ Garbage
- ▲ Gravel mine
- ▲ Road runoff
- ▲ Upper knotweed

Deposition

- Beaver Dam
- Debris
- Grasses
- Gravel bar
- Gravel bar/Beaver Dam
- Gravel bar/Debris
- Gravel bar/LWD
- Gravel bar/LWD/Beaver dam
- LWD
- Sediment
- Sediment/Debris
- No
- N/A

Buffer Potential

- N/A
- No
- Recent Planting
- Yes
- Yes/Recent planting

Floodplain Reconnection Potential

- ★ Floodplain Reconnection Potential

Instream Structures

- Instream Structures

NAACC Stream Crossing Evaluation

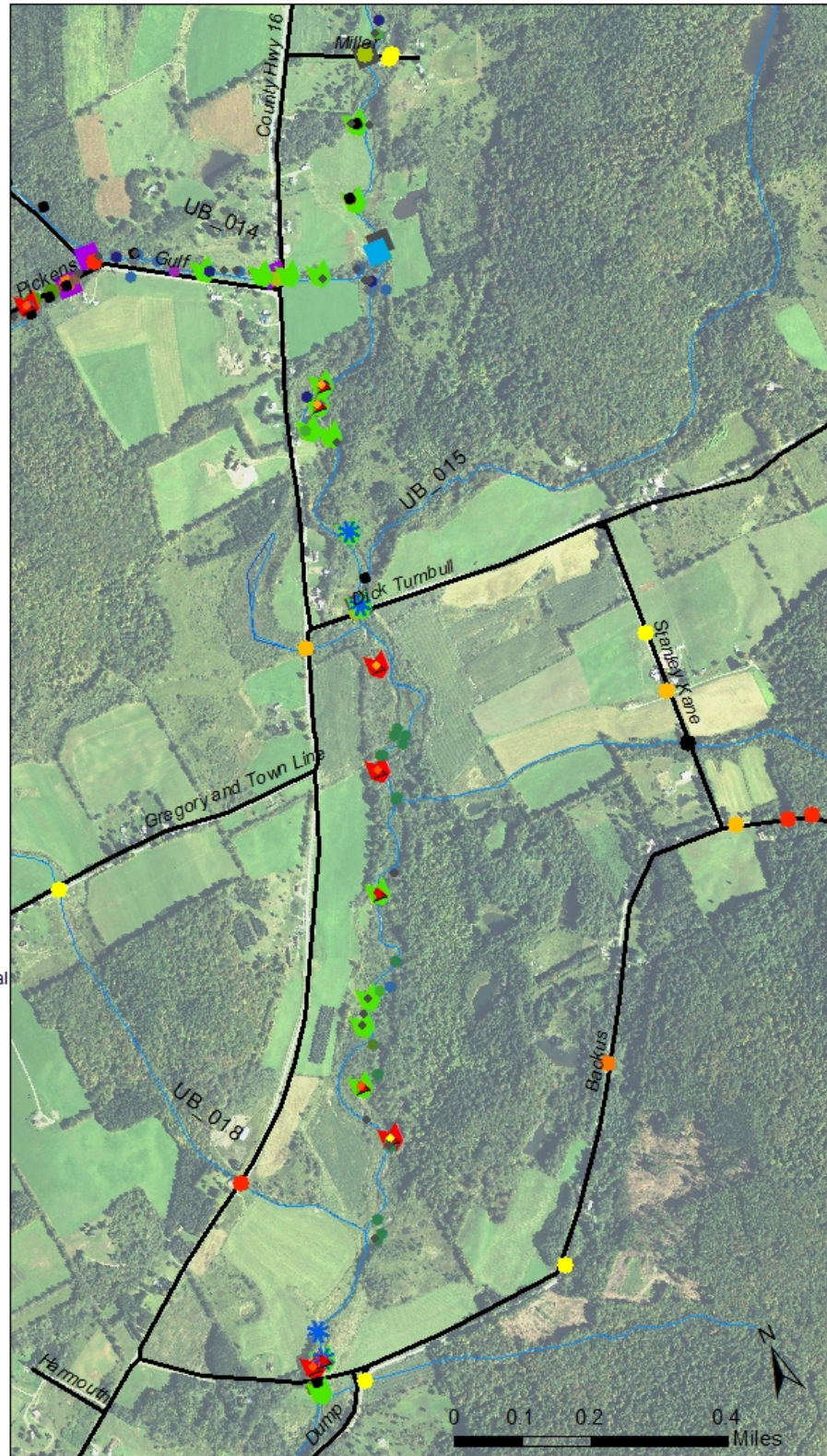
- no score - missing data
- No barrier
- Insignificant barrier
- Minor barrier
- Moderate barrier
- Significant barrier
- Severe barrier

Stream Crossings No NAACC

- Bridge
- Culvert
- Footbridge
- Ford
- Livestock crossing

- Roads
- Streams

- ▭ Butternut Watershed Boundaries



Upper Butternut Mainstem
Backus Rd to Bell Hill Rd

Erosion Sites

- ◆ Extreme
- ◆ Very High
- ◆ High
- ◆ Moderate
- ◆ No BEHI

Significant Features

- ▲ Berm
- ▲ Cold water input
- ▲ Dredging
- ▲ Erosion site
- ▲ Garbage
- ▲ Gravel mine
- ▲ Road runoff
- ▲ Upper knotweed

Deposition

- Beaver Dam
- Debris
- Grasses
- Gravel bar
- Gravel bar/Beaver Dam
- Gravel bar/Debris
- Gravel bar/LWD
- Gravel bar/LWD/Beaver dam
- LWD
- Sediment
- Sediment/Debris
- No
- N/A

Buffer Potential

- N/A
- No
- Recent Planting
- Yes
- Yes/Recent planting

Floodplain Reconnection Potential

- ★ Floodplain Reconnection Potential

Instream Structures

- Instream Structures

NAACC Stream Crossing Evaluation

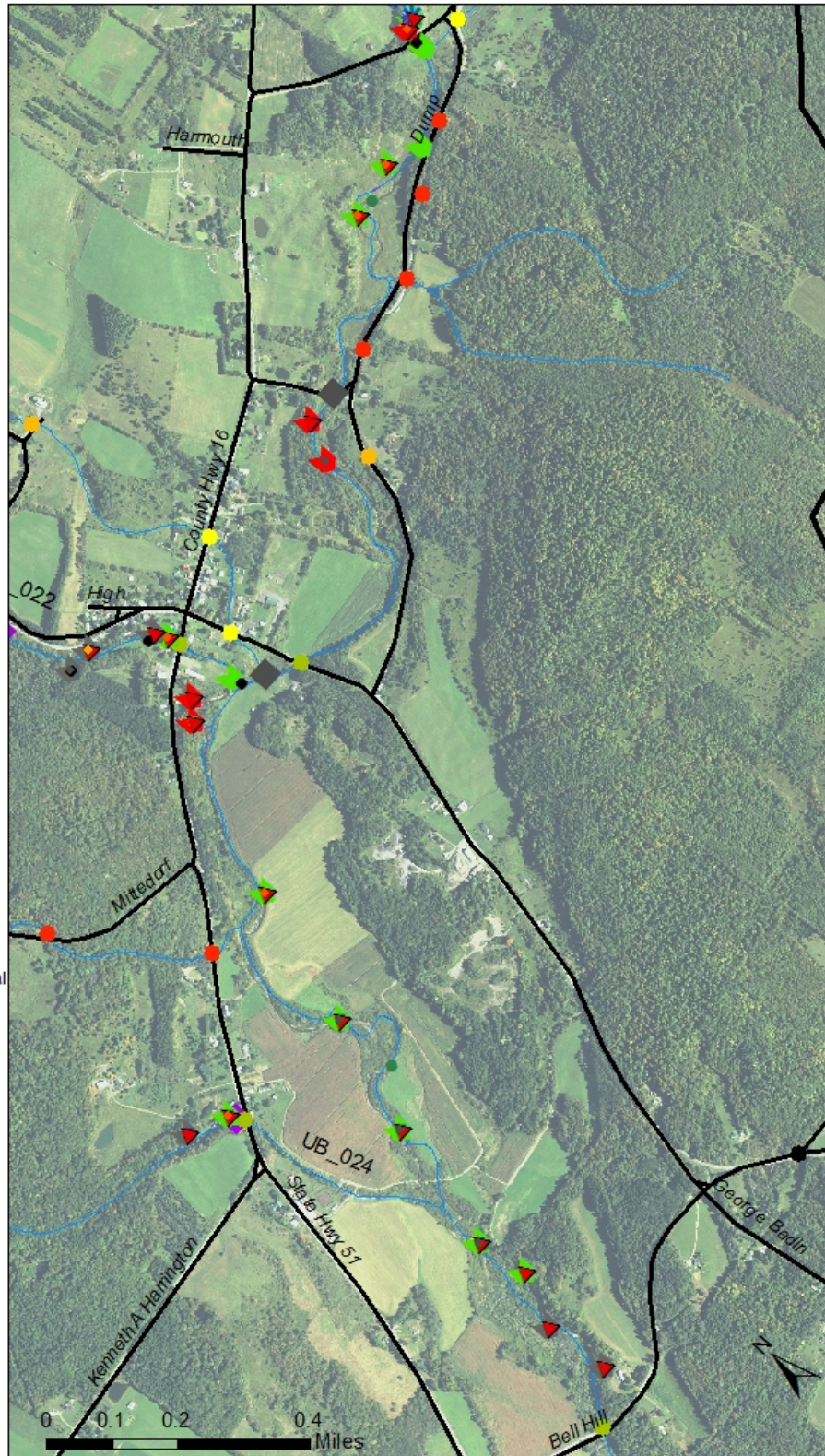
- no score - missing data
- No barrier
- Insignificant barrier
- Minor barrier
- Moderate barrier
- Significant barrier
- Severe barrier

Stream Crossings No NAACC

- Bridge
- Culvert
- Footbridge
- Ford
- Livestock crossing

- Roads
- Streams

- ▭ Butternut Watershed Boundaries



Upper Butternut Mainstem
Bell Hill Rd to bottom of watershed

Erosion Sites

- ◆ Extreme
- ◆ Very High
- ◆ High
- ◆ Moderate
- ◆ No BEHI

Significant Features

- ▲ Berm
- ▲ Cold water input
- ▲ Dredging
- ▲ Erosion site
- ▲ Garbage
- ▲ Gravel mine
- ▲ Road runoff
- ▲ Upper knotweed

Deposition

- Beaver Dam
- Debris
- Grasses
- Gravel bar
- Gravel bar/Beaver Dam
- Gravel bar/Debris
- Gravel bar/LWD
- Gravel bar/LWD/Beaver dam
- LWD
- Sediment
- Sediment/Debris
- No
- N/A

Buffer Potential

- N/A
- No
- Recent Planting
- Yes
- Yes/Recent planting

Floodplain Reconnection Potential

- ★

Instream Structures

-

NAACC Stream Crossing Evaluation

- no score - missing data
- No barrier
- Insignificant barrier
- Minor barrier
- Moderate barrier
- Significant barrier
- Severe barrier

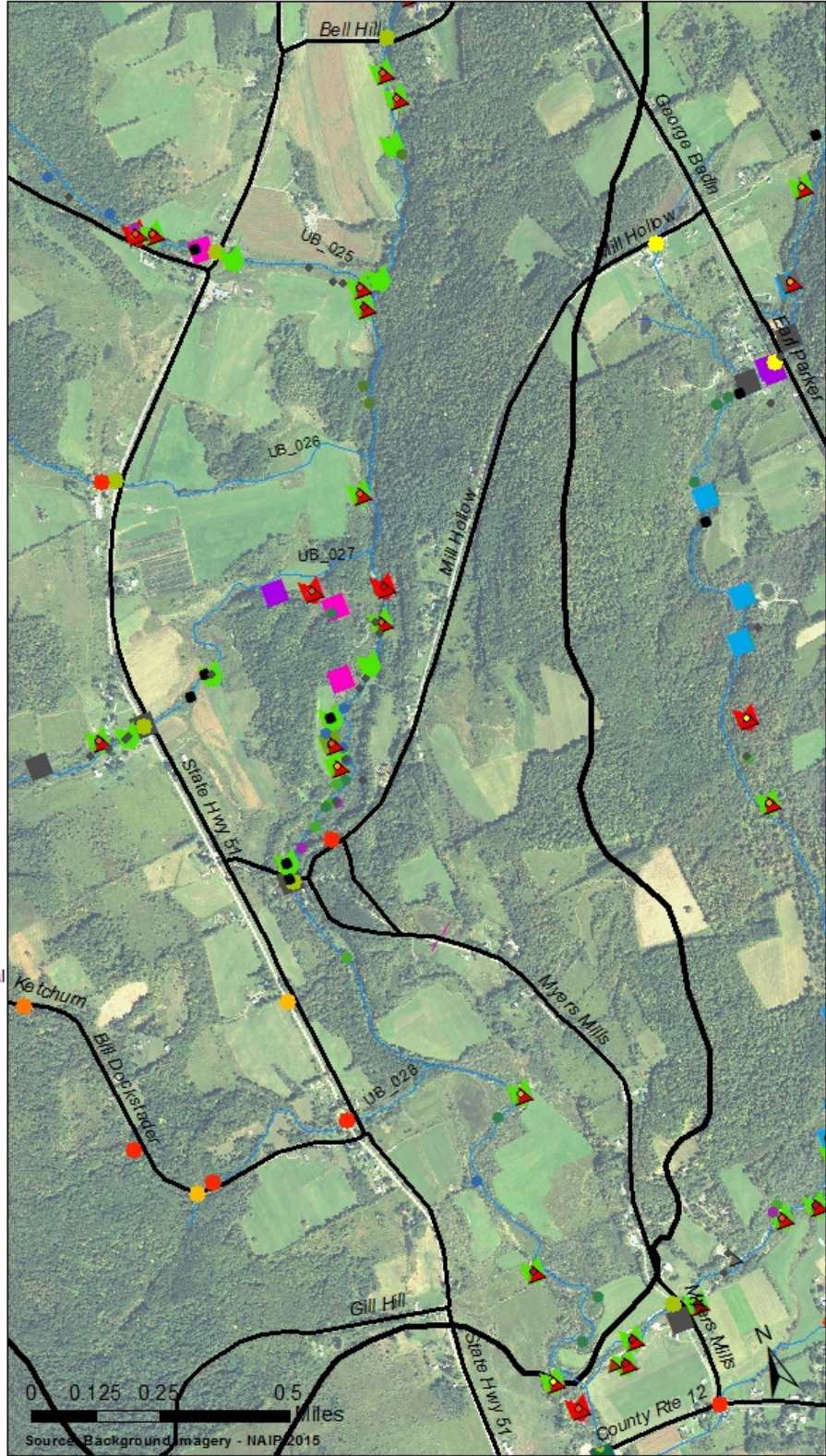
Stream Crossings No NAACC

- Bridge
- Culvert
- Footbridge
- Ford
- Livestock crossing

Roads

Streams

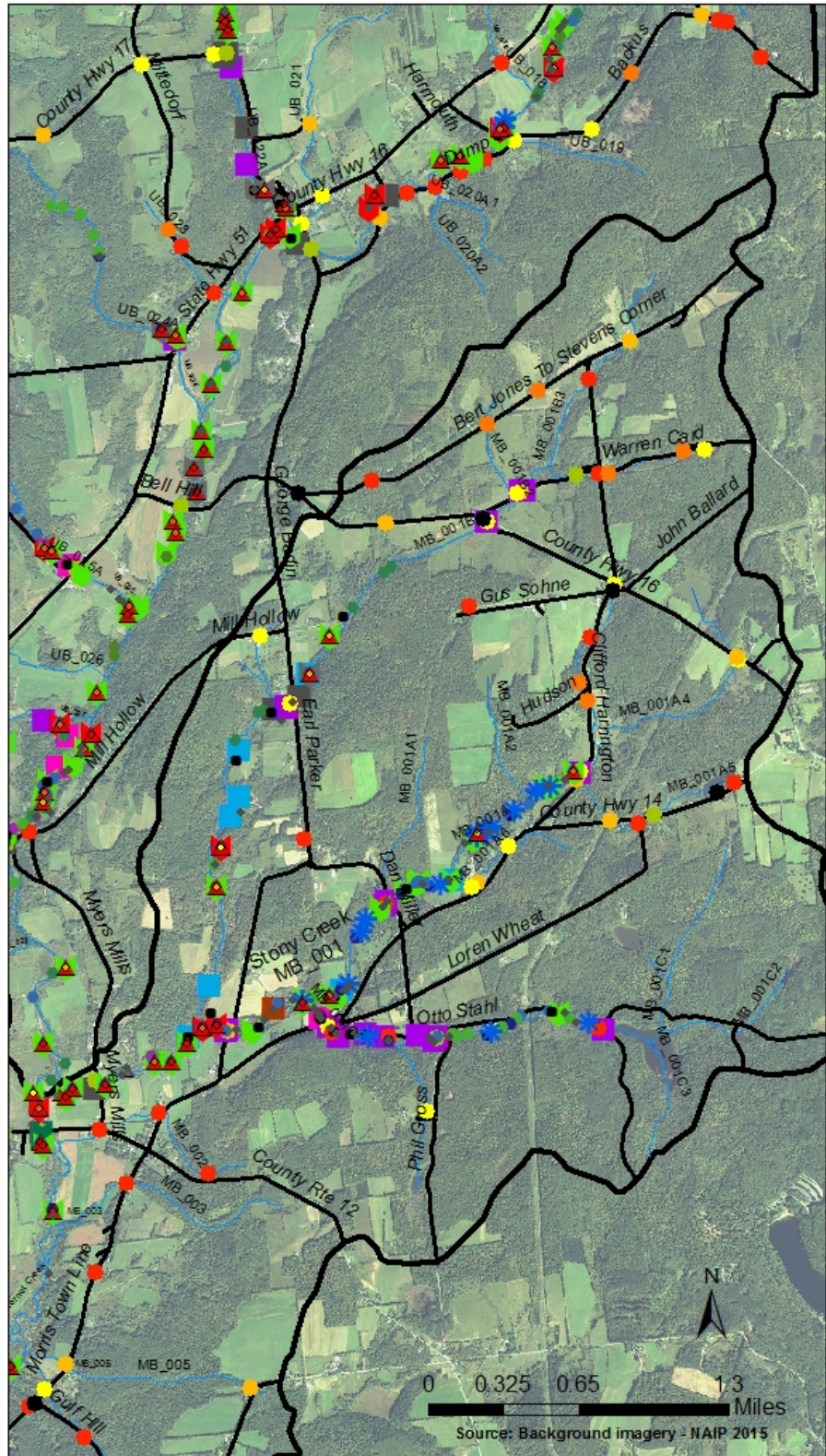
Butternut Watershed Boundaries



G.2 Middle Butternut Creek Watershed Figures

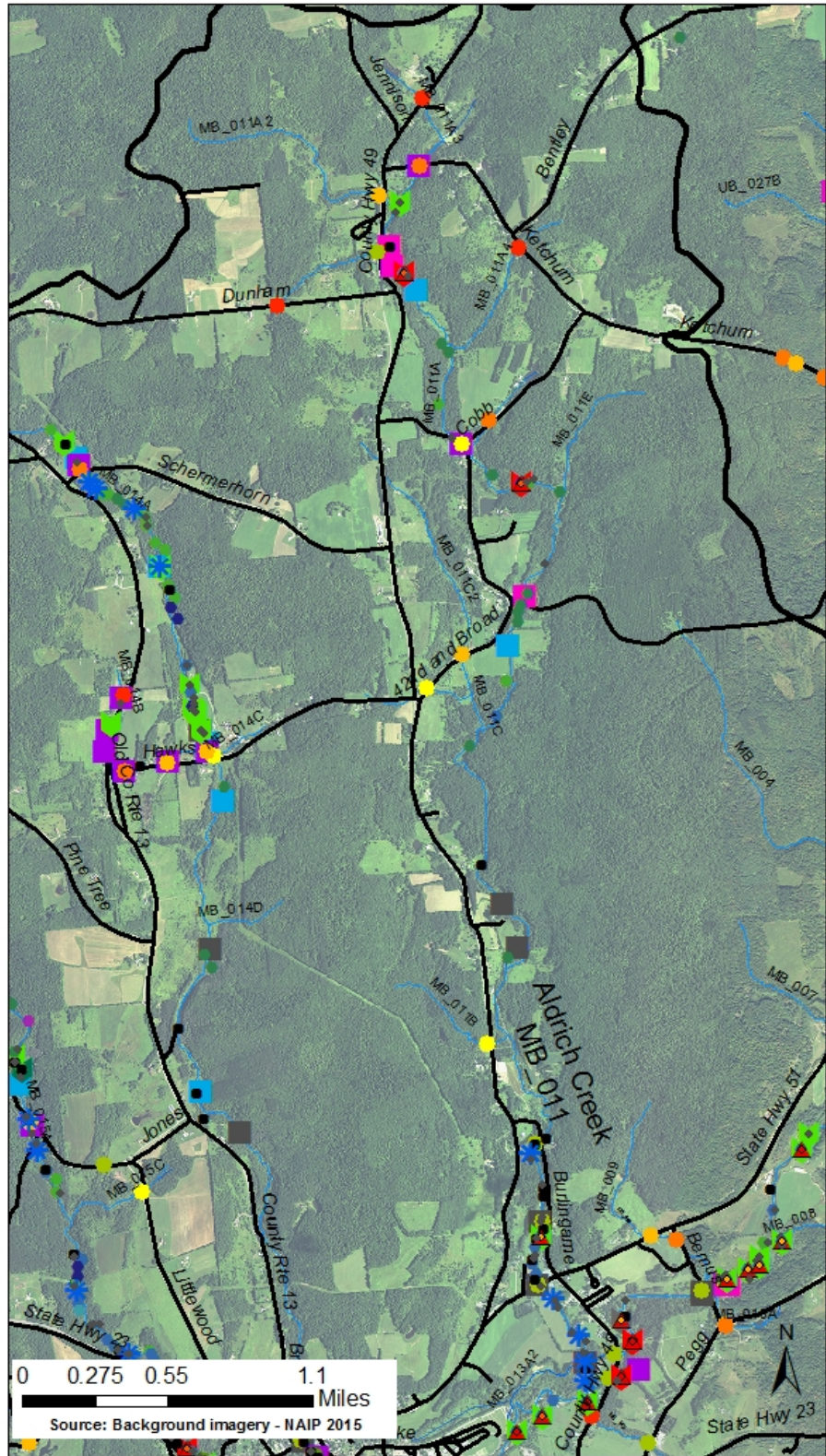
Middle Butternut Tributaries
Stony Creek/MB_001

- Erosion Sites**
- ◆ Extreme
- ◆ Very High
- ◆ High
- ◆ Moderate
- ◆ No BEHI
- Significant Features**
- ▲ Berm
- ▲ Cold water input
- ▲ Dredging
- ▲ Erosion site
- ▲ Garbage
- ▲ Gravel mine
- ▲ Road runoff
- ▲ Upper knotweed
- Deposition**
- Beaver Dam
- Debris
- Grasses
- Gravel bar
- Gravel bar/Beaver Dam
- Gravel bar/Debris
- Gravel bar/LWD
- Gravel bar/LWD/Beaver dam
- LWD
- Sediment
- Sediment/Debris
- No
- N/A
- Buffer Potential**
- N/A
- No
- Recent Planting
- Yes
- Yes/Recent planting
- ★ Floodplain Reconnection Potential
- Instream Structures
- NAACC Stream Crossing Evaluation**
- no score - missing data
- No barrier
- Insignificant barrier
- Minor barrier
- Moderate barrier
- Significant barrier
- Severe barrier
- Stream Crossings No NAACC**
- Bridge
- Culvert
- Footbridge
- Ford
- Livestock crossing
- Roads
- Streams
- Butternut Watershed Boundaries



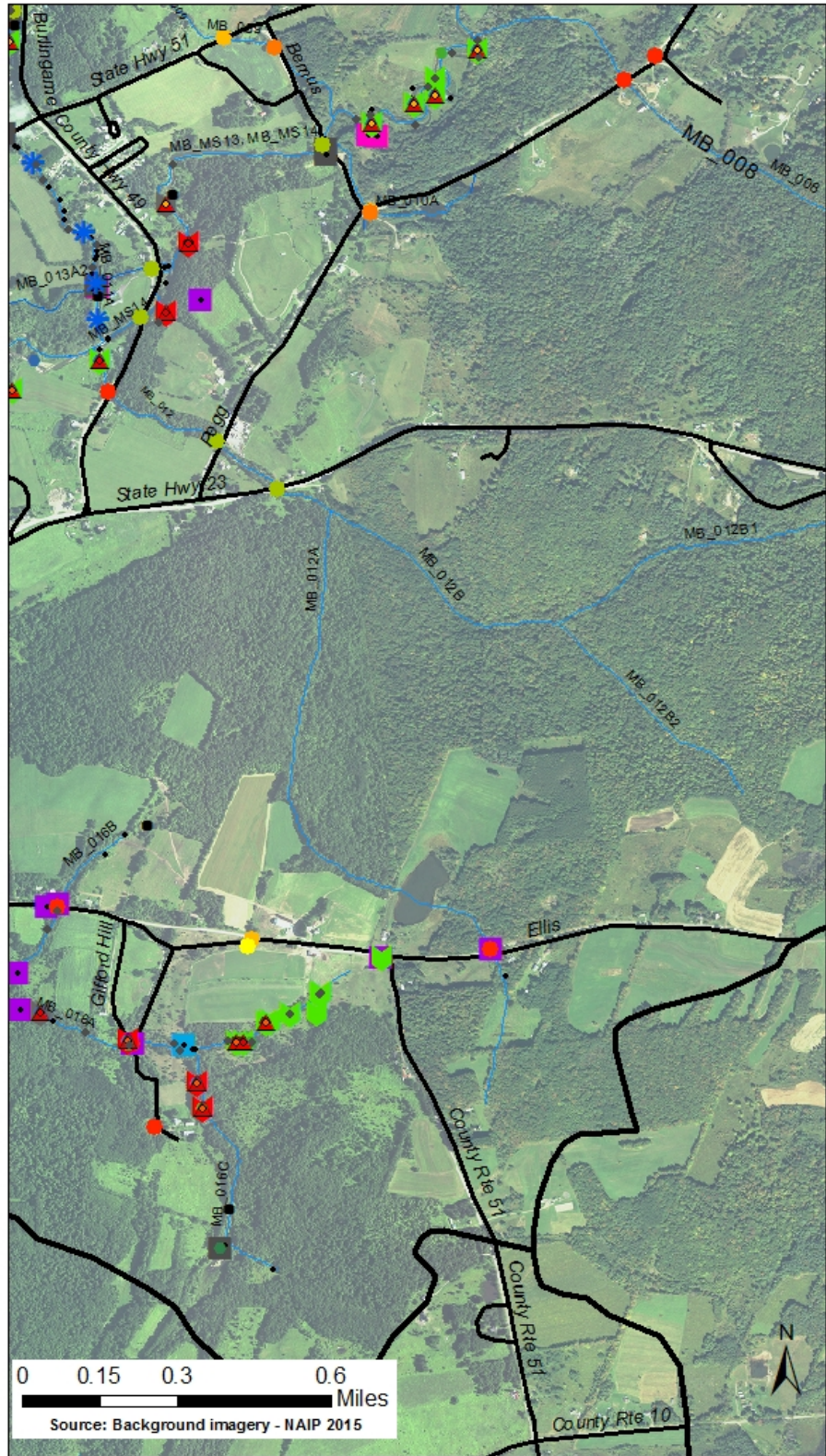
Middle Butternut Tributaries
Aldrich Creek/MB_011

- Erosion Sites**
 - ◆ Extreme
 - ◆ Very High
 - ◆ High
 - ◆ Moderate
 - ◆ No BEHI
- Significant Features**
 - ▲ Berm
 - ▲ Cold water input
 - ▲ Dredging
 - ▲ Erosion site
 - ▲ Garbage
 - ▲ Gravel mine
 - ▲ Road runoff
 - ▲ Upper knotweed
- Deposition**
 - Beaver Dam
 - Debris
 - Grasses
 - Gravel bar
 - Gravel bar/Beaver Dam
 - Gravel bar/Debris
 - Gravel bar/LWD
 - Gravel bar/LWD/Beaver dam
 - LWD
 - Sediment
 - Sediment/Debris
 - No
 - N/A
- Buffer Potential**
 - N/A
 - No
 - Recent Planting
 - Yes
 - Yes/Recent planting
 - ★ Floodplain Reconnection Potential
- Instream Structures**
 - Instream Structures
- NAACC Stream Crossing Evaluation**
 - no score - missing data
 - No barrier
 - Insignificant barrier
 - Minor barrier
 - Moderate barrier
 - Significant barrier
 - Severe barrier
- Stream Crossings No NAACC**
 - Bridge
 - Culvert
 - Footbridge
 - Ford
 - Livestock crossing
- Roads**
 - Roads
- Streams**
 - Streams
- Butternut Watershed Boundaries**
 - Butternut Watershed Boundaries



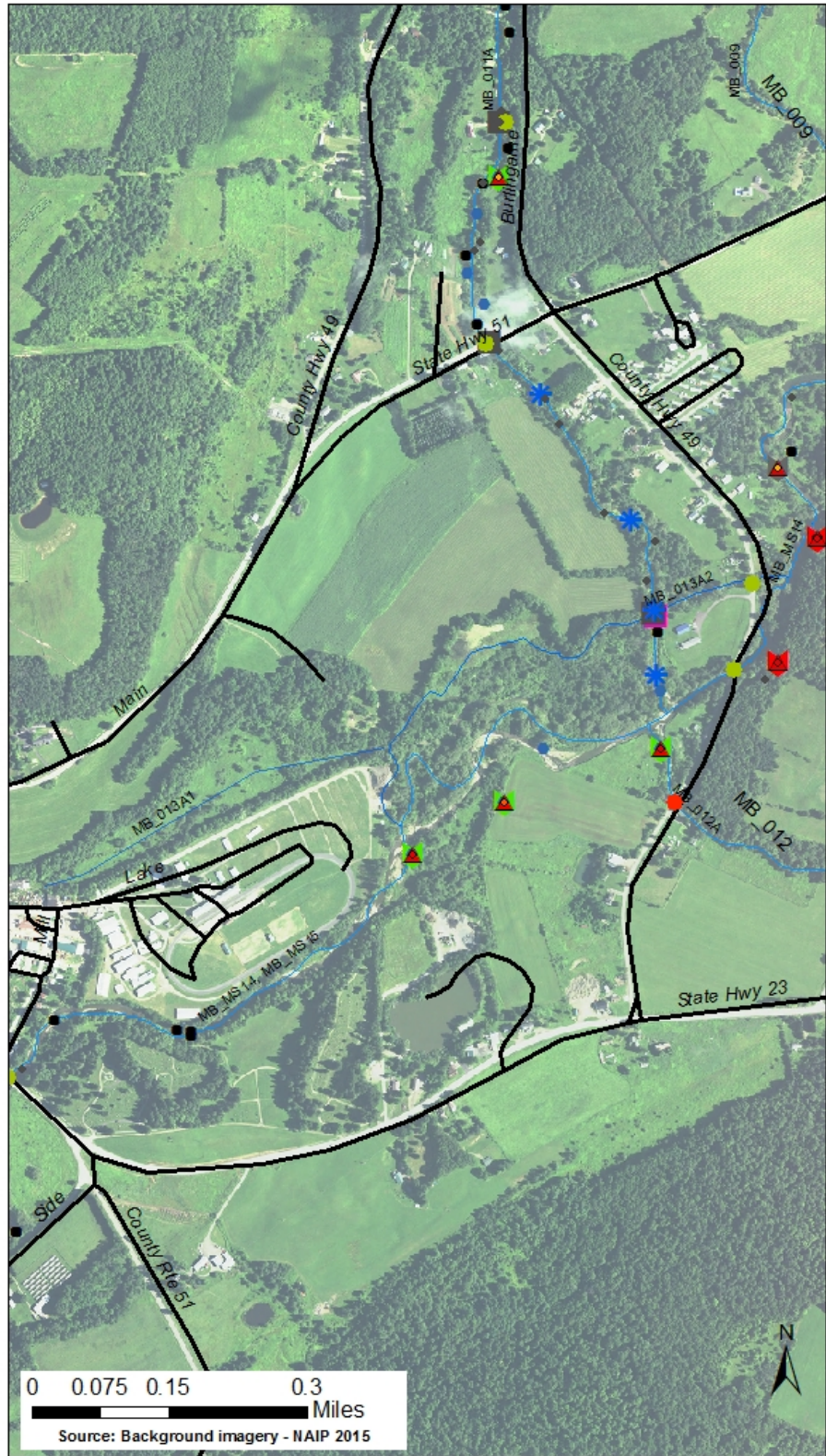
Middle Butternut Tributaries
 Unnamed Tributary/MB_012

- Erosion Sites**
 - ◆ Extreme
 - ◆ Very High
 - ◆ High
 - ◆ Moderate
 - ◆ No BEHI
- Significant Features**
 - ▲ Berm
 - ▲ Cold water input
 - ▲ Dredging
 - ▲ Erosion site
 - ▲ Garbage
 - ▲ Gravel mine
 - ▲ Road runoff
 - ▲ Upper knotweed
- Deposition**
 - Beaver Dam
 - Debris
 - Grasses
 - Gravel bar
 - Gravel bar/Beaver Dam
 - Gravel bar/Debris
 - Gravel bar/LWD
 - Gravel bar/LWD/Beaver dam
 - LWD
 - Sediment
 - Sediment/Debris
 - No
 - N/A
- Buffer Potential**
 - N/A
 - No
 - Recent Planting
 - Yes
 - Yes/Recent planting
- Floodplain Reconnection Potential**
 - ★ Floodplain Reconnection Potential
- Instream Structures**
 - Instream Structures
- NAACC Stream Crossing Evaluation**
 - no score - missing data
 - No barrier
 - Insignificant barrier
 - Minor barrier
 - Moderate barrier
 - Significant barrier
 - Severe barrier
- Stream Crossings No NAACC**
 - Bridge
 - Culvert
 - Footbridge
 - Ford
 - Livestock crossing
- Roads**
 - Roads
- Streams**
 - Streams
- Butternut Watershed Boundaries**
 - Butternut Watershed Boundaries



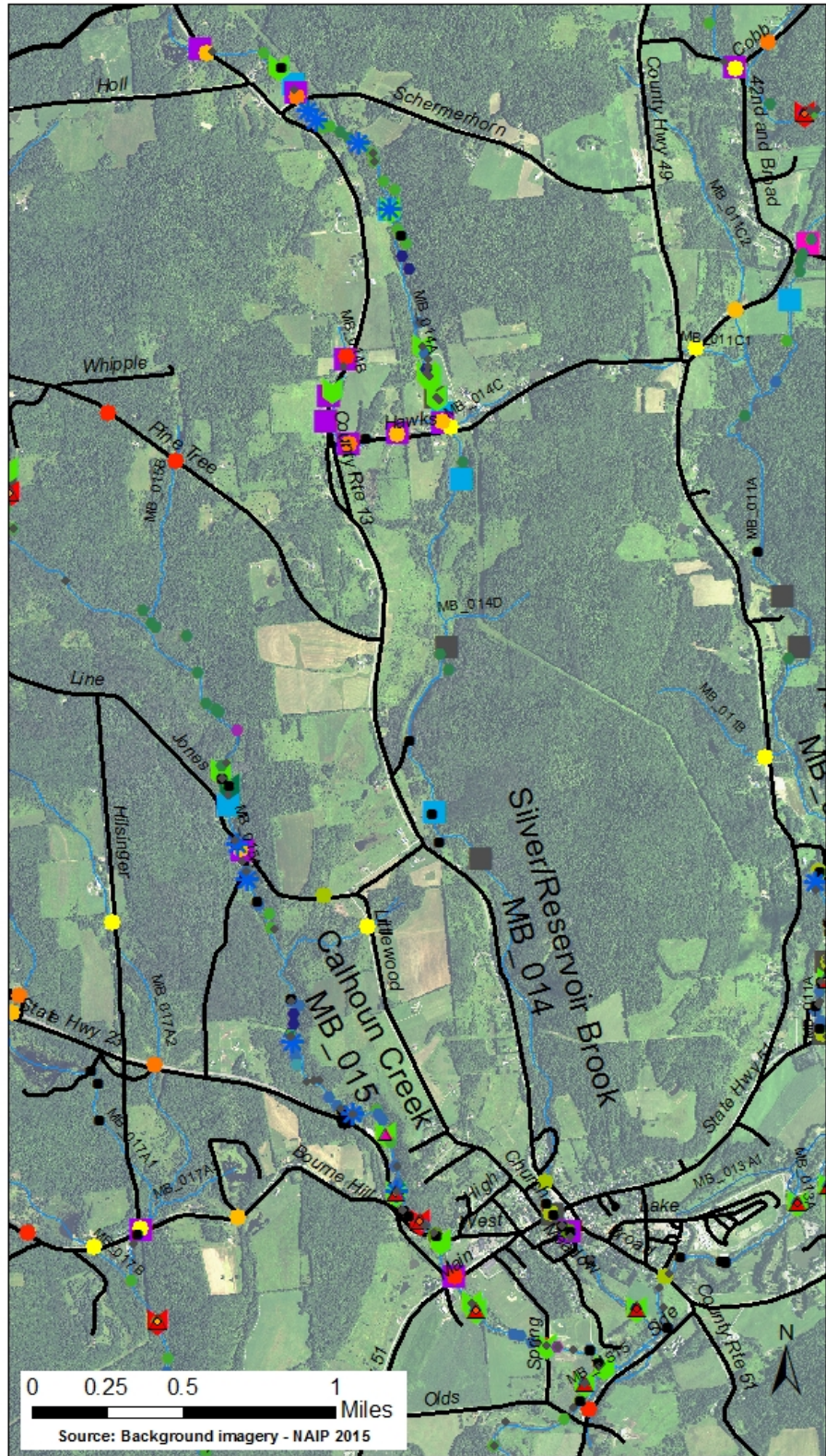
Middle Butternut Tributaries
Diversion Channel/MB_013

- Erosion Sites**
 - ◆ Extreme
 - ◆ Very High
 - ◆ High
 - ◆ Moderate
 - ◆ No BE HI
- Significant Features**
 - ▲ Berm
 - ▲ Cold water input
 - ▲ Dredging
 - ▲ Erosion site
 - ▲ Garbage
 - ▲ Gravel mine
 - ▲ Road runoff
 - ▲ Upper knotweed
- Deposition**
 - Beaver Dam
 - Debris
 - Grasses
 - Gravel bar
 - Gravel bar/Beaver Dam
 - Gravel bar/Debris
 - Gravel bar/LWD
 - Gravel bar/LWD/Beaver dam
 - LWD
 - Sediment
 - Sediment/Debris
 - No
 - N/A
- Buffer Potential**
 - N/A
 - No
 - Recent Planting
 - Yes
 - Yes/Recent planting
 - ★ Floodplain Reconnection Potential
- Instream Structures**
 - Instream Structures
- NAACC Stream Crossing Evaluation**
 - no score - missing data
 - No barrier
 - Insignificant barrier
 - Minor barrier
 - Moderate barrier
 - Significant barrier
 - Severe barrier
- Stream Crossings No NAACC**
 - Bridge
 - Culvert
 - Footbridge
 - Ford
 - Livestock crossing
- Roads**
 - Roads
- Streams**
 - Streams
- Butternut Watershed Boundaries**
 - ▭ Butternut Watershed Boundaries



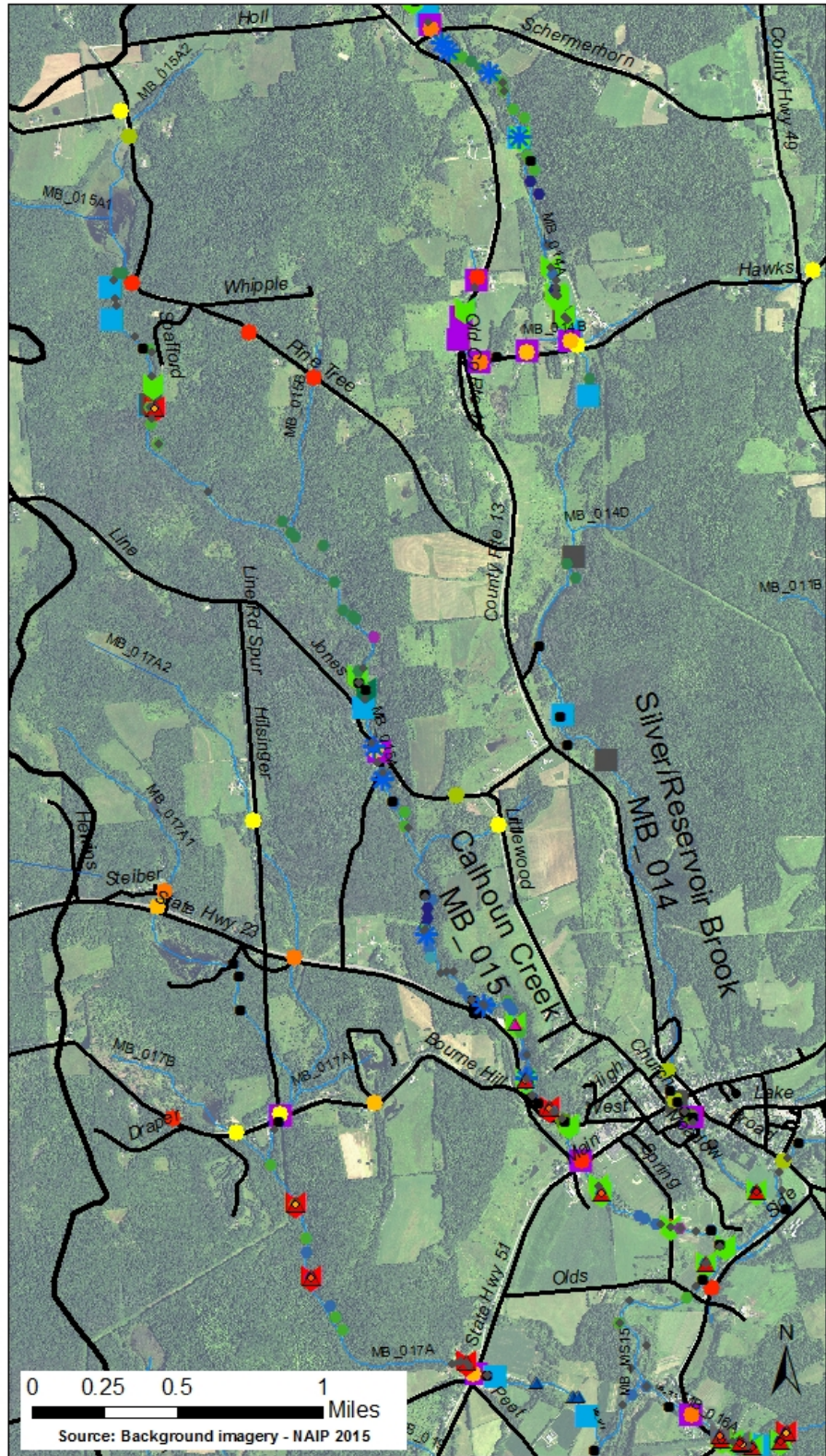
Middle Butternut Tributaries
 Unnamed Tributary/
 Silver/Reservoir Brook/MB_014

- Erosion Sites**
 - ◆ Extreme
 - ◆ Very High
 - ◆ High
 - ◆ Moderate
 - ◆ No BEHI
- Significant Features**
 - ▲ Berm
 - ▲ Cold water input
 - ▲ Dredging
 - ▲ Erosion site
 - ▲ Garbage
 - ▲ Gravel mine
 - ▲ Road runoff
 - ▲ Upper knotweed
- Deposition**
 - Beaver Dam
 - Debris
 - Grasses
 - Gravel bar
 - Gravel bar/Beaver Dam
 - Gravel bar/Debris
 - Gravel bar/LWD
 - Gravel bar/LWD/Beaver dam
 - LWD
 - Sediment
 - Sediment/Debris
 - No
 - N/A
- Buffer Potential**
 - N/A
 - No
 - Recent Planting
 - Yes
 - Yes/Recent planting
 - ★ Floodplain Reconnection Potential
- Instream Structures**
 - no score - missing data
 - No barrier
 - Insignificant barrier
 - Minor barrier
 - Moderate barrier
 - Significant barrier
 - Severe barrier
- Stream Crossings No NAACC**
 - Bridge
 - Culvert
 - Footbridge
 - Ford
 - Livestock crossing
- Roads**
- Streams**
- Butternut Watershed Boundaries**



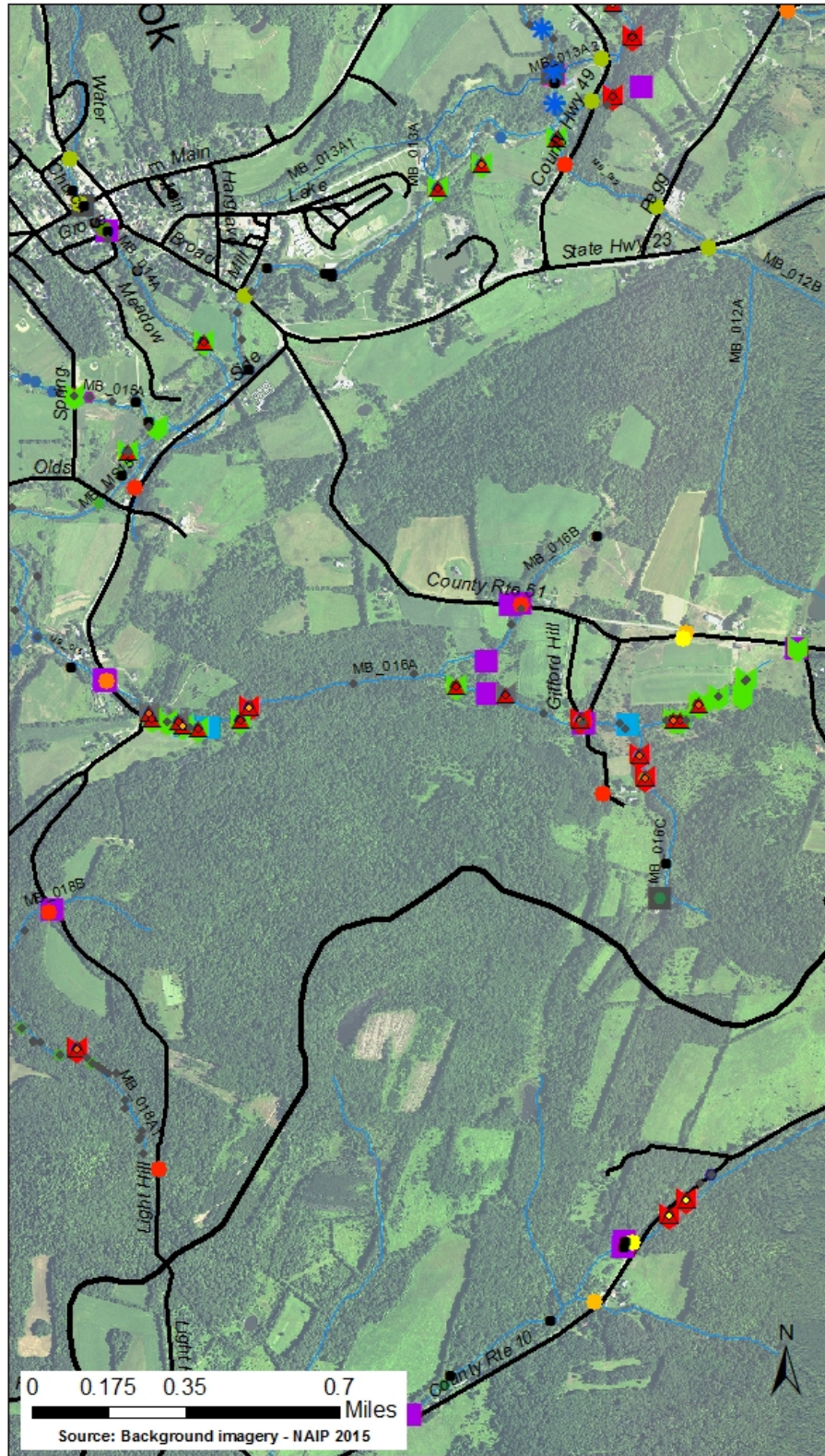
Middle Butternut Tributaries
Calhoun Creek/MB_015

- Erosion Sites**
 - ◆ Extreme
 - ◆ Very High
 - ◆ High
 - ◆ Moderate
 - ◆ No BEHI
- Significant Features**
 - ▲ Berm
 - ▲ Cold water input
 - ▲ Dredging
 - ▲ Erosion site
 - ▲ Garbage
 - ▲ Gravel mine
 - ▲ Road runoff
 - ▲ Upper knotweed
- Deposition**
 - Beaver Dam
 - Debris
 - Grasses
 - Gravel bar
 - Gravel bar/Beaver Dam
 - Gravel bar/Debris
 - Gravel bar/LWD
 - Gravel bar/LWD/Beaver dam
 - LWD
 - Sediment
 - Sediment/Debris
 - No
 - N/A
- Buffer Potential**
 - N/A
 - No
 - Recent Planting
 - Yes
 - Yes/Recent planting
 - ★ Floodplain Reconnection Potential
- Instream Structures**
 - Instream Structures
- NAACC Stream Crossing Evaluation**
 - no score - missing data
 - No barrier
 - Insignificant barrier
 - Minor barrier
 - Moderate barrier
 - Significant barrier
 - Severe barrier
- Stream Crossings No NAACC**
 - Bridge
 - Culvert
 - Footbridge
 - Ford
 - Livestock crossing
- Roads**
 - Roads
- Streams**
 - Streams
- Butternut Watershed Boundaries**
 - Butternut Watershed Boundaries



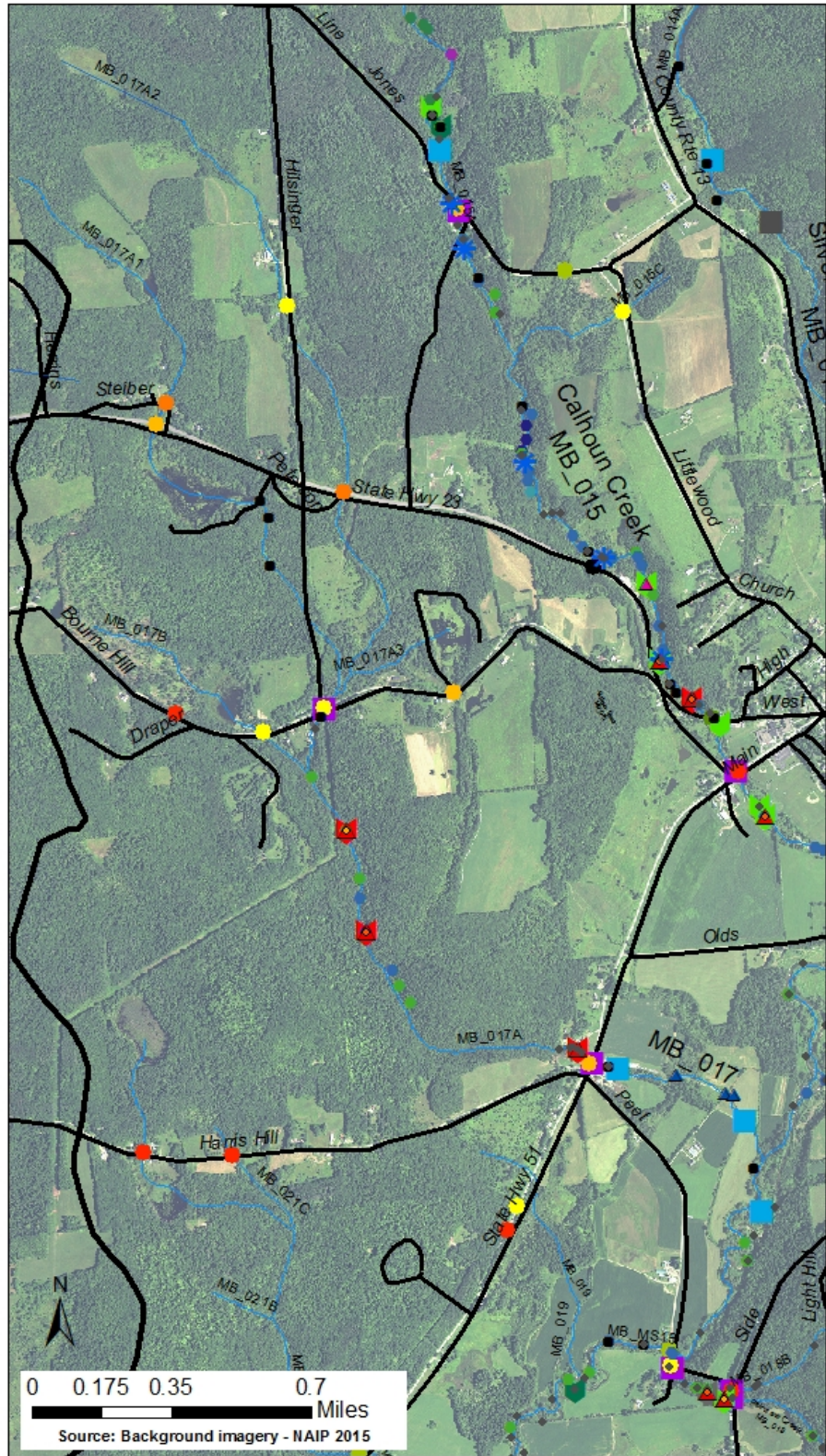
Middle Butternut Tributaries
 Unnamed Tributary/MB_016

- Erosion Sites**
 - ◆ Extreme
 - ◆ Very High
 - ◆ High
 - ◆ Moderate
 - ◆ No BEHI
- Significant Features**
 - ▲ Berm
 - ▲ Cold water input
 - ▲ Dredging
 - ▲ Erosion site
 - ▲ Garbage
 - ▲ Gravel mine
 - ▲ Road runoff
 - ▲ Upper knotweed
- Deposition**
 - Beaver Dam
 - Debris
 - Grasses
 - Gravel bar
 - Gravel bar/Beaver Dam
 - Gravel bar/Debris
 - Gravel bar/LWD
 - Gravel bar/LWD/Beaver dam
 - LWD
 - Sediment
 - Sediment/Debris
 - No
 - N/A
- Buffer Potential**
 - N/A
 - No
 - Recent Planting
 - Yes
 - Yes/Recent planting
 - ★ Floodplain Reconnection Potential
- Instream Structures**
 - Instream Structures
- NAACC Stream Crossing Evaluation**
 - no score - missing data
 - No barrier
 - Insignificant barrier
 - Minor barrier
 - Moderate barrier
 - Significant barrier
 - Severe barrier
- Stream Crossings No NAACC**
 - Bridge
 - Culvert
 - Footbridge
 - Ford
 - Livestock crossing
- Roads**
 - Roads
- Streams**
 - Streams
- Butternut Watershed Boundaries**
 - ▭ Butternut Watershed Boundaries



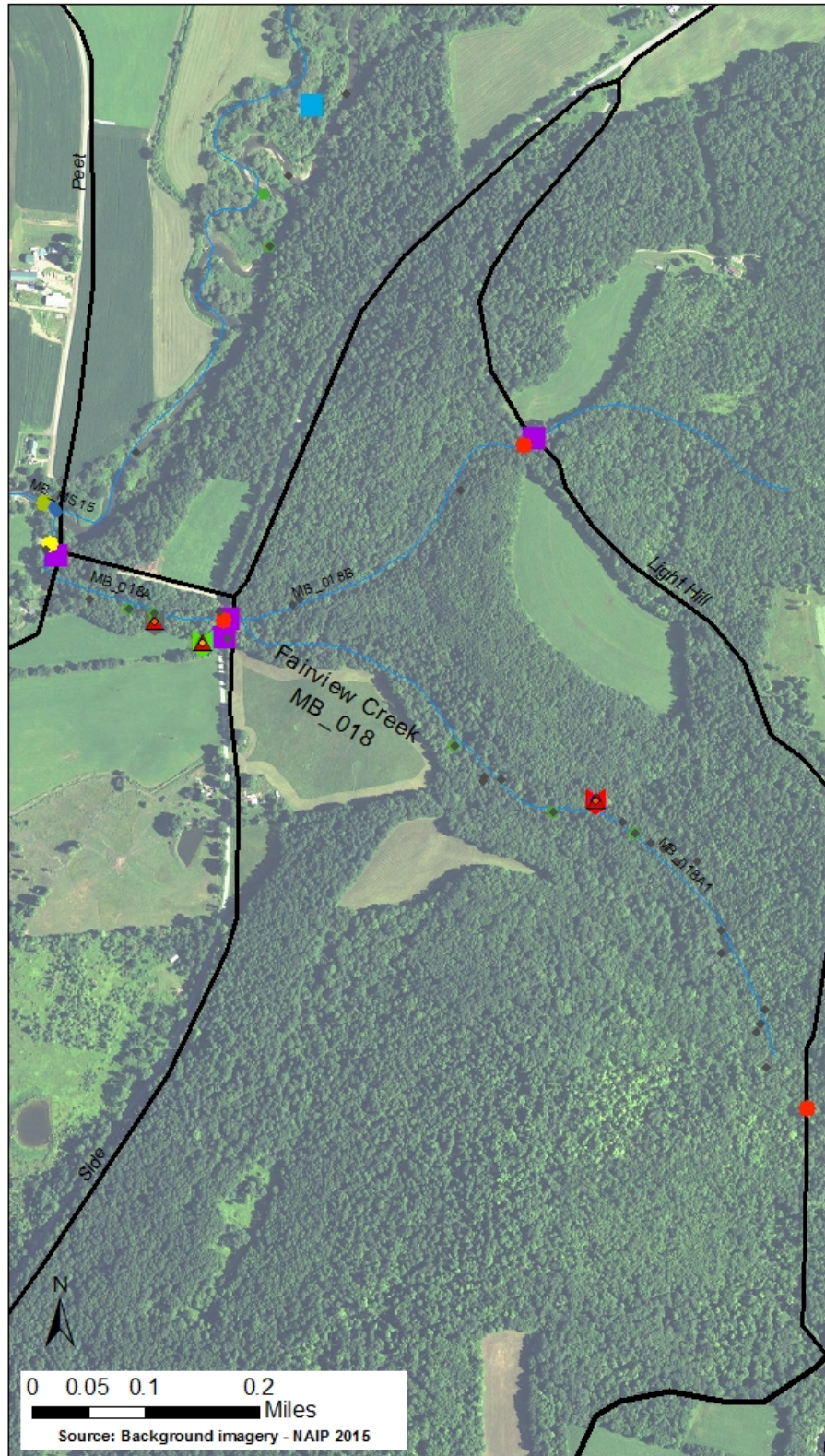
Middle Butternut Tributaries
 Unnamed Tributary/MB_017

- Erosion Sites**
 - ◆ Extreme
 - ◆ Very High
 - ◆ High
 - ◆ Moderate
 - ◆ No BEHI
- Significant Features**
 - ▲ Berm
 - ▲ Cold water input
 - ▲ Dredging
 - ▲ Erosion site
 - ▲ Garbage
 - ▲ Gravel mine
 - ▲ Road runoff
 - ▲ Upper knotweed
- Deposition**
 - Beaver Dam
 - Debris
 - Grasses
 - Gravel bar
 - Gravel bar/Beaver Dam
 - Gravel bar/Debris
 - Gravel bar/LWD
 - Gravel bar/LWD/Beaver dam
 - LWD
 - Sediment
 - Sediment/Debris
 - No
 - N/A
- Buffer Potential**
 - N/A
 - No
 - Recent Planting
 - Yes
 - Yes/Recent planting
 - ★ Floodplain Reconnection Potential
- Instream Structures**
 - Instream Structures
- NAACC Stream Crossing Evaluation**
 - no score - missing data
 - No barrier
 - Insignificant barrier
 - Minor barrier
 - Moderate barrier
 - Significant barrier
 - Severe barrier
- Stream Crossings No NAACC**
 - Bridge
 - Culvert
 - Footbridge
 - Ford
 - Livestock crossing
- Roads**
 - Roads
- Streams**
 - Streams
- Butternut Watershed Boundaries**
 - ▭ Butternut Watershed Boundaries



Middle Butternut Tributaries
 Unnamed Tributary/MB_018

- Erosion Sites**
 - ◆ Extreme
 - ◆ Very High
 - ◆ High
 - ◆ Moderate
 - ◆ No BEHI
- Significant Features**
 - ▲ Berm
 - ▲ Cold water input
 - ▲ Dredging
 - ▲ Erosion site
 - ▲ Garbage
 - ▲ Gravel mine
 - ▲ Road runoff
 - ▲ Upper knotweed
- Deposition**
 - Beaver Dam
 - Debris
 - Grasses
 - Gravel bar
 - Gravel bar/Beaver Dam
 - Gravel bar/Debris
 - Gravel bar/LWD
 - Gravel bar/LWD/Beaver dam
 - LWD
 - Sediment
 - Sediment/Debris
 - No
 - N/A
- Buffer Potential**
 - N/A
 - No
 - Recent Planting
 - Yes
 - Yes/Recent planting
 - ★ Floodplain Reconnection Potential
- Instream Structures**
 - Instream Structures
- NAACC Stream Crossing Evaluation**
 - no score - missing data
 - No barrier
 - Insignificant barrier
 - Minor barrier
 - Moderate barrier
 - Significant barrier
 - Severe barrier
- Stream Crossings No NAACC**
 - Bridge
 - Culvert
 - Footbridge
 - Ford
 - Livestock crossing
- Roads**
 - Roads
- Streams**
 - Streams
- Butternut Watershed Boundaries**
 - Butternut Watershed Boundaries



Middle Butternut Mainstem
Top of watershed to Bemus Rd

Erosion Sites

- ◆ Extreme
- ◆ Very High
- ◆ High
- ◆ Moderate
- ◆ No BEHI

Significant Features

- ▲ Berm
- ▲ Cold water input
- ▲ Dredging
- ▲ Erosion site
- ▲ Garbage
- ▲ Gravel mine
- ▲ Road runoff
- ▲ Upper knotweed

Deposition

- Beaver Dam
- Debris
- Grasses
- Gravel bar
- Gravel bar/Beaver Dam
- Gravel bar/Debris
- Gravel bar/LWD
- Gravel bar/LWD/Beaver dam
- LWD
- Sediment
- Sediment/Debris
- No
- N/A

Buffer Potential

- N/A
- No
- Recent Planting
- Yes
- Yes/Recent planting

Floodplain Reconnection Potential

- ★

Instream Structures

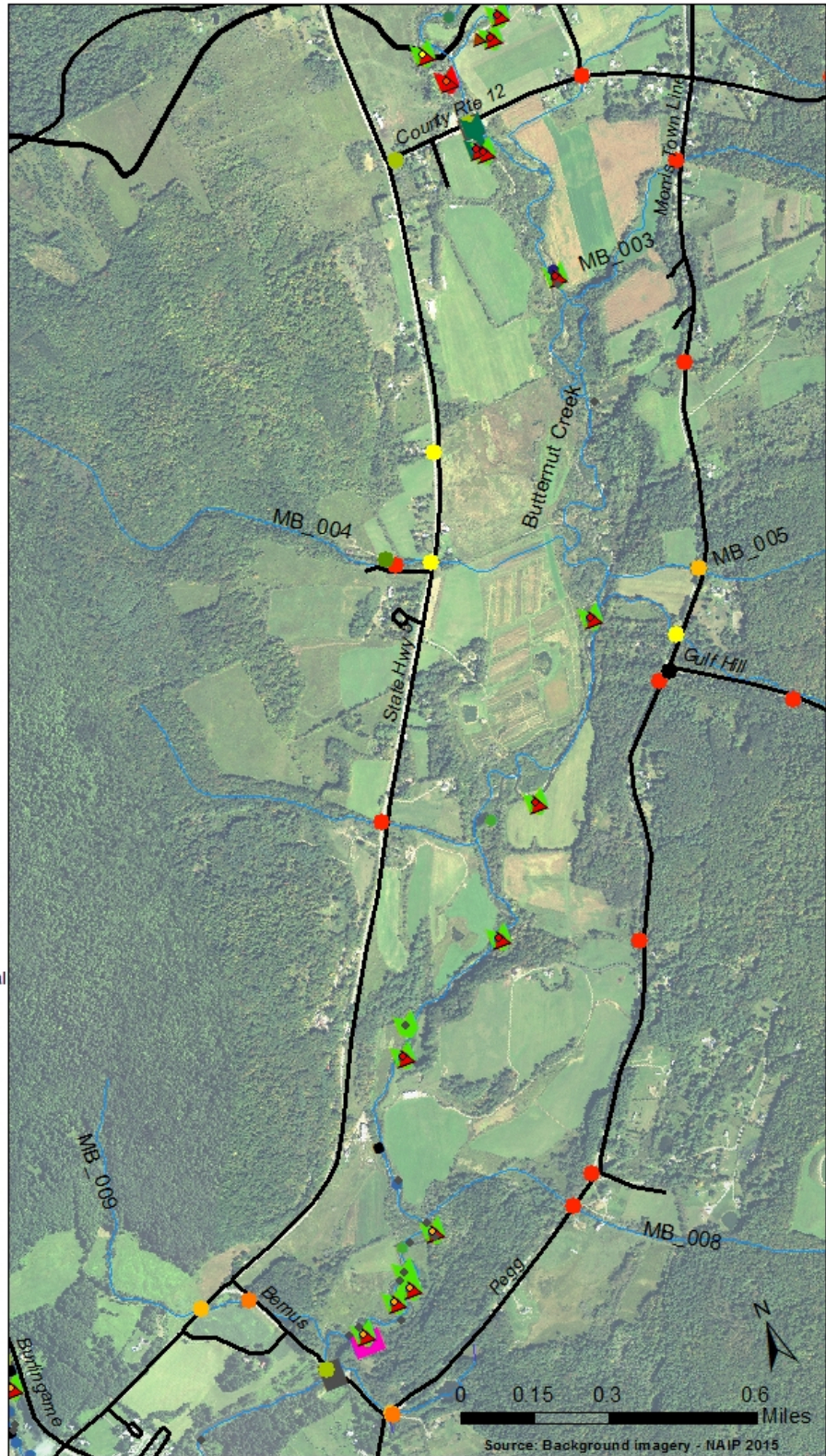
- no score - missing data
- No barrier
- Insignificant barrier
- Minor barrier
- Moderate barrier
- Significant barrier
- Severe barrier

Stream Crossings No NAACC

- Bridge
- Culvert
- Footbridge
- Ford
- Livestock crossing

- Roads
- Streams

- ▭ Butternut Watershed Boundaries



Middle Butternut Mainstem
Bemus Rd to Broad St

Erosion Sites

- ◆ Extreme
- ◆ Very High
- ◆ High
- ◆ Moderate
- ◆ No BEHI

Significant Features

- ▲ Berm
- ▲ Cold water input
- ▲ Dredging
- ▲ Erosion site
- ▲ Garbage
- ▲ Gravel mine
- ▲ Road runoff
- ▲ Upper knotweed

Deposition

- Beaver Dam
- Debris
- Grasses
- Gravel bar
- Gravel bar/Beaver Dam
- Gravel bar/Debris
- Gravel bar/LWD
- Gravel bar/LWD/Beaver dam
- LWD
- Sediment
- Sediment/Debris
- No
- N/A

Buffer Potential

- N/A
- No
- Recent Planting
- Yes
- Yes/Recent planting

Floodplain Reconnection Potential

- ★ Floodplain Reconnection Potential

Instream Structures

- Instream Structures
- no score - missing data
- No barrier
- Insignificant barrier
- Minor barrier
- Moderate barrier
- Significant barrier
- Severe barrier

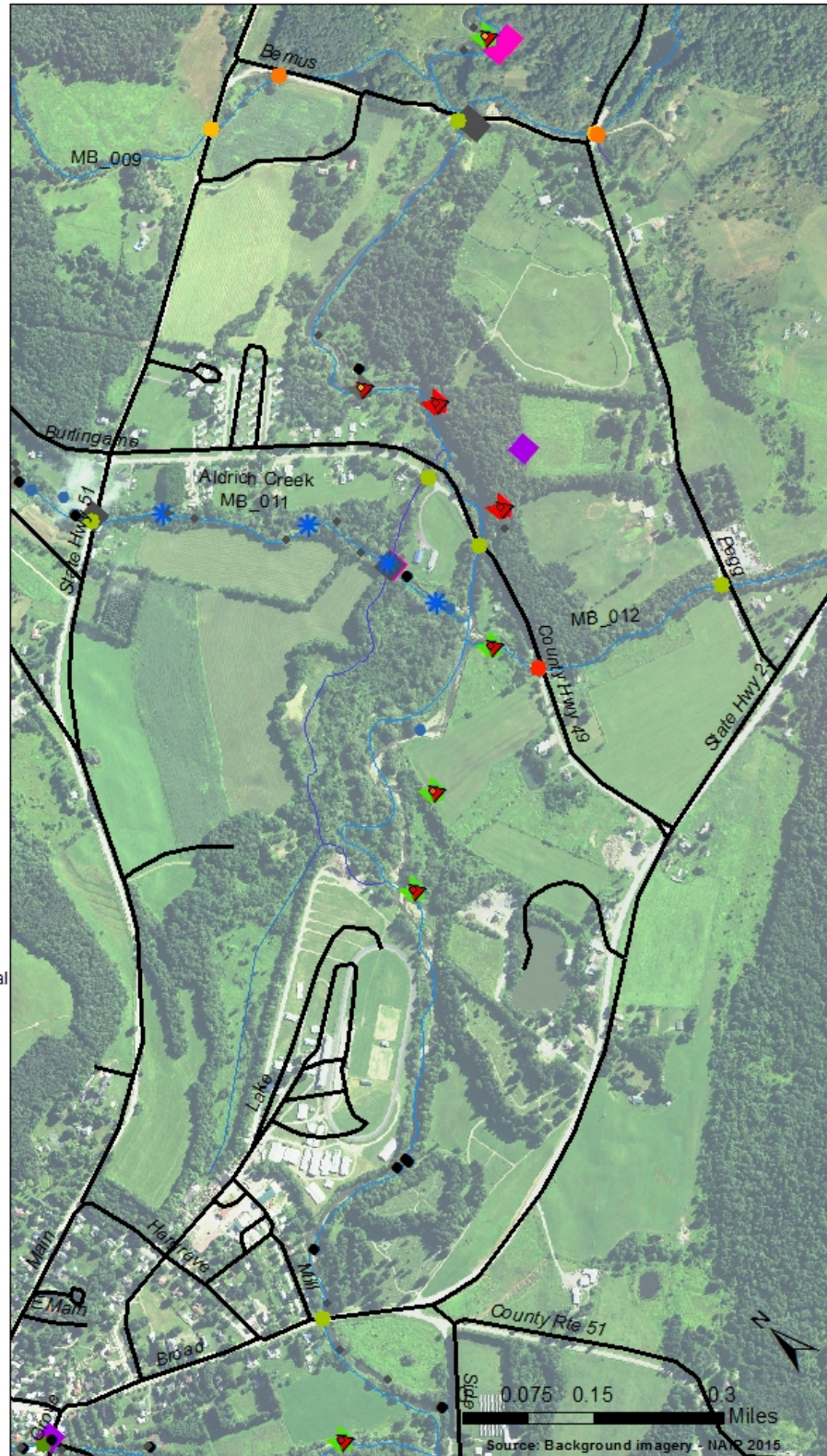
Stream Crossings No NAACC

- Bridge
- Culvert
- Footbridge
- Ford
- Livestock crossing

Roads

Streams

Butternut Watershed Boundaries



Middle Butternut Mainstem
Broad St to Peet Rd

Erosion Sites

- ◆ Extreme
- ◆ Very High
- ◆ High
- ◆ Moderate
- ◆ No BEHI

Significant Features

- ▲ Berm
- ▲ Cold water input
- ▲ Dredging
- ▲ Erosion site
- ▲ Garbage
- ▲ Gravel mine
- ▲ Road runoff
- ▲ Upper knotweed

Deposition

- Beaver Dam
- Debris
- Grasses
- Gravel bar
- Gravel bar/Beaver Dam
- Gravel bar/Debris
- Gravel bar/LWD
- Gravel bar/LWD/Beaver dam
- LWD
- Sediment
- Sediment/Debris
- No
- N/A

Buffer Potential

- N/A
- No
- Recent Planting
- Yes
- Yes/Recent planting

Floodplain Reconnection Potential

- ★

Instream Structures

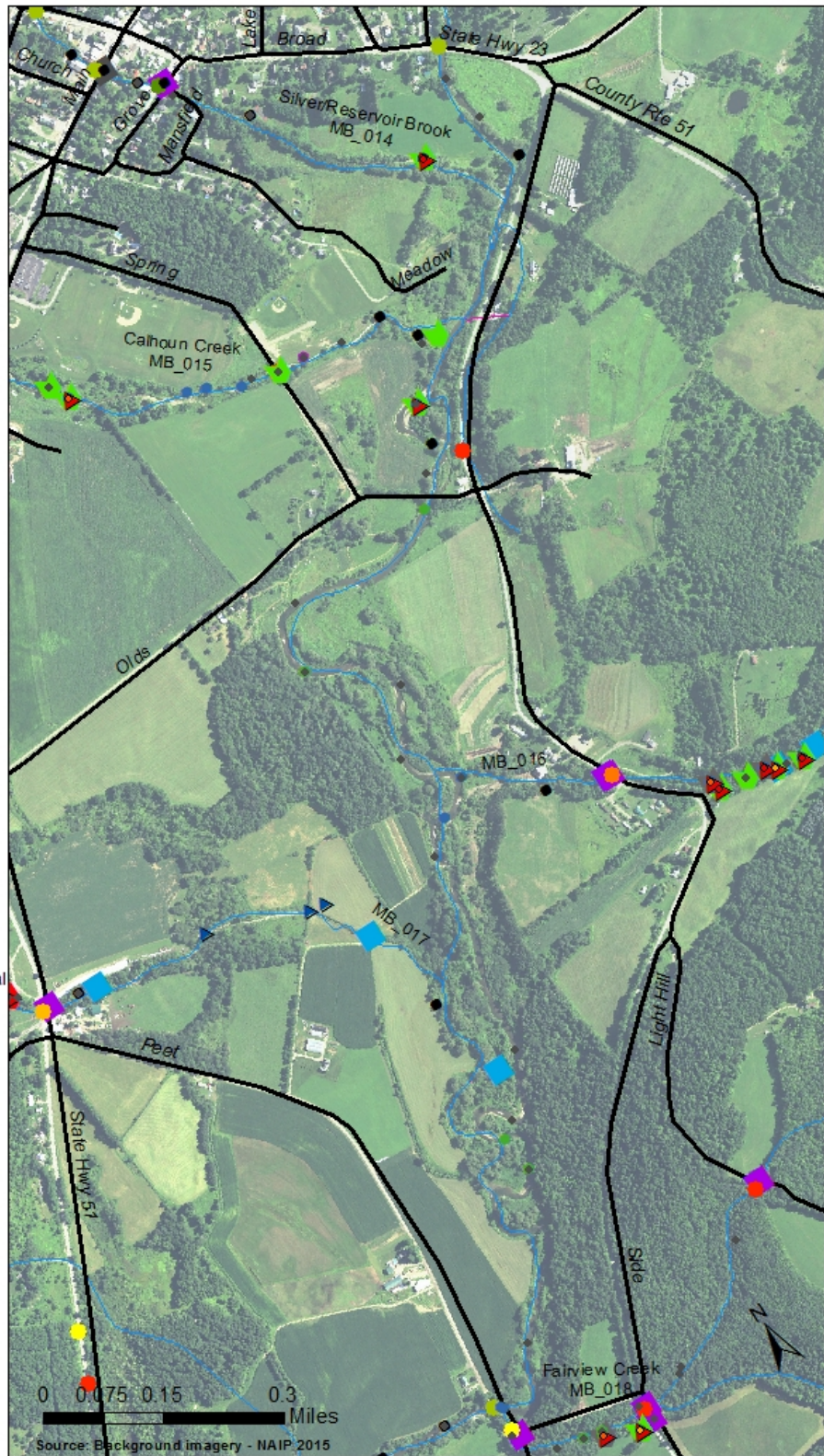
- no score - missing data
- No barrier
- Insignificant barrier
- Minor barrier
- Moderate barrier
- Significant barrier
- Severe barrier

Stream Crossings No NAACC

- Bridge
- Culvert
- Footbridge
- Ford
- Livestock crossing

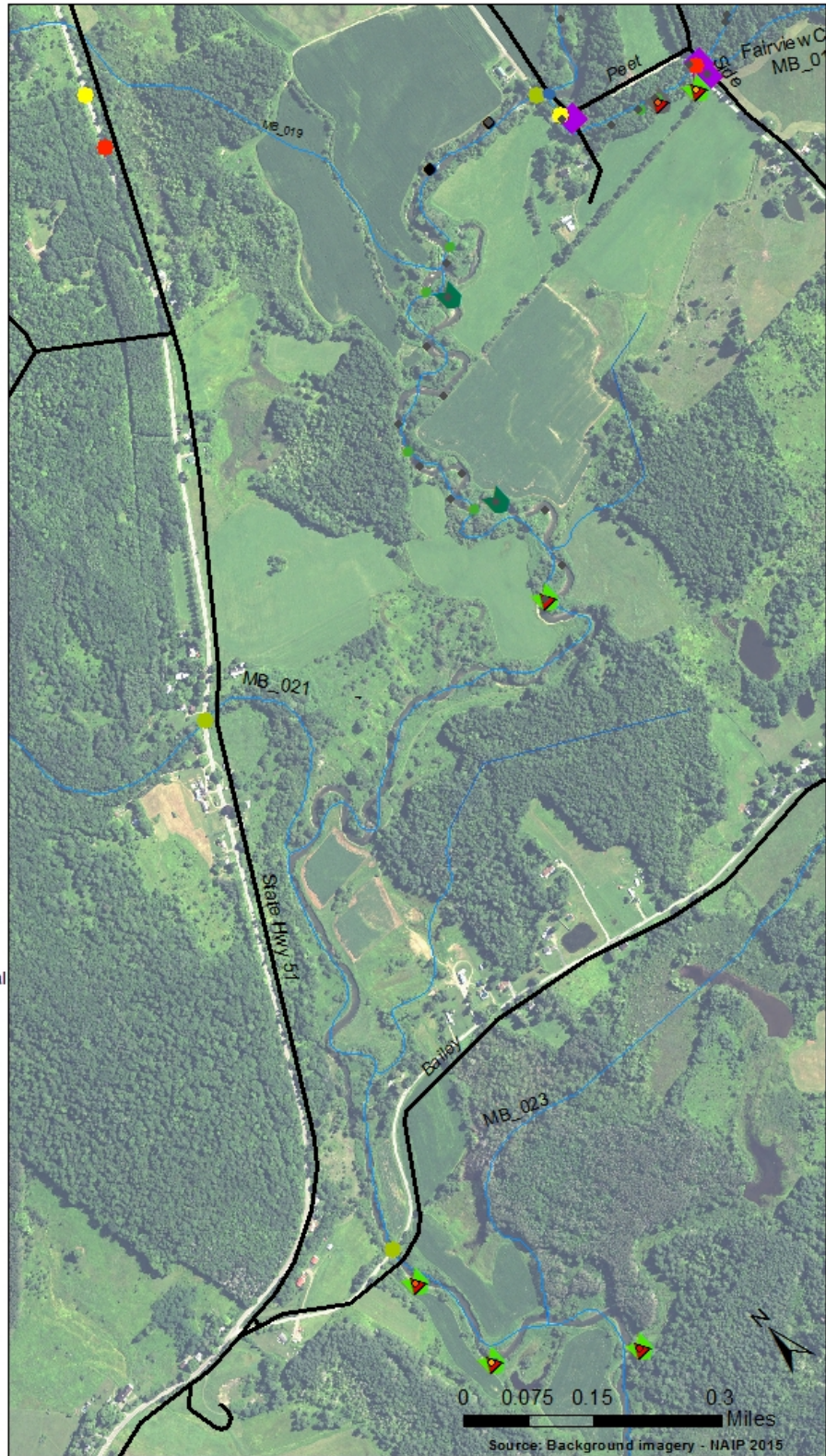
- Roads
- Streams

- Butternut Watershed Boundaries



Middle Butternut Mainstem
Peet Rd to Bailey Rd

- Erosion Sites**
- ◆ Extreme
 - ◆ Very High
 - ◆ High
 - ◆ Moderate
 - ◆ No BEHI
- Significant Features**
- ▲ Berm
 - ▲ Cold water input
 - ▲ Dredging
 - ▲ Erosion site
 - ▲ Garbage
 - ▲ Gravel mine
 - ▲ Road runoff
 - ▲ Upper knotweed
- Deposition**
- Beaver Dam
 - Debris
 - Grasses
 - Gravel bar
 - Gravel bar/Beaver Dam
 - Gravel bar/Debris
 - Gravel bar/LWD
 - Gravel bar/LWD/Beaver dam
 - LWD
 - Sediment
 - Sediment/Debris
 - No
 - N/A
- Buffer Potential**
- N/A
 - No
 - Recent Planting
 - Yes
 - Yes/Recent planting
 - ★ Floodplain Reconnection Potential
- Instream Structures**
- Instream Structures
- NAACC Stream Crossing Evaluation**
- no score - missing data
 - No barrier
 - Insignificant barrier
 - Minor barrier
 - Moderate barrier
 - Significant barrier
 - Severe barrier
- Stream Crossings No NAACC**
- Bridge
 - Culvert
 - Footbridge
 - Ford
 - Livestock crossing
- Roads**
- Roads
- Streams**
- Streams
- Butternut Watershed Boundaries**
- ▭ Butternut Watershed Boundaries



Middle Butternut Mainstem
Bailey Rd to Bottom of watershed

Erosion Sites

- ◆ Extreme
- ◆ Very High
- ◆ High
- ◆ Moderate
- ◆ No BEHI

Significant Features

- ▲ Berm
- ▲ Cold water input
- ▲ Dredging
- ▲ Erosion site
- ▲ Garbage
- ▲ Gravel mine
- ▲ Road runoff
- ▲ Upper knotweed

Deposition

- Beaver Dam
- Debris
- Grasses
- Gravel bar
- Gravel bar/Beaver Dam
- Gravel bar/Debris
- Gravel bar/LWD
- Gravel bar/LWD/Beaver dam
- LWD
- Sediment
- Sediment/Debris
- No
- N/A

Buffer Potential

- N/A
- No
- Recent Planting
- Yes
- Yes/Recent planting

Floodplain Reconnection Potential

- ★

Instream Structures

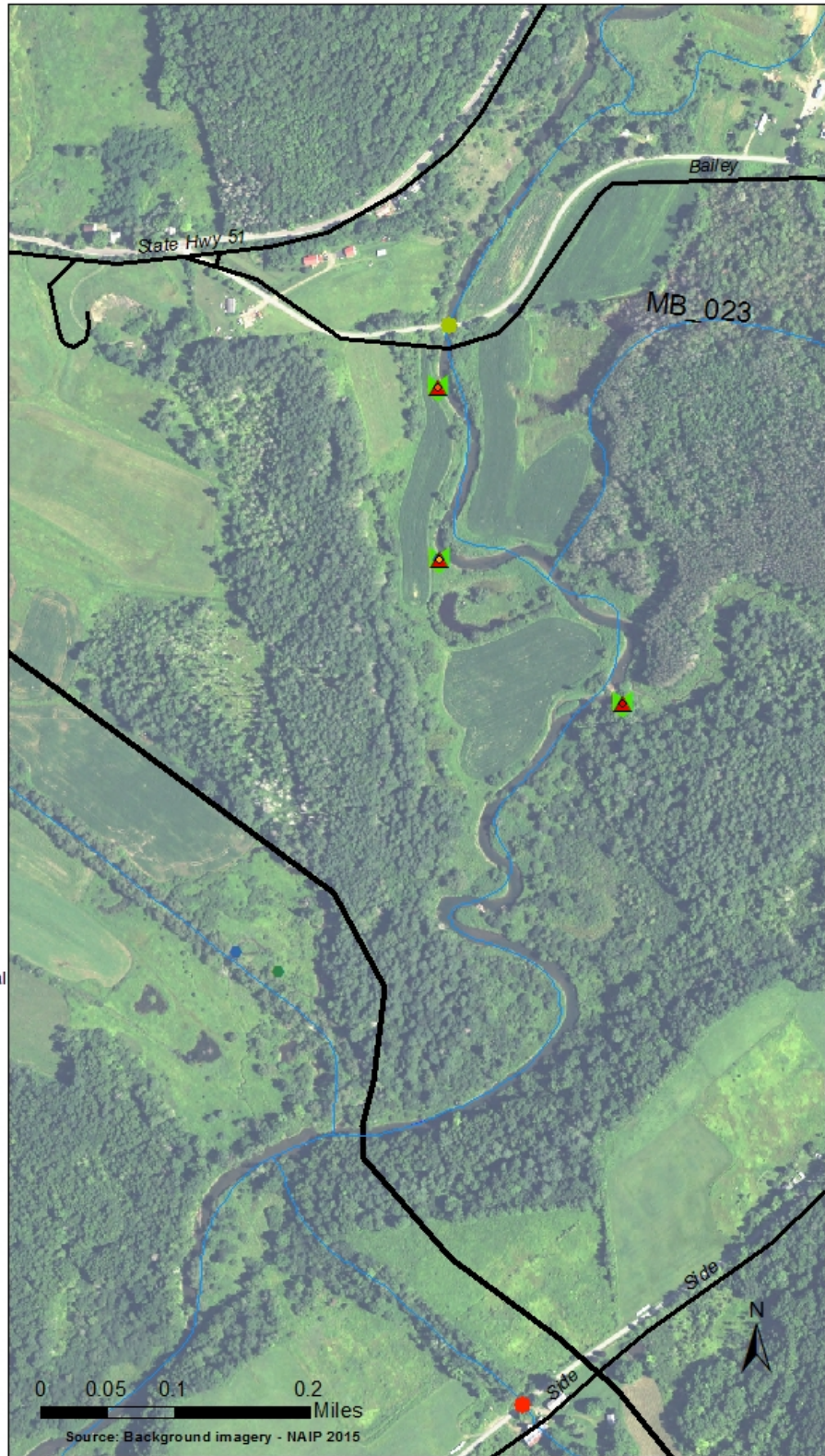
- no score - missing data
- No barrier
- Insignificant barrier
- Minor barrier
- Moderate barrier
- Significant barrier
- Severe barrier

Stream Crossings No NAACC

- Bridge
- Culvert
- Footbridge
- Ford
- Livestock crossing

- Roads
- Streams

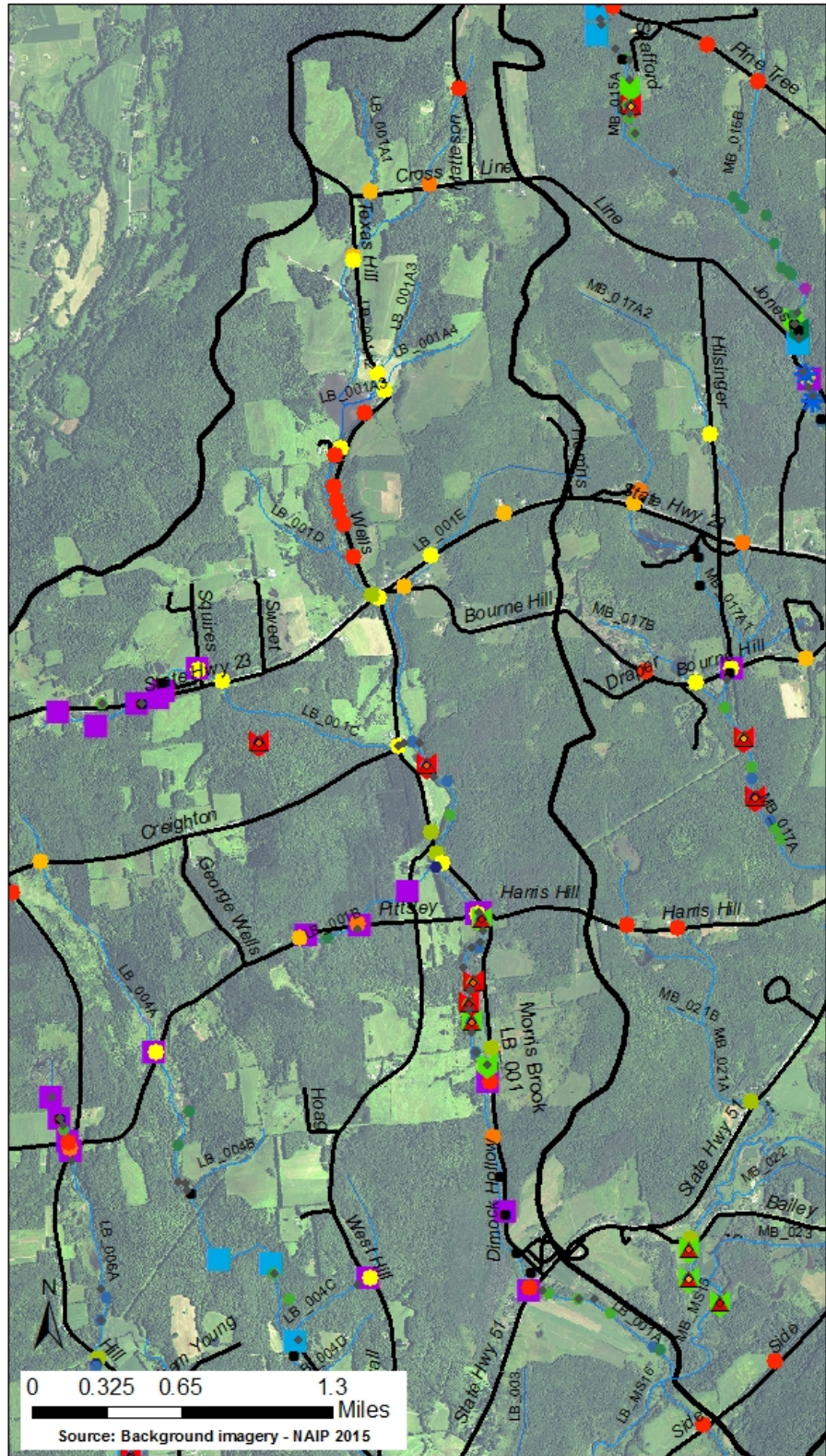
- ▭ Butternut Watershed Boundaries



G.3 Lower Butternut Creek Watershed Figures

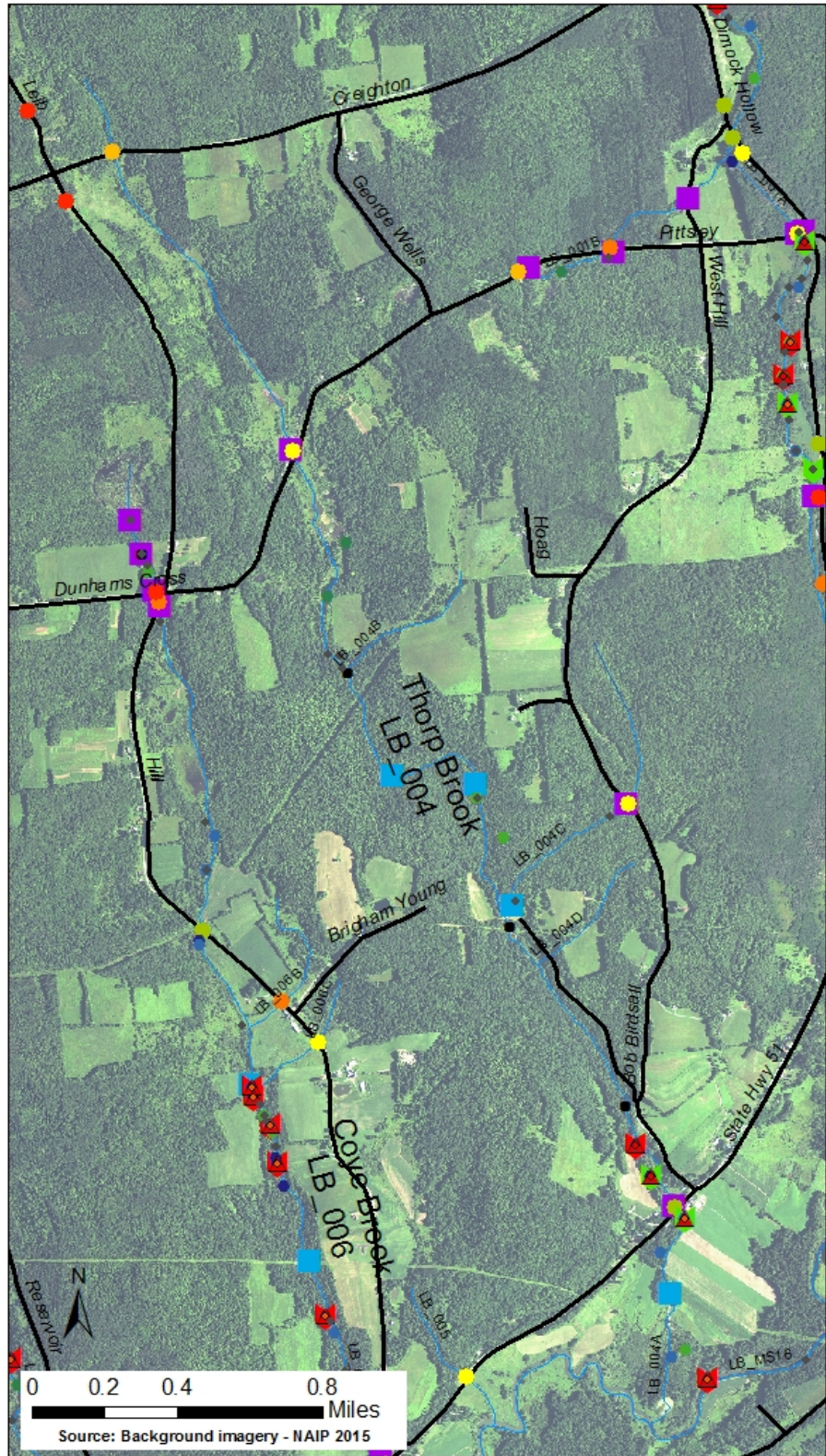
Lower Butternut Tributaries
Morris Brook/LB_001

- Erosion Sites**
 - ◆ Extreme
 - ◆ Very High
 - ◆ High
 - ◆ Moderate
 - ◆ No BEHI
- Significant Features**
 - ▲ Berm
 - ▲ Cold water input
 - ▲ Dredging
 - ▲ Erosion site
 - ▲ Garbage
 - ▲ Gravel mine
 - ▲ Road runoff
 - ▲ Upper knotweed
- Deposition**
 - Beaver Dam
 - Debris
 - Grasses
 - Gravel bar
 - Gravel bar/Beaver Dam
 - Gravel bar/Debris
 - Gravel bar/LWD
 - Gravel bar/LWD/Beaver dam
 - LWD
 - Sediment
 - Sediment/Debris
 - No
 - N/A
- Buffer Potential**
 - N/A
 - No
 - Recent Planting
 - Yes
 - Yes/Recent planting
- Floodplain Reconnection Potential**
 - ★
- Instream Structures**
 - no score - missing data
 - No barrier
 - Insignificant barrier
 - Minor barrier
 - Moderate barrier
 - Significant barrier
 - Severe barrier
- Stream Crossings No NAACC**
 - Bridge
 - Culvert
 - Footbridge
 - Ford
 - Livestock crossing
- Roads**
 - Roads
- Streams**
 - Streams
- Butternut Watershed Boundaries**
 - ▭



Lower Butternut Tributaries
Thorp Brook/LB_004

- Erosion Sites**
 - ◆ Extreme
 - ◆ Very High
 - ◆ High
 - ◆ Moderate
 - ◆ No BEHI
- Significant Features**
 - ▲ Berm
 - ▲ Cold water input
 - ▲ Dredging
 - ▲ Erosion site
 - ▲ Garbage
 - ▲ Gravel mine
 - ▲ Road runoff
 - ▲ Upper knotweed
- Deposition**
 - Beaver Dam
 - Debris
 - Grasses
 - Gravel bar
 - Gravel bar/Beaver Dam
 - Gravel bar/Debris
 - Gravel bar/LWD
 - Gravel bar/LWD/Beaver dam
 - LWD
 - Sediment
 - Sediment/Debris
 - No
 - N/A
- Buffer Potential**
 - N/A
 - No
 - Recent Planting
 - Yes
 - Yes/Recent planting
 - ★ Floodplain Reconnection Potential
- Instream Structures**
 - Instream Structures
- NAACC Stream Crossing Evaluation**
 - no score - missing data
 - No barrier
 - Insignificant barrier
 - Minor barrier
 - Moderate barrier
 - Significant barrier
 - Severe barrier
- Stream Crossings No NAACC**
 - Bridge
 - Culvert
 - Footbridge
 - Ford
 - Livestock crossing
- Roads**
 - Roads
- Streams**
 - Streams
- Butternut Watershed Boundaries**
 - ▭ Butternut Watershed Boundaries



Lower Butternut Tributaries
Coye Brook/LB_006

Erosion Sites

- ◆ Extreme
- ◆ Very High
- ◆ High
- ◆ Moderate
- ◆ No BEHI

Significant Features

- ▲ Berm
- ▲ Cold water input
- ▲ Dredging
- ▲ Erosion site
- ▲ Garbage
- ▲ Gravel mine
- ▲ Road runoff
- ▲ Upper knotweed

Deposition

- Beaver Dam
- Debris
- Grasses
- Gravel bar
- Gravel bar/Beaver Dam
- Gravel bar/Debris
- Gravel bar/LWD
- Gravel bar/LWD/Beaver dam
- LWD
- Sediment
- Sediment/Debris
- No
- N/A

Buffer Potential

- N/A
- No
- Recent Planting
- Yes
- Yes/Recent planting

Floodplain Reconnection Potential

- ★ Floodplain Reconnection Potential

Instream Structures

- Instream Structures
- no score - missing data
- No barrier
- Insignificant barrier
- Minor barrier
- Moderate barrier
- Significant barrier
- Severe barrier

Stream Crossings No NAACC

- Bridge
- Culvert
- Footbridge
- Ford
- Livestock crossing

Roads

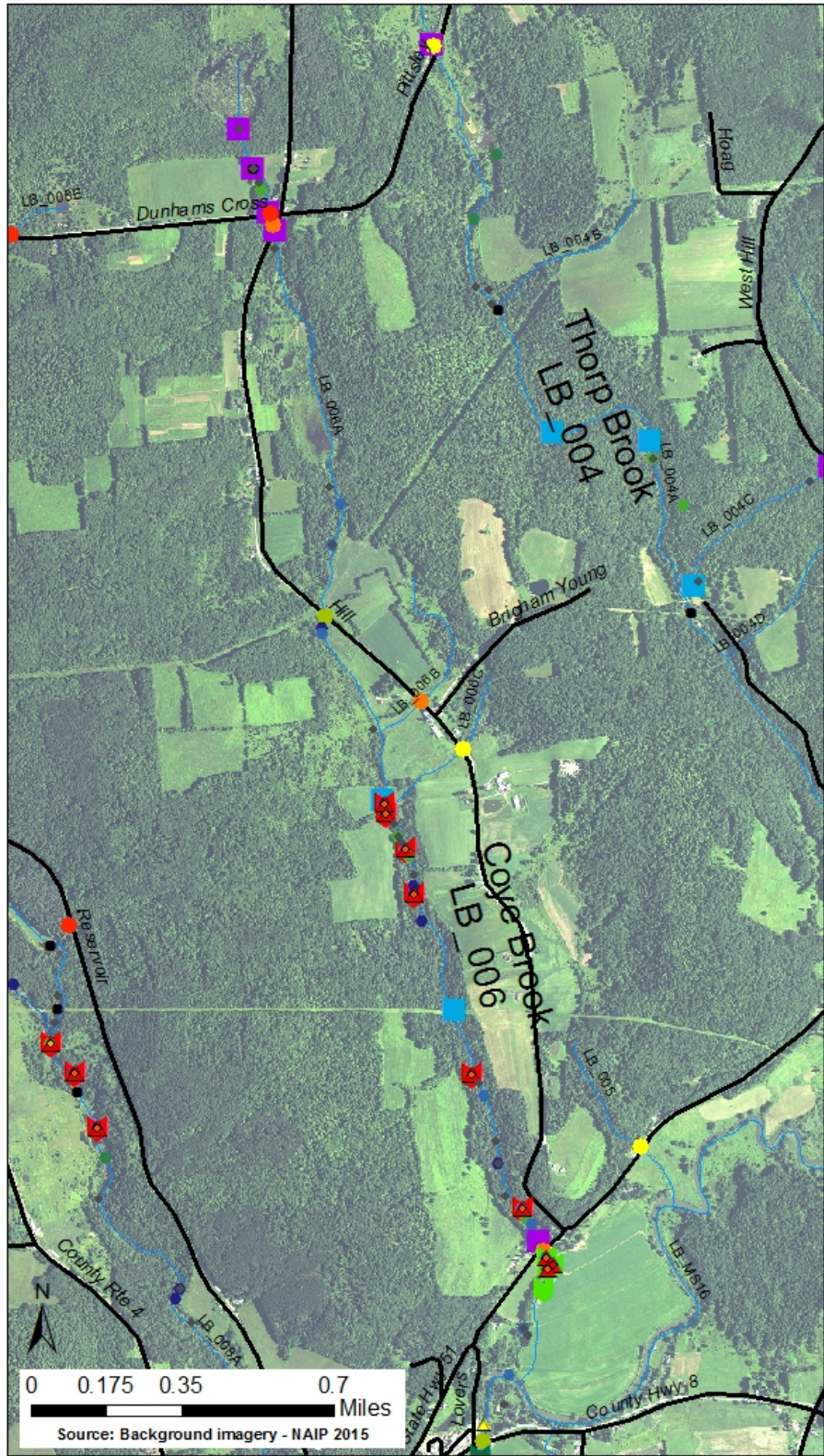
- Roads

Streams

- Streams

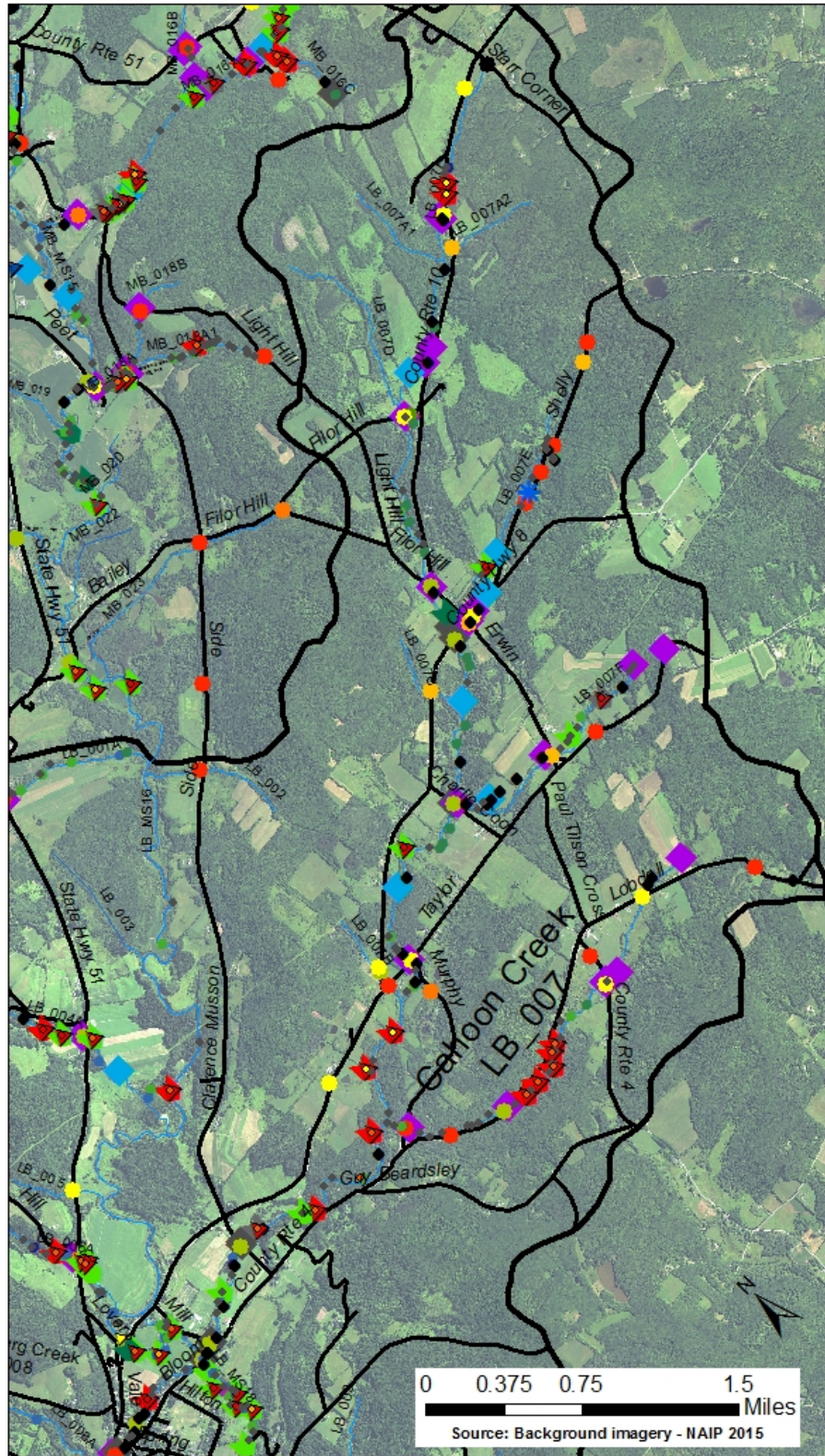
Butternut Watershed Boundaries

- Butternut Watershed Boundaries



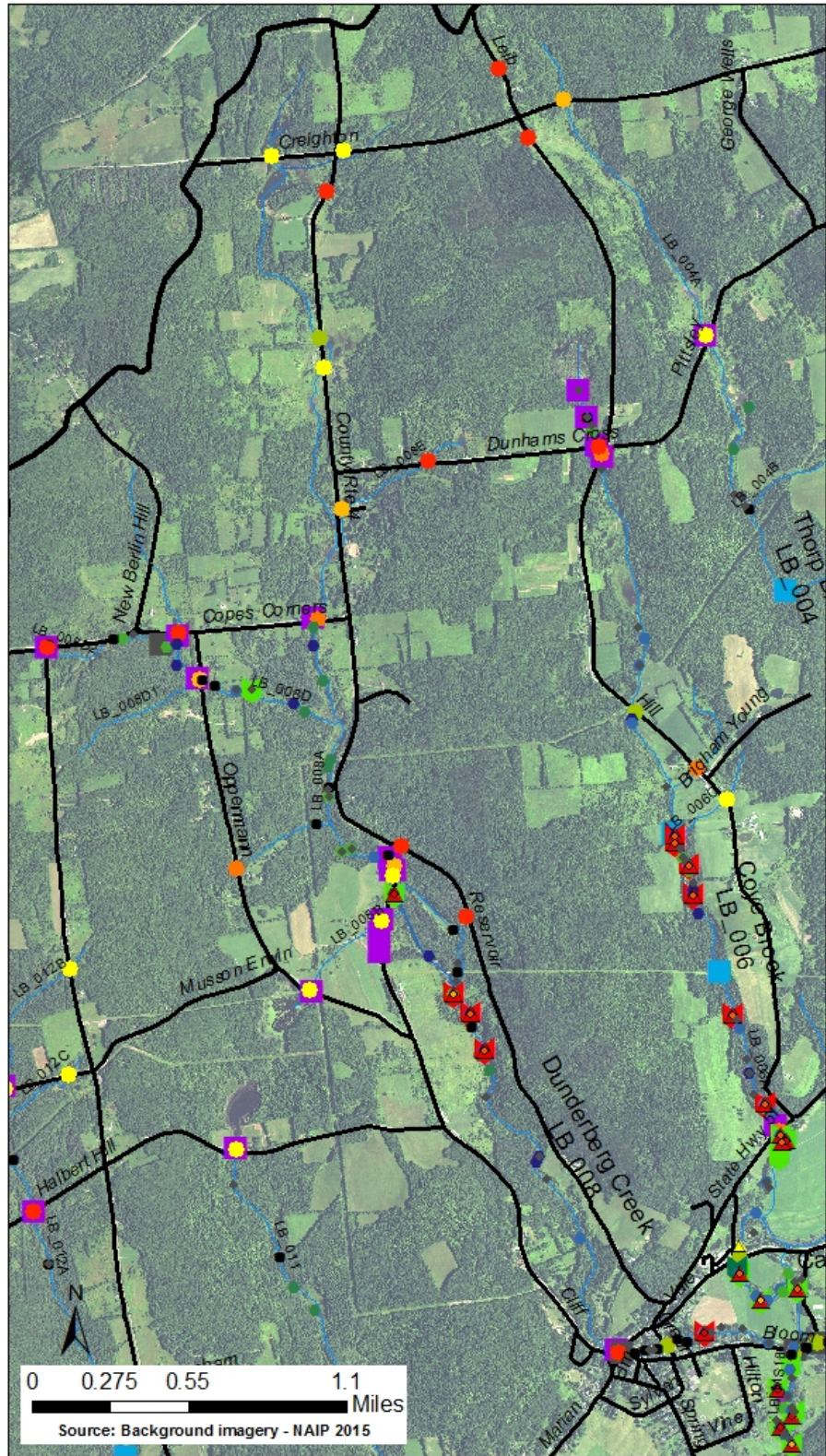
Lower Butternut Tributaries
Cahoon Creek/LB_007

- Erosion Sites**
 - ◆ Extreme
 - ◆ Very High
 - ◆ High
 - ◆ Moderate
 - ◆ No BEHI
- Significant Features**
 - ▲ Berm
 - ▲ Cold water input
 - ▲ Dredging
 - ▲ Erosion site
 - ▲ Garbage
 - ▲ Gravel mine
 - ▲ Road runoff
 - ▲ Upper knotweed
- Deposition**
 - Beaver Dam
 - Debris
 - Grasses
 - Gravel bar
 - Gravel bar/Beaver Dam
 - Gravel bar/Debris
 - Gravel bar/LWD
 - Gravel bar/LWD/Beaver dam
 - LWD
 - Sediment
 - Sediment/Debris
 - No
 - N/A
- Buffer Potential**
 - N/A
 - No
 - Recent Planting
 - Yes
 - Yes/Recent planting
 - ★ Floodplain Reconnection Potential
- Instream Structures**
 - Instream Structures
- NAACC Stream Crossing Evaluation**
 - no score - missing data
 - No barrier
 - Insignificant barrier
 - Minor barrier
 - Moderate barrier
 - Significant barrier
 - Severe barrier
- Stream Crossings No NAACC**
 - Bridge
 - Culvert
 - Footbridge
 - Ford
 - Livestock crossing
- Roads**
 - Roads
- Streams**
 - Streams
- Butternut Watershed Boundaries**
 - ▭ Butternut Watershed Boundaries



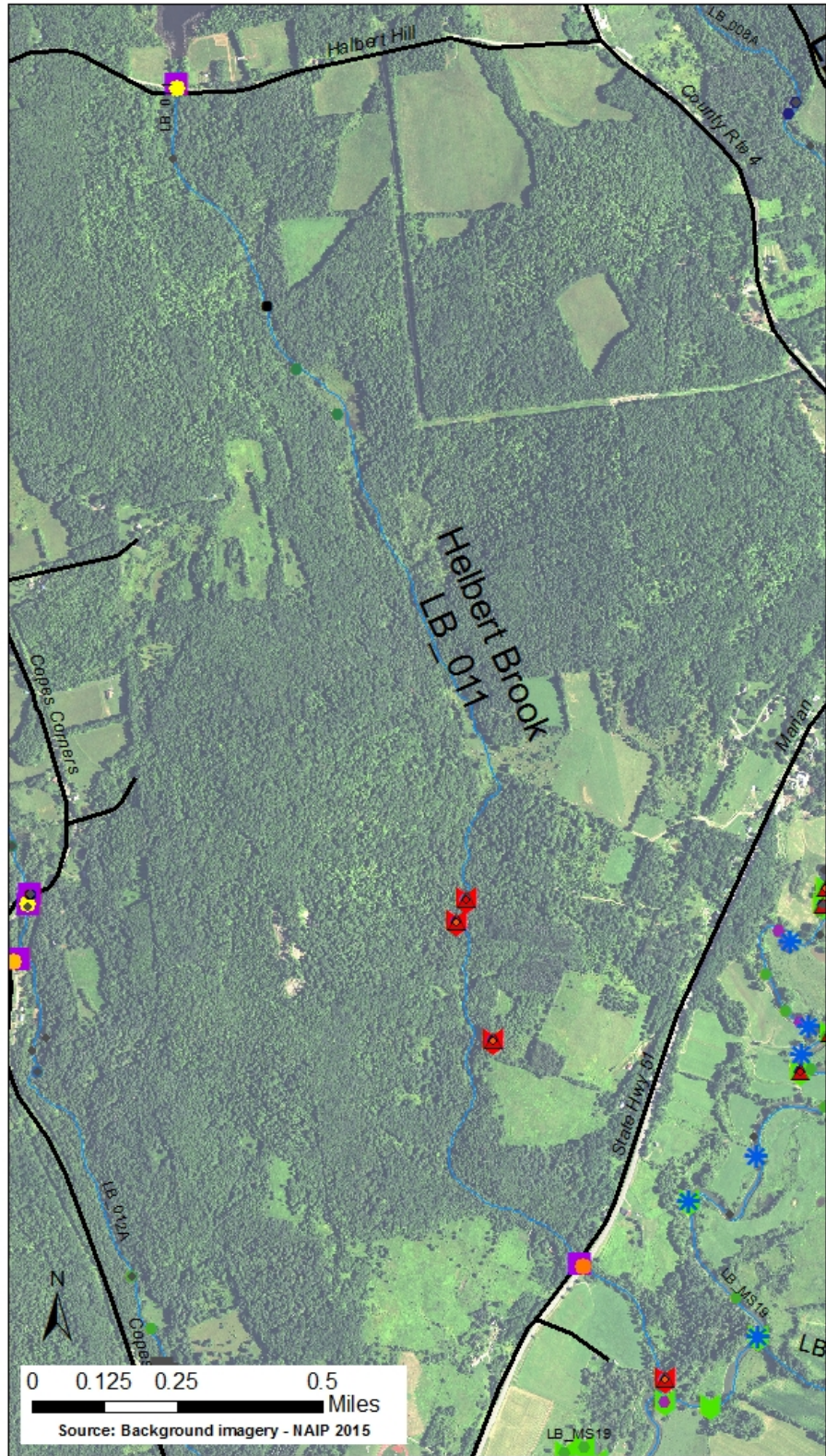
Lower Butternut Tributaries
Dunderberg Creek/LB_008

- Erosion Sites**
 - ◆ Extreme
 - ◆ Very High
 - ◆ High
 - ◆ Moderate
 - ◆ No BEHI
- Significant Features**
 - ▲ Berm
 - ▲ Cold water input
 - ▲ Dredging
 - ▲ Erosion site
 - ▲ Garbage
 - ▲ Gravel mine
 - ▲ Road runoff
 - ▲ Upper knotweed
- Deposition**
 - Beaver Dam
 - Debris
 - Grasses
 - Gravel bar
 - Gravel bar/Beaver Dam
 - Gravel bar/Debris
 - Gravel bar/LWD
 - Gravel bar/LWD/Beaver dam
 - LWD
 - Sediment
 - Sediment/Debris
 - No
 - N/A
- Buffer Potential**
 - N/A
 - No
 - Recent Planting
 - Yes
 - Yes/Recent planting
- Floodplain Reconnection Potential**
 - ★
- Instream Structures**
 -
- NAACC Stream Crossing Evaluation**
 - no score - missing data
 - No barrier
 - Insignificant barrier
 - Minor barrier
 - Moderate barrier
 - Significant barrier
 - Severe barrier
- Stream Crossings No NAACC**
 - Bridge
 - Culvert
 - Footbridge
 - Ford
 - Livestock crossing
- Roads**
 -
- Streams**
 -
- Butternut Watershed Boundaries**
 -



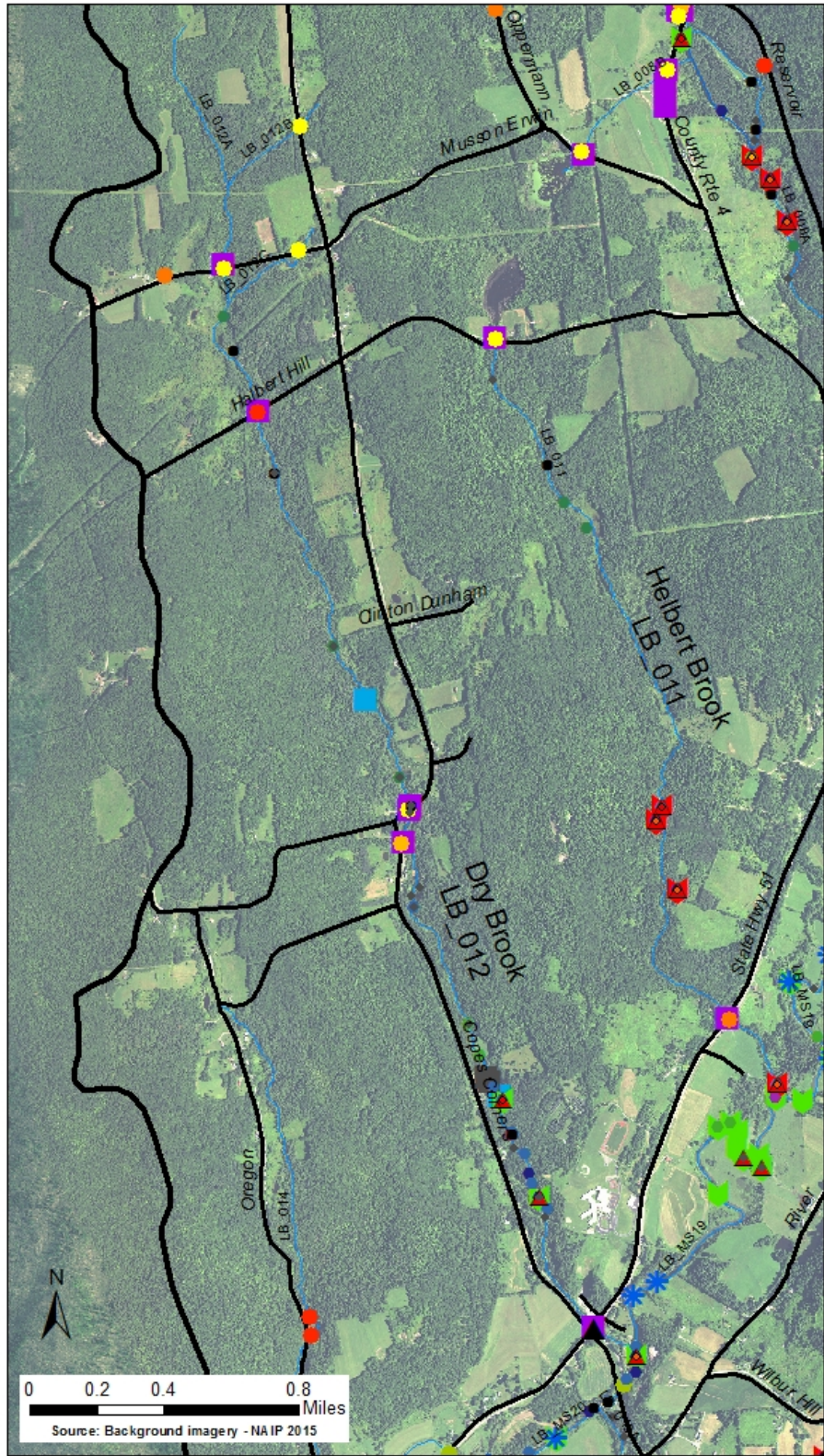
Lower Butternut Tributaries
Helbert Creek/LB_011

- Erosion Sites**
 - ◆ Extreme
 - ◆ Very High
 - ◆ High
 - ◆ Moderate
 - ◆ No BEHI
- Significant Features**
 - ▲ Berm
 - ▲ Cold water input
 - ▲ Dredging
 - ▲ Erosion site
 - ▲ Garbage
 - ▲ Gravel mine
 - ▲ Road runoff
 - ▲ Upper knotweed
- Deposition**
 - Beaver Dam
 - Debris
 - Grasses
 - Gravel bar
 - Gravel bar/Beaver Dam
 - Gravel bar/Debris
 - Gravel bar/LWD
 - Gravel bar/LWD/Beaver dam
 - LWD
 - Sediment
 - Sediment/Debris
 - No
 - N/A
- Buffer Potential**
 - N/A
 - No
 - Recent Planting
 - Yes
 - Yes/Recent planting
 - ★ Floodplain Reconnection Potential
- Instream Structures**
 - no score - missing data
 - No barrier
 - Insignificant barrier
 - Minor barrier
 - Moderate barrier
 - Significant barrier
 - Severe barrier
- Stream Crossings No NAACC**
 - Bridge
 - Culvert
 - Footbridge
 - Ford
 - Livestock crossing
- Roads**
 - Roads
- Streams**
 - Streams
- Butternut Watershed Boundaries**
 - ▭ Butternut Watershed Boundaries



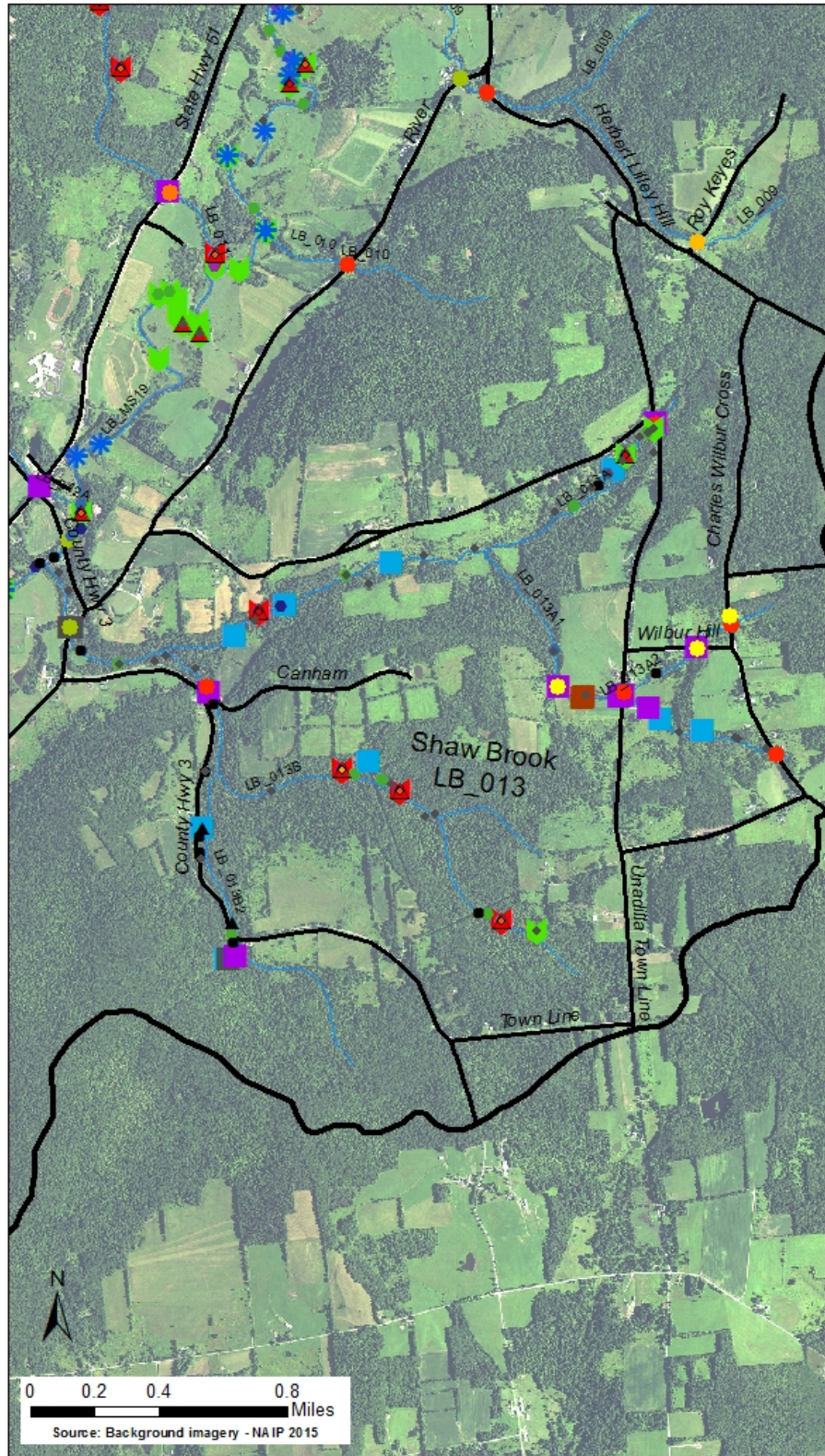
Lower Butternut Tributaries
 Dry Brook/Copes Brook/LB_012

- Erosion Sites**
 - ◆ Extreme
 - ◆ Very High
 - ◆ High
 - ◆ Moderate
 - ◆ No BEHI
- Significant Features**
 - ▲ Berm
 - ▲ Cold water input
 - ▲ Dredging
 - ▲ Erosion site
 - ▲ Garbage
 - ▲ Gravel mine
 - ▲ Road runoff
 - ▲ Upper knotweed
- Deposition**
 - Beaver Dam
 - Debris
 - Grasses
 - Gravel bar
 - Gravel bar/Beaver Dam
 - Gravel bar/Debris
 - Gravel bar/LWD
 - Gravel bar/LWD/Beaver dam
 - LWD
 - Sediment
 - Sediment/Debris
 - No
 - N/A
- Buffer Potential**
 - N/A
 - No
 - Recent Planting
 - Yes
 - Yes/Recent planting
- Floodplain Reconnection Potential**
 - ★
- Instream Structures**
 -
- NAACC Stream Crossing Evaluation**
 - no score - missing data
 - No barrier
 - Insignificant barrier
 - Minor barrier
 - Moderate barrier
 - Significant barrier
 - Severe barrier
 - ▲ Needs follow-up
- Stream Crossings No NAACC**
 - Bridge
 - Culvert
 - Footbridge
 - Ford
 - Livestock crossing
- Roads**
 -
- Streams**
 -
- Butternut Watershed Boundaries**
 -



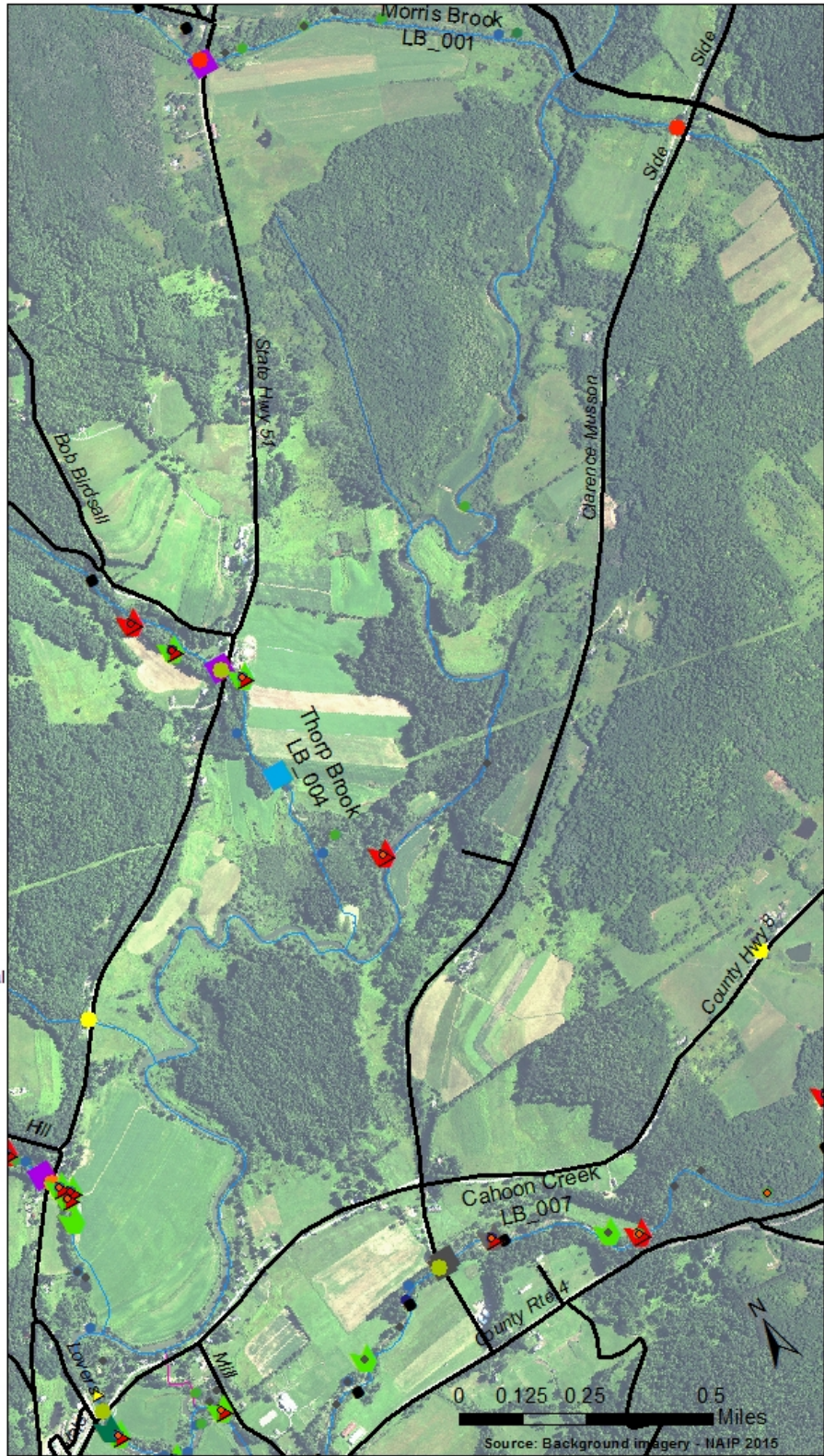
Lower Butternut Tributaries
Shaw Brook/LB_013

- Erosion Sites**
- ◆ Extreme
 - ◆ Very High
 - ◆ High
 - ◆ Moderate
 - ◆ No BEHI
- Significant Features**
- ▲ Berm
 - ▲ Cold water input
 - ▲ Dredging
 - ▲ Erosion site
 - ▲ Garbage
 - ▲ Gravel mine
 - ▲ Road runoff
 - ▲ Upper knotweed
- Deposition**
- Beaver Dam
 - Debris
 - Grasses
 - Gravel bar
 - Gravel bar/Beaver Dam
 - Gravel bar/Debris
 - Gravel bar/LWD
 - Gravel bar/LWD/Beaver dam
 - LWD
 - Sediment
 - Sediment/Debris
 - No
 - N/A
- Buffer Potential**
- N/A
 - No
 - Recent Planting
 - Yes
 - Yes/Recent planting
 - ★ Floodplain Reconnection Potential
- Instream Structures**
- Instream Structures
- NAACC Stream Crossing Evaluation**
- no score - missing data
 - No barrier
 - Insignificant barrier
 - Minor barrier
 - Moderate barrier
 - Significant barrier
 - Severe barrier
- Stream Crossings No NAACC**
- Bridge
 - Culvert
 - Footbridge
 - Ford
 - Livestock crossing
- Roads**
- Roads
- Streams**
- Streams
- Butternut Watershed Boundaries**
- ▭ Butternut Watershed Boundaries



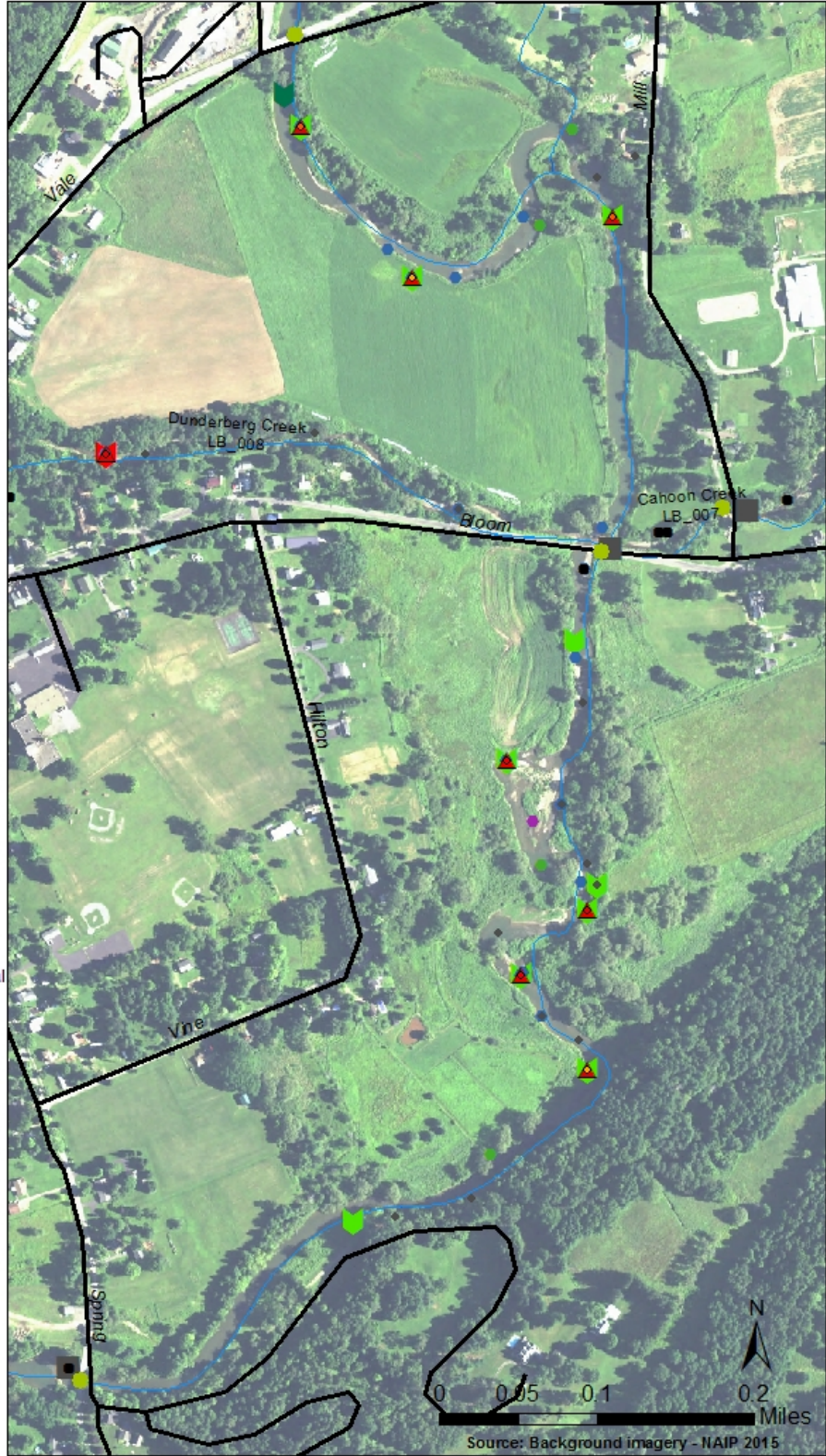
Lower Butternut Mainstem
 Top of watershed to Cty Hwy 8

- Erosion Sites**
- ◆ Extreme
- ◆ Very High
- ◆ High
- ◆ Moderate
- ◆ No BEHI
- Significant Features**
- ▲ Berm
- ▲ Cold water input
- ▲ Dredging
- ▲ Erosion site
- ▲ Garbage
- ▲ Gravel mine
- ▲ Road runoff
- ▲ Upper knotweed
- Deposition**
- Beaver Dam
- Debris
- Grasses
- Gravel bar
- Gravel bar/Beaver Dam
- Gravel bar/Debris
- Gravel bar/LWD
- Gravel bar/LWD/Beaver dam
- LWD
- Sediment
- Sediment/Debris
- No
- N/A
- Buffer Potential**
- N/A
- No
- Recent Planting
- Yes
- Yes/Recent planting
- ★ Floodplain Reconnection Potential
- Instream Structures
- NAACC Stream Crossing Evaluation**
- no score - missing data
- No barrier
- Insignificant barrier
- Minor barrier
- Moderate barrier
- Significant barrier
- Severe barrier
- Stream Crossings No NAACC**
- Bridge
- Culvert
- Footbridge
- Ford
- Livestock crossing
- Roads
- Streams
- ▭ Butternut Watershed Boundaries



Lower Butternut Mainstem
 Cty Hwy 8 to Spring St
 Erosion Sites

- ◆ Extreme
- ◆ Very High
- ◆ High
- ◆ Moderate
- ◆ No BEHI
- Significant Features**
- ▲ Berm
- ▲ Cold water input
- ▲ Dredging
- ▲ Erosion site
- ▲ Garbage
- ▲ Gravel mine
- ▲ Road runoff
- ▲ Upper knotweed
- Deposition**
- Beaver Dam
- Debris
- Grasses
- Gravel bar
- Gravel bar/Beaver Dam
- Gravel bar/Debris
- Gravel bar/LWD
- Gravel bar/LWD/Beaver dam
- LWD
- Sediment
- Sediment/Debris
- No
- N/A
- Buffer Potential**
- N/A
- No
- Recent Planting
- Yes
- Yes/Recent planting
- ★ Floodplain Reconnection Potential
- Instream Structures
- NAACC Stream Crossing Evaluation**
- no score - missing data
- No barrier
- Insignificant barrier
- Minor barrier
- Moderate barrier
- Significant barrier
- Severe barrier
- Stream Crossings No NAACC**
- Bridge
- Culvert
- Footbridge
- Ford
- Livestock crossing
- Roads
- Streams
- ▭ Butternut Watershed Boundaries



Lower Butternut Mainstem
Spring St to Cty Hwy 3

Erosion Sites

- ◆ Extreme
- ◆ Very High
- ◆ High
- ◆ Moderate
- ◆ No BEHI

Significant Features

- ▲ Berm
- ▲ Cold water input
- ▲ Dredging
- ▲ Erosion site
- ▲ Garbage
- ▲ Gravel mine
- ▲ Road runoff
- ▲ Upper knotweed

Deposition

- Beaver Dam
- Debris
- Grasses
- Gravel bar
- Gravel bar/Beaver Dam
- Gravel bar/Debris
- Gravel bar/LWD
- Gravel bar/LWD/Beaver dam
- LWD
- Sediment
- Sediment/Debris
- No
- N/A

Buffer Potential

- N/A
- No
- Recent Planting
- Yes
- Yes/Recent planting

Floodplain Reconnection Potential

- ★ Floodplain Reconnection Potential

Instream Structures

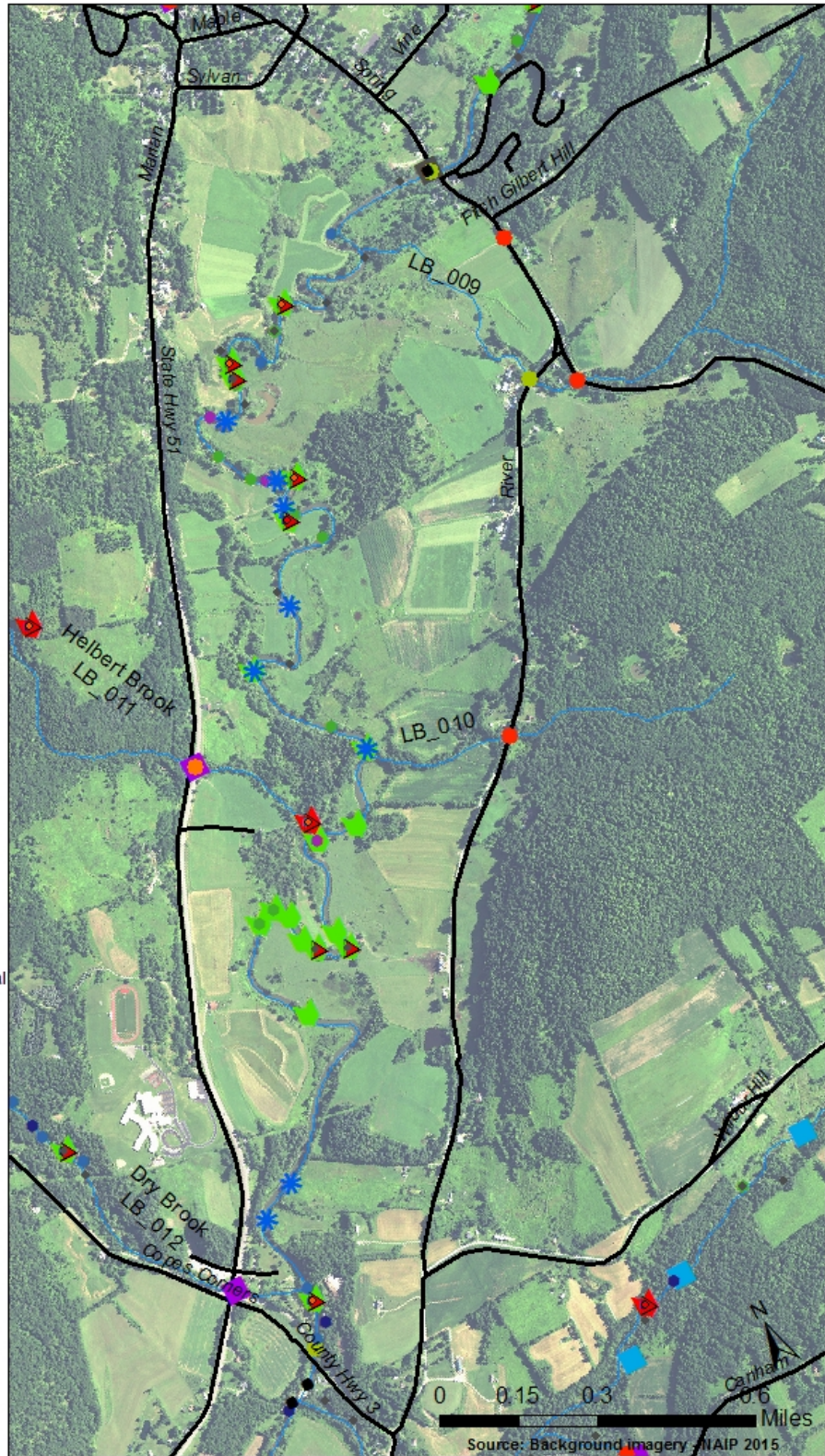
- Instream Structures
- no score - missing data
- No barrier
- Insignificant barrier
- Minor barrier
- Moderate barrier
- Significant barrier
- Severe barrier

Stream Crossings No NAACC

- Bridge
- Culvert
- Footbridge
- Ford
- Livestock crossing

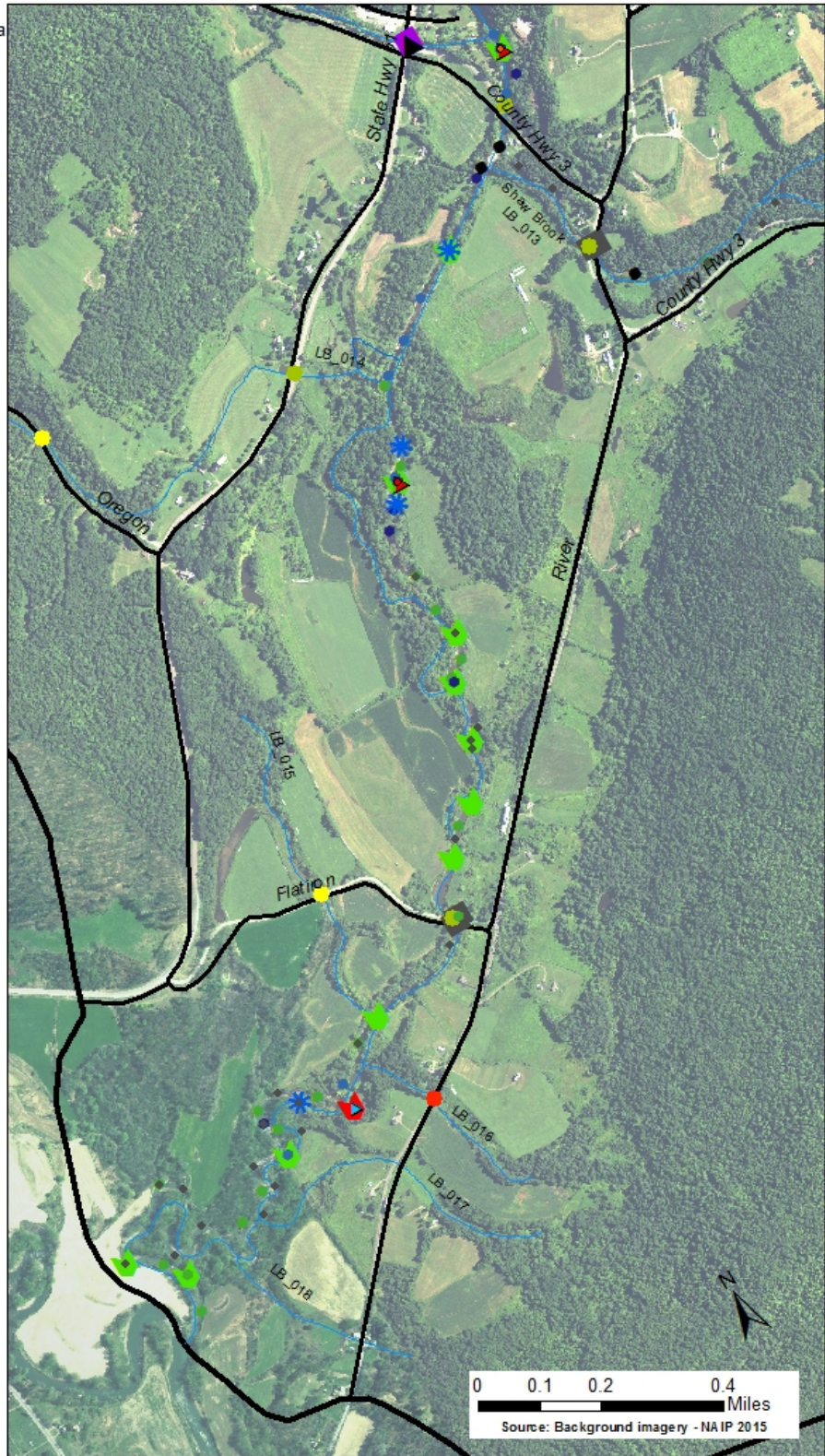
- Roads
- Streams

- ▭ Butternut Watershed Boundaries



Lower Butternut Mainstem
 Cty Hwy 3 to Confluence w/Unadilla

- Erosion Sites**
- ◆ Extreme
- ◆ Very High
- ◆ High
- ◆ Moderate
- ◆ No BEHI
- Significant Features**
- ▲ Berm
- ▲ Cold water input
- ▲ Dredging
- ▲ Erosion site
- ▲ Garbage
- ▲ Gravel mine
- ▲ Road runoff
- ▲ Upper knotweed
- Deposition**
- Beaver Dam
- Debris
- Grasses
- Gravel bar
- Gravel bar/Beaver Dam
- Gravel bar/Debris
- Gravel bar/LWD
- Gravel bar/LWD/Beaver dam
- LWD
- Sediment
- Sediment/Debris
- No
- N/A
- Buffer Potential**
- N/A
- No
- Recent Planting
- Yes
- Yes/Recent planting
- ★ Floodplain Reconnection Potential
- Instream Structures
- NAACC Stream Crossing Evaluation**
- no score - missing data
- No barrier
- Insignificant barrier
- Minor barrier
- Moderate barrier
- Significant barrier
- Severe barrier
- ▲ Needs follow-up
- Stream Crossings No NAACC**
- Bridge
- Culvert
- Footbridge
- Ford
- Livestock crossing
- Roads
- Streams
- ▭ Butternut Watershed Boundaries



Appendix H. Triage Report of Restoration Scenarios for Subset of Priority Sites

**Summary Report of
Butternut Creek Watershed
Otsego County, NY**

Dry Brook – Site 1



Site Observations – Upstream most site. Site is forested on right and left banks. It appears that during recent storm events, debris and gravel blocked the previous channel and a new channel has formed. The existing channel appears relatively stable even considering the steeper slope. Access is poor to get equipment or materials to the site.

Cause and Effect – Storm events in 2016 have created instability throughout Dry Brook. Instability upstream and within the site has led to gravel and debris accumulation and caused a channel avulsion. The new channel is steeper than the previous due to the loss of stream length as a result of the avulsion. Step pools have formed in the new channel and the bed material seems of adequate size to remain stable during most normal flow events and during higher frequency storm events.

Due to the limited access to this site and minor accelerated erosion, it is recommended to monitor this site to see how the newly formed channel accommodates normal flows as well as future storm flows. If significant changes are seen, enough to warrant remediation, grade control in the new channel may be needed, or re-opening the old channel to gain capacity and reduce velocities.

Remediation Approach

#1.) No Action / Monitor
Cost: \$0

#2.) Cut debris
Cost: \$750

#3.) Establish floodplain bench on newly deposited gravel bar (ESI)
Cost: \$2,000 - \$4,000

#4.) Grade Control & floodplain bench
Cost: \$8,500 - \$10,000

Dry Brook – Site 2



Site Observations – This site consists of a 15 foot high eroded right bank. The impaired reach is affected by debris and gravel accumulation and loose, unconsolidated soil.

Cause and Effect – Debris and gravel accumulation has shifted the thalweg toward the easily eroded right bank. The immediate area is forested, however, the roots of the woody vegetation do not protect the toe of the slope. Increased water velocity during high flow causes the right bank to erode at an accelerated rate due to increased near bank stress. As the channel erodes the outside meander bank, material is deposited on the inside bank, forming a disproportionately large point bar.

Access is limited and there is some evidence the bank may be starting to heal on its own, so monitoring should be the first remediation option. The toe of the bank has a gradual slope and some vegetation is starting to grow. If the site becomes less stable, toe protection using rock or logs, combined with floodplain reconnection should be considered. Also, willow live stakes could be incorporated with the toe protection or used as a stand-alone BMP at minimal cost.

Remediation Approach

#1.) No Action / Monitor
Cost: \$0

#2.) Toe protection right bank /
floodplain reconnection (ESI)
Cost: \$24,500 - \$29,000

#3.) Incorporate woody debris into right
bank toe protection
Cost: \$10,000 - \$12,000

Dry Brook – Site 3



Site Observations – Gravel deposition has created a truncated meander and thalweg is near toe of high bank. Affected right bank is approximately 8-10 feet high, 60 feet in length, and consists of fine, unconsolidated material. Right and left banks are forested, however, root systems do not reach the toe of the slope.

Cause and Effect – Debris and gravel deposition resulting from storm flows has caused the channel to shift against an easily erodible high bank. Height of gravel deposition is not excessive and may act as floodplain during high flow events. In addition, the toe of the affected bank seems to be establishing an appropriate angle and vegetation is becoming established.

Again, access to this site is limited and the bank appears to be healing on its own. Therefore, this site should be monitored to be sure no negative impacts are occurring. Planting live stakes along the toe of the slope would help speed up the revegetation process.

Remediation Approach

#1.) No Action / Monitor

Cost: \$0

#3.) Toe Protection

Cost: \$12,000 - \$20,000

#2.) Vegetate / Live stakes

Cost: \$500 - \$1,000

Dry Brook – Site 4



Site Observations – This site is a near vertical left bank approximately 10 feet high and 125 feet in length. The thalweg is concentrated toward the center of the channel with gravel side bars along the left and right.

Cause and Effect – Previous high-water events have caused the channel bed and banks to erode throughout this reach. The channel is entrenched and cannot access a floodplain to dissipate energy, therefore, erosion occurs as the stream tries to establish a stable pattern and profile. Currently, there is gravel deposition within the widened channel that may act as floodplain during lower frequency storm events.

With the thalweg toward the center of the channel and some floodplain access due to gravel deposition at this location, monitoring the site should be the plan of action at this time. This site is closer to a residence than the previously identified sites, so some action such as bank sloping and vegetating may be considered.

Remediation Approach

#1.) No Action / Monitor
Cost: \$0

#3.) Slope and Vegetate
Cost: \$3,000 - \$5,000

#2.) Vegetate / Live stakes
Cost: \$500 - \$1,000

Dry Brook – Site 5



Site Observations – This is a fairly straight section with gravel deposition leading into a truncated meander. Previous channel work may have occurred after a prior storm event (i.e. channel straightening, gravel removal/gravel bench creation). Although a floodplain bench is evident, it may be too high to be engaged during a bankfull storm event. The site is approximately 200 feet in length and landowner has already tried to revegetate the gravel bench with trees and shrubs. Site access is good.

Cause and Effect – A natural pinch point likely contributed to debris and gravel accumulation and has caused bed and bank instability at this site. Without armoring the toe of the slope on the left bank, accelerated erosion will likely continue.

Remediation Approach

#1.) Toe Protection along bench and high bank
Cost: \$20,000 - \$26,000

#2.) Bank protection along high bank only
Cost: \$8,000 - \$10,000

Dry Brook – Site 6



Site Observations – This site runs parallel to a driveway and previous storm events have washed the driveway out. Driveway has been filled and made passable. Stream is over-widened and gravel deposition is occurring in this reach. The site is approximately 250ft in length and the affected left bank is 6ft high. Site access is very good.

Cause and Effect – The easily erodible driveway material had washed out through this reach and a large side bar is present. The channel is over-widened compared to the adjacent upstream and downstream segments and may promote further deposition. Channel dimensions should be verified, and the appropriate width/depth ratio should be constructed. Additional material should be used to widen the driveway for vehicle safety and road/bank stability. Rock rip-rap should be installed to protect the driveway and stabilize the stream bank.

Remediation Approach

#1.) Bank Protection

Cost: \$30,000 - \$38,000

Dry Brook – Site 7



Site Observations – Channel is incised and entrenched through this entire reach. Some bank erosion is evident especially where riparian vegetation is limited. The upper segment of this reach has a slight floodplain bench along river right and trees protect the bank to the toe of the slope.

Cause and Effect – Human influence has affected this reach. It appears regular maintenance upstream from the bridge, riparian vegetation loss, and road and building encroachment within the floodplain have impacted stream stability, however, this stream reach may not require immediate action. Coordination with the municipality and landowners to see how often regular maintenance actually occurs would be helpful in assessing stability. Providing the banks with a more suitable slope and re-establishing a riparian zone (where feasible considering existing infrastructure) would be the first approach for remediation along this reach.

Remediation Approach

#1.) Slope / Vegetate
Cost: \$5,000 - \$8,000

#2.) No Action / Monitor
Cost: \$0

Butternut Creek – Haynes 1



Site Observations – Haynes site #1 is located within a pasture and the riparian vegetation consists mainly of perennial grasses. Cattle have uncontrolled access to the stream. The stream valley is extremely flat and a series of tortuous meanders are present. Site pictured above is approximately 300ft in length, however could be combined with a larger riparian buffer project.

Cause and Effect – Uncontrolled livestock access to the stream have contributed to a loss of woody riparian vegetation and accelerated bank erosion. Eliminating cattle access to the stream through streambank fencing and providing alternate watering sources would allow this site to regain stability and help to improve water quality.

If funding allows, supplemental plantings within the riparian zone and along the stream banks would facilitate more rapid bank stability and water quality improvements. Additionally, if funding was available, structures could be installed to improve instream habitat (i.e. bank cover cribbing).

Remediation Approach (costs include Haynes #1 and #2)

#1.) Streambank Fencing / Watering System

Cost: \$25,000 - \$32,000

#2.) Streambank Fencing / Watering System / Riparian Plantings

Cost: \$30,000 - \$37,000

#3.) Live stakes

Cost: \$5,000

#4.) Streambank Fencing / Watering System / Riparian Plantings / Habitat Improvement

Cost: \$40,000 - \$50,000

Butternut Creek – Haynes 2



Site Observations – The Haynes site #2 is a continuation of site #1 and should be considered as such when developing a remediation plan for this parcel. Again, cattle access to the stream and a lack of vegetation contribute to instability.

Cause and Effect – The near vertical banks consist of very fine, easily erodible material and without sufficient root systems to hold the material in place, erosion occurs. Additionally, hoof shear from cattle access contributes to the destabilization of this reach.

Remediation Approach (costs include Haynes #1 and #2)

#1.) Streambank Fencing / Watering System
Cost: \$25,000 - \$32,000

#2.) Streambank Fencing / Watering System / Riparian Plantings
Cost: \$30,000 - \$37,000

#3.) Live stakes
Cost: \$5,000

#4.) Streambank Fencing / Watering System / Riparian Plantings / Habitat Improvement
Cost: \$40,000 - \$50,000

Butternut Creek – Birdsall



Site Observations – The streambank at this site consists of fine, easily erodible material and the riparian zone is dominated by Japanese Knotweed and grasses, both having shallow root systems. The affected bank is approximately 550ft in length and 6ft high. Site is becoming disconnected from its floodplain except during larger frequency events. Field adjacent to stream is mostly open, however, ground may remain fairly wet most of the year which could make access difficult.

Cause and Effect – Vertical banks, easily erodible soils, and a lack of vegetation contribute to accelerated erosion. Storm events have eroded the banks and as the channel widens, it becomes further detached from its floodplain. The development of the point/side bar along river left may act as floodplain during high flows, however the outside meander should be sloped to reduce sheer stress or stabilized to prevent channel avulsion into field.

Remediation Approach

#1.) Bank protection / armoring / riparian plantings
Cost: \$60,000 - \$65,000

#2.) Slope and Vegetate / Buffer establishment
Cost: \$12,000 - \$16,000

#3.) Live stakes
Cost: \$5,000

Butternut Creek – Lilley



Site Observations – This 400ft section of Butternut Creek is braided and some woody vegetation is starting to grow on the center bar. Areas up and downstream of this reach are fairly stable with forested buffers on right and left banks. Soils along the eroded right bank consist of sand/silt and are easily erodible especially as they are nearly vertical and lack vegetation at the toe of the slope. Site consists of mostly shallow riffles with short pools. Equipment access could be poor due to wet site conditions.

Cause and Effect – Formation of a center bar has shifted the thalweg toward the easily erodible right bank. As vegetation becomes established on this center bar it becomes more stable and the stream remains braided. Returning this section to a single channel may not be cost effective and may not have the desired environmental benefits. Currently, the stream is able to lose some energy through this reach during high flow events. As long as sediment inputs from upstream segments stay relatively low, protecting the right bank as it currently exists in this reach would be the best option. Near bank stress should be relatively low and vegetative management may be the best option for remediation.

Remediation

#1.) Live stakes only
Cost: \$5,000

#2.) Slope and Vegetate / Buffer establishment
Cost: \$10,000 - \$15,000

#3.) Slope and Vegetate / Jute Matting / Buffer establishment
Cost: \$60,000 - \$65,000

#4.) Bank protection / armoring / riparian plantings
Cost: \$40,000 - \$50,000

Butternut Creek – Morris School



Site Observations – This site occurs along an agricultural field planted right to the edge of the right bank. No woody vegetation with adequate root systems are present. Near bank stress is high, especially at the tight meander. Point bar formation along river left contributes to increased near bank stress along river right. Site is approximately 400ft in length with an 8ft high, vertical right bank. Soils are stratified and unconsolidated. Some evidence of riparian plantings, however, streambank needs to be stabilized to assure success of a buffer.

Cause and Effect – The impacts of agricultural land use upon stream corridors is evident throughout the watershed. Erosion sites such as the one documented here are numerous. Removal of native vegetation with extensive root systems reduces the potential for soil to be held in place during storm events. The current stream pattern at this location leads to the potential for an avulsion into the adjacent corn field. Bank armoring, gravel bar removal, and reduction of the radius of curvature should be considered at this site. There is potential for the use of deflectors through the straight section leading into the tight meander.

Remediation

- 1.) Bank protection (rip-rap and deflectors) / gravel removal / buffer establishment
Cost: \$55,000 - \$65,000
- 2.) Rip-rap 250' (meander) / slope and vegetate 150'
Cost: \$28,000 - \$34,000

Butternut Creek – Morris Fairgrounds



Site Observations – This site occurs along the right bank adjacent to the Morris fairgrounds. It appears the tress were undermined and have fallen into the stream leaving a large scour pool and unstable bank. The site is approximately 150ft in length and 15ft high. It appears some attempt to stabilize the bank has been made by dumping concrete over the bank.

Cause and Effect – The loss of the riparian vegetation has left an exposed high bank. Toe protection should be installed to at least 1-2 feet above the opposite bank to prevent further erosion. Some gravel could be removed from the left bank to increase channel capacity. There may be opportunity to install root wads or other log structures to provide some in-stream habitat improvements as well.

Remediation

1.) Toe protection

Cost: \$22,000 - \$27,000

2.) Toe protection / habitat enhancement

Cost: \$28,000 - \$35,000

Butternut Creek – Galley 1



Site Observations – Generally speaking, the Butternut Creek (Galley) erosion sites (1 - 4) are similar in appearance and could benefit from similar remediation approaches. These sites are adjacent to row crop or hay fields with little to no woody riparian vegetation. Providing the near vertical banks with a more stable slope and installing structures to reduce shear stress along the toe of the slope would greatly reduce erosion and provide added stability throughout all 4 sections. Some areas where willows are taking hold along the toe of the slope appear to be stable and this approach should be mimicked throughout the affected reaches.

Cause and Effect – Again, we see a lack of riparian vegetation correlated to stream instability. With row crops and hay being the dominant riparian species, there is no natural protection to prevent streambank erosion. All of the affected sections are fairly straight or within long sweeping meanders where multi-log deflectors may be appropriate and more cost-effective than bank armoring, such as rock rip-rap. Galley site 1 may require rip-rap at the toe of the slope due to its position in the watershed and proximity to the confluence of a tributary.

Remediation Approach – site 1 (~ 120')

#1.) Toe Protection / Slope & Vegetate upper bank

Cost: \$18,000 – \$25,000

#2.) Multi-log Deflectors / Buffer establishment

Cost: \$13,000 – \$16,000

#3.) Slope / Vegetate

Cost: \$7,500

Butternut Creek – Galley 2



Remediation Approach – site 2 (~ 150')

#1.) Multi-log Deflectors / Buffer establishment
Cost: \$15,000 – \$18,000

#2.) Slope / Vegetate
Cost: \$7,500

Butternut Creek – Galley 3



Remediation Approach – site 3 (~ 200')

#1.) Multi-log Deflectors / Buffer establishment
Cost: \$17,000 – \$21,000

#2.) Slope / Vegetate
Cost: \$7,500

Butternut Creek – Galley 4



Remediation Approach – site 4 (~ 500')

#1.) Multi-log Deflectors / Buffer establishment

Cost: \$22,000 – \$26,000

#2.) Slope / Vegetate

Cost: \$8,500

Appendix I. Summary of NAACC Stream Crossing Assessment Data by Town

Visit https://naacc.org/naacc_search_crossing.cfm to search full database and enter five-digit SurveyID to locate a crossing.

Appendix I. Summary of NAACC Stream Crossing Assessment Data by Town

Table I1. List of stream crossings surveyed using NAACC protocol in the Butternut Creek watershed within the Town of Burlington.

Watershed	SurveyID	CrosCode	CrosType	AopNaacc	AqScNaac	DateObsd	Eval	Road	StrmName	CrTown	Latitude	Longitude
Upper Butternut	44537	xy4275688775119558	Culvert	No AOP	-1.000	2017-05-30	no score - missing data	Jacobs Rd.	UB_004	Burlington	42.756887	-75.119558
Upper Butternut	47560	xy4267826375187525	Partially Inaccessible	no score - missing data	-1.000	2017-06-27	no score - missing data	Sam Holdridge Rd	Unnamed Tributary - UB_022	Burlington	42.678263	-75.187525
Upper Butternut	48306	xy4266665375185108	Partially Inaccessible	no score - missing data	-1.000	2017-06-26	no score - missing data	Santoro Rd.	Unnamed Tributary - UB_022	Burlington	42.666653	-75.185108
Upper Butternut	44497	xy4274276475120870	Culvert	No AOP	0.000	2017-05-25	Severe barrier	Basswood Rd.	UB_005	Burlington	42.742764	-75.120870
Upper Butternut	46049	xy4271121575129758	Culvert	No AOP	0.000	2017-05-08	Severe barrier	Clock hill rd.	Unnamed tributary - UB_010	Burlington	42.711215	-75.129758
Upper Butternut	46054	xy4271075675126352	Culvert	No AOP	0.000	2017-06-20	Severe barrier	County Hwy 16	UB_010	Burlington	42.710756	-75.126352
Upper Butternut	46543	xy4267518575153371	Culvert	No AOP	0.000	2017-06-14	Severe barrier	Pickens Rd.	UB_014	Burlington	42.675185	-75.153371
Upper Butternut	47226	xy4266756375170868	Culvert	No AOP	0.000	2017-06-26	Severe barrier	Gregory Rd.	unnamed trib	Burlington	42.667563	-75.170868
Upper Butternut	47233	xy4267678575173908	Culvert	No AOP	0.000	2017-06-27	Severe barrier	Andy Garner Rd	unnamed trib	Burlington	42.676785	-75.173908
Upper Butternut	44687	xy4273073375106491	Culvert	No AOP	0.009	2017-06-05	Severe barrier	Hovick Rd.	UB_007	Burlington	42.730733	-75.106491
Upper Butternut	46559	xy4268700175163998	Culvert	No AOP	0.012	2017-06-15	Severe barrier	Dog Kennel Rd.	Unnamed Tributary - UB_014	Burlington	42.687001	-75.163998
Upper Butternut	44498	xy4274460975127936	Culvert	No AOP	0.024	2017-05-25	Severe barrier	Basswood rd.	unnamed-UB_um01	Burlington	42.744609	-75.127936
Upper Butternut	44567	xy4275618275112589	Culvert	No AOP	0.024	2017-05-30	Severe barrier	Jacobs Rd	UB_004	Burlington	42.756182	-75.112589
Upper Butternut	44566	xy4275722875114700	Culvert	No AOP	0.057	2017-05-30	Severe barrier	Jacobs rd.	UB_004	Burlington	42.757228	-75.114700
Upper Butternut	46549	xy4269756375157596	Culvert	No AOP	0.067	2017-06-14	Severe barrier	Gulf Road Spur	unnamed trib	Burlington	42.697563	-75.157596
Upper Butternut	48319	xy4267556475148087	Culvert	No AOP	0.093	2017-06-14	Severe barrier	Gulf Rd.	Unnamed Tributary - UB_014	Burlington	42.675564	-75.148087
Upper Butternut	47224	xy4265638875154226	Culvert	No AOP	0.110	2017-06-23	Severe barrier	County Hwy 16	unnamed - UB_018	Burlington	42.656388	-75.154226
Upper Butternut	44562	xy4274923575092588	Culvert	No AOP	0.130	2017-05-30	Severe barrier	Davenport Rd.	unnamed	Burlington	42.749235	-75.092588
Upper Butternut	44590	xy4272387475120124	Culvert	No AOP	0.130	2017-05-31	Severe barrier	HWY 80	unnamed UB_007	Burlington	42.723874	-75.120124
Upper Butternut	53841	xy4267499575151530	Culvert	No AOP	0.130	2017-09-08	Severe barrier	Pickens Rd	UB_014C	Burlington	42.674995	-75.151530
Upper Butternut	52560	xy4275293575111770	Culvert	No AOP	0.224	2017-09-01	Significant barrier	private	unnamed trib - UB_004	Burlington	42.752935	-75.111770
Upper Butternut	47556	xy4268370575181701	Culvert	No AOP	0.260	2017-06-27	Significant barrier	nys 51	unnamed tributary - UB_022	Burlington	42.683705	-75.181701
Upper Butternut	47005	xy4268012675153127	Culvert	No AOP	0.272	2017-06-20	Significant barrier	Dog Kennel Rd.	UB_014	Burlington	42.680126	-75.153127
Upper Butternut	44449	xy4273827575120990	Culvert	No AOP	0.332	2017-05-24	Significant barrier	county rd. 16	unnamed-UB_005	Burlington	42.738275	-75.120990
Upper Butternut	46547	xy4267536175149017	Culvert	No AOP	0.337	2017-06-14	Significant barrier	Pickens Rd.	Unnamed tributary - UB_014	Burlington	42.675361	-75.149017
Upper Butternut	46451	xy4270589775118922	Culvert	No AOP	0.345	2017-06-09	Significant barrier	Patent Rd	unnamed	Burlington	42.705897	-75.118922
Upper Butternut	44496	xy4274408275126043	Culvert	Reduced AOP	0.348	2017-05-25	Significant barrier	Basswood Rd.	unnamed-UB_02	Burlington	42.744082	-75.126043
Upper Butternut	47011	xy4267945075152450	Culvert	No AOP	0.407	2017-06-20	Moderate barrier	Dog Kennel Rd.	UB_014	Burlington	42.679450	-75.152450
Upper Butternut	44594	xy4272693275106612	Culvert	Reduced AOP	0.418	2017-05-31	Moderate barrier	State Hwy 80	unnamed	Burlington	42.726932	-75.106612
Upper Butternut	41856	xy4275030575100235	Culvert	No AOP	0.438	2016-11-30	Moderate barrier	Eckert	Unnamed	Burlington	42.750305	-75.100235
Upper Butternut	44448	xy4273515775123786	Culvert	No AOP	0.445	2017-05-24	Moderate barrier	county rd. 16	unnamed-UB_006	Burlington	42.735157	-75.123786
Upper Butternut	46055	xy4270976875124365	Culvert	Reduced AOP	0.466	2017-06-08	Moderate barrier	Patent Rd.	UB_010	Burlington	42.709768	-75.124365
Upper Butternut	46558	xy4268826475164838	Culvert	No AOP	0.471	2017-06-15	Moderate barrier	Dog Kennel Rd	Unnamed Tributary - UB_014	Burlington	42.688264	-75.164838
Upper Butternut	41936	xy4272611775126692	Culvert	No AOP	0.479	2016-11-30	Moderate barrier	County Highway 16	Unnamed	Burlington	42.726117	-75.126692
Upper Butternut	47559	xy4268073775181000	Culvert	No AOP	0.490	2017-06-27	Moderate barrier	Sam Holdridge Rd(UB)2	Unnamed Tributary - UB_022	Burlington	42.680737	-75.181000
Upper Butternut	44592	xy4272269475115337	Culvert	Reduced AOP	0.504	2017-05-31	Moderate barrier	Cranberry Bog Rd.	unnamed	Burlington	42.722694	-75.115337
Upper Butternut	47223	xy4268427775136176	Culvert	No AOP	0.504	2017-06-22	Moderate barrier	County Hwy 16	unnamed trib - UB_012	Burlington	42.684277	-75.136176
Upper Butternut	46540	xy4268911575131760	Culvert	No AOP	0.508	2017-06-09	Moderate barrier	County hwy 16	unnamed UB_011	Burlington	42.689115	-75.131760
Upper Butternut	44593	xy4272623575108456	Culvert	Reduced AOP	0.511	2017-05-31	Moderate barrier	State hwy 80	unnamed	Burlington	42.726235	-75.108456
Upper Butternut	44568	xy4275080775112349	Culvert	Reduced AOP	0.513	2017-05-30	Moderate barrier	Jacobs Rd.	UB_004	Burlington	42.750807	-75.112349
Upper Butternut	44570	xy4274719075111494	Culvert	No AOP	0.532	2017-05-30	Moderate barrier	Jacobs Rd.	UB_004	Burlington	42.747190	-75.111494
Upper Butternut	44587	xy4274647575110640	Culvert	Reduced AOP	0.548	2017-05-30	Moderate barrier	Jacobs Rd.	UB_004	Burlington	42.746475	-75.110640
Upper Butternut	44591	xy4272186075115525	Culvert	No AOP	0.549	2017-05-31	Moderate barrier	Cranberry Bog Rd.	unnamed	Burlington	42.721860	-75.115525

Upper Butternut	47291	xy4267757075178333	Culvert	Reduced AOP	0.550	2017-06-27	Moderate barrier	Andy Garner Rd	Unnamed tributary - UB_022	Burlington	42.677570	-75.178333
Upper Butternut	44569	xy4274901875112164	Culvert	Reduced AOP	0.566	2017-05-30	Moderate barrier	Jacobs Rd.	UB_004	Burlington	42.749018	-75.112164
Upper Butternut	44691	xy4272876775099965	Culvert	Reduced AOP	0.582	2017-06-05	Moderate barrier	State Hwy 80	unnamed	Burlington	42.728767	-75.099965
Upper Butternut	44565	xy4274981175101347	Culvert	Reduced AOP	0.585	2017-05-30	Moderate barrier	county rt. 16	UB_Mainstream	Burlington	42.749811	-75.101347
Upper Butternut	50945	xy4269384075152196	Bridge	Reduced AOP	0.586	2017-08-03	Moderate barrier	Private Drive	Unnamed Tributary - UB_014	Burlington	42.693840	-75.152196
Upper Butternut	46057	xy4270963075120240	Culvert	Reduced AOP	0.601	2017-06-08	Minor barrier	Patent Rd.	UB_Mainstem	Burlington	42.709630	-75.120240
Upper Butternut	44563	xy4275016375093044	Culvert	Reduced AOP	0.606	2017-05-30	Minor barrier	County Rd. 16	UB_003	Burlington	42.750163	-75.093044
Upper Butternut	47557	xy4268494475182729	Culvert	No AOP	0.612	2017-06-27	Minor barrier	nys 51	UB_022	Burlington	42.684944	-75.182729
Upper Butternut	50772	xy4266742875175718	Multiple Culvert	Reduced AOP	0.644	2017-08-03	Minor barrier	Gregory Rd.	UB_022	Burlington	42.667428	-75.175718
Upper Butternut	50308	xy4275626075102311	Multiple Culvert	Reduced AOP	0.645	2017-07-31	Minor barrier	Private road	Burlington-MS01	Burlington	42.756260	-75.102311
Upper Butternut	48307	xy4267743575179826	Culvert	Reduced AOP	0.649	2017-06-27	Minor barrier	Andy Garnder Rd./Seabury Rd	Unnamed Tributary - UB_022	Burlington	42.677435	-75.179826
Upper Butternut	47558	xy4268782475184569	Culvert	Reduced AOP	0.650	2017-06-27	Minor barrier	NYS 51	UB_022	Burlington	42.687824	-75.184569
Upper Butternut	46550	xy4269184175154523	Culvert	Reduced AOP	0.655	2017-06-14	Minor barrier	Gulf Road Spur	Unnamed tributary - UB_14	Burlington	42.691841	-75.154523
Upper Butternut	50769	xy4267589875179852	Culvert	Reduced AOP	0.667	2017-08-03	Minor barrier	State Hwy 51	Unnamed Tributary - UB_022	Burlington	42.675898	-75.179852
Upper Butternut	45789	xy4272383475137493	Culvert	Reduced AOP	0.672	2017-05-30	Minor barrier	State Hwy 80	unnamed	Burlington	42.723834	-75.137493
Upper Butternut	47222	xy4268246975137563	Culvert	Reduced AOP	0.672	2017-06-23	Minor barrier	County Hwy 16	unnamed trib	Burlington	42.682469	-75.137563
Upper Butternut	46552	xy4269188175154022	Culvert	Reduced AOP	0.678	2017-06-14	Minor barrier	Gulf Rd.	Unnamed Tributary - UB_014	Burlington	42.691881	-75.154022
Upper Butternut	46542	xy4267722275137956	Culvert	Reduced AOP	0.690	2017-06-14	Minor barrier	Miller Rd.	unnamed trib	Burlington	42.677222	-75.137956
Upper Butternut	46560	xy4268259275156301	Culvert	No AOP	0.708	2017-06-15	Minor barrier	Dog Kennel Rd.	unnamed trib	Burlington	42.682592	-75.156301
Upper Butternut	52559	xy4275320675111853	Culvert	Reduced AOP	0.711	2017-09-01	Minor barrier	private	unnamed trib - UB_004	Burlington	42.753206	-75.111853
Upper Butternut	41941	xy4272609075126780	Culvert	Reduced AOP	0.723	2016-11-30	Minor barrier	County Highway 16	Unnamed	Burlington	42.726090	-75.126780
Upper Butternut	47218	xy4267714875138055	Culvert	Reduced AOP	0.733	2017-06-23	Minor barrier	Miller Rd.	unnamed trib	Burlington	42.677148	-75.138055
Upper Butternut	46548	xy4267899475150402	Culvert	Full AOP	0.763	2017-06-14	Minor barrier	Pickens Rd.	Unnamed tributary - UB_014	Burlington	42.678994	-75.150402
Upper Butternut	44689	xy4272053675125638	Culvert	Reduced AOP	0.774	2017-06-05	Minor barrier	Country Rt. 16	UB_008	Burlington	42.720536	-75.125638
Upper Butternut	47012	xy4266385875137514	Culvert	Reduced AOP	0.775	2017-06-20	Minor barrier	Stanley Kane Rd.	unnamed trib	Burlington	42.663858	-75.137514
Upper Butternut	52561	xy4275274275111665	Culvert	Reduced AOP	0.803	2017-09-01	Insignificant barrier	Private drive	UB_004	Burlington	42.752742	-75.111665
Upper Butternut	44588	xy4274627475109936	Culvert	Reduced AOP	0.808	2017-05-30	Insignificant barrier	County Rt. 16	Unnamed trib - UB_004	Burlington	42.746274	-75.109936
Upper Butternut	52563	xy4275350675111934	Culvert	No AOP	0.823	2017-09-01	Insignificant barrier	private	UB_004	Burlington	42.753506	-75.111934
Upper Butternut	44574	xy4274628875110295	Culvert	Reduced AOP	0.878	2017-05-30	Insignificant barrier	Jacobs Rd.	UB_004	Burlington	42.746288	-75.110295
Upper Butternut	46539	xy4269989575121952	Multiple Culvert	Reduced AOP	0.883	2017-06-09	Insignificant barrier	Deminco Rd	Butternut Creek	Burlington	42.699895	-75.121952
Upper Butternut	53845	xy4268339675160864	Culvert	Reduced AOP	0.885	2017-09-08	Insignificant barrier	Private Rd	UB_940	Burlington	42.683396	-75.160864
Upper Butternut	47216	xy4267374875143426	Culvert	Reduced AOP	0.902	2017-06-23	Insignificant barrier	County Hwy 16	UB_014	Burlington	42.673748	-75.143426
Upper Butternut	46047	xy4271159075133289	Culvert	Reduced AOP	0.904	2017-05-08	Insignificant barrier	Clock Hill Rd.	UB_010	Burlington	42.711590	-75.133289
Upper Butternut	46052	xy4271119775127180	Culvert	Reduced AOP	0.906	2017-06-08	Insignificant barrier	Clock Hill Rd	unnamed UB_010	Burlington	42.711197	-75.127180
Upper Butternut	47221	xy4267742175138649	Bridge	Full AOP	0.980	2017-06-23	Insignificant barrier	Miller Rd.	Butternut Creek	Burlington	42.677421	-75.138649
Upper Butternut	44589	xy4272345875122562	Bridge	Full AOP	0.998	2017-05-31	Insignificant barrier	State Hwy 80	UB_Mainstream	Burlington	42.723458	-75.122562
Upper Butternut	45787	xy4273068775106616	No Crossing	Full AOP	1.000	2017-06-05	No barrier		UB_007	Burlington	42.730687	-75.106616
Upper Butternut	46544	xy4267526975150338	No Crossing	Full AOP	1.000	2017-06-14	No barrier	Pickens Rd.	UB_014	Burlington	42.675269	-75.150338
Upper Butternut	46545	xy4267530075150094	No Crossing	Full AOP	1.000	2017-06-14	No barrier	Pickens Rd.	UB_014	Burlington	42.675300	-75.150094
Upper Butternut	46546	xy4267531975149522	No Crossing	Full AOP	1.000	2017-06-14	No barrier	Pickens Rd.	UB_014	Burlington	42.675319	-75.149522
Upper Butternut	46555	xy4269528375151951	No Crossing	Full AOP	1.000	2017-06-14	No barrier	Gulf Rd.	Unnamed Tributary - UB_014	Burlington	42.695283	-75.151951
Upper Butternut	46557	xy4269655175151352	No Crossing	Full AOP	1.000	2017-06-14	No barrier	Gulf Rd	Unnamed Tributary - UB_014	Burlington	42.696551	-75.151352
Upper Butternut	46562	xy4269530875151938	No Crossing	Full AOP	1.000	2017-06-14	No barrier	Gulf Rd.	Unnamed Tributary - UB_014	Burlington	42.695308	-75.151938
Upper Butternut	50770	xy4267552575154923	No Crossing	Full AOP	1.000	2017-08-03	No barrier	End of Pickens Rd.		Burlington	42.675525	-75.154923
Upper Butternut	50771	xy4267537975154698	No Crossing	Full AOP	1.000	2017-08-03	No barrier	End of Pickens Rd.		Burlington	42.675379	-75.154698

Table 12. List of stream crossings surveyed using NAACC protocol in the Butternut Creek watershed within the Town of Butternuts. Note: Includes stream crossings in the Village of Gilbertsville.

Watershed	SurveyID	CrosCode	CrosType	AopNaacc	AqScNaac	DateObsd	Eval	Road	StrmName	CrTown	Latitude	Longitude
Lower Butternut	56363	xy4251917575208323	Partially Inaccessible	no score - missing data	-1.000	2017-12-04	no score - missing data	Star Corner Rd	Cahoon Creek - LB_007	Butternuts	42.51918	-75.20832
Lower Butternut	55737	xy4251773975328823	Culvert	No AOP	0.000	2017-10-25	Severe barrier	Dunham Cross	Coye Brook-LB_006	Butternuts	42.51774	-75.32882
Lower Butternut	56250	xy4248200375246963	Culvert	No AOP	0.000	2017-11-27	Severe barrier	Taylor Rd	Unnamed trib	Butternuts	42.48200	-75.24696
Lower Butternut	56318	xy4248034875277683	Culvert	No AOP	0.000	2017-11-30	Severe barrier	Taylor Rd	Unnamed trib to Cahoon Creek - LB_007	Butternuts	42.48035	-75.27768
Lower Butternut	56388	xy4249641475235860	Culvert	No AOP	0.000	2017-12-04	Severe barrier	Shelly Rd	Unnamed trib	Butternuts	42.49641	-75.23586
Lower Butternut	61030	xy4246172275320325	Culvert	No AOP	0.000	2018-07-09	Severe barrier	River Rd	Unnamed Trib	Butternuts	42.46172	-75.32033
Lower Butternut	61077	xy4245728375320350	Culvert	No AOP	0.000	2018-07-09	Severe barrier	Herbert Lilley Hill Road	Unnamed Trib - LB_009	Butternuts	42.45728	-75.32035
Lower Butternut	62687	xy4242739675302541	Culvert	No AOP	0.000	2018-07-25	Severe barrier	Wilbur Hill Rd	Unnamed trib to Shaw Brook - LB_013	Butternuts	42.42740	-75.30254
Lower Butternut	62694	xy4244233875309925	Culvert	No AOP	0.000	2018-07-25	Severe barrier	Wilbur Hill Rd	Shaw Brook - LB_013	Butternuts	42.44234	-75.30993
Lower Butternut	62697	xy4243036075337310	Culvert	No AOP	0.000	2018-07-25	Severe barrier	Canham Rd	Unnamed trib to Shaw Brook - LB_013	Butternuts	42.43036	-75.33731
Lower Butternut	62698	xy4241738275363546	Culvert	No AOP	0.000	2018-07-25	Severe barrier	River Rd.	Unnamed trib - LB_016	Butternuts	42.41738	-75.36355
Lower Butternut	64296	xy4250821675357551	Culvert	No AOP	0.000	2018-09-04	Severe barrier	Copes Corner Rd	Unnamed trib to Dunderberg Brook - LB_008	Butternuts	42.50822	-75.35755
Lower Butternut	64893	xy4243899375363976	Culvert	No AOP	0.000	2018-09-19	Severe barrier	Oregon Rd	Unnamed trib - LB_014	Butternuts	42.43899	-75.36398
Lower Butternut	61090	xy4243324975305330	Culvert	No AOP	0.020	2018-07-09	Severe barrier	Wilbur Hill Cross	Shaw Brook - LB_013	Butternuts	42.43325	-75.30533
Lower Butternut	56248	xy4246749175245973	Culvert	No AOP	0.029	2017-11-27	Severe barrier	Lobdell Rd	unnamed trib	Butternuts	42.46749	-75.24597
Lower Butternut	56315	xy4247275875286266	Culvert	No AOP	0.034	2017-11-30	Severe barrier	Murphy Rd	Trib to Cahoon Creek - SR-146-9-8-1	Butternuts	42.47276	-75.28627
Lower Butternut	56370	xy4247008575283879	Culvert	No AOP	0.034	2017-11-30	Severe barrier	County Hwy 4	unmapped trib to SR-146-9-8-1	Butternuts	42.47009	-75.28388
Lower Butternut	62966	xy4251699575340549	Culvert	No AOP	0.034	2018-08-02	Severe barrier	Dunhams Cross Rd	Unnamed trib to Dunderberg Creek - LB_008	Butternuts	42.51700	-75.34055
Lower Butternut	64888	xy4243020475311804	Culvert	No AOP	0.034	2018-08-01	Severe barrier	Shaw Brook Road	Shaw Brook - LB_013	Butternuts	42.43020	-75.31180
Lower Butternut	64896	xy4250743375366612	Culvert	No AOP	0.041	2018-09-19	Severe barrier	Copes Corner Rd	unnamed trib to Dry Brook - LB_012	Butternuts	42.50743	-75.36661
Lower Butternut	64895	xy4250747075366610	Culvert	No AOP	0.048	2018-09-19	Severe barrier	Copes Corner rd just east of Gun Club Rd	LB_012 trib to Dry Brook	Butternuts	42.50747	-75.36661
Lower Butternut	56390	xy4249779475230092	Culvert	No AOP	0.093	2017-12-04	Severe barrier	Shelly Rd	Unnamed Trib	Butternuts	42.49779	-75.23009
Lower Butternut	64935	xy4247880475367363	Culvert	No AOP	0.110	2018-09-21	Severe barrier	Halbert Hill Rd	Dry Brook	Butternuts	42.47880	-75.36736
Lower Butternut	55742	xy4244945175328760	Culvert	No AOP	0.130	2017-10-26	Severe barrier	River rd	Unnamed Trib - LB_010	Butternuts	42.44945	-75.32876
Lower Butternut	65853	xy4247180175327257	Culvert	No AOP	0.130	2018-10-26	Severe barrier	State highway 51	Dunderburg creek	Butternuts	42.47180	-75.32726
Lower Butternut	66039	xy4243981275364026	Culvert	No AOP	0.130	2018-11-01	Severe barrier	Oregon Road	Unnamed trib to Butternut Creek	Butternuts	42.43981	-75.36403
Lower Butternut	56389	xy4249708975232713	Culvert	No AOP	0.186	2017-12-04	Severe barrier	Shelly Rd	Unnamed trib	Butternuts	42.49709	-75.23271
Lower Butternut	66762	xy4247157275262634	Culvert	No AOP	0.186	2017-11-30	Severe barrier	County Hwy 4	Unnamed tributary	Butternuts	42.47157	-75.26263
Lower Butternut	64931	xy4250894675348046	Culvert	No AOP	0.262	2018-09-21	Significant barrier	Copes Corner road	Dunderberg Creek	Butternuts	42.50895	-75.34805
Lower Butternut	55484	xy4248303675316239	Culvert	No AOP	0.272	2017-10-20	Significant barrier	County Hwy 51	Coye Brook - LB_006	Butternuts	42.48304	-75.31624
Lower Butternut	64290	xy4250143875321919	Culvert	No AOP	0.272	2018-09-04	Significant barrier	Coye Brook Rd	Unnamed tributary to Coye Brook	Butternuts	42.50144	-75.32192
Lower Butternut	55736	xy4251734675328661	Culvert	No AOP	0.332	2017-10-25	Significant barrier	Coye Brook	Coye Brook-LB_006	Butternuts	42.51735	-75.32866
Lower Butternut	65686	xy4248468675372763	Culvert	No AOP	0.332	2018-10-19	Significant barrier	Musson Erwin	Unnamed trib to Dry Brook	Butternuts	42.48469	-75.37276
Lower Butternut	66037	xy4245270575339690	Culvert	Reduced AOP	0.332	2018-11-01	Significant barrier	St Hwy 51	Halbert Brook	Butternuts	42.45271	-75.33969
Lower Butternut	56316	xy4247791075275233	Multiple Culvert	No AOP	0.352	2017-11-30	Significant barrier	Murphy rd	Unnamed trib	Butternuts	42.47791	-75.27523
Lower Butternut	64295	xy4249625875353591	Culvert	No AOP	0.389	2018-09-04	Significant barrier	Oppermann Rd	Unnamed trib to Dunderberg Creek - LB_008	Butternuts	42.49626	-75.35359
Lower Butternut	64890	xy4248578875364951	Culvert	No AOP	0.439	2018-09-19	Moderate barrier	Musson Erwin Rd	Unnamed trib to Dry Brook - LB_012	Butternuts	42.48579	-75.36495
Lower Butternut	65729	xy4251448975346398	Culvert	No AOP	0.476	2018-10-25	Moderate barrier	Private Driveway	unnamed trib to Dunderberg Creek	Butternuts	42.51449	-75.34640
Lower Butternut	65079	xy4249640675342736	Culvert	Reduced AOP	0.502	2018-09-21	Moderate barrier	Cty Rte 4	Dunderberg Creek - LB_008	Butternuts	42.49641	-75.34274
Lower Butternut	61089	xy4245052875307409	Culvert	No AOP	0.537	2018-07-09	Moderate barrier	Roy Keyes Rd	Unnamed Trib - LB_009	Butternuts	42.45053	-75.30741
Lower Butternut	56249	xy4248300975251369	Culvert	No AOP	0.542	2017-11-27	Moderate barrier	Bell Hill Rd	Unnamed Trib to Cahoon Creek - LB_007	Butternuts	42.48301	-75.25137

Lower Butternut	66038	xy4250581675356137	Culvert	Reduced AOP	0.543	2018-11-01	Moderate barrier	Oppermann Road	unnamed trib to Dunderberg Creek	Butternuts	42.50582	-75.35614
Lower Butternut	56391	xy4250020775222544	Culvert	Reduced AOP	0.565	2017-12-04	Moderate barrier	Shelly Rd	Unnamed trib	Butternuts	42.50021	-75.22254
Lower Butternut	55703	xy4246023675358874	Culvert	No AOP	0.573	2017-10-27	Moderate barrier	Copes Corners	Unnamed trib	Butternuts	42.46024	-75.35887
Lower Butternut	62968	xy4252167175347730	Culvert	Reduced AOP	0.608	2018-08-02	Minor barrier	County Route 4	Dunderberg Creek - LB_008	Butternuts	42.52167	-75.34773
Lower Butternut	56368	xy4246943275263558	Culvert	No AOP	0.612	2017-11-30	Minor barrier	County Hwy 4	Trib to Cahoon Creek - SR-146-9-8-1	Butternuts	42.46943	-75.26356
Lower Butternut	61094	xy4243218675307393	Culvert	No AOP	0.612	2018-07-09	Minor barrier	Wilbur Hill Rd	Unnamed trib to Shaw Brook - LB_013	Butternuts	42.43219	-75.30739
Lower Butternut	56360	xy4248167575276978	Culvert	Reduced AOP	0.613	2017-12-04	Minor barrier	County Rte 8	Unnamed trib to Cahoon Creek - LB_007	Butternuts	42.48168	-75.27698
Lower Butternut	65730	xy4249365975343539	Culvert	No AOP	0.614	2018-10-25	Minor barrier	County Hwy 4	unnamed trib to Dunderberg Creek	Butternuts	42.49366	-75.34354
Lower Butternut	64894	xy4248501375369353	Culvert	Reduced AOP	0.616	2018-09-19	Minor barrier	Musson Erwin Rd	LB_012 trib to Dry Brook	Butternuts	42.48501	-75.36935
Lower Butternut	62681	xy4243367475305405	Culvert	Reduced AOP	0.617	2018-07-25	Minor barrier	Wilbur Cross Rd.	Shaw Brook - LB_013	Butternuts	42.43367	-75.30541
Lower Butternut	56317	xy4248041375274411	Multiple Culvert	Reduced AOP	0.643	2017-11-30	Minor barrier	Taylor Rd	Cahoon Creek	Butternuts	42.48041	-75.27441
Lower Butternut	64289	xy4249983775319948	Culvert	No AOP	0.647	2018-09-04	Minor barrier	Coye Brook Rd	Unnamed trib to Coye Brook - LB_006	Butternuts	42.49984	-75.31995
Lower Butternut	55745	xy4242289775363404	Culvert	Reduced AOP	0.672	2017-10-31	Minor barrier	Flat Iron	Unnamed Trib - LB_015	Butternuts	42.42290	-75.36340
Lower Butternut	55746	xy4243557175363938	Culvert	Reduced AOP	0.673	2017-10-31	Minor barrier	Oregon Rd	Unnamed Trib - LB_014	Butternuts	42.43557	-75.36394
Lower Butternut	65685	xy4248578875364951	Culvert	Reduced AOP	0.681	2018-10-19	Minor barrier	Musson Erwin Rd	unnamed trib to Dry Brook	Butternuts	42.48579	-75.36495
Lower Butternut	56251	xy4247180675255204	Culvert	Reduced AOP	0.688	2017-11-27	Minor barrier	Lobdell Rd	Trib to Cahoon Creek - SR-146-9-8-1	Butternuts	42.47181	-75.25520
Lower Butternut	64891	xy4249113975364915	Culvert	No AOP	0.706	2018-09-19	Minor barrier	Copes Corner Rd	unnamed trib to Dry Brook - LB_012	Butternuts	42.49114	-75.36492
Lower Butternut	55702	xy4246167375358410	Culvert	Reduced AOP	0.727	2017-10-27	Minor barrier	Copes Corners Rd	Dry Brook-LB_012	Butternuts	42.46167	-75.35841
Lower Butternut	64294	xy4249008275348501	Culvert	no score - missing data	0.737	2018-09-04	Minor barrier	Musson Erwin Rd	Unnamed trib to Dunderberg Creek - LB_008	Butternuts	42.49008	-75.34850
Lower Butternut	64930	xy4248198375353491	Culvert	No AOP	0.739	2018-09-04	Minor barrier	Halbert Hill Rd	LB_011 Halbert	Butternuts	42.48198	-75.35349
Lower Butternut	65728	xy4248653875311901	Culvert	Reduced AOP	0.740	2018-10-25	Minor barrier	State Hwy 51	Unnamed Trib to Butternut	Butternuts	42.48654	-75.31190
Lower Butternut	65080	xy4249594575342853	Culvert	Reduced AOP	0.749	2018-09-21	Minor barrier	Cty Rte 4	Dunderberg Creek - LB_008	Butternuts	42.49595	-75.34285
Lower Butternut	62976	xy4243045775315867	Culvert	Reduced AOP	0.752	2018-08-01	Minor barrier	No name - private farm rd	Unnamed trib to Shaw Brook - LB_013	Butternuts	42.43046	-75.31587
Lower Butternut	56319	xy4247867675288113	Culvert	Reduced AOP	0.797	2017-11-30	Minor barrier	County Hwy 8	Unnamed trib	Butternuts	42.47868	-75.28811
Lower Butternut	56359	xy4248144175277163	Culvert	Reduced AOP	0.811	2017-12-04	Insignificant barrier	County Rte 8	Unnamed trib to Cahoon Creek - LB_007	Butternuts	42.48144	-75.27716
Lower Butternut	64932	xy4252316775347947	Culvert	Reduced AOP	0.811	2018-09-21	Insignificant barrier	Cty Rte 4	Dunderberg Creek	Butternuts	42.52317	-75.34795
Lower Butternut	64292	xy4250425975326224	Culvert	Reduced AOP	0.829	2018-09-04	Insignificant barrier	Coye brook rd	Coye Brook - LB_006	Butternuts	42.50426	-75.32622
Lower Butternut	65855	xy4247232575313602	Bridge	Full AOP	0.861	2018-10-26	Insignificant barrier	Mill Street	Cahoon creek	Butternuts	42.47233	-75.31360
Lower Butternut	56361	xy4248570475261019	Culvert	Full AOP	0.889	2017-12-04	Insignificant barrier	Charlie Coon rd	Cahoon creek	Butternuts	42.48570	-75.26102
Lower Butternut	65854	xy4247191275315126	Bridge	Full AOP	0.892	2018-10-26	Insignificant barrier	Bloom St	Butternut Creek	Butternuts	42.47191	-75.31513
Lower Butternut	55743	xy4243392575355889	Culvert	Reduced AOP	0.895	2017-10-31	Insignificant barrier	State hwy 51	Unnamed Trib - LB_014	Butternuts	42.43393	-75.35589
Lower Butternut	56369	xy4246854575278681	Bridge	Reduced AOP	0.905	2017-12-04	Insignificant barrier	County Hwy 4	Trib to Cahoon Creek - SR-146-9-8-1	Butternuts	42.46855	-75.27868
Lower Butternut	65735	xy4247541375304913	Bridge	Full AOP	0.910	2018-10-19	Insignificant barrier	Clarence Munson Rd	Cahoon Creek	Butternuts	42.47541	-75.30491
Lower Butternut	56397	xy4245792075321912	Culvert	Reduced AOP	0.931	2017-10-26	Insignificant barrier	River Rd	Unnamed trib	Butternuts	42.45792	-75.32191
Lower Butternut	65852	xy4247216375323804	Bridge	Reduced AOP	0.954	2018-10-26	Insignificant barrier	Green Street	Dunderberg Creek	Butternuts	42.47216	-75.32380
Lower Butternut	65856	xy4246425375321572	Bridge	Full AOP	0.955	2018-10-26	Insignificant barrier	River st	Butternut	Butternuts	42.46425	-75.32157
Lower Butternut	56358	xy4247666675318956	Bridge	Full AOP	0.973	2017-12-04	Insignificant barrier	County Rte 8	Butternut Creek	Butternuts	42.47667	-75.31896
Lower Butternut	55705	xy4243696175345780	Bridge	Full AOP	0.982	2017-10-27	Insignificant barrier	River Road	Butternut Creek	Butternuts	42.43696	-75.34578
Lower Butternut	62695	xy4243305675345673	Bridge	Full AOP	0.988	2018-07-25	Insignificant barrier	River Rd	Shaw Brook - LB_013	Butternuts	42.43306	-75.34567

Table I3. List of stream crossings surveyed using NAACC protocol in the Butternut Creek watershed within the Town of Exeter.

Watershed	SurveyID	CrosCode	CrosType	AopNaacc	AqScNaac	DateObsd	Eval	Road	StrmName	CrTown	Latitude	Longitude
Upper Butternut	44564	xy4275475775075793	Culvert	No AOP	0.000	2017-05-30	Severe barrier	Brady Rd.	unnamed	Exeter	42.75476	-75.07579
Upper Butternut	41948	xy4276398175098357	Culvert	No AOP	0.382	2016-11-30	Significant barrier	Eckert/ No Mans Land	Unnamed	Exeter	42.76398	-75.09836
Upper Butternut	52558	xy4277634575101331	Culvert	No AOP	0.764	2017-08-31	Minor barrier	Private Road	UB_Mainstem	Exeter	42.77635	-75.10133

Table 14. List of stream crossings surveyed using NAACC protocol in the Butternut Creek watershed within the Town of Morris. Note: Includes stream crossings in the Village of Morris.

Watershed	SurveyID	CrosCode	CrosType	AopNaacc	AqScNaac	DateObsd	Eval	Road	StrmName	CrTown	Latitude	Longitude
Middle Butternut	52773	xy4255273575259635	No Upstream Channel	no score - missing data	-1.000	2017-09-05	no score - missing data	State Hwy 23	unnamed trib	Morris	42.55274	-75.25964
Middle Butternut	53842	xy4256536375181804	Partially Inaccessible	no score - missing data	-1.000	2017-09-18	no score - missing data	Gulf Hill	Unnamed trib-mb_006	Morris	42.56536	-75.18180
Lower Butternut	52738	xy4250869775289702	Culvert	No AOP	0.000	2017-09-05	Severe barrier	State Hwy 51	Morris Brook	Morris	42.50870	-75.28970
Lower Butternut	55842	xy4249739275342223	Culvert	No AOP	0.000	2017-10-24	Severe barrier	Reservoir Rd	unnamed trib	Morris	42.49739	-75.34222
Lower Butternut	55845	xy4249385375337820	Culvert	No AOP	0.000	2017-10-24	Severe barrier	Reservoir Rd	Unnamed trib	Morris	42.49385	-75.33782
Lower Butternut	64187	xy4255724975306119	Culvert	No AOP	0.000	2018-08-30	Severe barrier	Wells Rd	Unnamed trib	Morris	42.55725	-75.30612
Lower Butternut	64188	xy4255801075306333	Culvert	No AOP	0.000	2018-08-30	Severe barrier	Wells Rd	Unnamed trib	Morris	42.55801	-75.30633
Lower Butternut	64238	xy4256079475306499	Bridge	No AOP	0.000	2018-08-30	Severe barrier	private road	Unnamed trib to Morris Brook - LB_001	Morris	42.56079	-75.30650
Middle Butternut	52188	xy4255853175205014	Culvert	No AOP	0.000	2017-08-25	Severe barrier	Pegg Rd.	Unnamed Trib - MB_008	Morris	42.55853	-75.20501
Middle Butternut	52189	xy4255922375203859	Culvert	No AOP	0.000	2017-08-25	Severe barrier	Pegg Rd.	unnamed trib	Morris	42.55922	-75.20386
Middle Butternut	52755	xy4252861975263733	Culvert	No AOP	0.000	2017-09-06	Severe barrier	State Hwy 51	unnamed trib	Morris	42.52862	-75.26373
Middle Butternut	53116	xy4252279475252685	Culvert	No AOP	0.000	2017-09-07	Severe barrier	East side Rd.	unnamed trib-MB_018	Morris	42.52279	-75.25269
Middle Butternut	53608	xy4256187475185541	Culvert	No AOP	0.000	2017-09-15	Severe barrier	Potato Farm	Unnamed trib-MB_005	Morris	42.56187	-75.18554
Middle Butternut	53840	xy4256485875180548	Culvert	No AOP	0.000	2017-09-18	Severe barrier	Potato Farm	Unnamed Trib-MB_006	Morris	42.56486	-75.18055
Middle Butternut	53843	xy4256588375182798	Culvert	No AOP	0.000	2017-09-18	Severe barrier	Gulf Hill	Unnamed Trib-MB_006	Morris	42.56588	-75.18280
Middle Butternut	54043	xy4256669275185461	Culvert	No AOP	0.000	2017-09-18	Severe barrier	Gulf Hill	MB_006	Morris	42.56669	-75.18546
Middle Butternut	54063	xy4256731975186755	Culvert	Reduced AOP	0.000	2017-09-18	Severe barrier	Gulf Hill	MB_006	Morris	42.56732	-75.18676
Middle Butternut	54468	xy4253403375210042	Multiple Culvert	No AOP	0.000	2017-09-29	Severe barrier	Ellis Rd	unnamed trib - MB_012	Morris	42.53403	-75.21004
Middle Butternut	55309	xy4251659675242633	Culvert	No AOP	0.000	2017-10-13	Severe barrier	Light Hill Rd	unnamed trib	Morris	42.51660	-75.24263
Middle Butternut	55310	xy4252502575247538	Culvert	No AOP	0.000	2017-10-13	Severe barrier	Light Hill Rd	unnamed trib - MB_018	Morris	42.52503	-75.24754
Middle Butternut	55312	xy4251099675259607	Culvert	No AOP	0.000	2017-10-11	Severe barrier	East Side Rd	unnamed trib-MB_023	Morris	42.51100	-75.25961
Middle Butternut	64018	xy4253519675226553	Culvert	No AOP	0.000	2018-08-28	Severe barrier	County Route 51	MB_016	Morris	42.53520	-75.22655
Middle Butternut	65857	xy4250417375268980	Culvert	No AOP	0.000	2018-10-26	Severe barrier	E Side Rd	unnamed trib to Butternut	Morris	42.50417	-75.26898
Middle Butternut	52541	xy4254971875224671	Culvert	Reduced AOP	0.004	2017-08-31	Severe barrier	County Hwy 49	unnamed trib-MB_012	Morris	42.54972	-75.22467
Middle Butternut	53104	xy4254737375280094	Culvert	No AOP	0.007	2017-09-06	Severe barrier	Bourne Hill Rd.	unnamed trib	Morris	42.54737	-75.28009
Lower Butternut	64246	xy4253063275347590	Culvert	No AOP	0.009	2018-08-31	Severe barrier	County Route 4	Unnamed trib	Morris	42.53063	-75.34759
Middle Butternut	54467	xy4253373275214108	Culvert	Reduced AOP	0.009	2017-09-29	Severe barrier	County Hwy 51	unnamed trib	Morris	42.53373	-75.21411
Lower Butternut	64244	xy4258378175296017	Culvert	No AOP	0.012	2018-08-31	Severe barrier	Matteson Road	Unnamed trib to Morris Brook - LB_001	Morris	42.58378	-75.29602
Middle Butternut	52714	xy4254530975252464	Culvert	No AOP	0.012	2017-09-05	Severe barrier	State Hwy 51	Calhoun Creek	Morris	42.54531	-75.25246
Middle Butternut	53839	xy4256486275180827	Culvert	No AOP	0.012	2017-09-18	Severe barrier	Gulf Hill	Unnamed Trib-MB_006	Morris	42.56486	-75.18083
Lower Butternut	56834	xy4253333175333715	Culvert	No AOP	0.020	2018-02-22	Severe barrier	Coye Brook Road	Unamed tributary	Morris	42.53333	-75.33372
Middle Butternut	53607	xy4255968375188665	Culvert	No AOP	0.034	2017-09-15	Severe barrier	Potato Farm	Unnamed trib-MB_005	Morris	42.55968	-75.18867
Middle Butternut	53832	xy4258926075259668	Culvert	No AOP	0.034	2017-09-19	Severe barrier	State Hwy 132	MB_014	Morris	42.58926	-75.25967
Middle Butternut	52130	xy4257108775206530	Culvert	No AOP	0.048	2017-08-23	Severe barrier	State Hwy 51	Unnamed Trib - MB_007	Morris	42.57109	-75.20653
Middle Butternut	54469	xy4252899875222843	Culvert	No AOP	0.048	2017-09-29	Severe barrier	Gilford Hill rd	unamed MB_140	Morris	42.52900	-75.22284
Lower Butternut	56392	xy4250092075220830	Culvert	No AOP	0.057	2017-12-04	Severe barrier	Shelly Rd	Unnamed trib	Morris	42.50092	-75.22083
Lower Butternut	64221	xy4255889275306525	Culvert	No AOP	0.057	2018-08-20	Severe barrier	Wells Rd	Unnamed trib	Morris	42.55889	-75.30653
Lower Butternut	63417	xy4252161775293090	Culvert	No AOP	0.067	2018-08-06	Severe barrier	Dimmock Hollow Rd	Unnamed trib to Morris Brook - LB_001	Morris	42.52162	-75.29309
Lower Butternut	64223	xy4256344675304010	Culvert	Reduced AOP	0.067	2018-08-30	Severe barrier	Wells Rd	Unnamed trib	Morris	42.56345	-75.30401
Middle Butternut	54470	xy4253134175223691	Culvert	No AOP	0.067	2017-09-29	Severe barrier	Gifford Hill Rd	unnamed trib - MB_016	Morris	42.53134	-75.22369
Lower Butternut	64185	xy4255443875304848	Culvert	No AOP	0.079	2018-08-30	Severe barrier	Wells Rd	Morris Brook - LB_001	Morris	42.55444	-75.30485
Middle Butternut	53076	xy4254203975246516	Culvert	Reduced AOP	0.079	2017-09-06	Severe barrier	Spring St.	Calhoun Creek	Morris	42.54204	-75.24652
Middle Butternut	55307	xy4253902775243764	Culvert	Reduced AOP	0.093	2017-10-13	Severe barrier	Side	unnamed trib	Morris	42.53903	-75.24376

Lower Butternut	55847	xy4253688175335805	Culvert	No AOP	0.110	2017-10-24	Severe barrier	Lieb Hill rd	Unnamed trib	Morris	42.53688	-75.33581
Middle Butternut	52217	xy4256510475198722	Culvert	No AOP	0.110	2017-08-25	Severe barrier	Pegg Rd.	unnamed trib	Morris	42.56510	-75.19872
Lower Butternut	65731	xy4250022275275034	Culvert	No AOP	0.155	2018-10-19	Severe barrier	Clarence Musson Road	LB_022 Unnamed Trib to Butternut Creek	Morris	42.50022	-75.27503
Middle Butternut	53112	xy4253131775277253	Culvert	No AOP	0.155	2017-09-07	Severe barrier	Harris Hill Rd	Unnamed Trib - MB_021	Morris	42.53132	-75.27725
Lower Butternut	64186	xy4255643775305747	Culvert	No AOP	0.186	2018-08-30	Severe barrier	Wells Rd	Morris Brook - LB_001	Morris	42.55644	-75.30575
Middle Butternut	53110	xy4253141575281625	Culvert	No AOP	0.186	2017-09-07	Severe barrier	Bourne Hill Rd	Unnamed Trib - MB_017	Morris	42.53142	-75.28163
Middle Butternut	64025	xy4255864775280682	Culvert	No AOP	0.224	2018-08-27	Significant barrier	Steiber Road	unnamed trib	Morris	42.55865	-75.28068
Middle Butternut	53102	xy4255542375271921	Culvert	No AOP	0.332	2017-09-05	Significant barrier	State Hwy 23	unnamed trib-MB_017	Morris	42.55542	-75.27192
Middle Butternut	55308	xy4253268475244990	Culvert	No AOP	0.332	2017-10-13	Significant barrier	Side rd	Unamed trib MB_016	Morris	42.53268	-75.24499
Middle Butternut	52133	xy4255943975218395	Culvert	No AOP	0.333	2017-08-23	Significant barrier	Bemus Rd	Unnamed Trib-MB_009	Morris	42.55944	-75.21840
Lower Butternut	63047	xy4251818875292860	Culvert	No AOP	0.373	2018-08-06	Significant barrier	Dimmick Hollow Rd	Unnamed trib	Morris	42.51819	-75.29286
Lower Butternut	62958	xy4253152075304369	Culvert	Reduced AOP	0.391	2018-08-02	Significant barrier	Pittsley Rd	Unnamed trib to Morris Brook - LB_001	Morris	42.53152	-75.30437
Middle Butternut	55311	xy4250834075252010	Culvert	No AOP	0.391	2017-10-13	Significant barrier	fior hill rd	unnamed	Morris	42.50834	-75.25201
Middle Butternut	52186	xy4255476475214724	Culvert	No AOP	0.400	2017-08-25	Significant barrier	Pegg Rd	MB_010	Morris	42.55476	-75.21472
Middle Butternut	54464	xy4253429575219152	Culvert	Reduced AOP	0.407	2017-09-29	Moderate barrier	County Hwy 51	unnamed trib	Morris	42.53430	-75.21915
Lower Butternut	62959	xy4253055575309352	Culvert	No AOP	0.429	2018-08-02	Moderate barrier	Pittsley Rd	Unnamed trib to Morris Brook - LB_001	Morris	42.53056	-75.30935
Lower Butternut	65849	xy4255721675292117	Culvert	No AOP	0.446	2018-10-26	Moderate barrier	Private driveway	Unnamed trib to morris brook	Morris	42.55722	-75.29212
Middle Butternut	53099	xy4254815875266485	Culvert	No AOP	0.458	2017-09-06	Moderate barrier	Bourne Hill Rd.	unnamed trib	Morris	42.54816	-75.26649
Middle Butternut	52715	xy4253467175259737	Culvert	No AOP	0.468	2017-09-05	Moderate barrier	State Hwy 51	unnamed-MB_017	Morris	42.53467	-75.25974
Lower Butternut	55550	xy4251227275223200	Culvert	No AOP	0.500	2017-10-19	Moderate barrier	County Highway 10	Unnamed trib to Cahoon Creek - LB_007	Morris	42.51227	-75.22320
Middle Butternut	52717	xy4255788575281149	Culvert	Reduced AOP	0.500	2017-09-05	Moderate barrier	State Hwy 23	unnamed trib -MB_017	Morris	42.55789	-75.28115
Middle Butternut	52185	xy4255481575214732	Culvert	Reduced AOP	0.524	2017-08-25	Moderate barrier	Pegg Rd	Unnamed trib - MB_010	Morris	42.55482	-75.21473
Lower Butternut	65850	xy4255258375300581	Culvert	Reduced AOP	0.530	2018-10-26	Moderate barrier	Bourne Hill road	Unnamed trib to morris brook	Morris	42.55258	-75.30058
Lower Butternut	55836	xy4249357175247660	Culvert	Reduced AOP	0.539	2017-10-20	Moderate barrier	County rd 8	Unnamed trib to Calhoun Creek - LB_007	Morris	42.49357	-75.24766
Lower Butternut	64245	xy4253527775331281	Culvert	No AOP	0.547	2018-08-31	Moderate barrier	Creighton Road	Thorp Brook - LB_004	Morris	42.53528	-75.33128
Lower Butternut	56362	xy4249222675254780	Culvert	No AOP	0.552	2017-12-04	Moderate barrier	County Hwy 8	Unnamed trib	Morris	42.49223	-75.25478
Middle Butternut	53455	xy4256573675266428	Culvert	Reduced AOP	0.590	2017-09-13	Moderate barrier	Jones Rd	Unnamed trib-MB_015	Morris	42.56574	-75.26643
Middle Butternut	52131	xy4255969375220300	Culvert	No AOP	0.591	2017-08-23	Moderate barrier	State Hwy 51	Unnamed Trib - MB_009	Morris	42.55969	-75.22030
Lower Butternut	55838	xy4249367575246927	Culvert	No AOP	0.612	2017-10-20	Minor barrier	County Rte 8	Unnamed trib to Callhoun Creek - LB_007	Morris	42.49368	-75.24693
Lower Butternut	62947	xy4253213875294248	Culvert	Reduced AOP	0.612	2018-08-02	Minor barrier	Pittsley Rd	Morris Brook - LB_001	Morris	42.53214	-75.29425
Middle Butternut	53844	xy4256642475184588	Culvert	No AOP	0.612	2017-09-18	Minor barrier	Gulf Hill	Unnamed Trib-MB_006	Morris	42.56642	-75.18459
Lower Butternut	62960	xy4252338575321445	Culvert	Reduced AOP	0.614	2018-08-02	Minor barrier	Pittsley Rd	Thorp Brook - LB_004	Morris	42.52339	-75.32145
Lower Butternut	64934	xy4253269175346387	Culvert	Reduced AOP	0.615	2018-09-21	Minor barrier	Creighton Rd	unnamed trib to Dunderberg	Morris	42.53269	-75.34639
Middle Butternut	53109	xy4254668775275778	Culvert	Reduced AOP	0.630	2017-09-06	Minor barrier	Bourne Hill Rd.	unnamed trib-MB_017	Morris	42.54669	-75.27578
Lower Butternut	64293	xy4250934975303267	Culvert	No AOP	0.636	2018-09-04	Minor barrier	West Hill Rd	Unnamed trib to Thorp Brook - LB_004	Morris	42.50935	-75.30327
Middle Butternut	53605	xy4256219275274723	Culvert	Reduced AOP	0.648	2017-09-15	Minor barrier	Hilsinger	Unnamed trib-MB_017	Morris	42.56219	-75.27472
Lower Butternut	55509	xy4251922775211399	Culvert	Reduced AOP	0.653	2017-10-19	Minor barrier	County Highway 10	Cahoon Creek - LB_007	Morris	42.51923	-75.21140
Lower Butternut	65851	xy4256593575302909	Culvert	Reduced AOP	0.663	2018-10-26	Minor barrier	Wells Road	Unnamed trib to morris brook	Morris	42.56594	-75.30291
Lower Butternut	64243	xy4254734275317957	Culvert	Reduced AOP	0.664	2018-08-31	Minor barrier	Squires Road	Unnamed trib to Morris Brook - LB_001	Morris	42.54734	-75.31796
Middle Butternut	53482	xy4256201375258187	Culvert	Reduced AOP	0.664	2017-09-13	Minor barrier	Littlewood	Unnamed trib-MB_015	Morris	42.56201	-75.25819
Lower Butternut	56365	xy4250665675237837	Culvert	Full AOP	0.691	2017-12-04	Minor barrier	Filor Rd	Cahoon Creek - LB_007	Morris	42.50666	-75.23784
Middle Butternut	53074	xy4254757675272809	Culvert	Reduced AOP	0.697	2017-09-06	Minor barrier	Bourne Hill Rd.	unnamed trib-MB_017	Morris	42.54758	-75.27281
Middle Butternut	54466	xy4253408775219326	Ford	No AOP	0.706	2017-09-29	Minor barrier	private pasture	unnamed trib	Morris	42.53409	-75.21933

Lower Butternut	64222	xy4256124975306007	Culvert	Reduced AOP	0.724	2018-08-30	Minor barrier	west road	unnamed	Morris	42.56125	-75.30601
Lower Butternut	55545	xy4251422675221501	Culvert	Reduced AOP	0.730	2017-10-19	Minor barrier	County Highway 10	Cahoon Creek-LB_007	Morris	42.51423	-75.22150
Lower Butternut	62953	xy4253534075297290	Culvert	Reduced AOP	0.731	2018-08-02	Minor barrier	Dimmock Hollow Rd	Unnamed trib	Morris	42.53534	-75.29729
Lower Butternut	63975	xy4254260675301049	Culvert	No AOP	0.739	2018-08-07	Minor barrier	Dimmock Hollow Rd	Unnamed trib to Morris Brook - LB_001	Morris	42.54261	-75.30105
Lower Butternut	64240	xy4254664975315964	Culvert	Reduced AOP	0.748	2018-08-31	Minor barrier	State Highway 23	Unnamed trib to Morris Brook - LB_001	Morris	42.54665	-75.31596
Lower Butternut	64239	xy4255454475298289	Culvert	Reduced AOP	0.749	2018-08-30	Minor barrier	State hwy 23	Unnamed trib to Morris Brook - LB_001	Morris	42.55454	-75.29829
Lower Butternut	64235	xy4256490075302266	Culvert	Reduced AOP	0.763	2018-08-30	Minor barrier	Wells Rd	Unnamed trib to Morris Brook - LB_001	Morris	42.56490	-75.30227
Middle Butternut	52716	xy4252949375263236	Culvert	Reduced AOP	0.764	2017-09-05	Minor barrier	State Hwy 51	unnamed	Morris	42.52949	-75.26324
Lower Butternut	64933	xy4253236075351343	Culvert	Reduced AOP	0.767	2018-09-21	Minor barrier	Creighton Rd	Dunderberg Creek - LB_008	Morris	42.53236	-75.35134
Middle Butternut	53115	xy4252375375255685	Culvert	Reduced AOP	0.778	2017-09-07	Minor barrier	Peet Rd.	unnamed trib-MB_018	Morris	42.52375	-75.25569
Lower Butternut	63976	xy4255189375302742	Culvert	Reduced AOP	0.782	2018-08-07	Minor barrier	Dimmock Hollow Rd	Morris Brook	Morris	42.55189	-75.30274
Middle Butternut	64023	xy4257019875232498	Culvert	Reduced AOP	0.782	2018-08-27	Minor barrier	County Highway 49	Unnamed trib	Morris	42.57020	-75.23250
Lower Butternut	63973	xy4252372675293081	Culvert	Reduced AOP	0.820	2018-08-06	Insignificant barrier	Dimmock Hollow Road	Unnamed trib	Morris	42.52373	-75.29308
Middle Butternut	52184	xy4254831475220538	Culvert	Reduced AOP	0.821	2017-08-25	Insignificant barrier	Pegg Rd.	Unnamed Trib - MB_012	Morris	42.54831	-75.22054
Lower Butternut	55706	xy4249726175247679	Multiple Culvert	Reduced AOP	0.827	2017-10-27	Insignificant barrier	Sampson	Cahoon Creek - LB_007	Morris	42.49726	-75.24768
Middle Butternut	52538	xy4255695375228743	Culvert	Reduced AOP	0.832	2017-08-31	Insignificant barrier	State Hwy 51	Aldrich Creek	Morris	42.55695	-75.22874
Middle Butternut	53478	xy4256350075261040	Culvert	Reduced AOP	0.833	2017-09-13	Insignificant barrier	Jones Rd	Unnamed trib-MB_015	Morris	42.56350	-75.26104
Lower Butternut	55485	xy4249346675249764	Bridge	Full AOP	0.849	2017-10-20	Insignificant barrier	County Rt 8	Cahoon Creek - LB_007	Morris	42.49347	-75.24976
Lower Butternut	63974	xy4253723975298269	Culvert	Reduced AOP	0.852	2018-08-06	Insignificant barrier	Dimmock Hollow Rd	Unnamed Trib	Morris	42.53724	-75.29827
Middle Butternut	53113	xy4252428075255771	Bridge	Full AOP	0.860	2017-09-07	Insignificant barrier	Peet Rd.	Butternut Creek	Morris	42.52428	-75.25577
Lower Butternut	65734	xy4249330675300717	Multiple Culvert	Reduced AOP	0.874	2018-10-19	Insignificant barrier	County Hwy 51	Thorp Brook	Morris	42.49331	-75.30072
Middle Butternut	52224	xy4254698575218242	Bridge	Reduced AOP	0.879	2017-08-25	Insignificant barrier	State Hwy 23	Unnamed Trib - MB_012	Morris	42.54699	-75.21824
Middle Butternut	52537	xy4255669575216524	Bridge	Full AOP	0.888	2017-08-31	Insignificant barrier	Bemis Rd.	Butternut Creek	Morris	42.55670	-75.21652
Lower Butternut	63977	xy4255204575303359	Bridge	Reduced AOP	0.911	2018-08-07	Insignificant barrier	County Hwy 23	Morris Brook	Morris	42.55205	-75.30336
Middle Butternut	52428	xy4256044575228349	Bridge	Reduced AOP	0.918	2017-08-28	Insignificant barrier	Burlingame Rd	Aldrich Creek	Morris	42.56045	-75.22835
Middle Butternut	53831	xy4254984475246666	Bridge	Reduced AOP	0.924	2017-09-19	Insignificant barrier	County Hwy. 13	Silver Creek-MB_014	Morris	42.54984	-75.24667
Middle Butternut	52713	xy4254837075246238	Culvert	Reduced AOP	0.932	2017-09-05	Insignificant barrier	State Hwy 51	Silver Creek - MB014	Morris	42.54837	-75.24624
Middle Butternut	52539	xy4255317975223031	Culvert	Reduced AOP	0.934	2017-08-31	Insignificant barrier	County Hwy 49	MB_013	Morris	42.55318	-75.22303
Middle Butternut	55007	xy4256470075228978	Removed Crossing	no score - missing data	0.938	2017-10-04	Insignificant barrier	Burlingame Rd	Aldrich Creek	Morris	42.56470	-75.22898
Middle Butternut	52766	xy4252047675270997	Culvert	Reduced AOP	0.944	2017-09-05	Insignificant barrier	State Hwy 51	unnamed-MB_021	Morris	42.52048	-75.27100
Middle Butternut	52540	xy4255180975223443	Bridge	Full AOP	0.955	2017-08-31	Insignificant barrier	County Hwy 49	Butternut Creek	Morris	42.55181	-75.22344
Middle Butternut	53829	xy4254536075238910	Bridge	Full AOP	0.955	2017-09-19	Insignificant barrier	State Hwy 23	Butternut Creek	Morris	42.54536	-75.23891
Middle Butternut	55830	xy4251183975276158	Bridge	Full AOP	0.959	2017-10-25	Insignificant barrier	Bailey Rd.	Butternut Creek	Morris	42.51184	-75.27616
Lower Butternut	62949	xy4253593875297774	Bridge	Full AOP	0.975	2018-08-02	Insignificant barrier	Dimmock Hollow Rd	Morris Brook - LB_001	Morris	42.53594	-75.29777
Lower Butternut	55744	xy4242087275360136	Bridge	Full AOP	0.994	2017-10-31	Insignificant barrier	Flat Iron	Butternut Creek	Morris	42.42087	-75.36014
Lower Butternut	56364	xy4250640975237326	Removed Crossing	no score - missing data	1.000	2017-12-04	No barrier	Filor Rd	Cahoon Creek - LB_007	Morris	42.50641	-75.23733
Middle Butternut	53075	xy4254726275253734	No Crossing	Full AOP	1.000	2017-09-06	No barrier	West Rd.	Calhoun Creek	Morris	42.54726	-75.25373
Middle Butternut	53830	xy4254751975245158	Bridge Adequate	Full AOP	1.000	2017-09-19	No barrier	Grove Rd	Silver Creek-MB_014	Morris	42.54752	-75.24516

Table 15. List of stream crossings surveyed using NAACC protocol in the Butternut Creek watershed within the Town of New Lisbon.

Watershed	SurveyID	CrosCode	CrosType	AopNaacc	AqScNaac	DateObsd	Eval	Road	StrmName	CrTown	Latitude	Longitude
Middle Butternut	51889	xy4261058275135749	Inaccessible	No AOP	-1.000	2017-08-21	no score - missing data	County Hwy 14		New Lisbon	42.61058	-75.13575
Middle Butternut	52116	xy4262772475155773	Partially Inaccessible	no score - missing data	-1.000	2017-08-23	no score - missing data	County Highway 16	MB_001	New Lisbon	42.62772	-75.15577
Middle Butternut	52120	xy4262321575144733	Partially Inaccessible	no score - missing data	-1.000	2017-08-23	no score - missing data	Gus Sohne Rd. (abandoned)	Unnamed Trib to Stony Creek - MB_001	New Lisbon	42.62322	-75.14473
Middle Butternut	53849	xy4257212875193676	Partially Inaccessible	no score - missing data	-1.000	2017-09-18	no score - missing data	Gulf Hill	Unnamed trib-MB_006	New Lisbon	42.57213	-75.19368
Upper Butternut	47015	xy4266138175137595	Partially Inaccessible	no score - missing data	-1.000	2017-06-20	no score - missing data	Stanley Kane Rd.	UB_017	New Lisbon	42.66138	-75.13760
Upper Butternut	48277	xy4262930775171489	Partially Inaccessible	no score - missing data	-1.000	2017-07-13	no score - missing data	Jones Rd.	unnamed trib	New Lisbon	42.62931	-75.17149
Middle Butternut	51711	xy4262223275156969	Culvert	No AOP	0.000	2017-08-17	Severe barrier	Gus Sohne Rd.	unnamed trib	New Lisbon	42.62223	-75.15697
Middle Butternut	51898	xy4259523575163704	Culvert	No AOP	0.000	2017-08-21	Severe barrier	Otto Stahl Rd.	unnamed trib	New Lisbon	42.59524	-75.16370
Middle Butternut	52221	xy4258040875188653	Multiple Culvert	No AOP	0.000	2017-08-25	Severe barrier	Pegg Rd.	MB_003	New Lisbon	42.58041	-75.18865
Middle Butternut	52222	xy4258601275186010	Culvert	No AOP	0.000	2017-08-25	Severe barrier	Pegg Rd.	MB_003	New Lisbon	42.58601	-75.18601
Middle Butternut	56366	xy4259577075145864	Culvert	No AOP	0.000	2017-11-08	Severe barrier	unnamed	Trib to Stony Creek - SR-146-9 29-2	New Lisbon	42.59577	-75.14586
Upper Butternut	47058	xy4264852975159888	Culvert	No AOP	0.000	2017-06-21	Severe barrier	Dump Rd.	UB_020	New Lisbon	42.64853	-75.15989
Upper Butternut	47061	xy4264952975157716	Culvert	No AOP	0.000	2017-06-21	Severe barrier	Dump Rd	UB_020	New Lisbon	42.64953	-75.15772
Upper Butternut	47144	xy4265032675155725	Culvert	No AOP	0.000	2017-06-21	Severe barrier	Dump Rd	unnamed trib	New Lisbon	42.65033	-75.15573
Upper Butternut	48853	xy4264185175178690	Culvert	No AOP	0.000	2017-06-18	Severe barrier	State Hwy 51	Unnamed Tributary - UB_024	New Lisbon	42.64185	-75.17869
Upper Butternut	50946	xy4260027375203276	Culvert	No AOP	0.000	2017-08-07	Severe barrier	Dockstader Road	Unnamed Tributary - UB_028	New Lisbon	42.60027	-75.20328
Upper Butternut	47046	xy4264821775162330	Culvert	No AOP	0.020	2017-06-21	Severe barrier	Dump Rd.	unnamed trib	New Lisbon	42.64822	-75.16233
Upper Butternut	47550	xy4264484375181535	Culvert	No AOP	0.024	2017-06-29	Severe barrier	Mittlesdorf	Unnamed tributary - UB_023	New Lisbon	42.64484	-75.18154
Middle Butternut	50959	xy4263015775165205	Culvert	No AOP	0.034	2017-08-07	Severe barrier	Jones Rd.	unnamed trib	New Lisbon	42.63016	-75.16521
Middle Butternut	51712	xy4262028975146662	Culvert	No AOP	0.041	2017-08-17	Severe barrier	Clifford Harrington Rd.	Unnamed Tributary - MB_001	New Lisbon	42.62029	-75.14666
Upper Butternut	47017	xy4265909075135769	Culvert	No AOP	0.041	2017-06-20	Severe barrier	Backus Rd.	unnamed trib	New Lisbon	42.65909	-75.13577
Middle Butternut	51950	xy4258937275188311	Culvert	No AOP	0.048	2017-08-22	Severe barrier	County Rte 12	Unnamed Tributary - MB_002	New Lisbon	42.58937	-75.18831
Upper Butternut	50765	xy4260191475205600	Culvert	No AOP	0.067	2017-08-02	Severe barrier	Dockstader Rd.	unnamed trib	New Lisbon	42.60191	-75.20560
Middle Butternut	51647	xy4263064175145972	Culvert	No AOP	0.093	2017-08-16	Severe barrier	Oliver Jones Rd.	MB_001	New Lisbon	42.63064	-75.14597
Upper Butternut	47025	xy4265673075132230	Culvert	No AOP	0.093	2017-06-20	Severe barrier	Backus Rd.	unnamed trib	New Lisbon	42.65673	-75.13223
Upper Butternut	49731	xy4265896075135096	Culvert	No AOP	0.093	2017-06-20	Severe barrier	Backus Rd.	unnamed trib	New Lisbon	42.65896	-75.13510
Upper Butternut	50296	xy4263324275201851	Culvert	No AOP	0.093	2017-07-31	Severe barrier	Bundy Pittsfield Rd.	Unnamed Tributary - UB_025	New Lisbon	42.63324	-75.20185
Middle Butternut	50982	xy4260762875170878	Culvert	No AOP	0.110	2017-08-08	Severe barrier	Earl Parker	unnamed	New Lisbon	42.60763	-75.17088
Middle Butternut	51888	xy4261117275134367	Culvert	No AOP	0.110	2017-08-21	Severe barrier	County Hwy 14	unnamed trib	New Lisbon	42.61117	-75.13437
Middle Butternut	51893	xy4260859375142514	Culvert	No AOP	0.130	2017-08-21	Severe barrier	Loren Wheat Rd.	Unnamed Tributary - MB_001	New Lisbon	42.60859	-75.14251
Middle Butternut	51946	xy4259038875183277	Culvert	No AOP	0.130	2017-08-22	Severe barrier	COUNTY HWY 14	Unnamed Tributary - MB_002	New Lisbon	42.59039	-75.18328
Middle Butternut	52111	xy4259548675168452	Culvert	No AOP	0.155	2017-08-21	Severe barrier	Otto Stahl Rd.	Unnamed Trib to Stony Creek - MB_001	New Lisbon	42.59549	-75.16845
Middle Butternut	52218	xy4257198475194223	Culvert	No AOP	0.155	2017-08-25	Severe barrier	Pegg Rd.	unnamed trib	New Lisbon	42.57198	-75.19422
Upper Butternut	48872	xy4261971275197645	Culvert	No AOP	0.155	2017-06-18	Severe barrier	Private Driveway	UB_26	New Lisbon	42.61971	-75.19765
Upper Butternut	49701	xy4264927475199478	Culvert	No AOP	0.155	2017-07-26	Severe barrier	County Hwy 17	unnamed trib	New Lisbon	42.64927	-75.19948
Upper Butternut	50280	xy4260806875194376	Culvert	No AOP	0.155	2017-08-01	Severe barrier	mill hollow	unnamed trib	New Lisbon	42.60807	-75.19438
Middle Butternut	51897	xy4260353975163967	Culvert	No AOP	0.186	2017-08-21	Severe barrier	Dan Miller Rd.	Stony Creek - MB_001	New Lisbon	42.60354	-75.16397
Middle Butternut	51945	xy4258665075179071	Culvert	No AOP	0.186	2017-08-22	Severe barrier	Private driveway	unnamed trib	New Lisbon	42.58665	-75.17907
Middle Butternut	52124	xy4257799075202305	Culvert	No AOP	0.186	2017-08-23	Severe barrier	private drive off state hwy 51	unnamed trib - MB_004	New Lisbon	42.57799	-75.20231
Middle Butternut	53850	xy4257002675189497	Culvert	No AOP	0.186	2017-09-18	Severe barrier	Gulf Hill	Unnamed trib-MB_006	New Lisbon	42.57003	-75.18950
Upper Butternut	50299	xy4262772275202312	Culvert	No AOP	0.186	2017-07-31	Severe barrier	Ned Elliot Rd.	unnamed trib	New Lisbon	42.62772	-75.20231
Middle Butternut	51645	xy4263653475146790	Culvert	No AOP	0.190	2017-08-16	Severe barrier	Oliver Jones Rd.	Unnamed Tributary - MB_001	New Lisbon	42.63653	-75.14679

Middle Butternut	50958	xy4263372275155399	Culvert	No AOP	0.224	2017-08-07	Significant barrier	Jones Rd.	Unnamed Tributary - MB_001	New Lisbon	42.63372	-75.15540
Middle Butternut	51657	xy4263056475145083	Culvert	No AOP	0.224	2017-08-16	Significant barrier	Wareen Card. Rd.	unnamed trib	New Lisbon	42.63056	-75.14508
Upper Butternut	47170	xy4265578475143225	Culvert	No AOP	0.224	2017-06-21	Significant barrier	Backus Rd.	unnamed trib	New Lisbon	42.65578	-75.14323
Upper Butternut	47551	xy4264584175182527	Multiple Culvert	No AOP	0.224	2017-06-29	Significant barrier	Mittlesdorf Rd.	Unnamed tributary - UB_023	New Lisbon	42.64584	-75.18253
Middle Butternut	51655	xy4263200775138777	Culvert	No AOP	0.272	2017-08-16	Significant barrier	Private Driveway	Mill Creek - MB_001	New Lisbon	42.63201	-75.13878
Middle Butternut	51713	xy4261744875147584	Multiple Culvert	No AOP	0.272	2017-08-17	Significant barrier	Hudson Rd.	Unnamed Tributary - MB_001	New Lisbon	42.61745	-75.14758
Middle Butternut	51714	xy4261631975146842	Culvert	No AOP	0.272	2017-08-17	Significant barrier	Clifford Harrington Rd.	Unnamed Tributary - MB_001	New Lisbon	42.61632	-75.14684
Upper Butternut	50297	xy4262772475204324	Culvert	No AOP	0.272	2017-07-31	Significant barrier	Ned Elliot Rd./Bentley Rd	Unnamed Tributary - UB_026	New Lisbon	42.62772	-75.20432
Upper Butternut	49702	xy4264945775199619	Culvert	No AOP	0.332	2017-07-26	Significant barrier	Jellystone road	unnamed trib	New Lisbon	42.64946	-75.19962
Middle Butternut	50957	xy4263579175151156	Culvert	No AOP	0.383	2017-08-07	Significant barrier	Jones Rd.	unnamed trib	New Lisbon	42.63579	-75.15116
Upper Butternut	47013	xy4266256675137585	Culvert	No AOP	0.407	2017-06-20	Moderate barrier	Stanley Kane Rd.	unnamed trib	New Lisbon	42.66257	-75.13759
Upper Butternut	49704	xy4264970375199782	Culvert	No AOP	0.407	2017-07-26	Moderate barrier	Jellystone Rd.	unnamed trib	New Lisbon	42.64970	-75.19978
Upper Butternut	49728	xy4265940575137214	Culvert	No AOP	0.445	2017-06-20	Moderate barrier	Backus Rd.	unnamed trib	New Lisbon	42.65941	-75.13721
Upper Butternut	49446	xy4260426575198114	Culvert	No AOP	0.469	2017-07-17	Moderate barrier	State Hwy 51	unnamed - UB_028	New Lisbon	42.60427	-75.19811
Middle Butternut	51716	xy4260884975144957	Culvert	No AOP	0.483	2017-08-17	Moderate barrier	County Hwy 14	Unnamed Tributary - MB_001	New Lisbon	42.60885	-75.14496
Middle Butternut	52121	xy4262747275164022	Culvert	No AOP	0.489	2017-08-23	Moderate barrier	County Hwy 16	unnamed trib	New Lisbon	42.62747	-75.16402
Middle Butternut	50983	xy4259557775177369	Culvert	No AOP	0.508	2017-08-08	Moderate barrier	Earl Parker	Stony Creek-MB_001	New Lisbon	42.59558	-75.17737
Upper Butternut	47176	xy4266630875146683	Culvert	No AOP	0.526	2017-06-23	Moderate barrier	County Hwy 16	unnamed trib-UB_016	New Lisbon	42.66631	-75.14668
Upper Butternut	47039	xy4264657375164587	Culvert	No AOP	0.531	2017-06-21	Moderate barrier	Dump Rd.	unnamed trib	New Lisbon	42.64657	-75.16459
Middle Butternut	50956	xy4263897475143321	Culvert	Reduced AOP	0.533	2017-08-07	Moderate barrier	Jones Rd	Unnamed Tributary - MB_001	New Lisbon	42.63897	-75.14332
Middle Butternut	52223	xy4257319375175352	Culvert	Reduced AOP	0.543	2017-08-25	Moderate barrier	Morse Rd	Unnamed Trib - MB_005	New Lisbon	42.57319	-75.17535
Upper Butternut	49699	xy4265179175193225	Culvert	Reduced AOP	0.548	2017-07-26	Moderate barrier	County Rd 17	unnamed	New Lisbon	42.65179	-75.19323
Middle Butternut	51719	xy4261134875147782	Culvert	Reduced AOP	0.551	2017-08-17	Moderate barrier	Clifford Harrington Rd.	Unnamed Tributary - MB_001	New Lisbon	42.61135	-75.14778
Upper Butternut	48849	xy4265254875170567	Culvert	Reduced AOP	0.555	2017-06-18	Moderate barrier	Charlie Ward Rd.	Unnamed Tributary - UB_021	New Lisbon	42.65255	-75.17057
Upper Butternut	48289	xy4265059075197783	Culvert	Reduced AOP	0.558	2017-06-29	Moderate barrier	Park road	unnamed tributary - UB_024	New Lisbon	42.65059	-75.19778
Upper Butternut	50766	xy4260014075203952	Culvert	Reduced AOP	0.560	2017-08-02	Moderate barrier	Dockstader Rd.	Unnamed Tributary - UB_028	New Lisbon	42.60014	-75.20395
Middle Butternut	51894	xy4260489575156206	Culvert	No AOP	0.583	2017-08-21	Moderate barrier	County hwy 14	unnamed tribs	New Lisbon	42.60490	-75.15621
Middle Butternut	52220	xy4257462375191124	Culvert	Reduced AOP	0.583	2017-08-25	Moderate barrier	Pegg Rd.	Unnamed Trib - MB_005	New Lisbon	42.57462	-75.19112
Middle Butternut	52119	xy4261913275134167	Culvert	Reduced AOP	0.586	2017-08-23	Moderate barrier	Driveway	Stony Creek - MB_001	New Lisbon	42.61913	-75.13417
Middle Butternut	51717	xy4262945875152491	Culvert	Reduced AOP	0.593	2017-08-17	Moderate barrier	Warren Card Rd.	Mill Creek - MB_001	New Lisbon	42.62946	-75.15249
Middle Butternut	53827	xy4257319375175352	Culvert	Reduced AOP	0.595	2017-09-19	Moderate barrier	Potato Farm Rd	unnamed tributary - MB_005	New Lisbon	42.57319	-75.17535
Middle Butternut	51718	xy4262930775152823	Culvert	No AOP	0.601	2017-08-17	Minor barrier	Warren Card Rd.	Unnamed Tributary - MB_001	New Lisbon	42.62931	-75.15282
Upper Butternut	47554	xy4265683975178744	Culvert	No AOP	0.605	2017-06-29	Minor barrier	otsego 17	ub_022	New Lisbon	42.65684	-75.17874
Upper Butternut	48838	xy4266467175176697	Culvert	Reduced AOP	0.622	2017-06-18	Minor barrier	State Hwy 51	unnamed - UB022	New Lisbon	42.66467	-75.17670
Middle Butternut	51943	xy4260722275153585	Culvert	Reduced AOP	0.627	2017-08-22	Minor barrier	County Hwy 14	Unnamed Tributary - MB_001	New Lisbon	42.60722	-75.15359
Upper Butternut	47549	xy4265494875199991	Multiple Culvert	Reduced AOP	0.627	2017-06-29	Minor barrier	Side Turtle Lake Rd.	Unnamed Tributary - UB_024	New Lisbon	42.65495	-75.19999
Upper Butternut	48850	xy4264800175169544	Culvert	Reduced AOP	0.646	2017-06-18	Minor barrier	County Hwy 16	Unnamed Tributary - UB_021	New Lisbon	42.64800	-75.16954
Middle Butternut	52122	xy4258065875199241	Culvert	Reduced AOP	0.650	2017-08-23	Minor barrier	State Hwy 51	unnamed trib	New Lisbon	42.58066	-75.19924
Upper Butternut	49711	xy4264653775221044	Culvert	Reduced AOP	0.659	2017-07-26	Minor barrier	County Hwy 17	Unnamed Tributary - UB_025	New Lisbon	42.64654	-75.22104
Upper Butternut	47225	xy4266356575155862	Culvert	Reduced AOP	0.665	2017-06-26	Minor barrier	Gregory Rd.	unnamed trib - UB_018	New Lisbon	42.66357	-75.15586
Middle Butternut	50984	xy4261608475172169	Culvert	Reduced AOP	0.681	2017-08-08	Minor barrier	Earl Parker	Mill Creek - MB_001	New Lisbon	42.61608	-75.17217
Middle Butternut	51651	xy4263213375136930	Culvert	Reduced AOP	0.689	2017-08-16	Minor barrier	Warren Card Rd.	MB_001	New Lisbon	42.63213	-75.13693
Middle Butternut	52117	xy4261895275133999	Culvert	Reduced AOP	0.689	2017-08-23	Minor barrier	County Hwy 16	Stony Creek - MB_001	New Lisbon	42.61895	-75.13400
Middle Butternut	51710	xy4262356975144590	Culvert	Reduced AOP	0.691	2017-08-17	Minor barrier	County Hwy 16	Unnamed Tributary - MB_001	New Lisbon	42.62357	-75.14459
Upper Butternut	48845	xy4266386675176865	Culvert	Reduced AOP	0.703	2017-07-18	Minor barrier	State Hwy 51	unnamed - UB022	New Lisbon	42.66387	-75.17687
Upper Butternut	48847	xy4266117275177086	Culvert	Reduced AOP	0.705	2017-06-18	Minor barrier	State Hwy 51	Unnamed Tributary - UB_022	New Lisbon	42.66117	-75.17709
Upper Butternut	47168	xy4265151775153123	Culvert	Reduced AOP	0.706	2017-06-21	Minor barrier	Dump Rd.	Unnamed Tributary - UB_019	New Lisbon	42.65152	-75.15312
Middle Butternut	64017	xy4261190875147387	Culvert	No AOP	0.709	2018-08-28	Minor barrier	Clifford Harrington Road	Stony Creek	New Lisbon	42.61191	-75.14739
Middle Butternut	52219	xy4257305475192926	Culvert	Reduced AOP	0.710	2017-08-25	Minor barrier	Pegg Rd/Morris Town Line Rd	Unnamed Trib - MB_006	New Lisbon	42.57305	-75.19293
Upper Butternut	49700	xy4265049675197436	Culvert	No AOP	0.717	2017-07-25	Minor barrier	County Hwy 17	Unnamed Tributary - UB_024	New Lisbon	42.65050	-75.19744

Upper Butternut	47172	xy4265217875146533	Culvert	No AOP	0.723	2017-06-21	Minor barrier	Backus Rd	unnamed trib	New Lisbon	42.65218	-75.14653
Middle Butternut	50985	xy4262037875174722	Culvert	No AOP	0.724	2017-08-08	Minor barrier	Bardin Rd	Unnamed Tributary - MB_001	New Lisbon	42.62038	-75.17472
Middle Butternut	52114	xy4259054775160427	Culvert	No AOP	0.725	2017-08-21	Minor barrier	Private driveway	Unnamed Trib - MB_001	New Lisbon	42.59055	-75.16043
Middle Butternut	52115	xy4262760575155366	Culvert	Reduced AOP	0.729	2017-08-23	Minor barrier	County Hwy 16	Mill Creek - MB_001	New Lisbon	42.62761	-75.15537
Middle Butternut	51896	xy4260464975156652	Culvert	Reduced AOP	0.731	2017-08-21	Minor barrier	County Hwy 14	MB_001	New Lisbon	42.60465	-75.15665
Upper Butternut	48279	xy4264625775171237	Culvert	Full AOP	0.735	2017-06-13	Minor barrier	County Hwy 16	Unnamed Tributary - UB_021	New Lisbon	42.64626	-75.17124
Upper Butternut	48303	xy4266356575155862	Culvert	Reduced AOP	0.747	2017-06-26	Minor barrier	Gregory Rd.	Unnamed Tributary - UB_018	New Lisbon	42.66357	-75.15586
Upper Butternut	50300	xy4262808875198824	Culvert	Reduced AOP	0.763	2017-07-31	Minor barrier	Ned Ellio Rd.	unnamed	New Lisbon	42.62809	-75.19882
Middle Butternut	52123	xy4257766975200930	Culvert	No AOP	0.770	2017-08-23	Minor barrier	State Hwy 51	Unnamed Trib - MB_004	New Lisbon	42.57767	-75.20093
Middle Butternut	52017	xy4259585975168850	Culvert	Reduced AOP	0.783	2017-08-21	Minor barrier	County Hwy 14	Unnamed Trib to Stony Creek - MB_001	New Lisbon	42.59586	-75.16885
Upper Butternut	47552	xy4265621675184916	Multiple Culvert	Reduced AOP	0.798	2017-06-29	Minor barrier	otsego 17	ub_022	New Lisbon	42.65622	-75.18492
Middle Butternut	52112	xy4259515875159599	Culvert	Reduced AOP	0.802	2017-08-21	Insignificant barrier	Phil Gross Rd.	Unnamed Trib to Stony Creek - MB_001	New Lisbon	42.59516	-75.15960
Middle Butternut	51891	xy4260912375141202	Culvert	Reduced AOP	0.814	2017-08-21	Insignificant barrier	county hwy 14	Unnamed Tributary - MB_001	New Lisbon	42.60912	-75.14120
Upper Butternut	47547	xy4265293175201053	Culvert	Reduced AOP	0.844	2017-06-29	Insignificant barrier	Camp Rd. (in Jellystone Park)	Unnamed tributary - UB_024	New Lisbon	42.65293	-75.20105
Upper Butternut	50768	xy4264465275170492	Bridge	Full AOP	0.864	2017-08-03	Insignificant barrier	County Hwy16	Butternut Creek	New Lisbon	42.64465	-75.17049
Upper Butternut	52542	xy4264691475172516	Culvert	Reduced AOP	0.868	2017-08-31	Insignificant barrier	State Hwy 51	Unnamed Tributary - UB_022	New Lisbon	42.64691	-75.17252
Upper Butternut	50773	xy4260732975196288	Bridge	Reduced AOP	0.880	2017-08-01	Insignificant barrier	Badin Rd.	Butternut Creek	New Lisbon	42.60733	-75.19629
Upper Butternut	50278	xy4262848375181459	Bridge	Full AOP	0.884	2017-08-01	Insignificant barrier	Bell Hill Rd	Butternut Creek	New Lisbon	42.62848	-75.18146
Upper Butternut	49721	xy4261290775199477	Culvert	Full AOP	0.893	2017-07-18	Insignificant barrier	State Hwy 51	Unnamed Tributary - UB_027	New Lisbon	42.61291	-75.19948
Middle Butternut	64019	xy4263046875147824	Culvert	Reduced AOP	0.901	2018-08-28	Insignificant barrier	Warren Card road	Mill Creek	New Lisbon	42.63047	-75.14782
Middle Butternut	50952	xy4258903075196407	Culvert	Reduced AOP	0.906	2017-08-07	Insignificant barrier	County Rt. 12	unnamed trib	New Lisbon	42.58903	-75.19641
Middle Butternut	51948	xy4258924175193157	Bridge	Reduced AOP	0.908	2017-08-22	Insignificant barrier	County Rte. 12	Butternut Creek	New Lisbon	42.58924	-75.19316
Upper Butternut	47555	xy4265694475177622	Bridge	Reduced AOP	0.916	2017-06-29	Insignificant barrier	county highway 17	Unnamed tributary - UB_022	New Lisbon	42.65694	-75.17762
Upper Butternut	48863	xy4261962775197108	Culvert	Reduced AOP	0.930	2017-06-18	Insignificant barrier	State Hwy 51	Unnamed Tributary - UB_026	New Lisbon	42.61963	-75.19711
Middle Butternut	50955	xy4259246375188648	Bridge	Full AOP	0.949	2017-08-07	Insignificant barrier	Myers Mills Rd.	Stony Creek - MB_001	New Lisbon	42.59246	-75.18865
Upper Butternut	48855	xy4263886675181722	Culvert	Full AOP	0.949	2017-07-18	Insignificant barrier	State Hwy 51	Unnamed Tributary - UB_024	New Lisbon	42.63887	-75.18172
Upper Butternut	47174	xy4266659675144942	Bridge	Full AOP	0.953	2017-06-23	Insignificant barrier	Dick Turnbull Rd	Butternut Creek	New Lisbon	42.66660	-75.14494
Upper Butternut	48857	xy4262460275190433	Bridge	Full AOP	0.973	2017-06-19	Insignificant barrier	State Hwy 51	Unnamed Tributary - UB_025	New Lisbon	42.62460	-75.19043
Upper Butternut	49723	xy4265179775154518	No Crossing	Full AOP	1.000	2017-06-18	No barrier	Rabbit Hollow Rd.	Mainstem	New Lisbon	42.65180	-75.15452

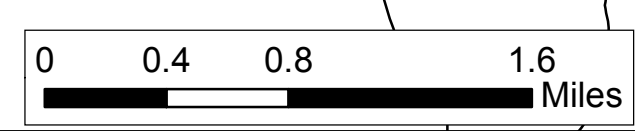
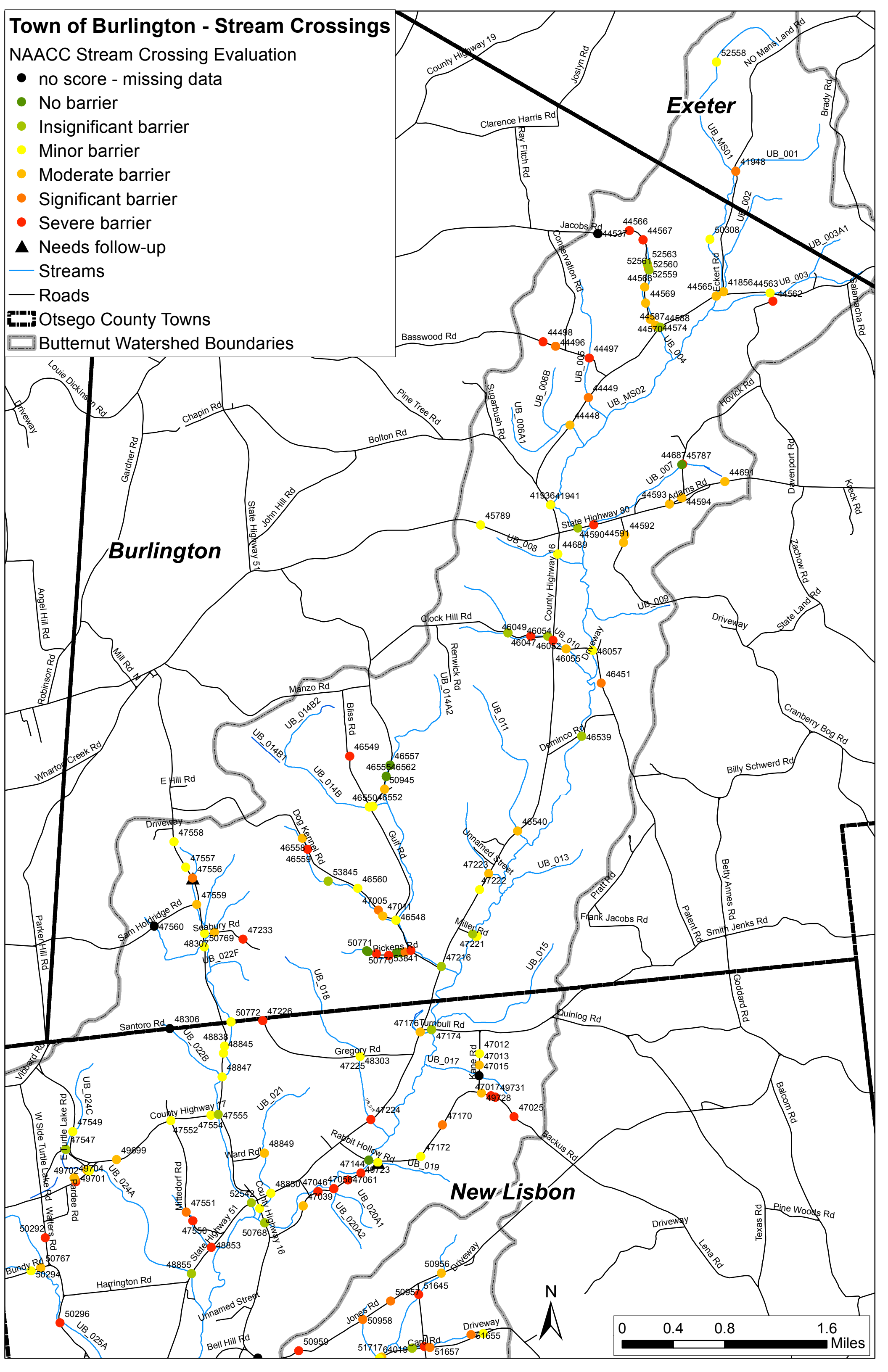
Table 16. List of stream crossings surveyed using NAACC protocol in the Butternut Creek watershed within the Town of Pittsfield.

Watershed	SurveyID	CrosCode	CrosType	AopNaacc	AqScNaac	DateObsd	Eval	Road	StrmName	CrTown	Latitude	Longitude
Upper Butternut	50283	xy4264372275217930	Inaccessible	No AOP	-1.000	2017-07-28	no score - missing data	Miller Rd.	UB_025	Pittsfield	42.64372	-75.21793
Middle Butternut	53454	xy4261068775248316	Culvert	No AOP	0.000	2017-09-13	Severe barrier	Dunham	Unnamed trib-MB_011	Pittsfield	42.61069	-75.24832
Upper Butternut	50289	xy4263861475211881	Culvert	No AOP	0.000	2017-07-28	Severe barrier	Bundy Pittsfield Rd.	UB_025	Pittsfield	42.63861	-75.21188
Middle Butternut	55499	xy4262204875237572	Culvert	No AOP	0.034	2017-10-23	Severe barrier	County Highway 49	Aldrich Creek-MB_011	Pittsfield	42.62205	-75.23757
Upper Butternut	50292	xy4264289475204150	Culvert	No AOP	0.048	2017-07-28	Severe barrier	Walters Rd.	unnamed trib	Pittsfield	42.64289	-75.20415
Upper Butternut	49447	xy4260055075197668	Culvert	No AOP	0.057	2017-07-17	Severe barrier	State Hwy 51	UB_028	Pittsfield	42.60055	-75.19767
Middle Butternut	52441	xy4258897775283006	Culvert	No AOP	0.079	2017-08-28	Severe barrier	Pine Tree Rd	MB_015	Pittsfield	42.58898	-75.28301
Middle Butternut	52015	xy4261389775230328	Culvert	No AOP	0.093	2017-08-22	Severe barrier	Ketchum Rd.	Unnamed Trib to Aldrich Creek - MB_011	Pittsfield	42.61390	-75.23033
Middle Butternut	52556	xy4258426175270692	Culvert	No AOP	0.130	2017-08-30	Severe barrier	Pine Tree	MB_015	Pittsfield	42.58426	-75.27069
Middle Butternut	52442	xy4258653675275077	Culvert	Reduced AOP	0.186	2017-08-28	Severe barrier	Pine Tree	MB_015	Pittsfield	42.58654	-75.27508
Middle Butternut	53453	xy4260997175268843	Culvert	No AOP	0.186	2017-09-13	Severe barrier	Dunham	Unnamed trib-MB_011	Pittsfield	42.60997	-75.26884
Lower Butternut	61355	xy4257776375298491	Culvert	No AOP	0.224	2018-07-12	Significant barrier	Cross Rd.	Morris Brook	Pittsfield	42.57776	-75.29849
Middle Butternut	52011	xy4260439475232485	Culvert	No AOP	0.224	2017-08-22	Significant barrier	Cobb Rd.	Unnamed Tributary - MB_011	Pittsfield	42.60439	-75.23249
Middle Butternut	52427	xy4260166575262911	Culvert	No AOP	0.224	2017-08-28	Significant barrier	Schermerhorn	MB_014	Pittsfield	42.60167	-75.26291
Middle Butternut	52555	xy4258506675259508	Culvert	No AOP	0.224	2017-08-30	Significant barrier	Hawks Rd	Unnamed Trib	Pittsfield	42.58507	-75.25951
Upper Butternut	50763	xy4260679375207570	Culvert	No AOP	0.332	2017-08-02	Significant barrier	Dockstader RD	unnamed trib	Pittsfield	42.60679	-75.20757
Upper Butternut	50760	xy4260784275210649	Culvert	Reduced AOP	0.395	2017-08-02	Significant barrier	Dockstader Rd	unnamed trib	Pittsfield	42.60784	-75.21065
Middle Butternut	52014	xy4261837775237712	Culvert	Reduced AOP	0.398	2017-08-22	Significant barrier	Ketchum Rd.	Aldrich Creek - MB_011	Pittsfield	42.61838	-75.23771
Lower Butternut	61349	xy4257329475305005	Culvert	No AOP	0.407	2018-07-12	Moderate barrier	Texas Hill Rd.	Unnamed Water	Pittsfield	42.57329	-75.30501
Lower Butternut	61354	xy4257734775303578	Culvert	No AOP	0.430	2018-07-12	Moderate barrier	Cross Rd.	Unnamed Water	Pittsfield	42.57735	-75.30358
Middle Butternut	53484	xy4259154875234505	Culvert	Reduced AOP	0.465	2017-09-13	Moderate barrier	42nd And Broad	unnamed-MB_011	Pittsfield	42.59155	-75.23451
Middle Butternut	55498	xy4261674175240712	Culvert	No AOP	0.500	2017-10-19	Moderate barrier	County Highway 49	Aldrich Creek-MB_011	Pittsfield	42.61674	-75.24071
Upper Butternut	50761	xy4260755575209637	Culvert	No AOP	0.509	2017-08-02	Moderate barrier	Dockstader Rd	unknown trib	Pittsfield	42.60756	-75.20964
Middle Butternut	52436	xy4260378075268722	Culvert	Reduced AOP	0.552	2017-08-29	Moderate barrier	County Hwy. 13	Silver Brook - MB-014	Pittsfield	42.60378	-75.26872
Middle Butternut	52554	xy4258556375256357	Culvert	No AOP	0.553	2017-08-30	Moderate barrier	Hawks Rd	MB_014	Pittsfield	42.58556	-75.25636
Middle Butternut	56804	xy4258616075253410	Culvert	No AOP	0.563	2017-11-16	Moderate barrier	Driveway off Hawks road	Unnamed tributary - FIN SR-146-9-17-5	Pittsfield	42.58616	-75.25341
Upper Butternut	50767	xy4263951875204859	Culvert	Reduced AOP	0.577	2017-08-02	Moderate barrier	Bundy Pittsfield Rd.	Unnamed Tributary - UB_025	Pittsfield	42.63952	-75.20486
Upper Butternut	49715	xy4264394375217807	Culvert	No AOP	0.587	2017-07-26	Moderate barrier	Miller Rd.	UB_025	Pittsfield	42.64394	-75.21781
Upper Butternut	50287	xy4264030475214918	Culvert	Reduced AOP	0.649	2017-07-28	Minor barrier	Miller Rd.	UB_025	Pittsfield	42.64030	-75.21492
Upper Butternut	50294	xy4263914975206356	Culvert	Reduced AOP	0.649	2017-07-28	Minor barrier	Bundy Pittsfield rd.	Unnamed Tributary - UB_025	Pittsfield	42.63915	-75.20636
Lower Butternut	64236	xy4257301375304956	Culvert	Reduced AOP	0.695	2018-08-31	Minor barrier	Texas Hill Rd	Unnamed trib to Morris Brook	Pittsfield	42.57301	-75.30496
Middle Butternut	52012	xy4260309575234572	Culvert	Reduced AOP	0.708	2017-08-22	Minor barrier	Cobb Rd.	Aldrich Creek - MB_011	Pittsfield	42.60310	-75.23457
Upper Butternut	50285	xy4264215875217381	Culvert	Reduced AOP	0.740	2017-07-28	Minor barrier	Miller Rd.	Unnamed Tributary - UB_025	Pittsfield	42.64216	-75.21738
Middle Butternut	52439	xy4259753975283762	Culvert	No AOP	0.746	2017-08-28	Minor barrier	Pine Tree	MB-015	Pittsfield	42.59754	-75.28376
Middle Butternut	52557	xy4258972075237079	Culvert	Reduced AOP	0.761	2017-08-30	Minor barrier	42nd and Broad	Unnamed Trib - MB_011	Pittsfield	42.58972	-75.23708
Middle Butternut	52553	xy4258592075252915	Multiple Culvert	Reduced AOP	0.779	2017-08-30	Minor barrier	Hawks Rd	Silver Creek - MB_014	Pittsfield	42.58592	-75.25292
Middle Butternut	64024	xy4259625675283230	Culvert	Reduced AOP	0.802	2018-08-27	Insignificant barrier	Pine Tree Road	Calhoun Creek	Pittsfield	42.59626	-75.28323
Upper Butternut	50286	xy4264049275215494	Culvert	Reduced AOP	0.831	2017-07-28	Insignificant barrier	Miller Rd.	UB_025	Pittsfield	42.64049	-75.21549
Middle Butternut	55496	xy4261366475240884	Culvert	Reduced AOP	0.894	2017-10-19	Insignificant barrier	County Highway 49	Aldrich Creek -MB_011	Pittsfield	42.61366	-75.24088
Middle Butternut	53121	xy4257823175202584	Ford	Reduced AOP	1.000	2017-08-23	No barrier	private	unnamed trib - MB_004	Pittsfield	42.57823	-75.20258

Town of Burlington - Stream Crossings

NAACC Stream Crossing Evaluation

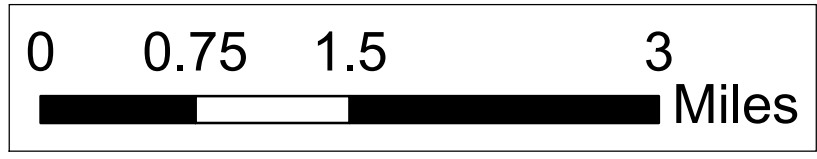
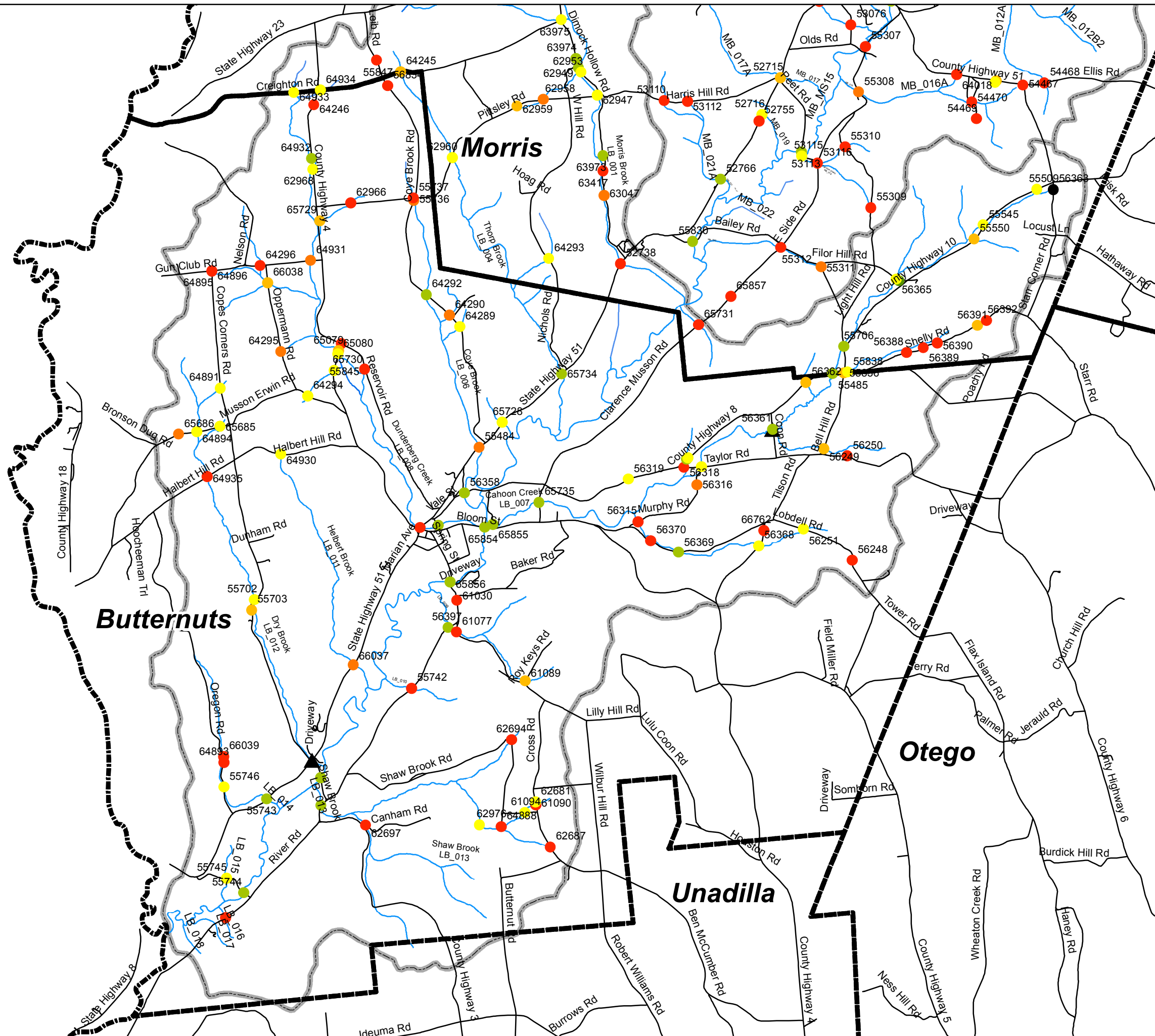
- no score - missing data
- No barrier
- Insignificant barrier
- Minor barrier
- Moderate barrier
- Significant barrier
- Severe barrier
- ▲ Needs follow-up
- Streams
- Roads
- ▭ Otsego County Towns
- ▭ Butternut Watershed Boundaries



Town of Butternuts - Stream Crossings

NAACC Stream Crossing Evaluation

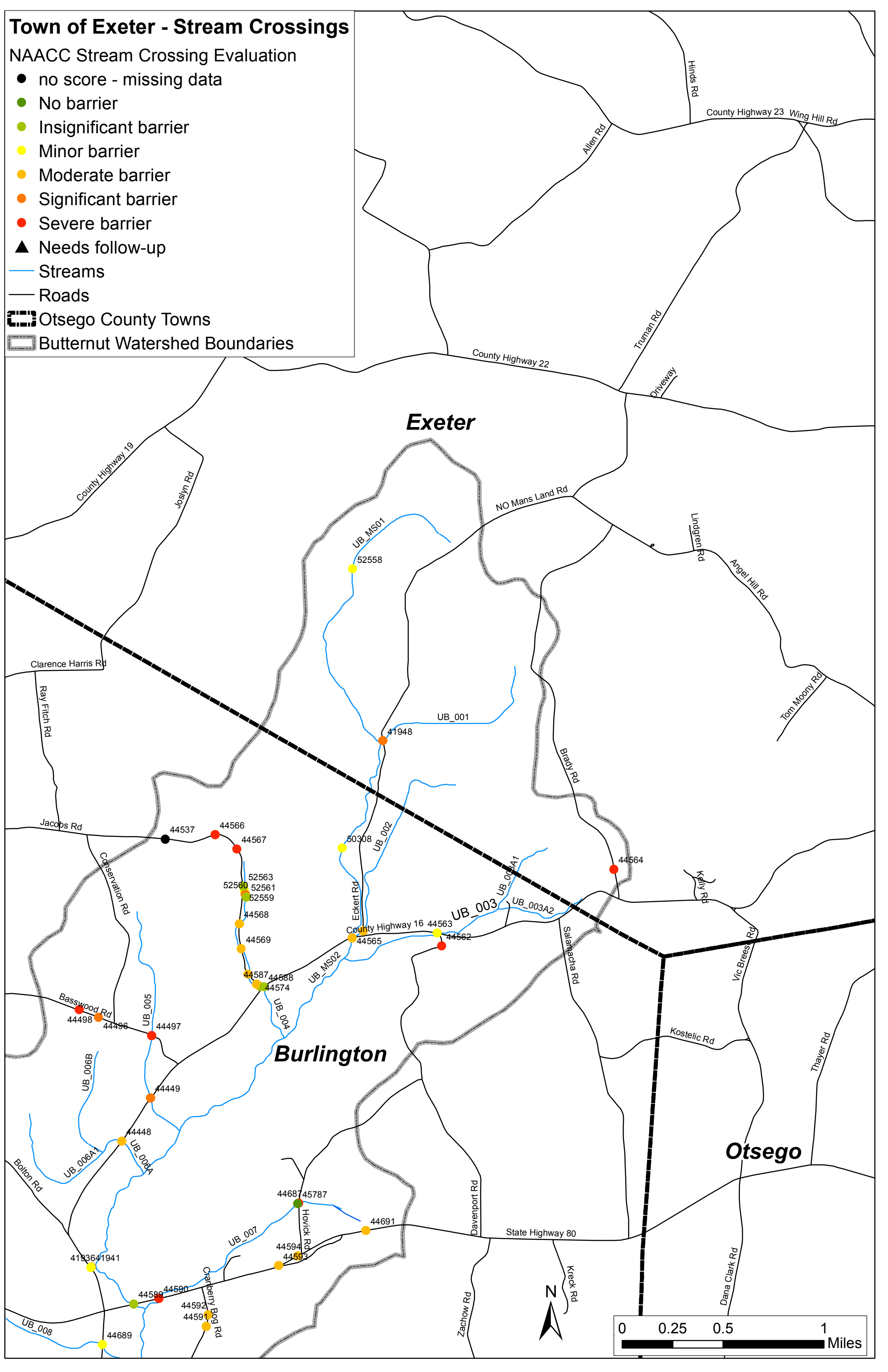
- no score - missing data
- No barrier
- Insignificant barrier
- Minor barrier
- Moderate barrier
- Significant barrier
- Severe barrier
- ▲ Needs follow-up
- Streams
- Roads
- ▭ Otsego County Towns
- ▭ Butternut Watershed Boundaries



Town of Exeter - Stream Crossings

NAACC Stream Crossing Evaluation

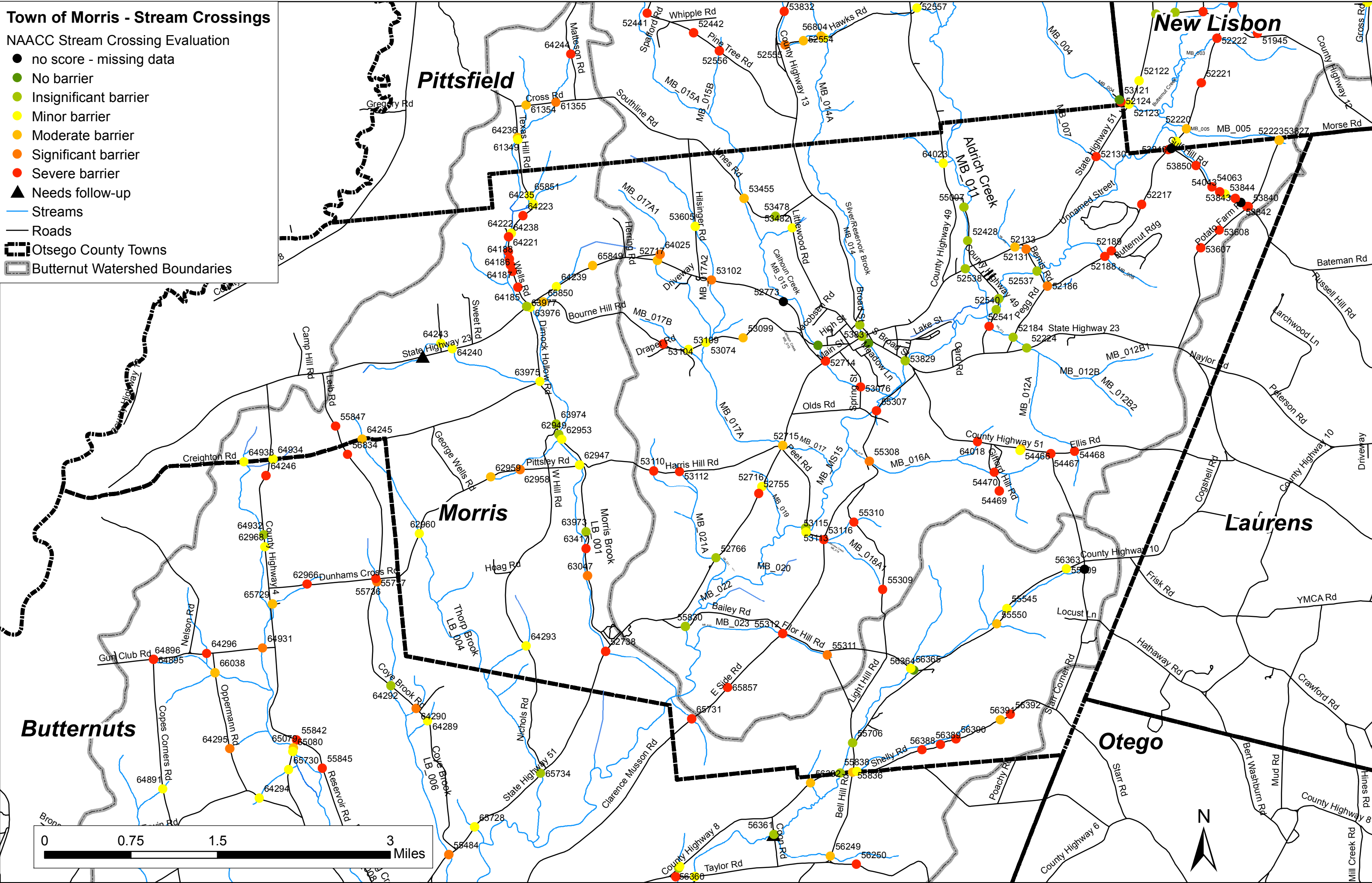
- no score - missing data
- No barrier
- Insignificant barrier
- Minor barrier
- Moderate barrier
- Significant barrier
- Severe barrier
- ▲ Needs follow-up
- Streams
- Roads
- ▭ Otsego County Towns
- ▭ Butternut Watershed Boundaries



Town of Morris - Stream Crossings

NAACC Stream Crossing Evaluation

- no score - missing data
- No barrier
- Insignificant barrier
- Minor barrier
- Moderate barrier
- Significant barrier
- Severe barrier
- ▲ Needs follow-up
- Streams
- Roads
- ▭ Otsego County Towns
- ▭ Butternut Watershed Boundaries



Town of New Lisbon - Stream Crossings

NAACC Stream Crossing Evaluation

- no score - missing data
- No barrier
- Insignificant barrier
- Minor barrier
- Moderate barrier
- Significant barrier
- Severe barrier
- ▲ Needs follow-up
- Streams
- Roads
- ▭ Otsego County Towns
- ▭ Butternut Watershed Boundaries

