Port Henry Stream Study

A multi-year investigation of Mill, McKenzie, and Stony Brooks

Introduction

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Noah Weber – District Technician

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Organization Mission Statement: Essex County SWCD is dedicated to the preservation of soil and water resources. The District's goal is to work with landowners, municipalities, agricultural producers and the public toward the improvement of water quality, resource protection, and the implementation of best management practices. The District will implement projects and programs to further this goal and to enhance the quality of life in Essex County.

New York State has Soil and Water Conservation Districts in every county

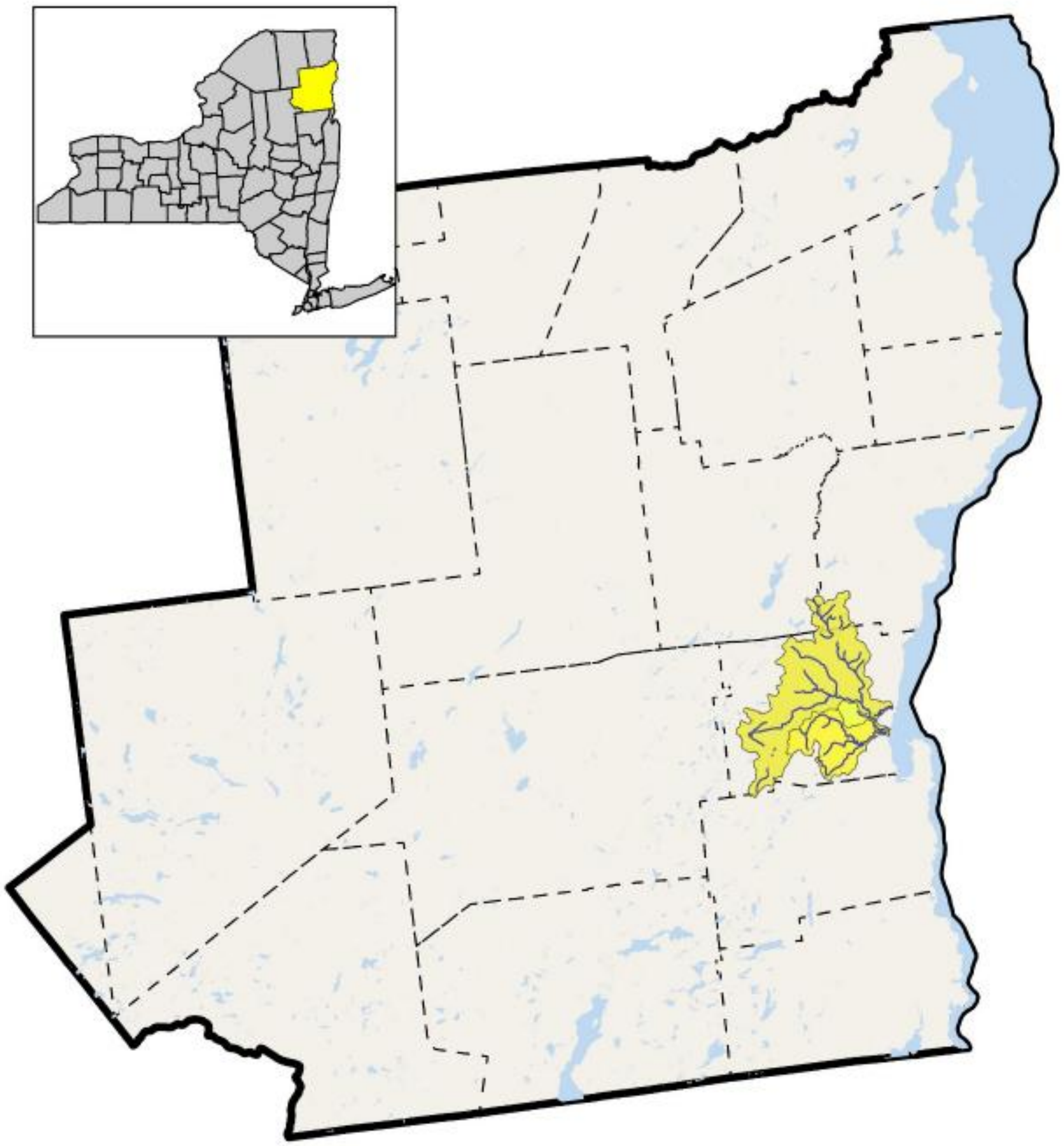
Reason for study

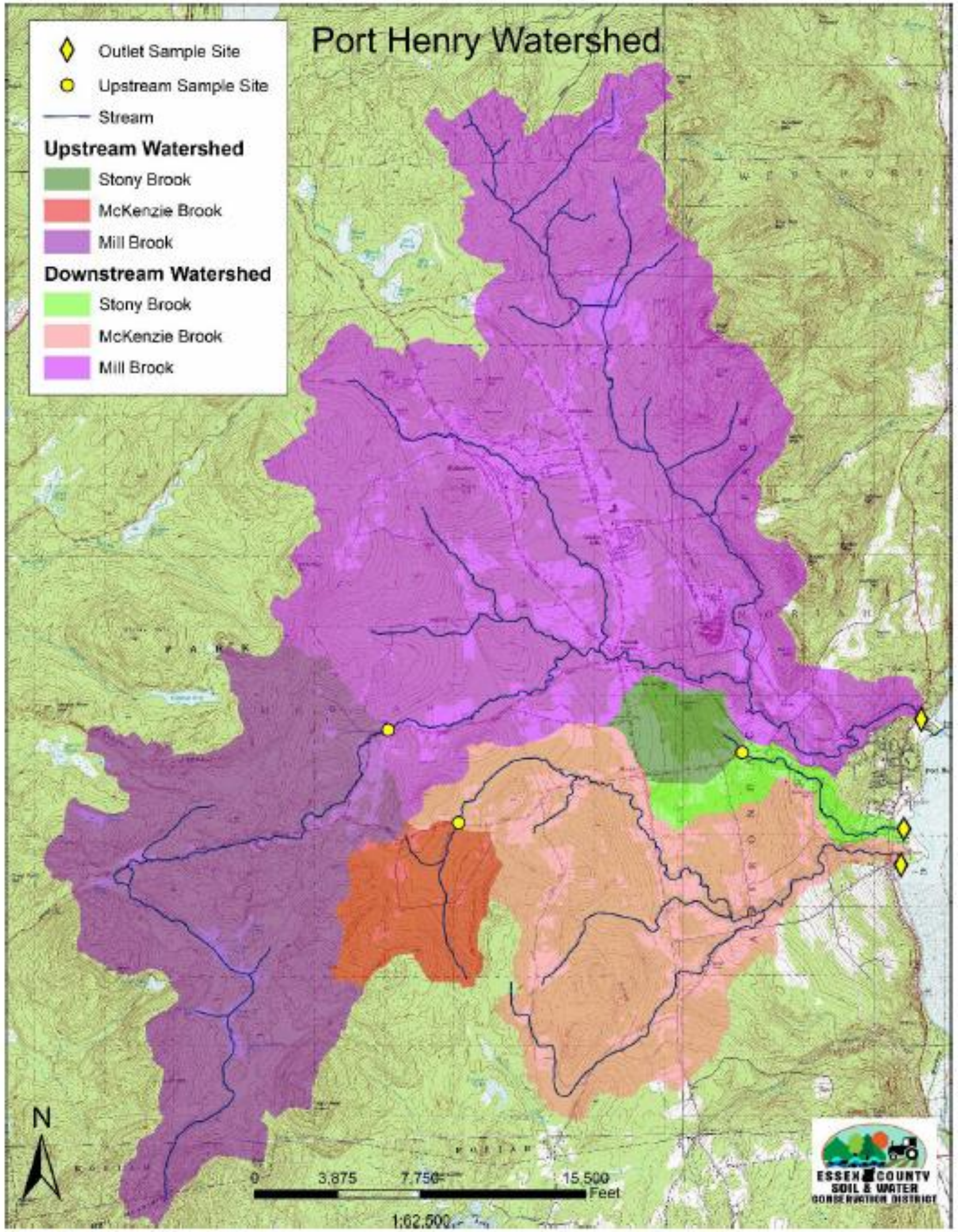
- HABS concerns

Aims and Objectives

- Water quality
- Sources of problems
- Potential projects and solutions

Port Henry Stream Study Location

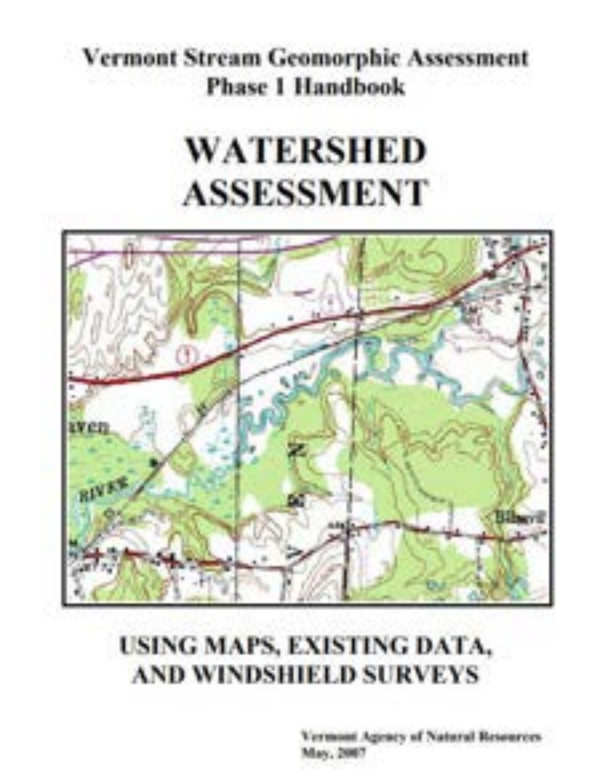




Map 2: Port Henry Watersheds

Phase 1

A wide lens approach to get an overview of the streams utilizing existing information.

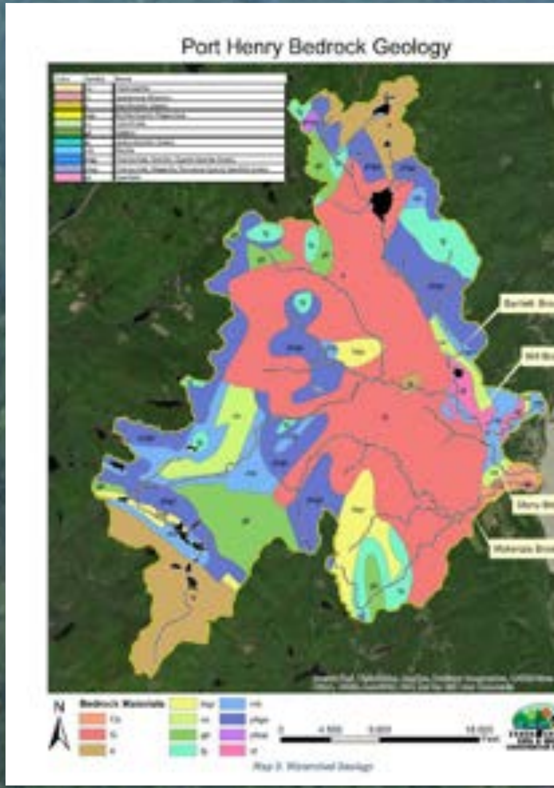

Vermont Stream Geomorphic Assessment
Phase 1 Handbook

WATERSHED ASSESSMENT

USING MAPS, EXISTING DATA, AND WINDSHIELD SURVEYS

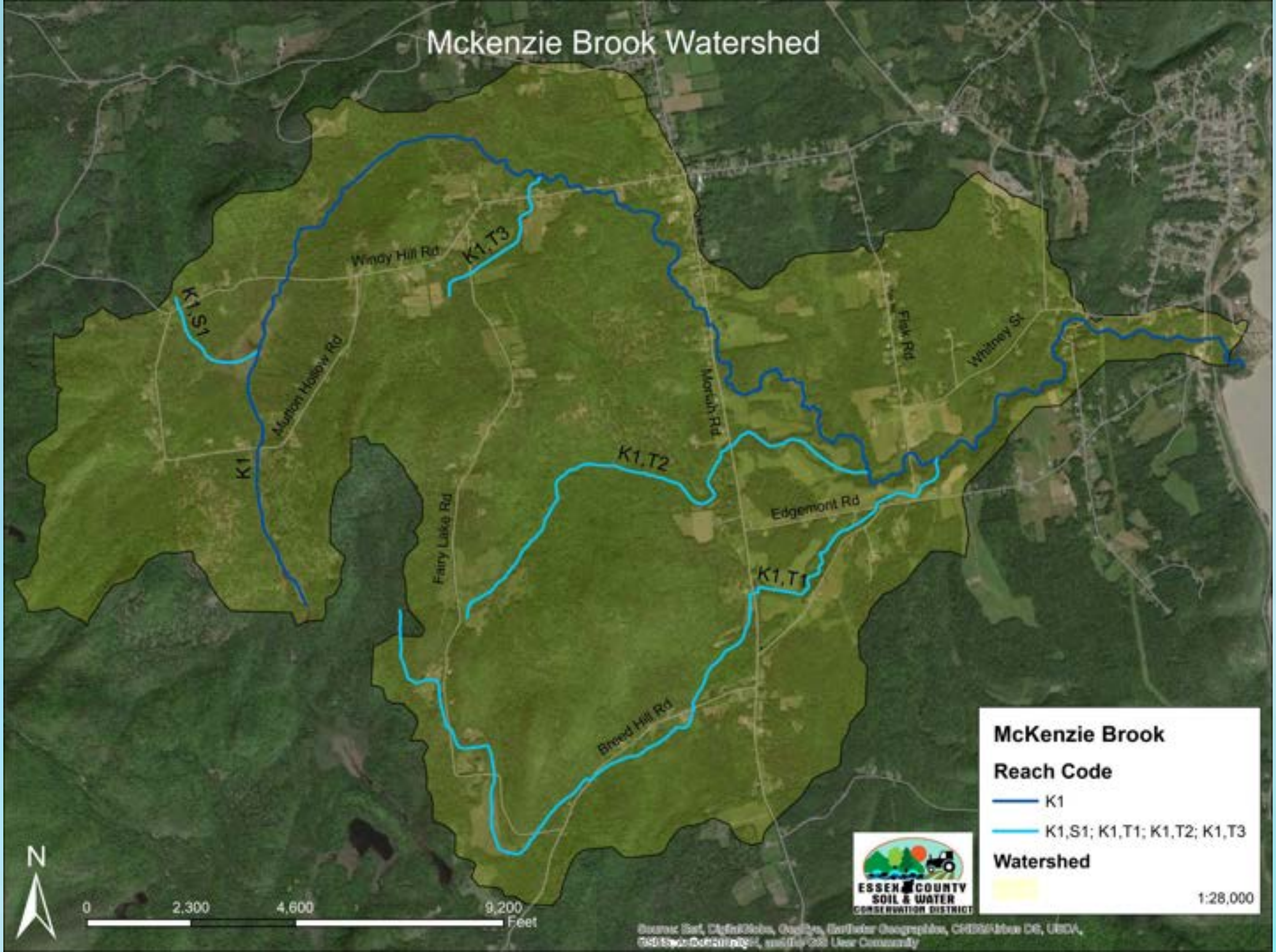
Vermont Agency of Natural Resources
May, 2007

Aerial photographs
GIS
Existing maps
Windshield surveys
Other plans or studies



Phase 1

- Vermont Stream Assessment Protocols
- Step 1 – Reach identification using GIS
- Step 2 – Determine stream type
- Step 3 – Investigate geology and soils
- Steps 4-6 –Land cover, reach hydrology, channel & floodplain modifications
- Impact Rating assigned to each reach


Mckenzie Brook Watershed
Windy Hill Rd
K1,T3
K1,S1
Mutton Hollow Rd
K1
Fairy Lake Rd
K1,T2
Edgemont Rd
Morah Rd
Fisk Rd
Whitney St
K1,T1
Breed Hill Rd
McKenzie Brook
Reach Code
K1
K1,S1; K1,T1; K1,T2; K1,T3
Watershed
1:28,000
ESSEX COUNTY SOIL & WATER CONSERVATION DISTRICT
N
0
2,300
4,600
9,200
Feet

Parameters

- Watershed Land Cover/Land Use
- Corridor Land Use
- Riparian Buffer
- Flow Regulation and Water Withdrawals
- Bridges and Culverts
- Channel Straightening
- Berms, Roads, Improved Paths, Railroads

Scoring Criteria

Each parameter was given it's own rubric to derive an individual impact rating for that category. That rating was converted into a numeric score of 0, 1 or 2. Ratings were tallied to find the total impact score.

- Example for Riparian Buffer:
  - 0-2.0% unforested = 0
  - 2.1-10% unforested = 1
  - 10.1-23% unforested = 2

Table 2: Land Use for all streams and reaches

Watershed	Reach	Ag Land	Development	Forest	Open Water	grass/shrub	wetland
McKenzie Brook	K1	9%	5%	79%	0%	1%	6%
	K1, T1	7%	6%	82%	0%	0%	5%
	K1, T2	9%	4%	84%	0%	1%	3%
	K1, T3	12%	7%	80%	0%	0%	1%
	K1, S1	No Data	No Data	No Data	No Data	No Data	No Data
Stony Brook	R1	22%	12%	65%	0%	0%	0%
	R1, S1	6%	7%	74%	0%	7%	6%
Mill Brook	M1	11%	13%	69%	0%	0%	6%
	M2	11%	15%	72%	0%	1%	1%
	M3	3%	3%	87%	1%	2%	5%
	M4	No Data	No Data	No Data	No Data	No Data	No Data
	M5	0%	0%	96%	0%	1%	2%
	M2, T1	4%	17%	74%	0%	2%	2%
	M3, T1	23%	7%	60%	0%	0%	11%
	M3, T2	0%	0%	89%	1%	0%	10%
	M3, T1.1	2%	1%	96%	0%	1%	0%
	M3, T1.2	2%	3%	91%	0%	3%	2%
	M3, S1	No Data	No Data	No Data	No Data	No Data	No Data
	M3, S2	0%	0%	96%	1%	1%	2%
Bartlett Brook	B1	16%	9%	65%	5%	0%	5%
	B2	2%	8%	81%	4%	1%	4%
	B2, T1	0%	0%	97%	0%	0%	3%
	B2, T2	0%	0%	97%	0%	1%	1%
	B2, S1	0%	0%	100%	0%	0%	0%

Table 3: Impact scores and final impact rating for each reach

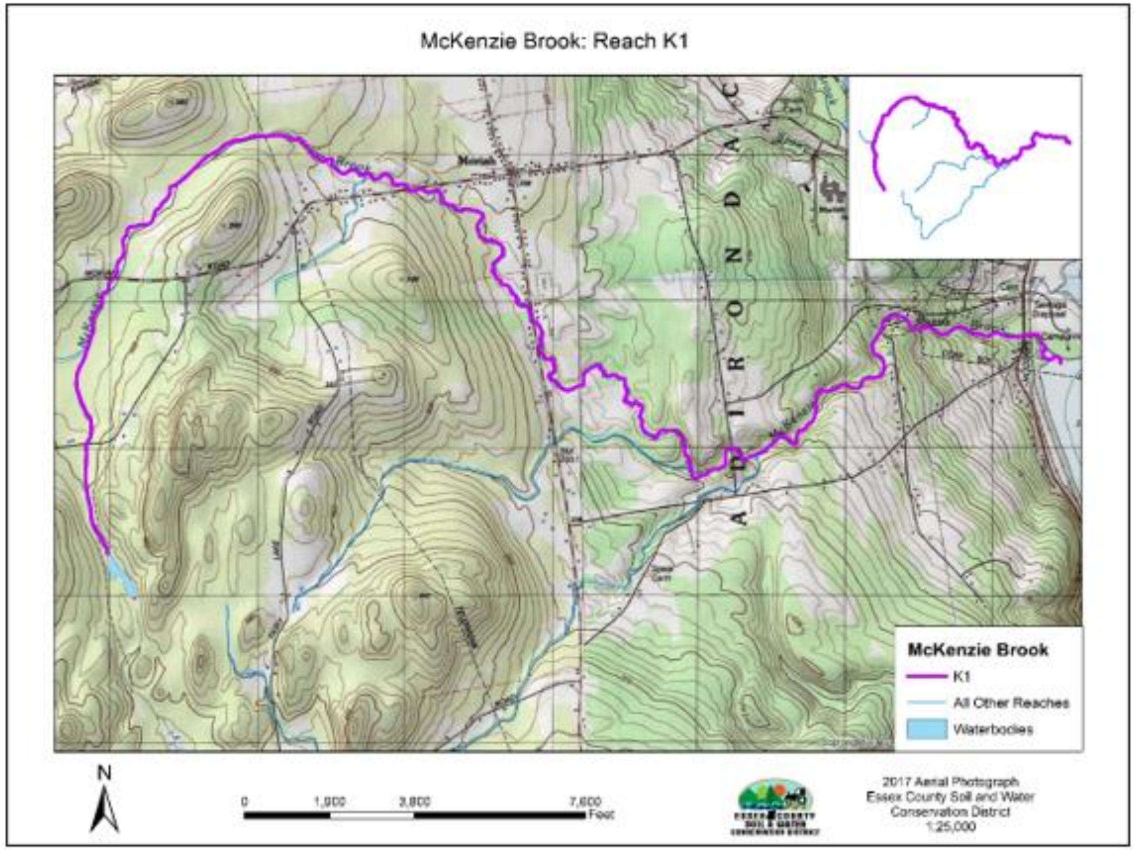
Watershed	Reach	Land Use Score	IR Corridor LU	Riparian Buffer IR	Flow Reg. IR	Bridge and Culvert IR	Straight IR	Berm and Roads	Reach	Final Impact Rating Score (out of 14 possible)
McKenzie Brook	K1	2	1	1	0	1	1	1	K1	7
	K1, T1	2	2	2	0	2	0	2	K1, T1	10
	K1, T2	2	0	0	1	1	0	0	K1, T2	4
	K1, T3	2	2	2	0	1	0	1	K1, T3	8
	K1, S1	0	0	0	0	1	0	1	K1, S1	2
Stony Brook	R1	2	2	2	0	2	1	1	R1	10
	R1, S1	2	2	2	0	1	2	0	R1, S1	9
Mill Brook	M1	2	2	2	0	1	2	2	M1	11
	M2	2	2	2	0	1	1	1	M2	9
	M3	1	2	2	2	1	1	2	M3	11
	M4	0	0	0	0	2	0	0	M4	2
	M5	0	0	0	0	0	0	0	M5	0
	M2, T1	2	2	2	2	1	0	2	M2, T1	11
	M3, T1	2	1	1	0	0	0	0	M3, T1	4
	M3, T2	0	0	0	0	0	0	0	M3, T2	0
	M3, T1.1	1	1	1	0	0	1	1	M3, T1.1	5
	M3, T1.2	1	1	1	0	0	0	1	M3, T1.2	4
	M3, S1	0	0	0	0	1	2	2	M3, S1	5
	M3, S2	0	0	0	0	0	0	0	M3, S2	0
Bartlett Brook	B1	2	2	2	2	2	0	2	B1	12
	B2	2	2	1	2	1	1	2	B2	11
	B2, T1	0	1	1	0	0	0	1	B2, T1	3
	B2, T2	0	0	0	0	0	0	0	B2, T2	0
	B2, S1	0	0	0	0	0	0	0	B2, S1	0

Upstream Start of Reach: -73.458188, 44.03407 Downstream End of Reach: -73.540139, 44.023741

Impact Rating	Score (0-2)
4.1 Watershed Land Cover / Land Use	2
4.2 Corridor Land Cover / Land Use	1
4.3 Riparian Buffer Width	1
5.1 Flow Regulations and Water Withdrawals	0
5.2 Bridges and Culverts	1
5.4 Channel Straightening	1
6.1 Berms and Roads	1
6.2 River Corridor Development	0

Watershed Area (mi²)	8.81
Channel Length (ft)	42946.20
Channel Width (ft)	34.12
Channel Slope (%)	.762
Sinuosity	1.174
Valley Type	VB
Reference Stream Type	C or E
Total Impact Rating	7
Priority Level	Medium

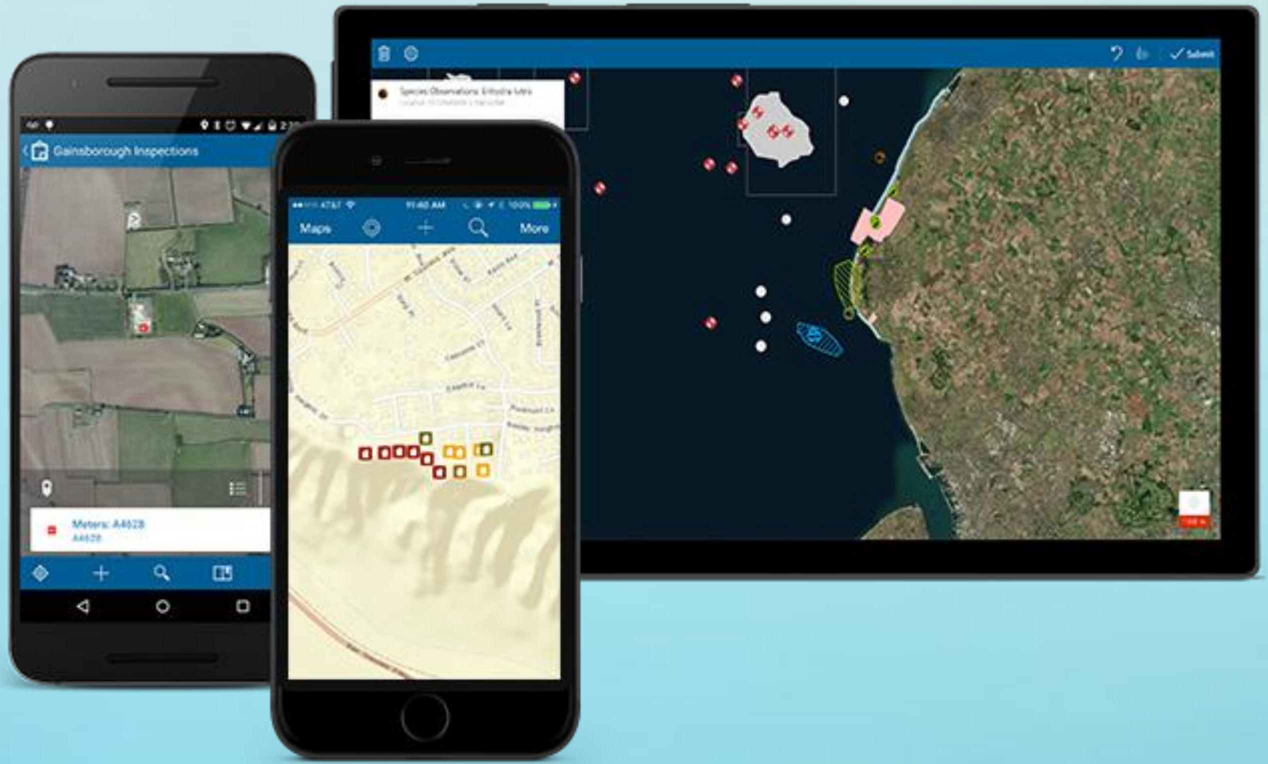
Reach Highlights: Longest reach out of McKenzie Brook, the start (upstream) is a wetland created by beavers. As you travel downstream there are two more wetland locations with beaver dams. The stream then runs into Lake Champlain on the south edge south of an RV campground.

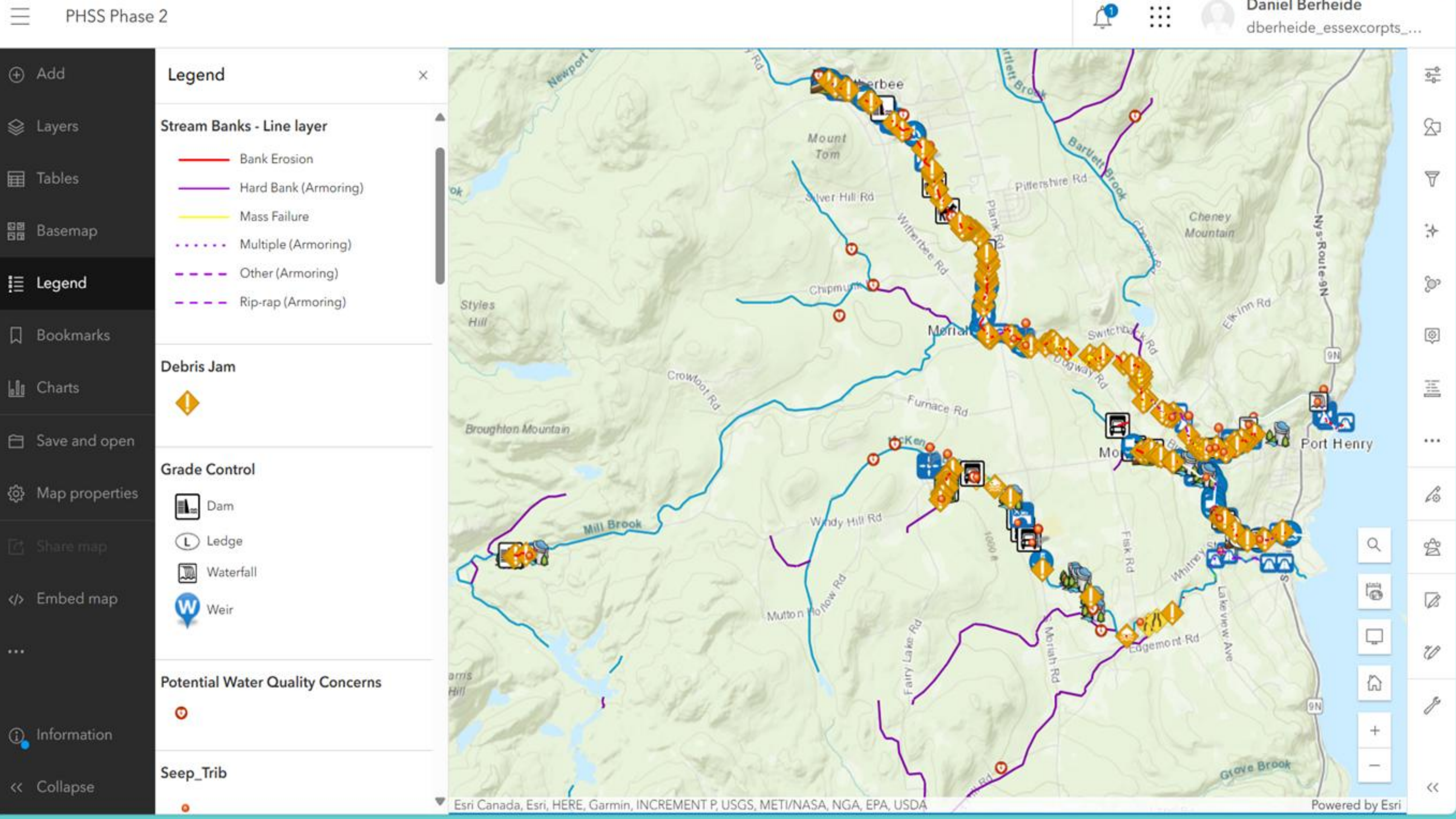


Phase II

Rapid Stream Assessment Results and Corridor Planning

ArcGIS Collector App




PHSS Phase 2
Daniel Berheide
dberheide_essexcorpts_...
Add
Layers
Tables
Basemap
Legend
Bookmarks
Charts
Save and open
Map properties
Share map
Embed map
Information
Collapse
Legend
Stream Banks - Line layer
Bank Erosion
Hard Bank (Armoring)
Mass Failure
Multiple (Armoring)
Other (Armoring)
Rip-rap (Armoring)
Debris Jam
Grade Control
Dam
Ledge
Waterfall
Weir
Potential Water Quality Concerns
Seep_Trib
Mount Tom
Silver Hill Rd
Pilfershire Rd
Cheney Mountain
Styles Hill
Crowfoot Rd
Furnace Rd
Broughton Mountain
Mill Brook
Windy Hill Rd
Mutton Hollow Rd
Fairy Lake Rd
Moriah Rd
Edgemont Rd
Lakeview Ave
Port Henry
Switchback Rd
Dugway Rd
Elk Inn Rd
Nys-Route-9N
Bartlett Brook
Witherbee Rd
Plank Rd
Fisk Rd
Grove Brook
Esri Canada, Esri, HERE, Garmin, INCREMENT P, USGS, METI/NASA, NGA, EPA, USDA
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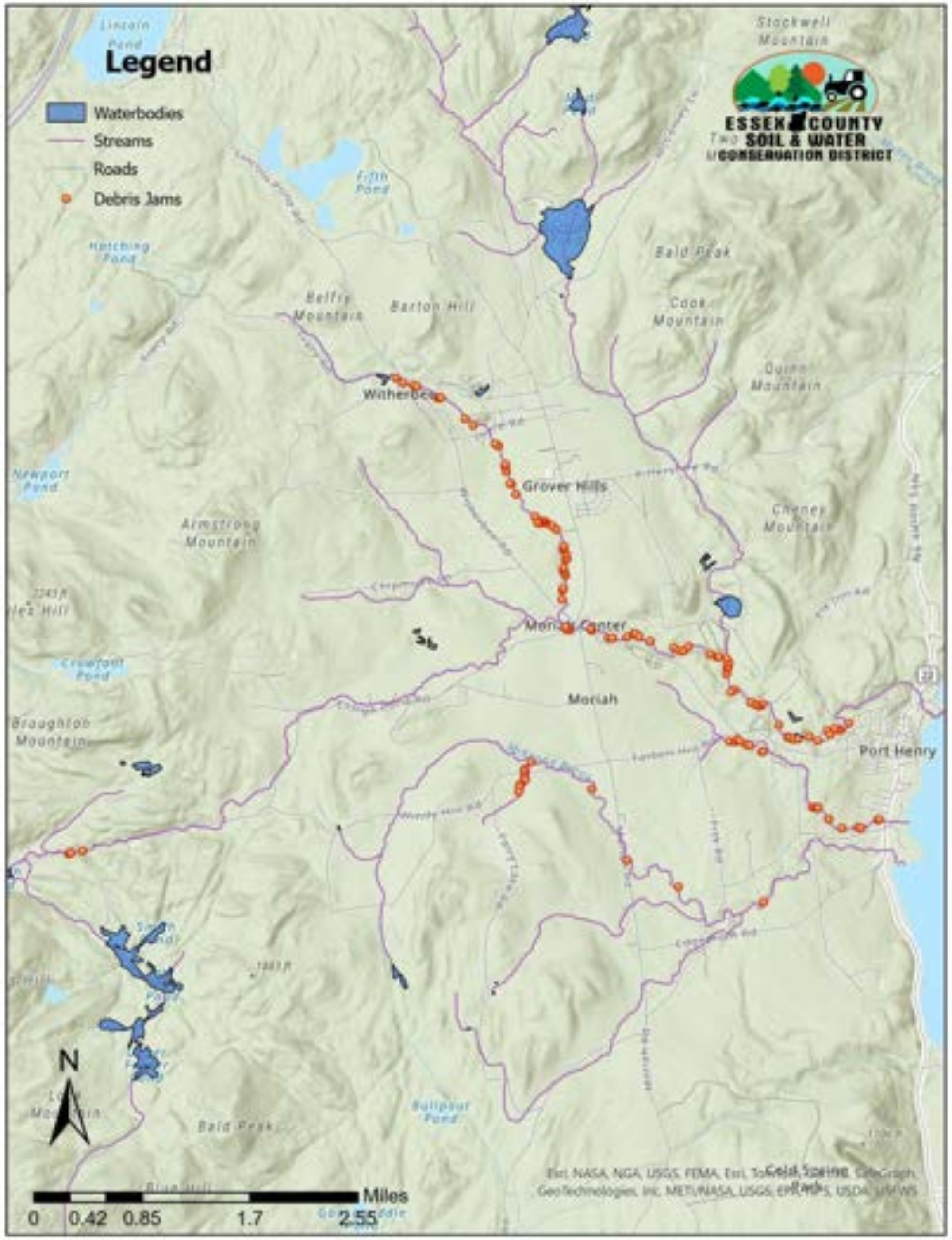
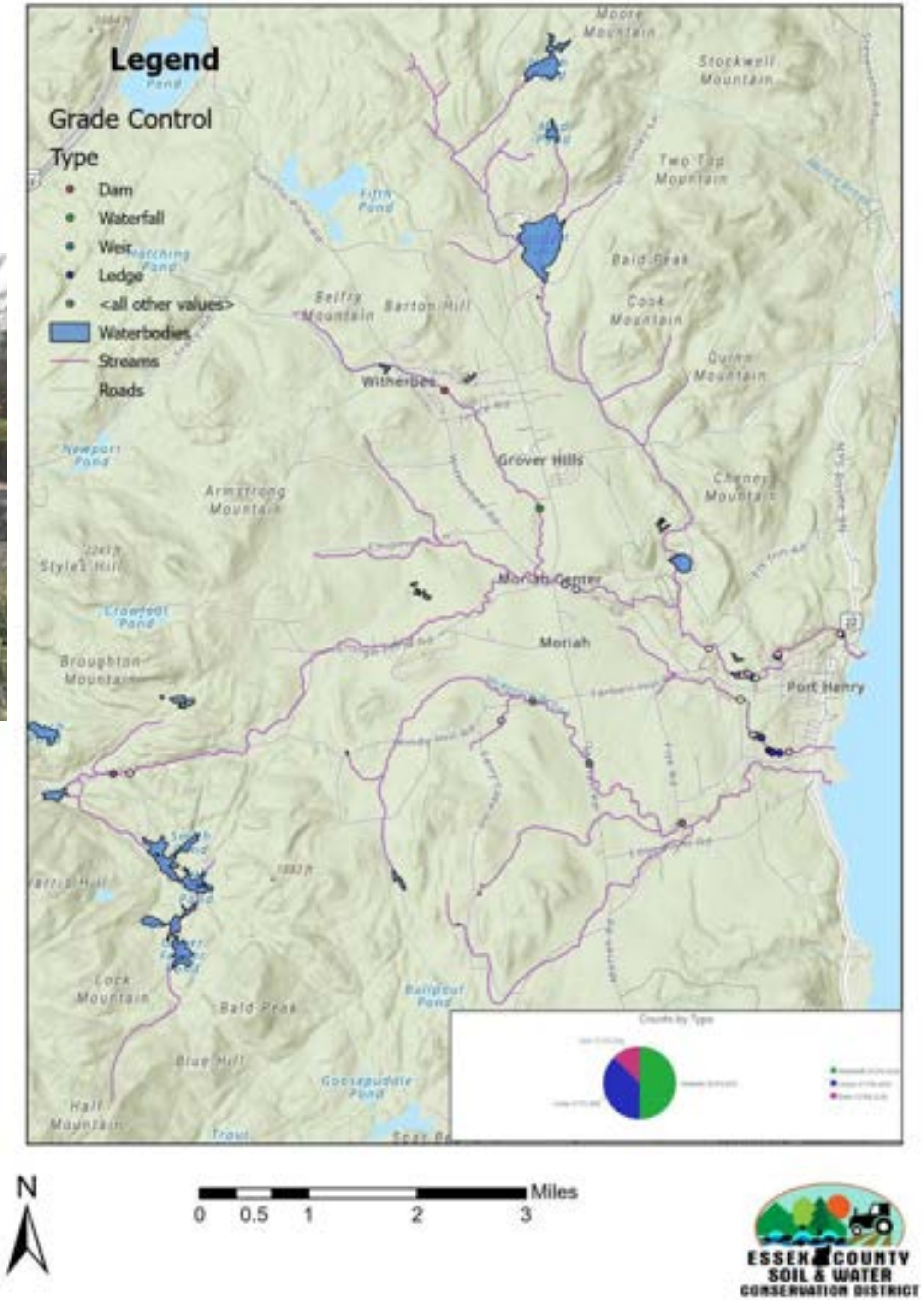
DEBRIS JAMS

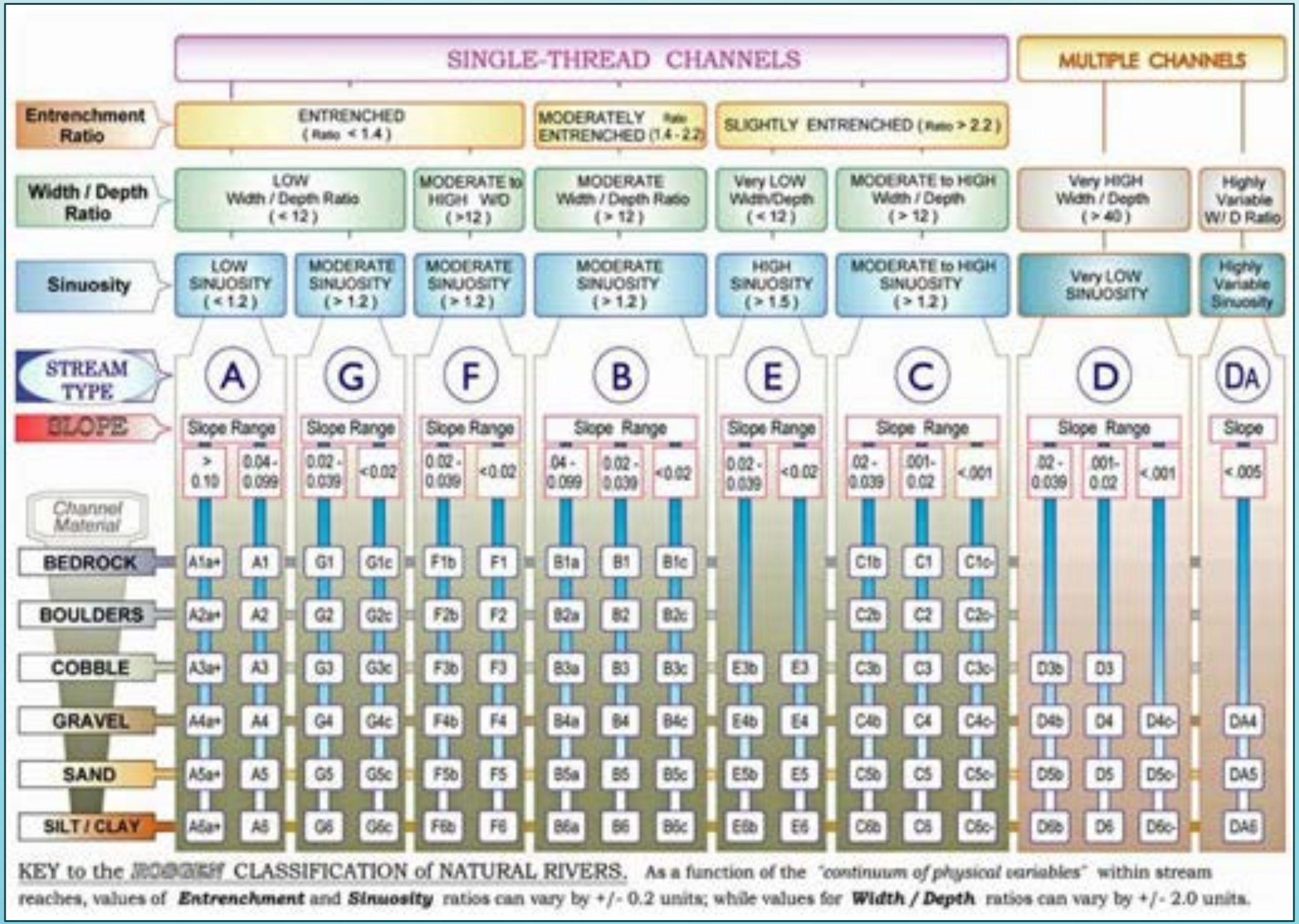


Legend
Waterbodies
Streams
Roads
Debris Jams
ESSEX COUNTY SOIL & WATER CONSERVATION DISTRICT
Stockwell Mountain
Bald Peak
Cook Mountain
Quinn Mountain
Cheney Mountain
Belfry Mountain
Barton Hill
Witherbee
Grover Hills
Armstrong Mountain
Moriah Center
Moriah
Port Henry
Broughton Mountain
Newport Pond
Crowfoot Pond
Hatching Pond
Fifth Pond
Lincoln Pond
Bullpout Pond
Bald Peak
N
Miles
0 0.42 0.85 1.7 2.55
Esri, NASA, NGA, USGS, FEMA, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, USDA, USFWS

GRADE CONTROLS

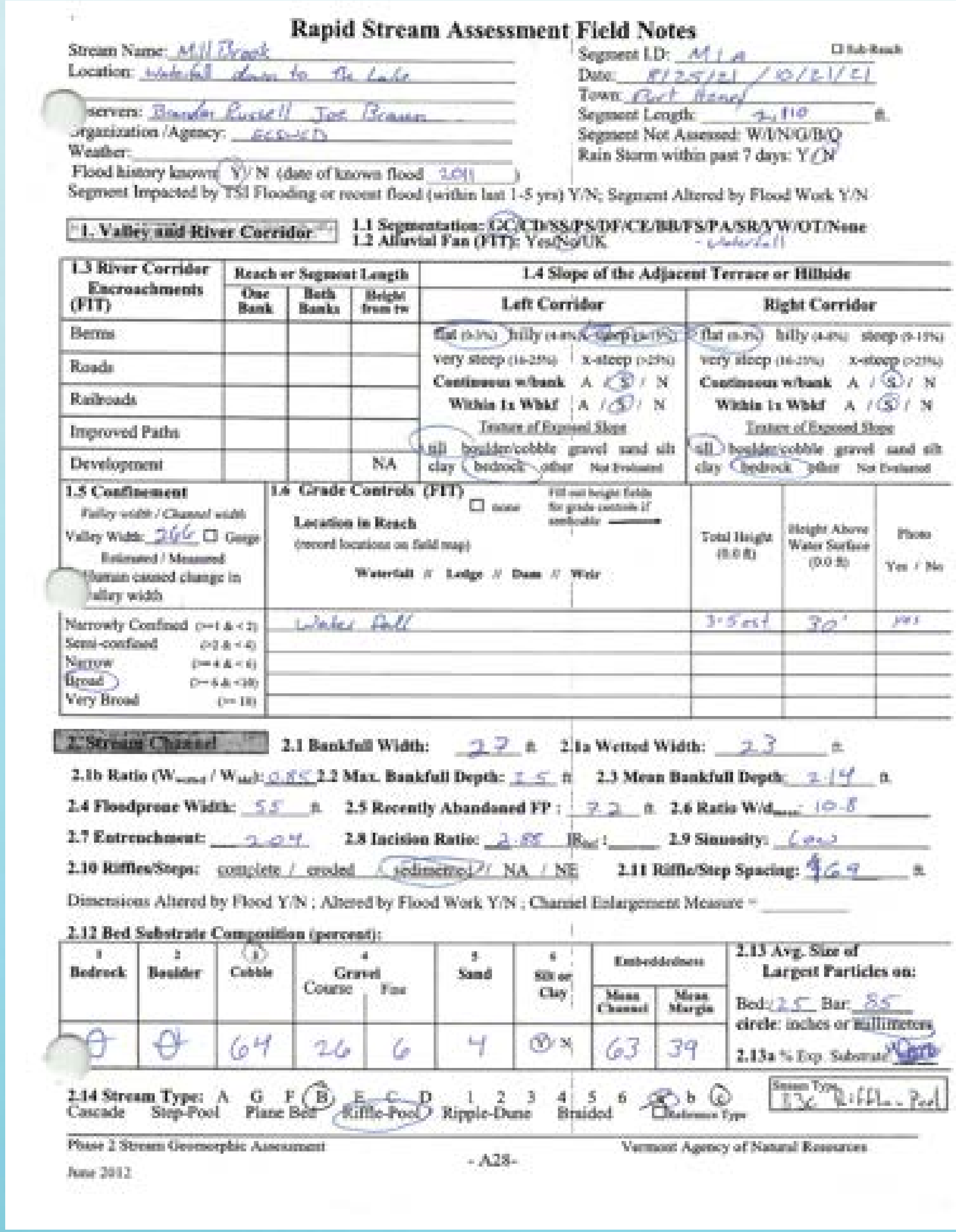


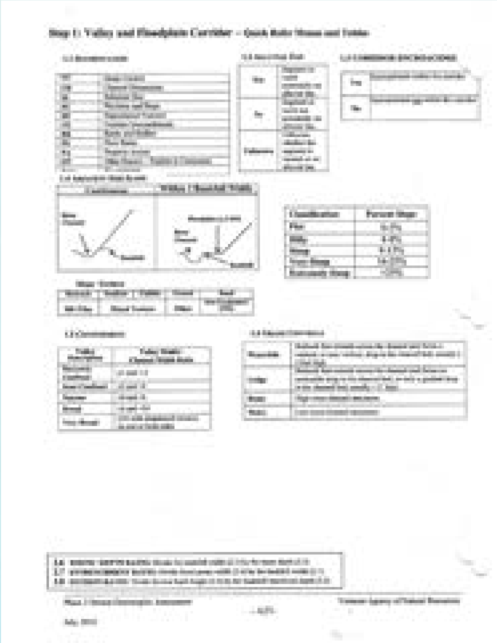
Rapid Stream Assessment Field Note Worksheets



Key to the Rosgen Classification of Natural Rivers

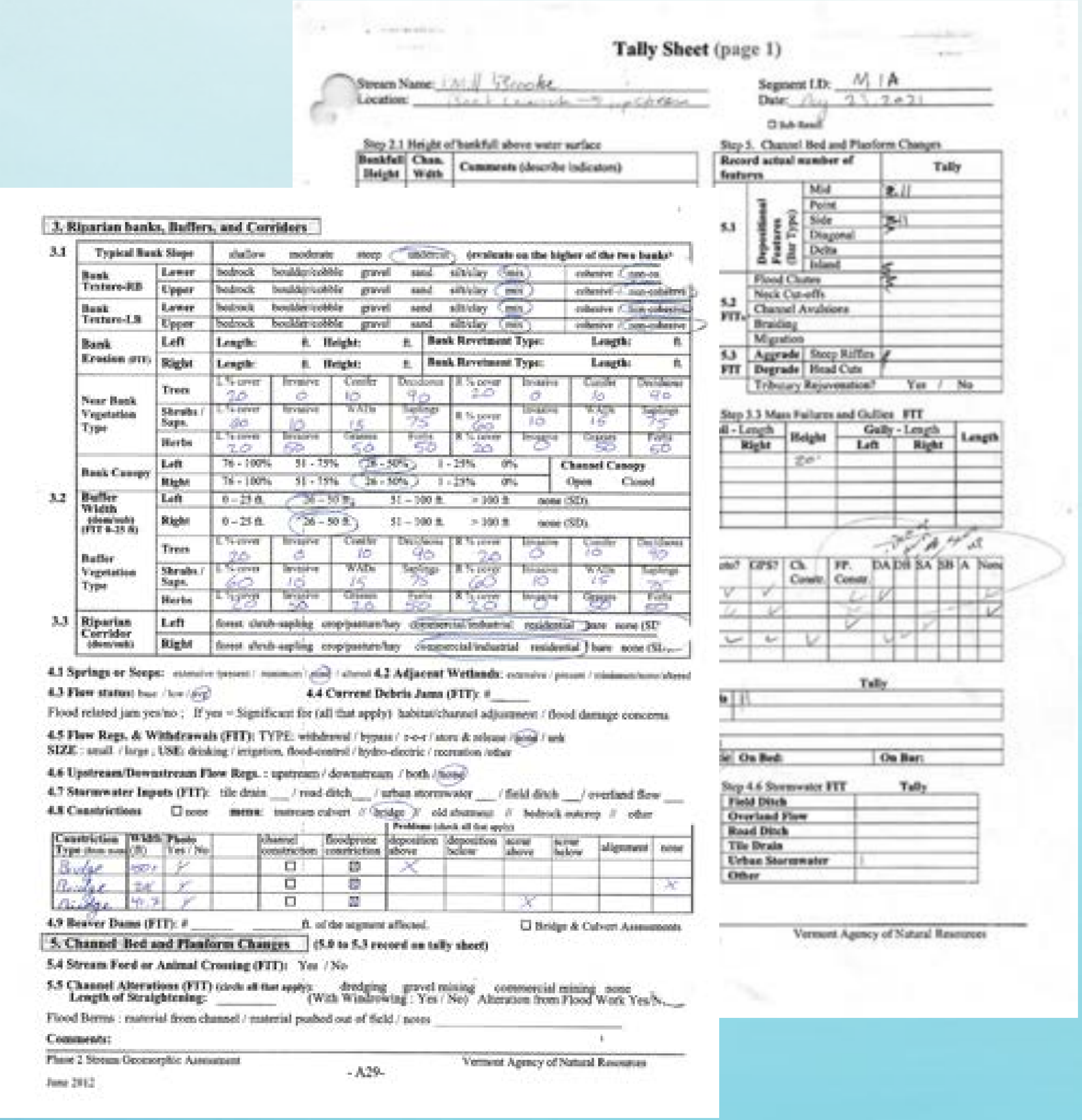
Reach	Stream type
M1a	B3c
M1c	B4a
M1d	B3
M1e	F3
M1f	B3
M2a	B2
M2b	A1
M2c	C3b
K1T3	B





Step 1 and 2

1. Valley and River Corridor
2. Stream Channel



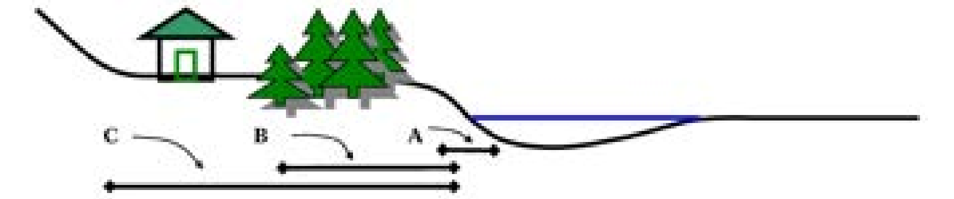
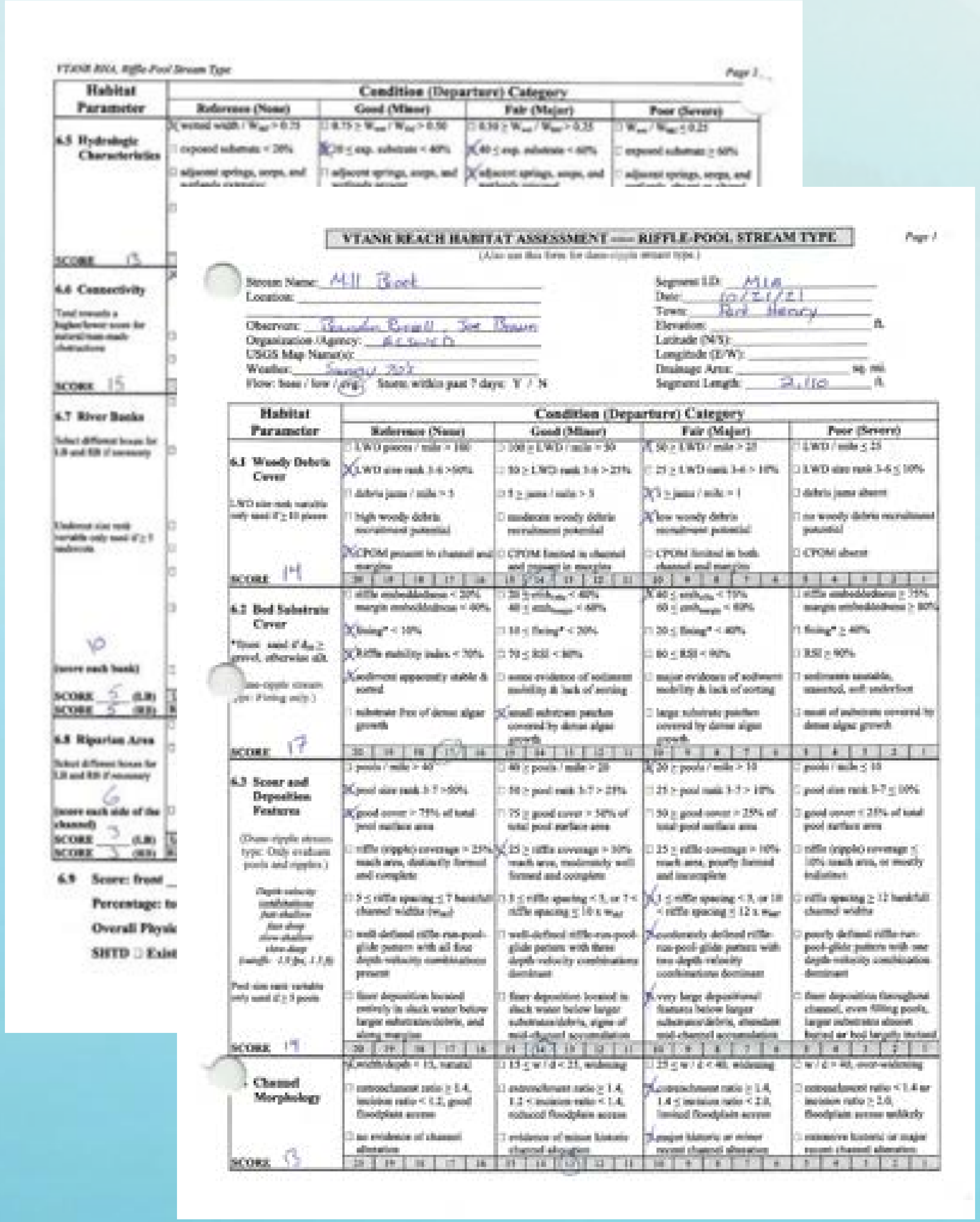


Figure 3.1 Stream bank (A), riparian buffer (B), and river corridor (C) further defined below.

Step 3, 4, and 5

3. Riparian Banks, Buffers and Corridors
4. Flow Modifiers
5. Channel Bed and Planform Changes


VTANR REACH HABITAT ASSESSMENT — RIFFLE-POOL STREAM TYPE

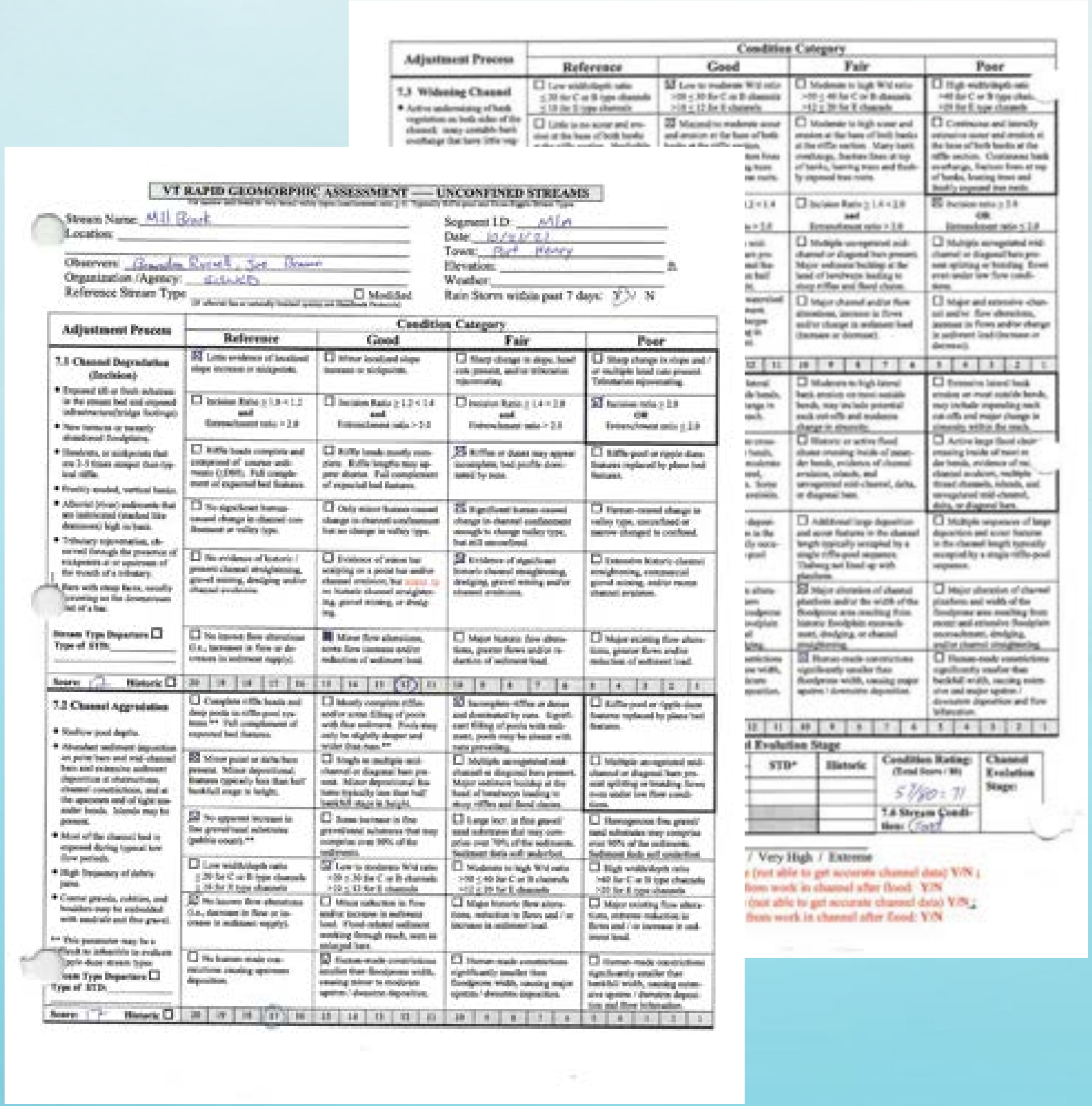
Habitat Parameter	Condition (Departure) Category			
	Reference (None)	Good (Minor)	Fair (Major)	Poor (Severe)
6.1 Woody Debris Cover				
6.2 Bed Substrate Cover				
6.3 Scour and Deposition Features				
Channel Morphology				

Step 6

Rapid Habitat Assessment

Reach Habitat Assessment

Reach	Score (%)	Condition
M1a	64	Fair
M1c	67	Good
M1d	83	Good
M1e	64	Fair
M1f	72	Good
M2a	81	Good
M2b	79	Good
M2c	78	Good
K1-1	74	Good
K1T3	74	Good



VT RAPID GEOMORPHIC ASSESSMENT — UNCONFINED STREAMS

Adjustment Process

Condition Category

Reference

Good

Fair

Poor

7.1 Channel Degradation (Incision)

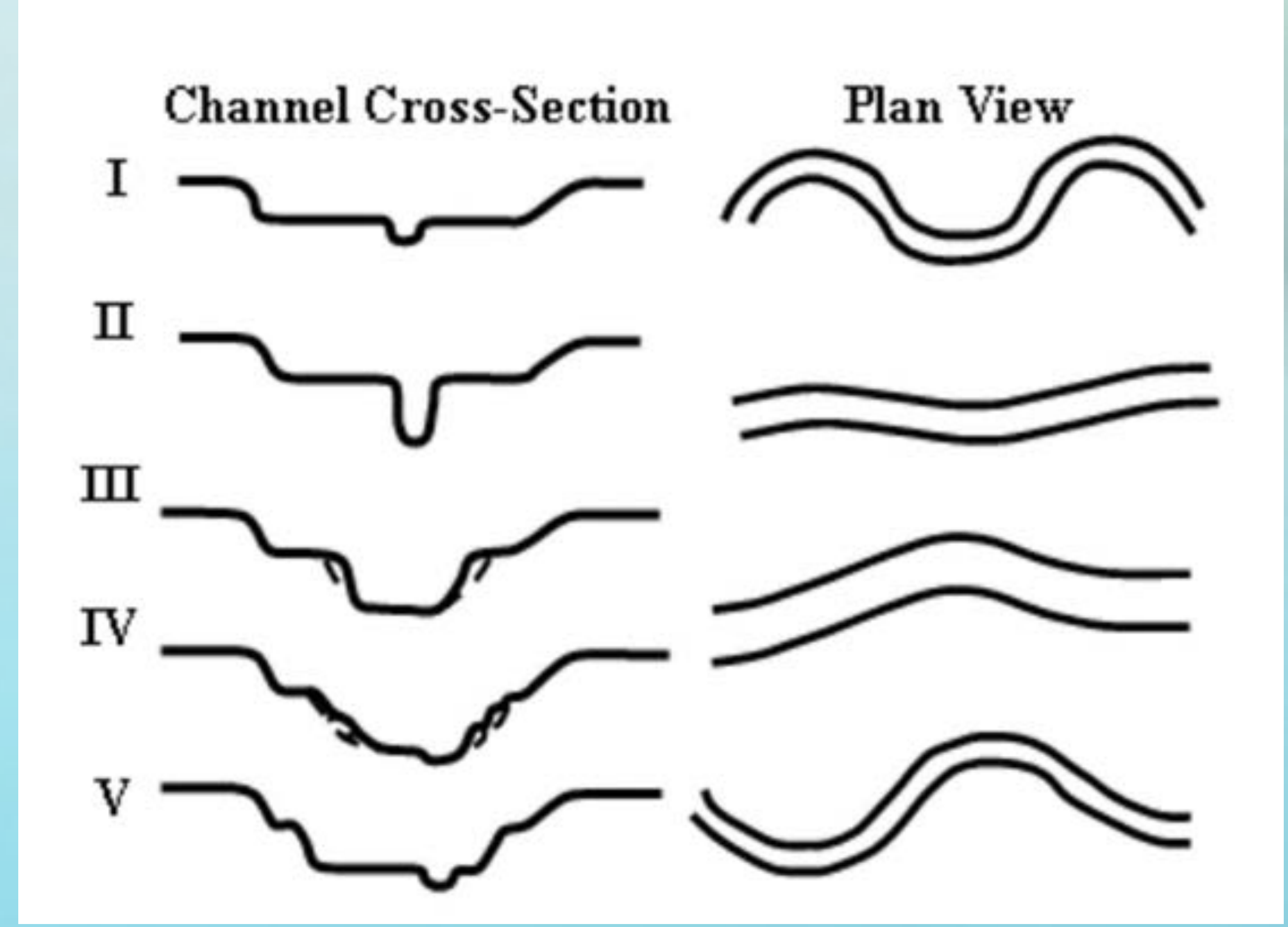
7.2 Channel Aggradation

7.3 Widening Channel

Step 7

Rapid Geomorphic Assessment

CHANNEL EVOLUTION



Mill Brook – M1d

Stream: Mill Brook Segment: M1d Town: Moriah Date Assessed: 9/12/2021

Channel Length (ft): 2,466.97 Channel Slope (%): 3.4 Location: Upstream Stone Street Bridge

Stream Type Summary	
	P2 Assessed
Confinement	Semi-confined
Bedform	Step-Pool
Stream Type	B3b

Crossing/Construction Summary			
Type	Location	Span	Impacts
Bridge		15	Channel Cons

P2 Data	
Length of Erosion (ft)	274.10
Length of Mass Failure (ft)	0
Length of Bank Armoring (ft)	0
Inadequate Riparian Buffer (ft)	0
Corridor Encroachment (ft)	0
# of Stormwater Inputs	1
# Beaver Dams	0
# Flow Regulation and Withdrawal	0
# Debris Jams	7
# Grade Control	2

Reach Habitat Assessment

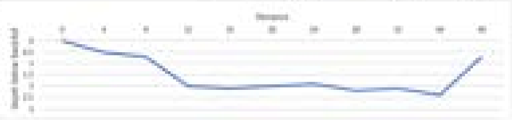
Habitat Parameter	Score
6.1 Woody Debris Cover	14
6.2 Bed Substrate Cover	18
6.3 Scour and Depo. Feature	17
6.4 Channel Morphology	12
6.5 Hydraulic Characteristics	15
6.6 Connectivity	16
6.7 River Banks	20
6.8 Riparian Area	16
Total	132
Percentage	82.5
Condition	Good

Stream Measurements (FT)	
Bankfull Width	46
Wetted Width	31
Ratio (Wetted/BKFW)	0.67
Max. Bankfull Depth	2.4
Mean Bankfull Depth	1.51
Floodprone Width	75
[illegible]	7.6
Ratio (W/D)	15.17
Entrenchment	1.63
Incision Ratio	1.17
Sinuosity	Moderate
Riffle Step Spacing	150

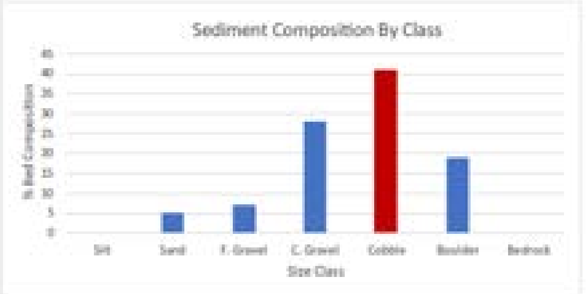
Geomorphic Assessment

Adjustment Process	Score
Degradation	16
Aggradation	16
Widening	16
Planform	18
Condition %	**82.5**
Condition	**Good**
Stream Type	**B3**
Evolution Stage	**4**
Sensitivity	**Moderate**
Channel Adjustment Proc.	**Stabilizing**

Cross Section		
Measurement	Distance	Depth
1	0	0
2	4	0.5
3	8	0.7
4	12	2
5	16	2.1
6	20	2
7	24	1.5
8	28	2.1
9	32	2.1
10	36	2.4
11	40	0.7
Mean Depth		1.66



Sediment Composition and Mobility		
Class	Range (mm)	Percentage
Silt	<.06	0
Sand	.06-2	5
F. Gravel	2-16	7
C. Gravel	16-64	28
Cobble	64-256	41
Boulder	256-4096	19
Bedrock	>4096	0
Avg. Largest Particle (Bed):		250mm
Avg. Largest Particle (Bar):		90mm
Riffle Stability Index (RSI):		



Large Woody Debris (LWD)			
Rank	Diameter (ft)	L(Wbkf)	#
1	0.5< D<1	<0.5	5
2	0.5< D<1	>0.5	1
3	1.0< D <2.0	<0.5	1
4	1.0< D <2.0	>0.5	0

Pools			
Rank	Depth (ft)	L (Wbkf)	#
1	1.0 < D <2.0	<0.5	5
2	1.0< D <2.0	>0.5	0
3	2.0< D <3.0	<0.5	0
4	2.0< D <3.0	>0.5	1
5	D> 3.0	<0.5	0
6	D >3.0	>0.5	2
7	D >3.0	>1.0	0

Water Quality Monitoring and Data Collection

Results

Port Henry Watershed

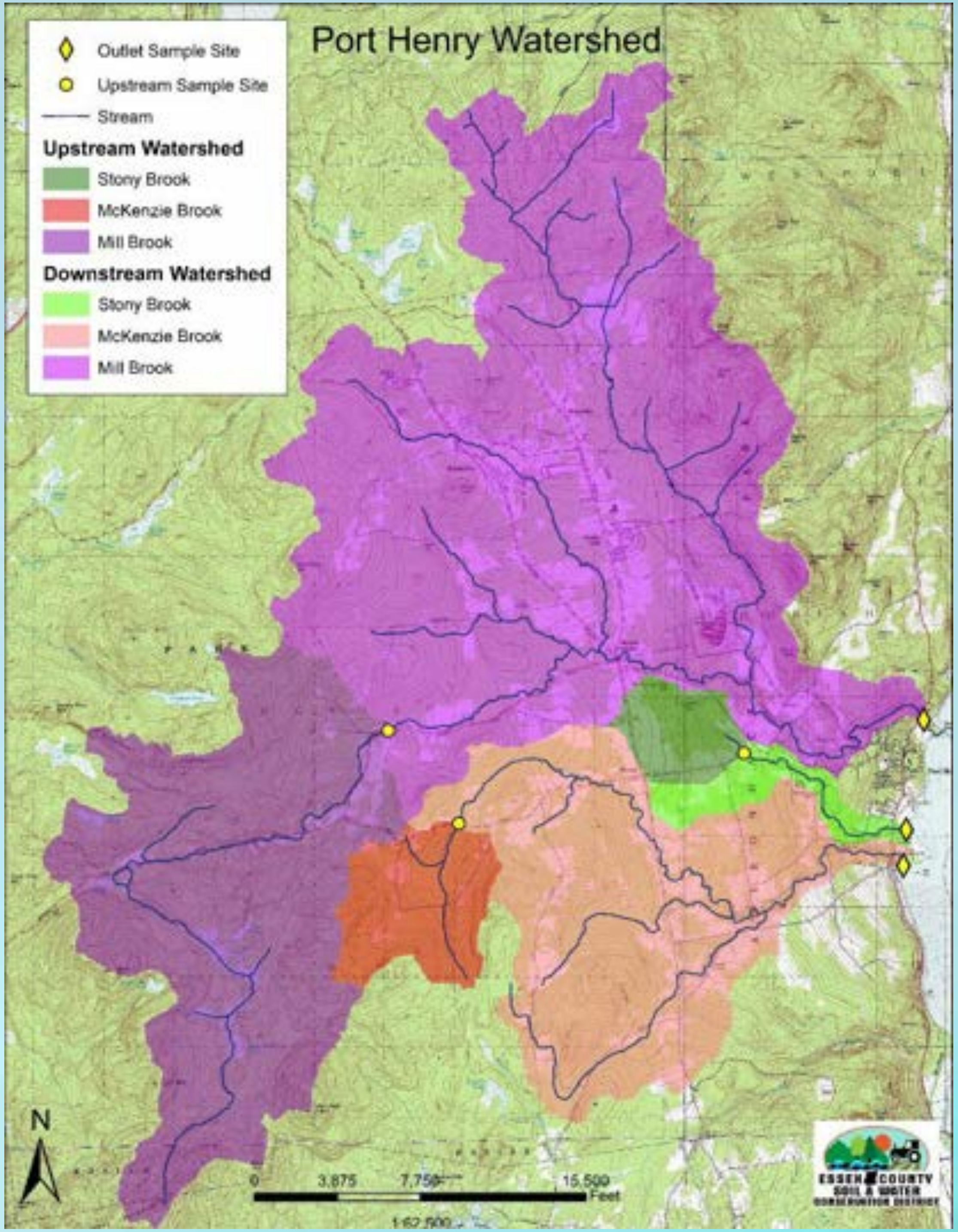
Water quality analysis of 3 tributaries of Lake Champlain:

- Mill Brook
- Stony Brook
- McKenzie Brook

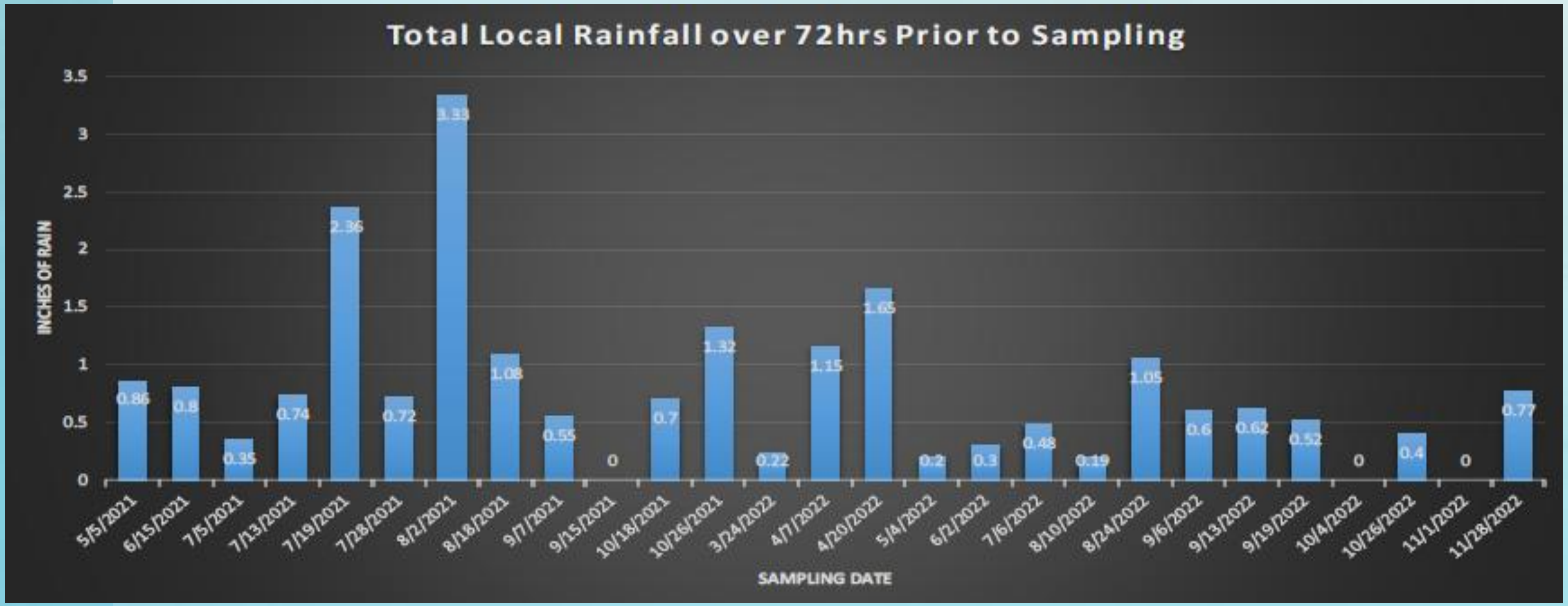
Total of 6 sites, with an upstream and downstream site on each stream

27 field days sampling water

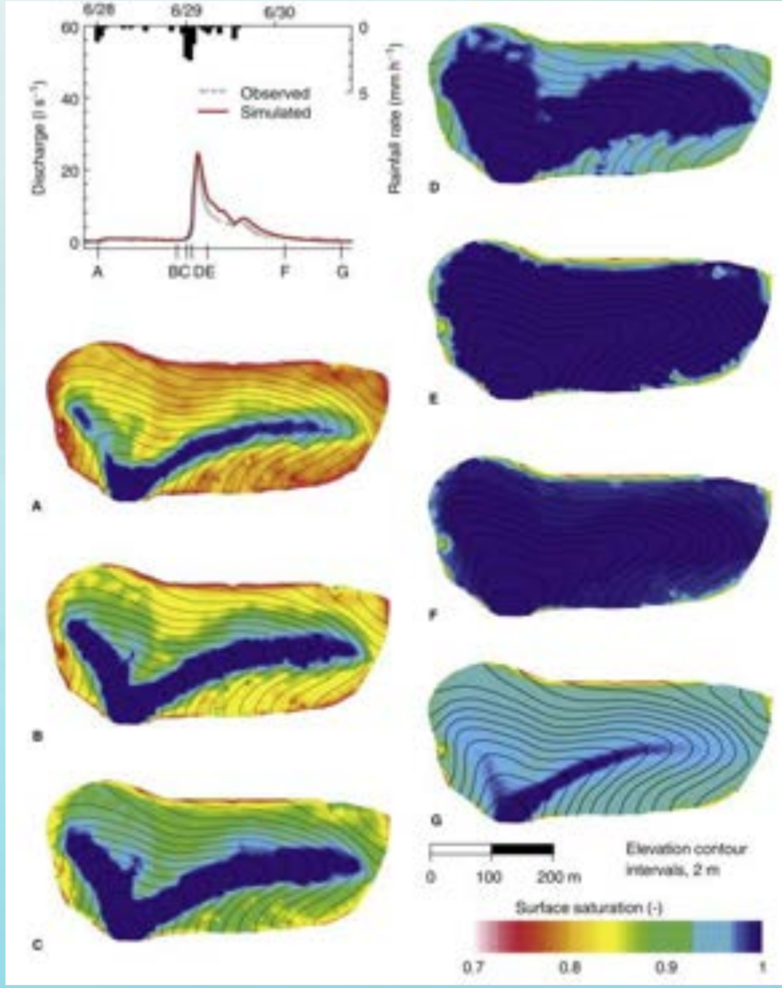
- Goal was to conduct at least half of the sampling days after a rain event…



Achieved!



- 24 of the 27 collection days occurred within 72 hours of a rain event



Example of post-rain event time of concentration saturation within a watershed

Monitoring Locations

Post Rain Event Sedimentation and Turbidity

- These pictures were taken on the same day, 4 miles apart after a rain event
- Some streams are affected more than others by runoff
- Land use, riparian buffers, and marsh filtration make a difference

Ward Creek

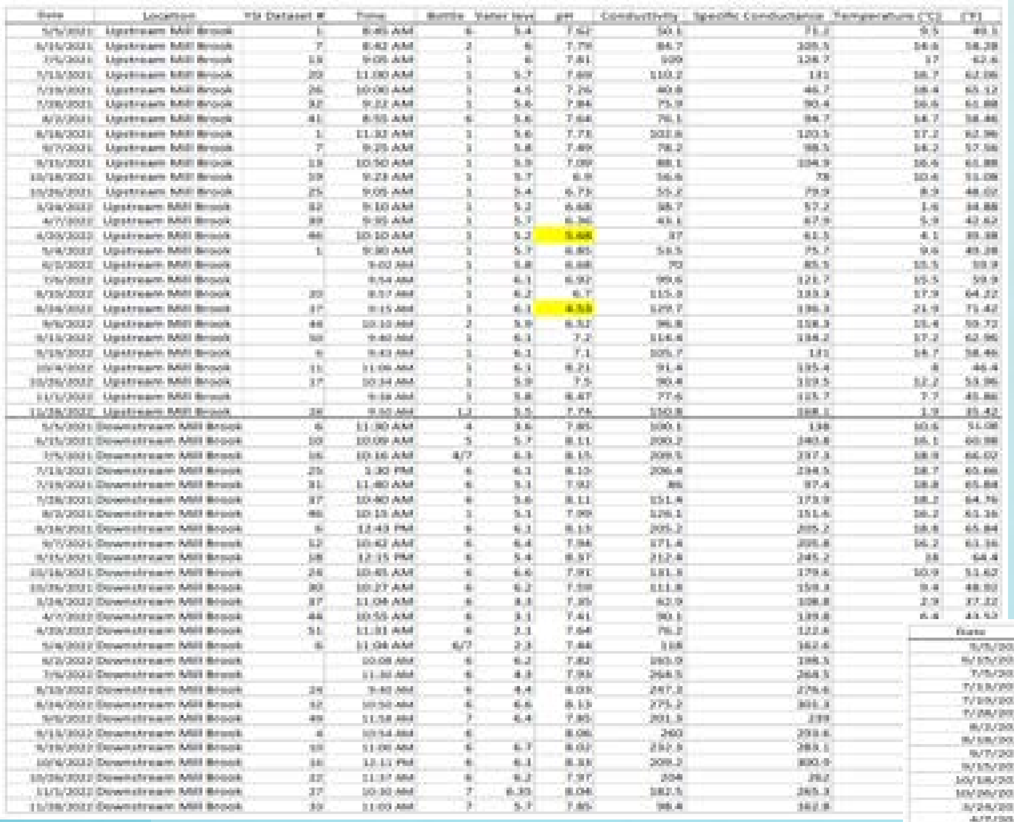
La Chute River

- What is in that water?

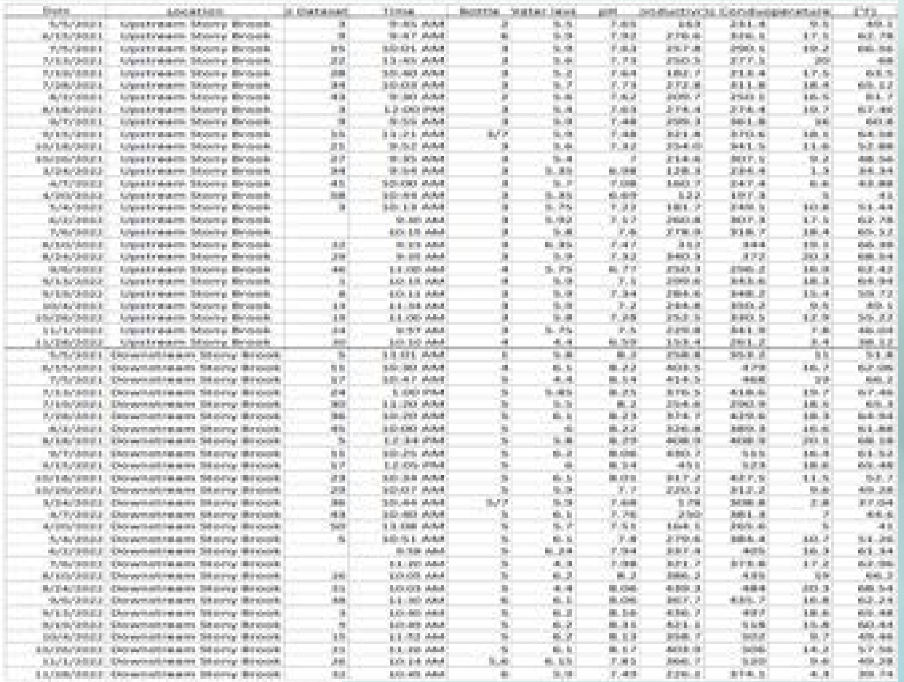
Water Quality Sampling

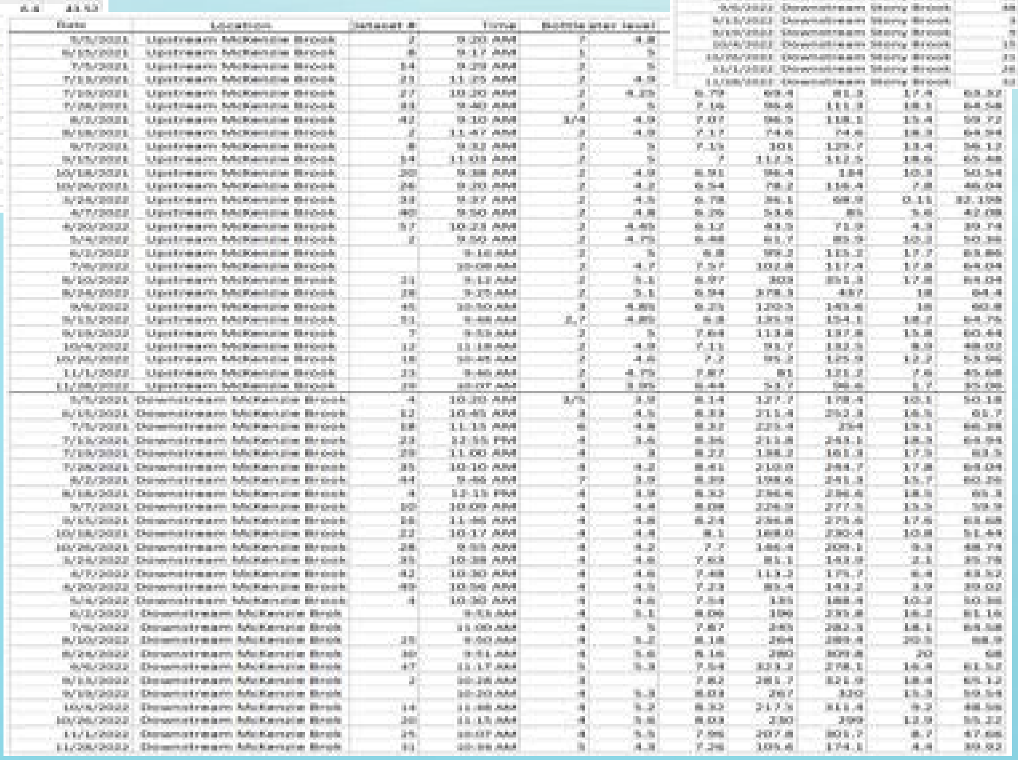
Field data collection:

1. YSI Pro 1030 Probe
2. Water samples to Endyne
3. Endyne data then sent to LaBella Labs for analysis



Data! Now what?

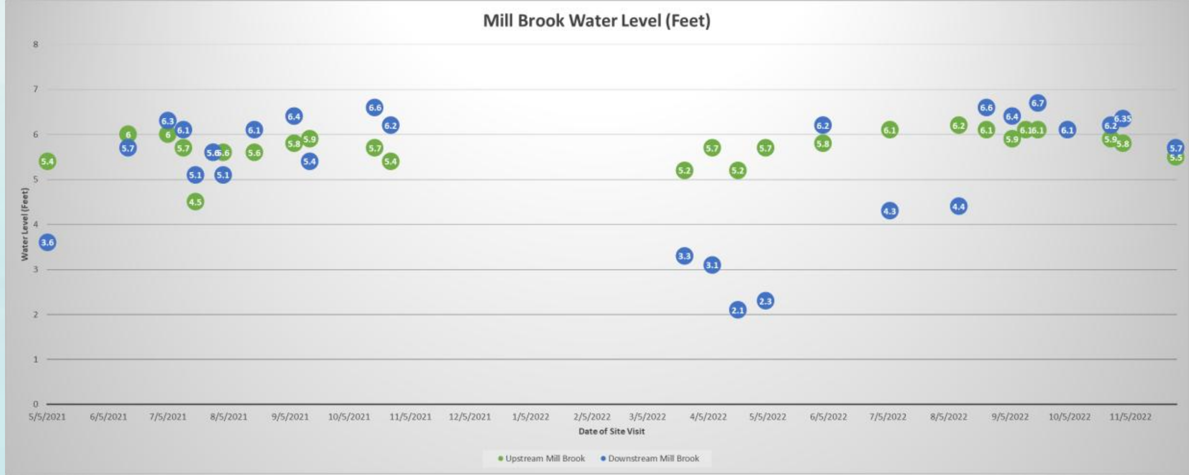


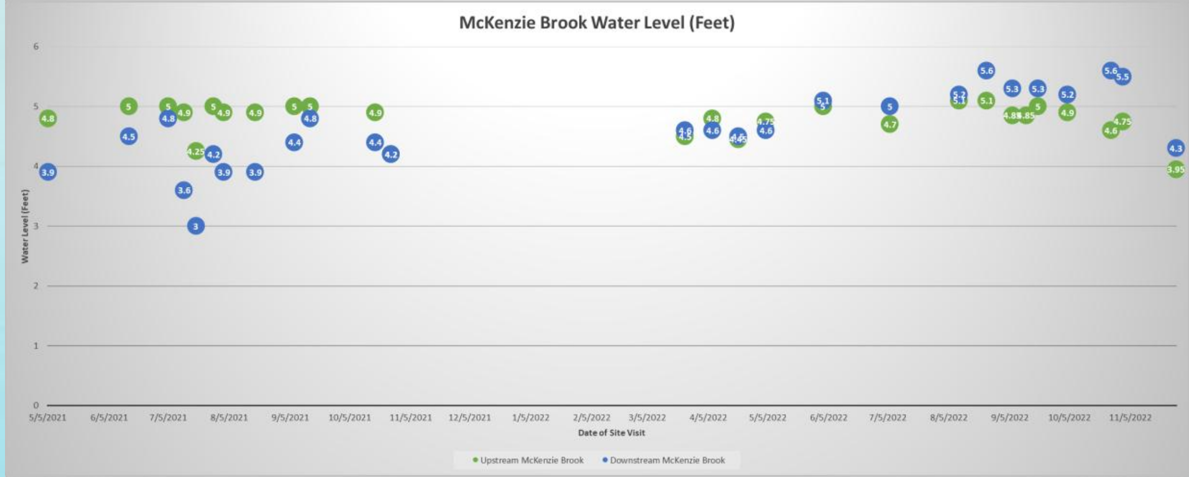


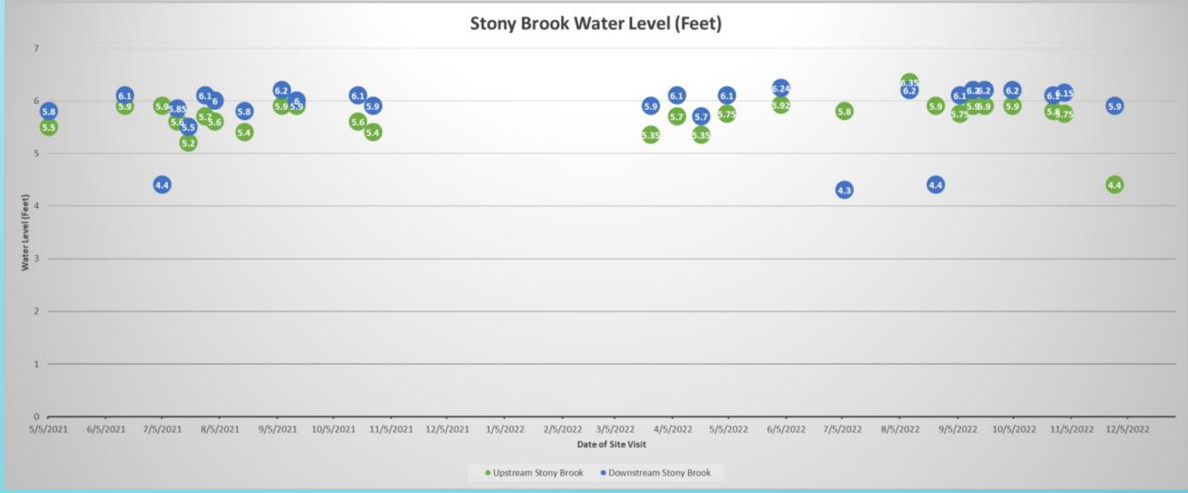
Stadia Rod measurements of water depth

Water Level

- Lower water levels
  - Concentrate pollutants
  - Summer = hotter water
  - Winter = potential for complete freeze
- Higher water levels
  - Greater velocity
  - Increased erosion, turbidity and sedimentation

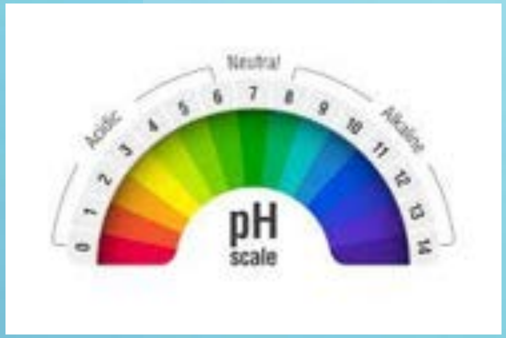


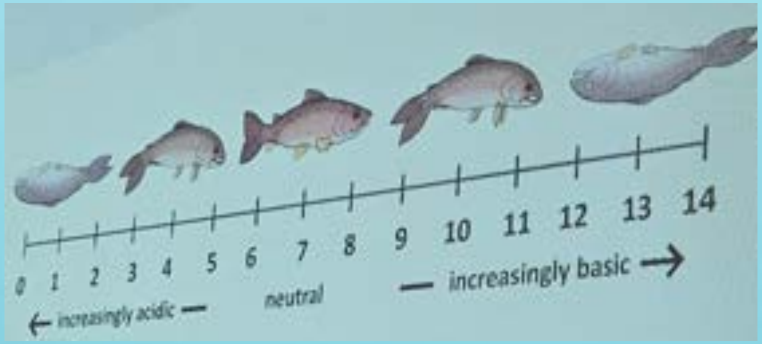


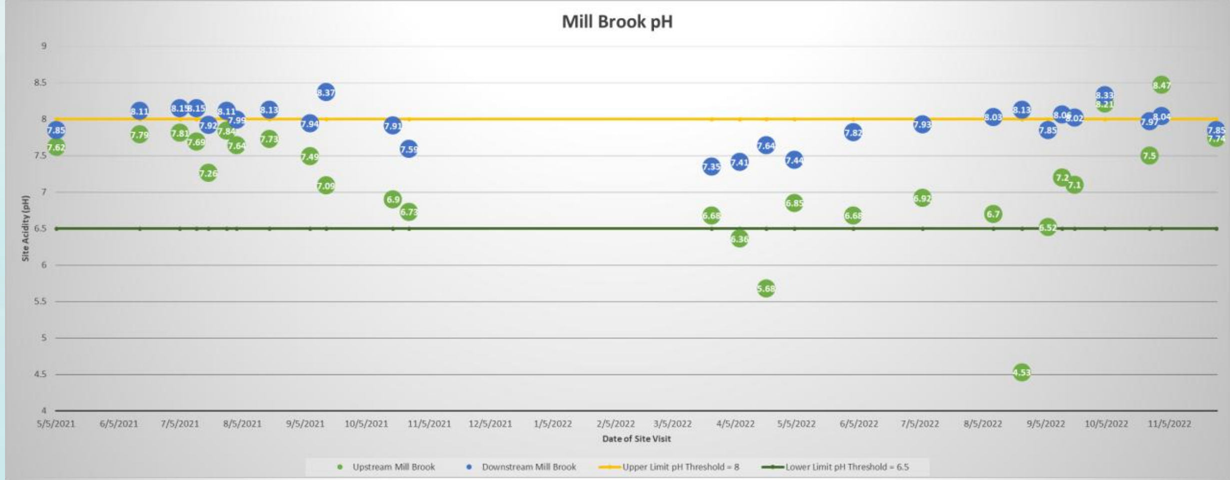


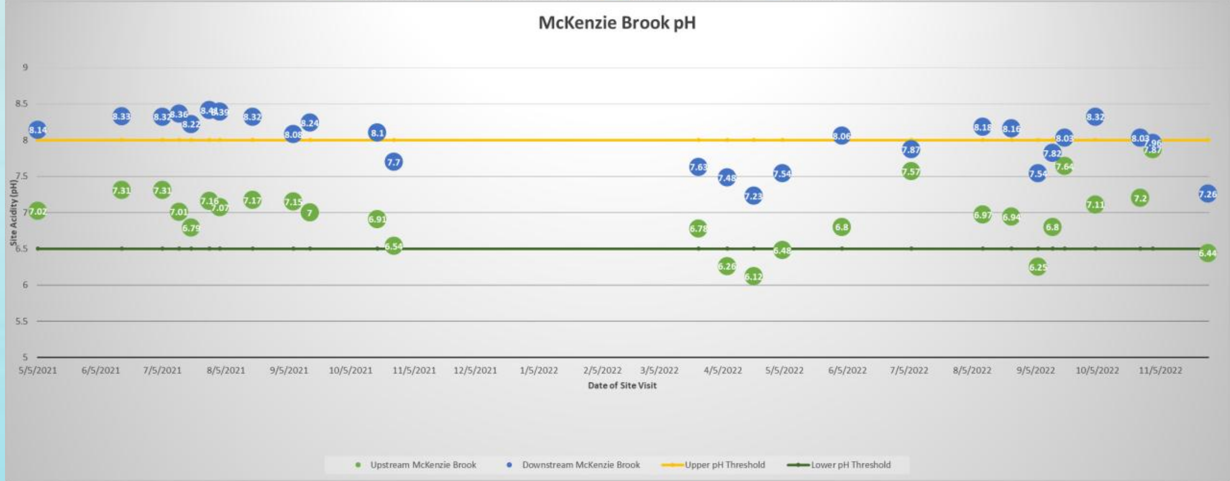
pH

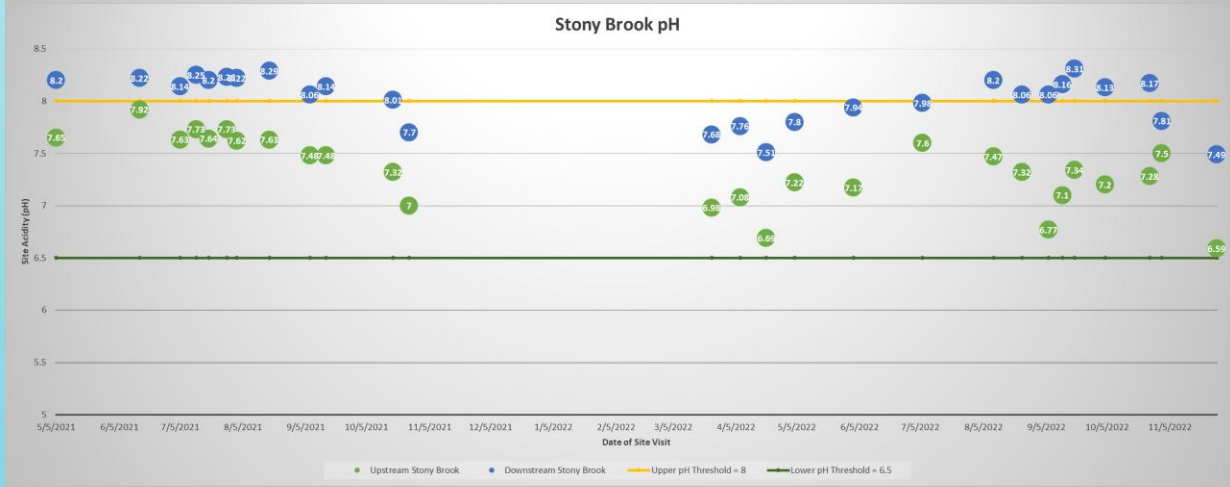
- Optimal pH for aquatic organisms between 6.5 and 8.0
  - Streams are buffered by geology
  - Maintain equilibrium unless impacted by external sources
  - Most pollutants increase acidity and drop the pH
    - Agricultural nutrients, mining byproducts, stormwater runoff from developed lands
  - A few do the opposite
    - Oils, agricultural lime, limestone gravel leachate





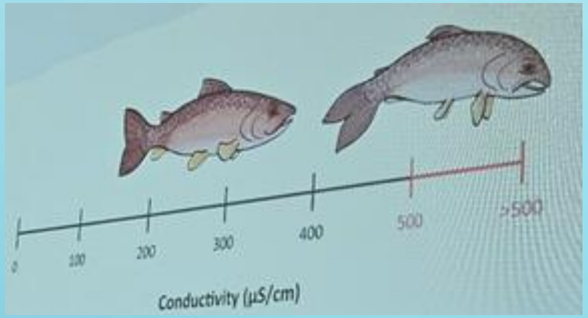


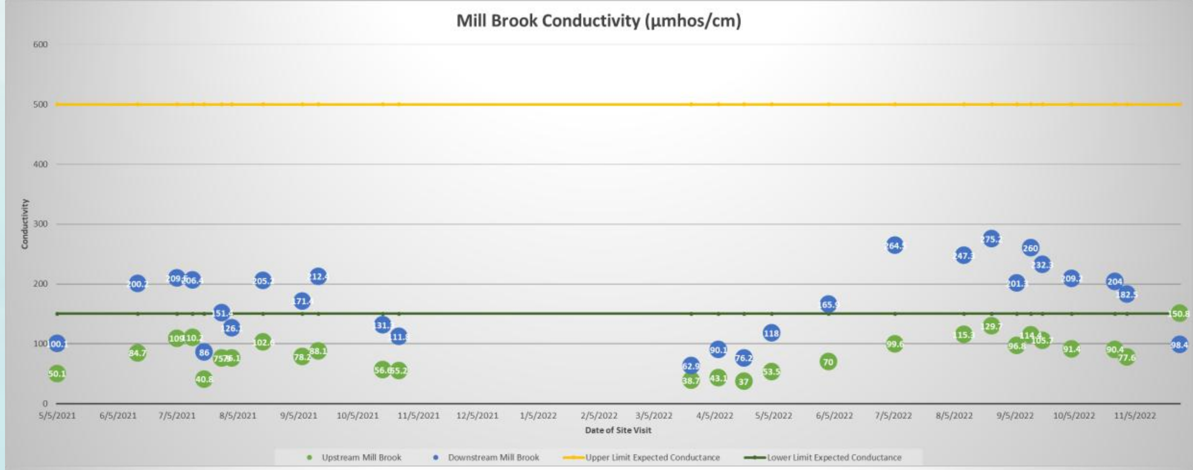


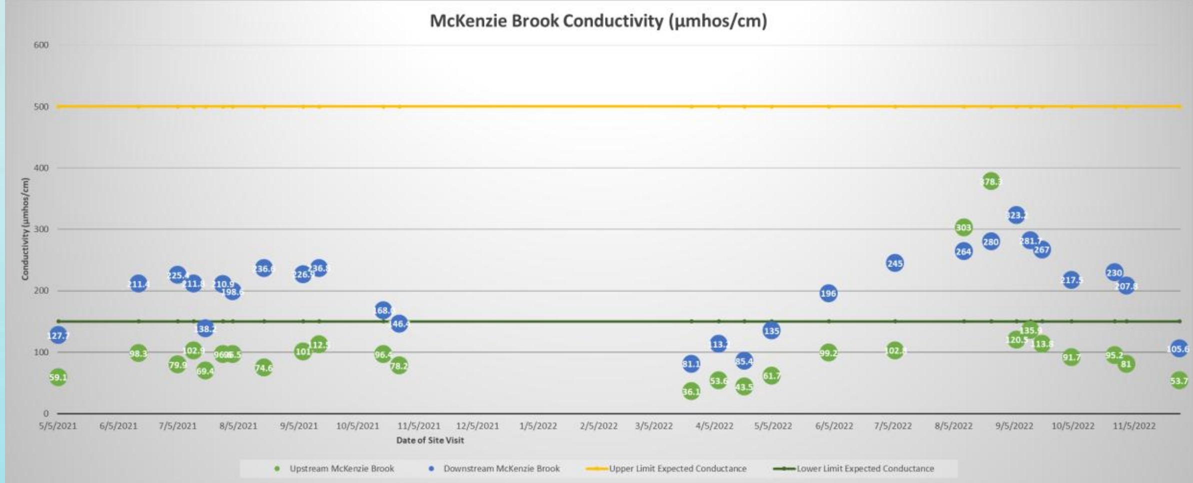


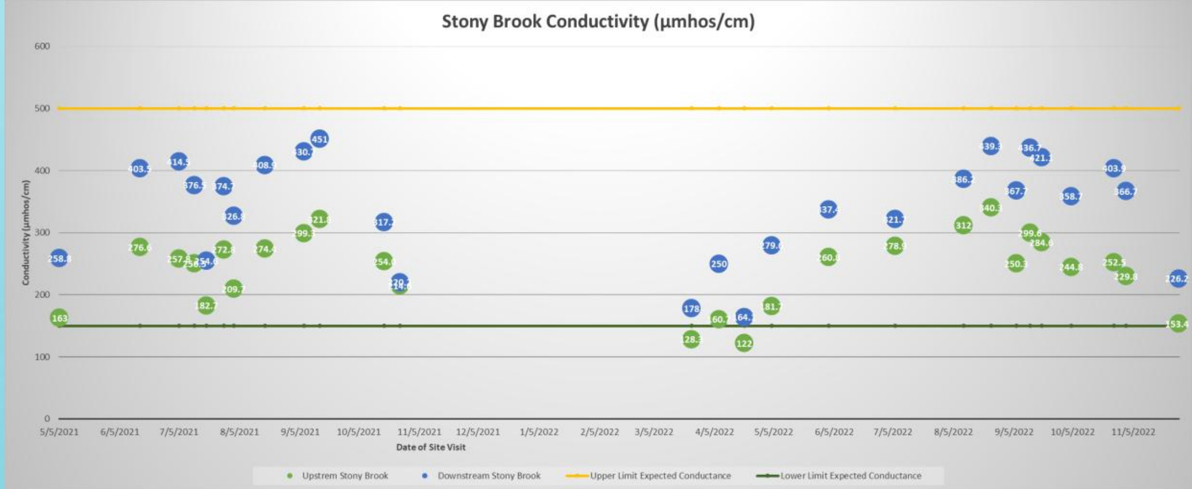
Conductivity

- A measure of how easily a water body can conduct an electrical current (indirect measure of salinity/salt)
  - Also, how fish sense their environment



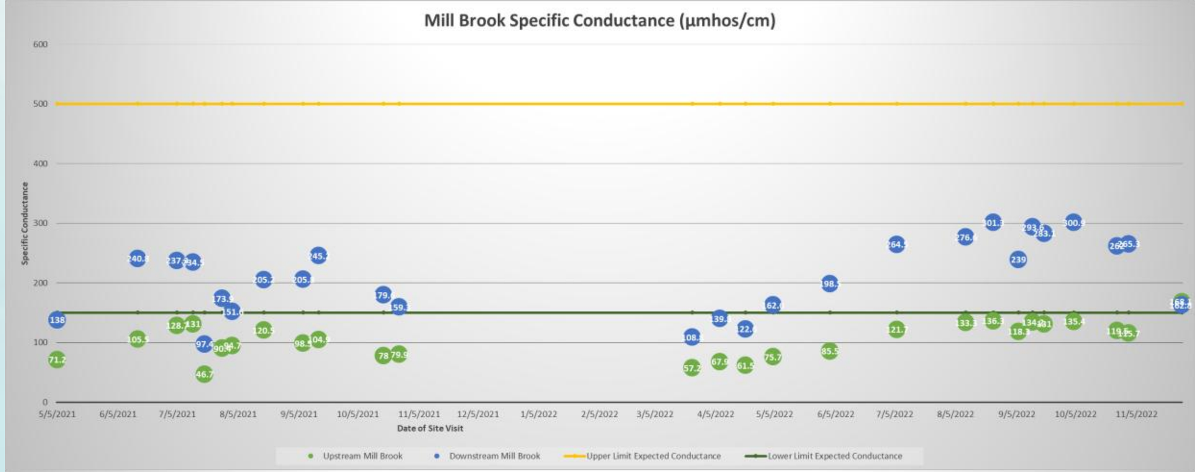


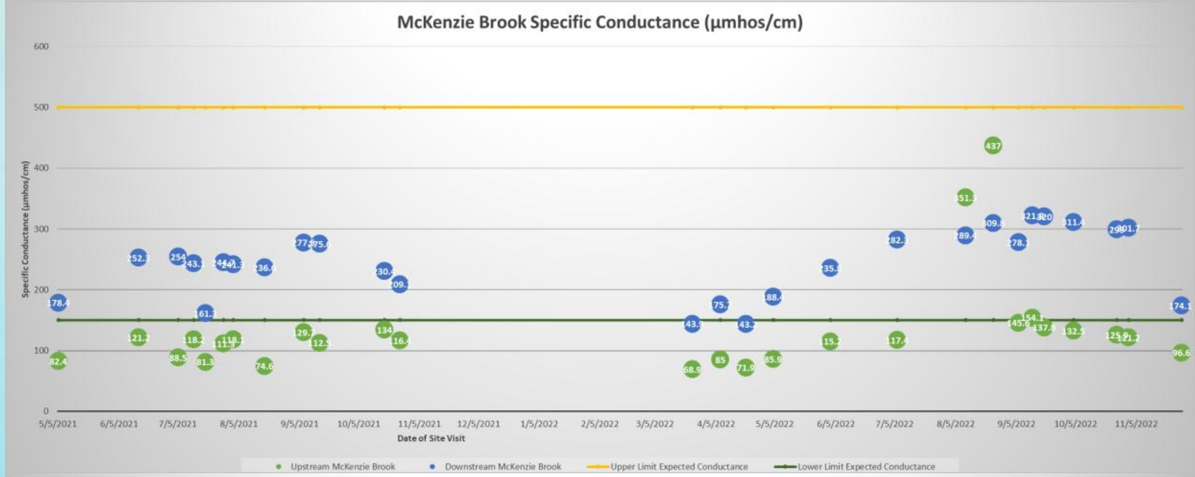


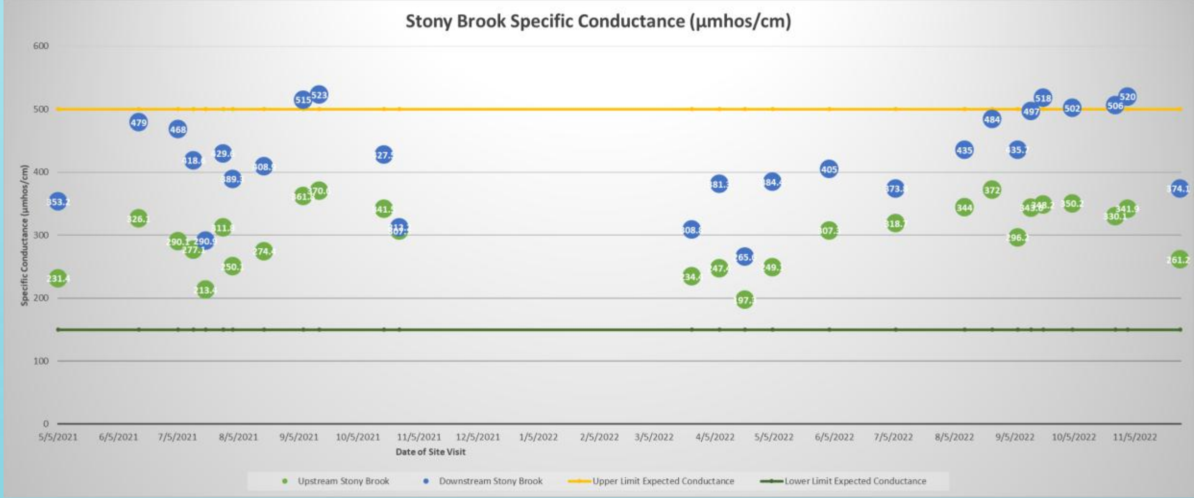


Specific Conductance

- The calculated conductivity of the river at a standardized temperature of 25ºC (77ºF)
- This calculation is necessary to allow comparison of one or more bodies of water as temperatures fluctuate throughout the day, season, or year
- Temperature changes can resemble pollutant discharge if not disassociated in the data

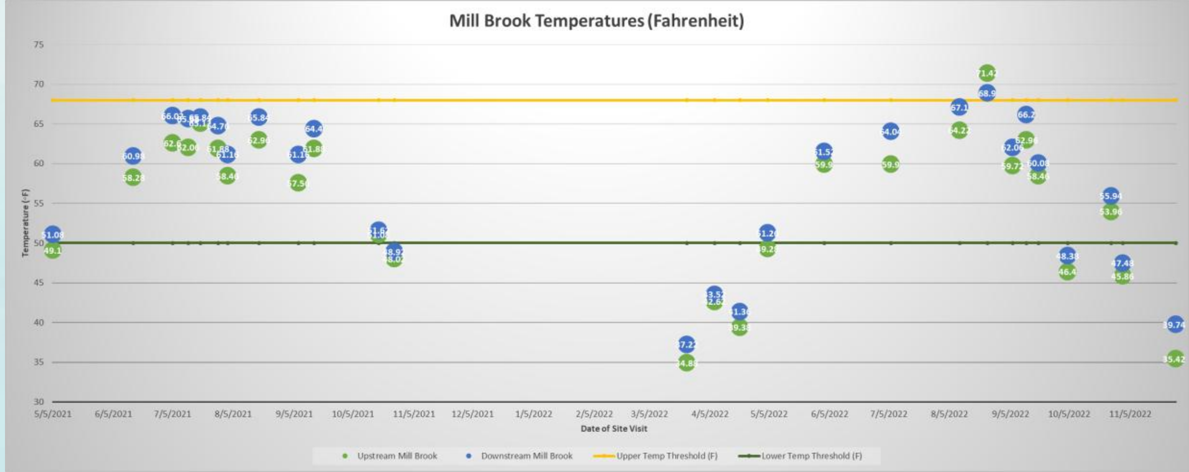


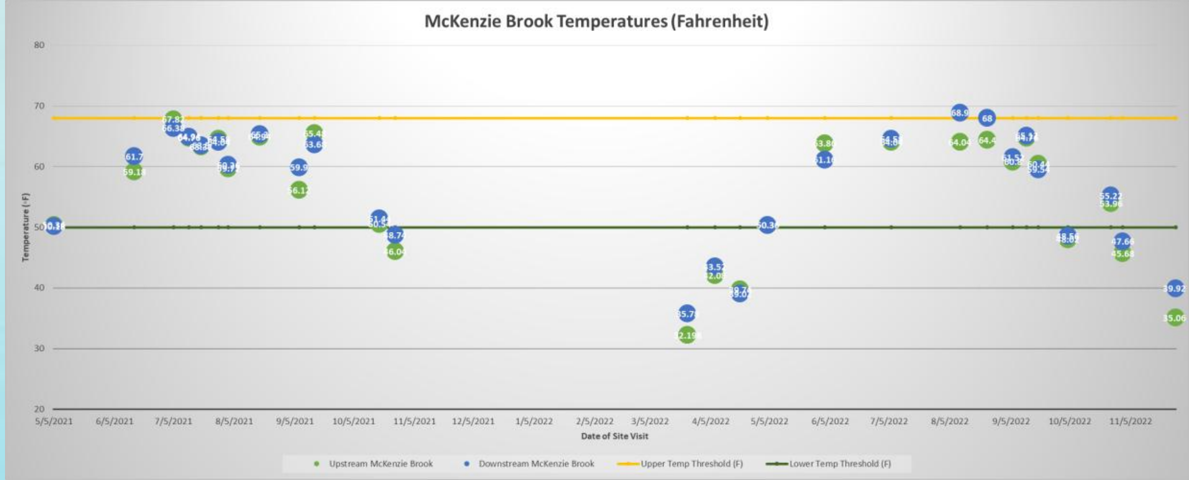


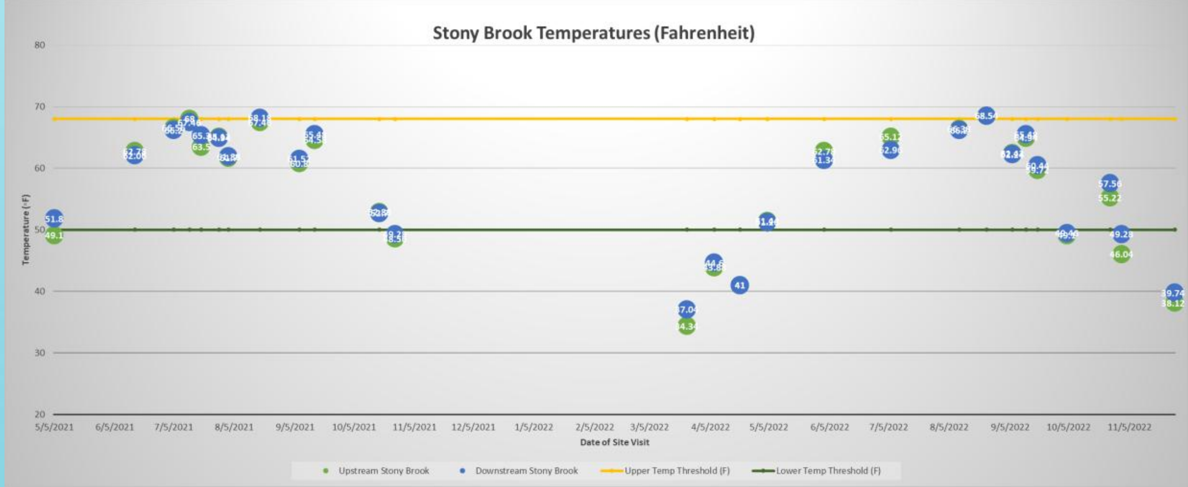


Temperature

- Rising temperatures yield:
  - Decrease in dissolved oxygen
  - Increase in
    - Photosynthesis
    - Chemical reactivity
    - Total dissolved solids
    - Conductance
    - Geologic dissolution
    - HABs



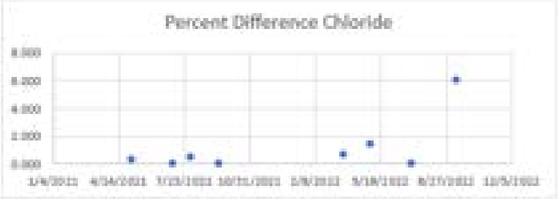




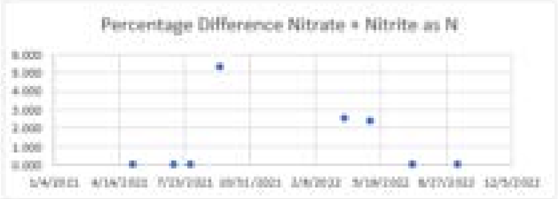
Quality Analysis

	Alkalinity at pH4.5	Control bottle	% Difference
5/5/2021 Lower MK	74	74	0.000
7/6/2021 Lower Mill	71	71	0.000
8/2/2021 Upper MK	42	43	0.588
9/15/2021 Upper Stony	150	150	0.000
3/24/2022 Lower Stony	90	92	0.549
5/4/2022 Lower Mill	50	49	0.505
7/6/2022 Upper MK	62	62	0.000
9/13/2022 Upper MK	55	60	2.174

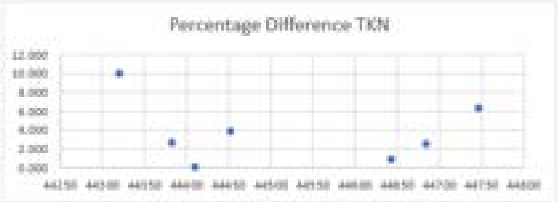
	Chloride	Control bottle	% Difference
5/5/2021 Lower MK	9.9	10	0.251
7/6/2021 Lower Mill	22	22	0.000
8/2/2021 Upper MK	4.9	5	0.505
9/15/2021 Upper Stony	25	25	0.000
3/24/2022 Lower Stony	38	39	0.649
5/4/2022 Lower Mill	17	18	1.429
7/6/2022 Upper MK	<2.5	<2.5	0.000
9/13/2022 Upper MK	3.7	2.9	6.061



	Nitrate + Nitrite as N	Control bottle	% Difference
5/5/2021 Lower MK	<0.1	<0.1	0.000
7/6/2021 Lower Mill	0.14	0.14	0.000
8/2/2021 Upper MK	<0.05	<0.05	0.000
9/15/2021 Upper Stony	0.078	0.063	5.319
3/24/2022 Lower Stony	0.19	0.21	2.500
5/4/2022 Lower Mill	0.1	0.11	2.381
7/6/2022 Upper MK	<0.05	<0.05	0.000
9/13/2022 Upper MK	<0.05	<0.05	0.000

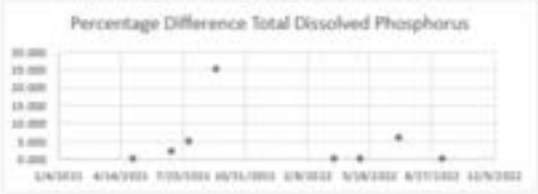


	TKN	Control bottle	% Difference
5/5/2021 Lower MK	0.39	0.26	10.000
7/6/2021 Lower Mill	0.27	0.5	2.632
8/2/2021 Upper MK	0.53	0.53	0.000
9/15/2021 Upper Stony	0.42	0.36	3.846
3/24/2022 Lower Stony	0.32	0.33	0.769
5/4/2022 Lower Mill	0.38	0.42	2.500
7/6/2022 Upper MK	0.89	0.69	6.329
9/13/2022 Upper MK	0.7	0.99	8.580

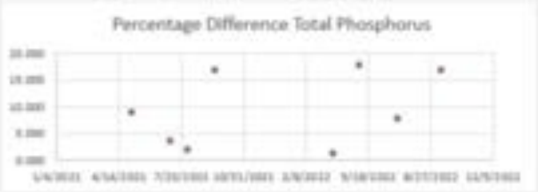


	Total Nitrogen as N	Control bottle	% Difference
5/5/2021 Lower MK	0.49	0.36	7.647
7/6/2021 Lower Mill	0.41	0.44	1.765
8/2/2021 Upper MK	0.58	0.58	0.000
9/15/2021 Upper Stony	0.5	0.42	4.348
3/24/2022 Lower Stony	0.51	0.54	1.429
5/4/2022 Lower Mill	0.48	0.53	2.475
7/6/2022 Upper MK	0.89	0.69	6.329
9/13/2022 Upper MK	0.7	0.99	8.580

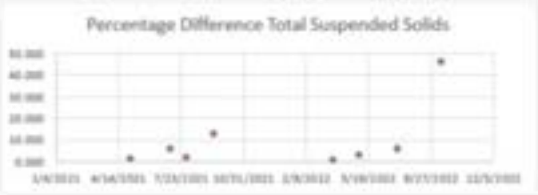
	Total Dissolved Phosphorus	Control bottle	% Difference
5/5/2021 Lower MK	<0.01	<0.01	0.000
7/6/2021 Lower Mill	0.012	0.011	2.174
8/2/2021 Upper MK	0.0084	0.0069	4.902
9/15/2021 Upper Stony	0.03	0.01	[illegible]
3/24/2022 Lower Stony	<0.012	<0.012	0.000
5/4/2022 Lower Mill	<0.012	<0.012	0.000
7/6/2022 Upper MK	0.022	0.028	6.000
9/13/2022 Upper MK	0.02	0.02	0.000



	Total Phosphorus	Control bottle	% Difference
5/5/2021 Lower MK	0.0077	0.011	8.824
7/6/2021 Lower Mill	0.013	0.015	3.571
8/2/2021 Upper MK	0.012	0.013	2.000
9/15/2021 Upper Stony	0.01	0.02	16.667
3/24/2022 Lower Stony	0.021	0.022	1.163
5/4/2022 Lower Mill	0.09	0.043	17.669
7/6/2022 Upper MK	0.067	0.049	7.759
9/13/2022 Upper MK	0.03	0.06	16.667



	Total Suspended Solids	Control bottle	% Difference
5/5/2021 Lower MK	4.1	3.9	1.250
7/6/2021 Lower Mill	1.2	1.5	5.556
8/2/2021 Upper MK	1.2	1.3	2.000
9/15/2021 Upper Stony	3	5	12.500
3/24/2022 Lower Stony	12	12.2	0.413
5/4/2022 Lower Mill	22.6	20.3	2.681
7/6/2022 Upper MK	19.4	15.4	5.747
9/13/2022 Upper MK	1	23.4	[illegible]



>20% difference

Endyne Labs

- Water bottle analysis results

Table 1.3a: Mean concentration and range of surface grab chemical parameters of McKenzie Brook upstream and downstream from May 2021 – November 2022.

Parameter (mg/L)	Upstream Mean	Downstream Mean	Upstream Range	Downstream Range
Alkalinity at pH 4.5 ($CaCO_3$)	53.77	109.56	28 - 150	60 - 150
Chloride (Cl^-)	5.51	11.43	<2.5 - 39	6.1 - 22
Nitrate + Nitrite as N	0.06	0.14	<0.05 - <0.1	<0.05 - 0.34
TKN	0.57	0.34	0.27 - 0.99	0.21 - 0.62
Total Nitrogen as N	0.59	0.44	0.27 – 0.99	0.26 - 0.67
Total Dissolved Phosphorus	0.02	0.02	0.0069 - 0.028	0.005 - 0.063
Total Phosphorus	0.03	0.02	0.01 - 0.067	0.0077 - 0.034
Total Suspended Solids	7.18	6.75	1 – 24	<1 - 28.8
Total Calcium (Ca^{2+})	16.83	34.40	8.5 - 36	20 - 47
Total Magnesium (Mg^{2+})	3.12	6.81	1.70 – 3.70	3.5 - 12
Total Potassium (K^+)	0.74	0.92	0.52 – 0.99	<0.50 - 1.5
Total Sodium (Na^+)	4.52	7.79	2.50 – 4.6	5.2 - 11

Table 1.3b: Mean concentration and range of surface grab chemical parameters of Stony Brook upstream and downstream from May 2021 – November 2022.

Parameter (mg/L)	Upstream Mean	Downstream Mean	Upstream Range	Downstream Range
Alkalinity at pH 4.5 ($CaCO_3$)	121.16	137.44	64 - 160	30 - 180
Chloride (Cl^-)	21.48	48.36	15 - 30	27 - 65
Nitrate + Nitrite as N	0.09	0.16	<0.05 - 0.14	0.07 - 0.34
TKN	0.45	0.38	0.25 - 0.80	0.24 - 0.69
Total Nitrogen as N	0.50	0.65	0.25 - 0.80	0.24 - 4.10
Total Dissolved Phosphorus	0.02	0.02	0.0071 - 0.03	0.0075 - 0.02
Total Phosphorus	0.03	0.05	<0.01 - 0.13	<0.01 - 0.088
Total Suspended Solids	13.12	15.89	<1 - 44.80	<1 - 67.30
Total Calcium (Ca^{2+})	38.32	47.48	19 - 50	30 - 58
Total Magnesium (Mg^{2+})	7.92	8.95	3.90 - 10	5.40 - 12
Total Potassium (K^+)	1.03	1.44	<0.50 - 2.20	0.77 - 3.10
Total Sodium (Na^+)	11.87	27.52	9.10 - 14	16 - 36

Table 1.3c: Mean concentration and range of surface grab chemical parameters of Mill Brook upstream and downstream from May 2021 – November 2022.

Parameter (mg/L)	Upstream Mean	Downstream Mean	Upstream Range	Downstream Range
Alkalinity at pH 4.5 ($CaCO_3$)	41.58	67.52	22 - 56	30 - 140
Chloride (Cl^-)	5.94	22.45	3 - 9.60	7.60 - 35
Nitrate + Nitrite as N	0.08	0.13	<0.05 - 0.16	0.014 - 0.25
TKN	0.33	0.34	0.20 - 0.63	0.20- 0.63
Total Nitrogen as N	0.39	0.47	0.25 - 0.68	0.31 - 0.78
Total Dissolved Phosphorus	0.01	0.01	0.0052 - 0.02	0.005 - 0.021
Total Phosphorus	0.02	0.07	0.0087 - 0.039	<0.01 - 0.53
Total Suspended Solids	5.09	15.88	<1 - 33.20	<1 - 69.30
Total Calcium (Ca^{2+})	13.40	23.31	6.50 - 23	11 - 43
Total Magnesium (Mg^{2+})	2.26	4.68	1.1 - 3.9	2.20 - 9.30
Total Potassium (K^+)	0.58	0.86	<0.50 - 0.77	<0.50 - 1.80
Total Sodium (Na^+)	4.28	13.83	1.90 - 6.80	5.70 - 22

LaBella Associates

- Took raw data from Endyne and prepared water quality graphs to show change over time to be able to infer or draw conclusions from

Alkalinity

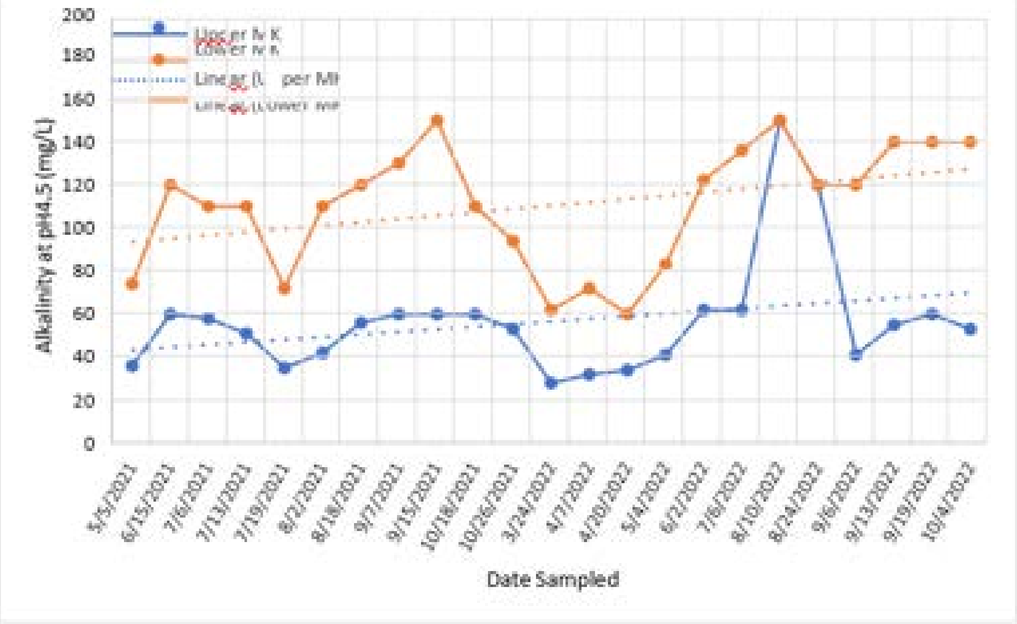


Figure 1.3.1a: Alkalinity at pH 4.5 (mg/L) concentrations from seasonal water quality sampling dates for McKenzie Brook.

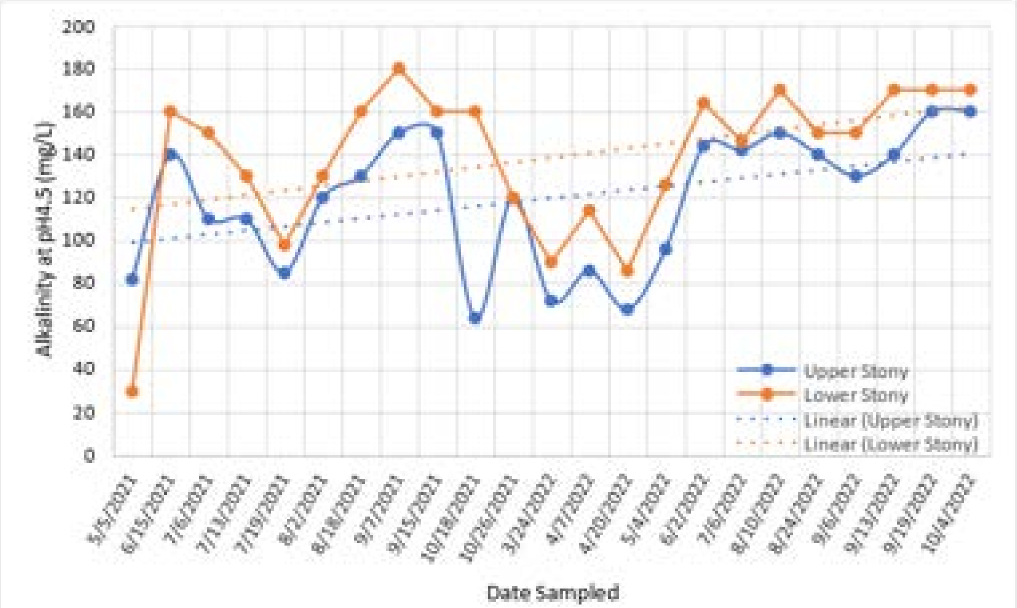


Figure 1.3.1b: Alkalinity at pH 4.5 (mg/L) concentrations from seasonal water quality sampling dates for Stony Brook.

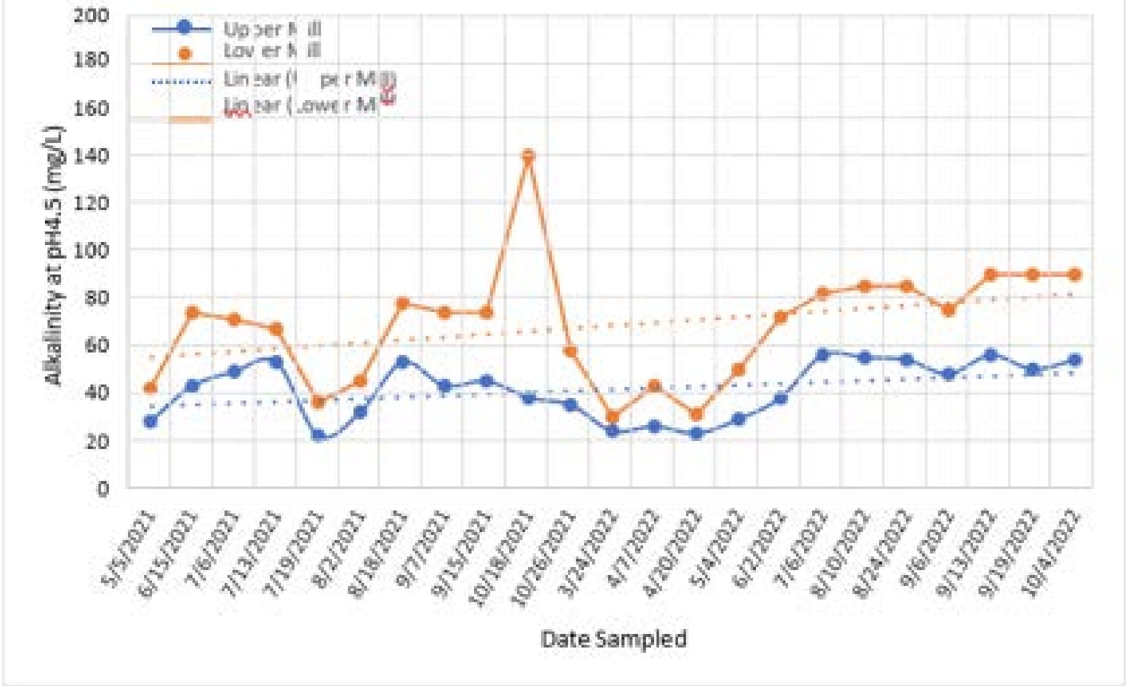


Figure 1.3.1c: Alkalinity at pH 4.5 (mg/L) concentrations from seasonal water quality sampling dates for Mill Brook.

Chloride

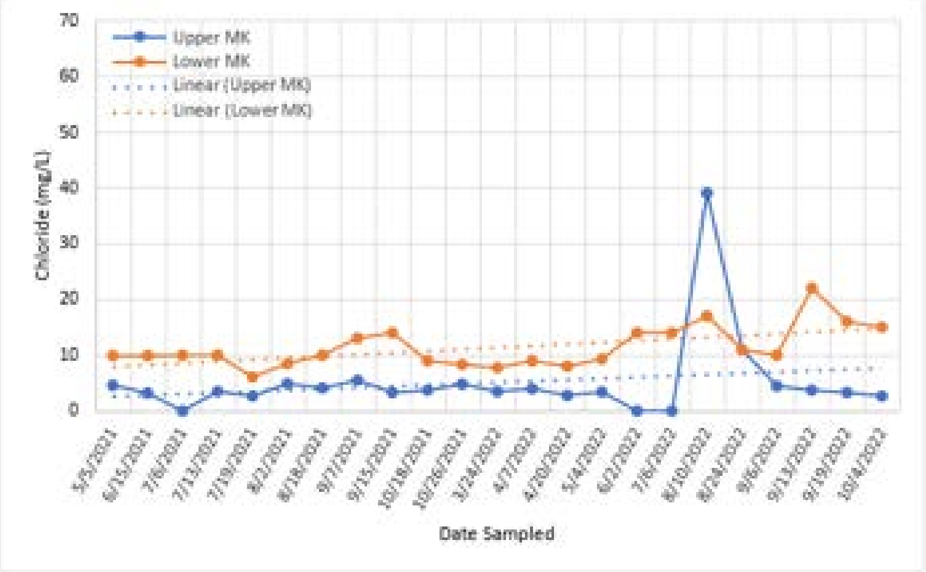


Figure 1.3.1d: Chloride (mg/L) concentrations from seasonal water quality sampling dates for McKenzie Brook.

Figure 1.3.1e: Chloride (mg/L) concentrations from seasonal water quality sampling dates for Stony Brook.

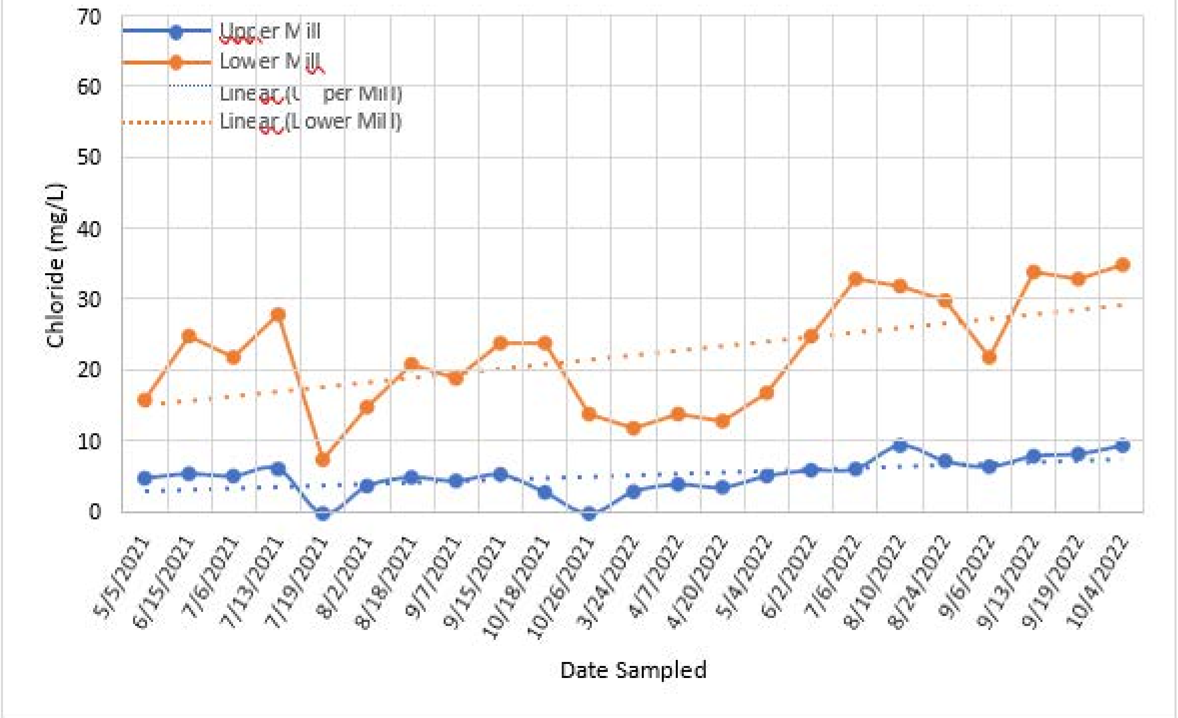


Figure 1.3.1f: Chloride (mg/L) concentrations from seasonal water quality sampling dates for Mill Brook.

McKenzie Brook: Total Calcium, Magnesium, Potassium and Sodium

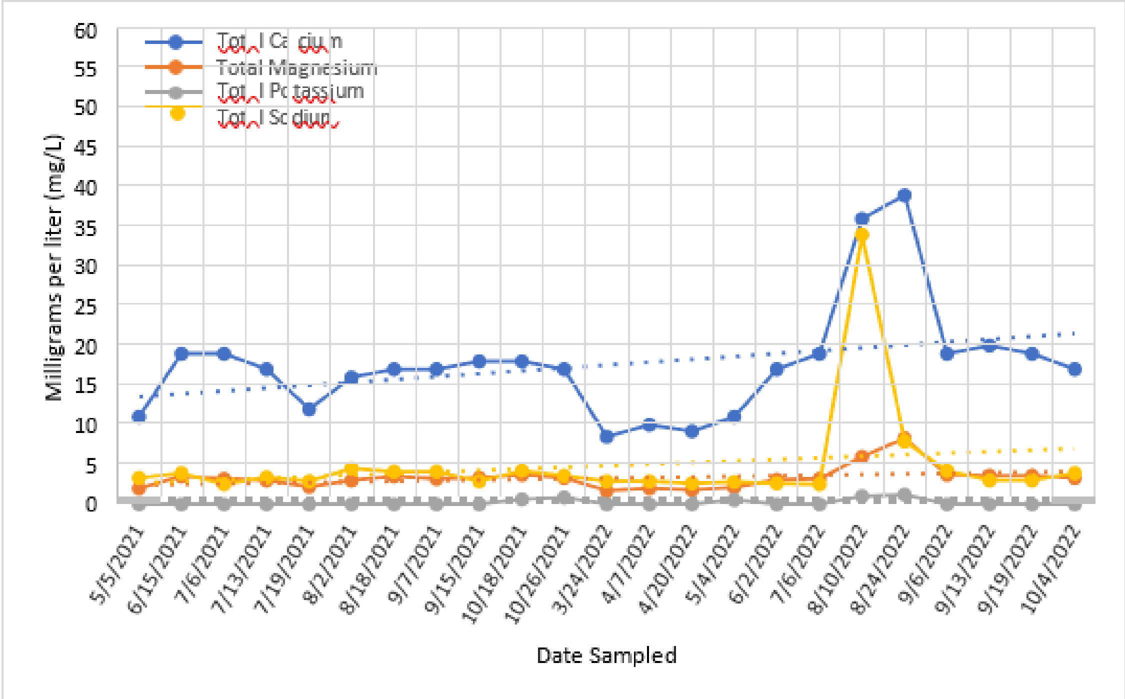


Figure 1.3.1g: Total calcium, total magnesium, total potassium, and total sodium milligrams per liter (mg/L) concentrations from seasonal water quality sampling dates for McKenzie Brook upstream.

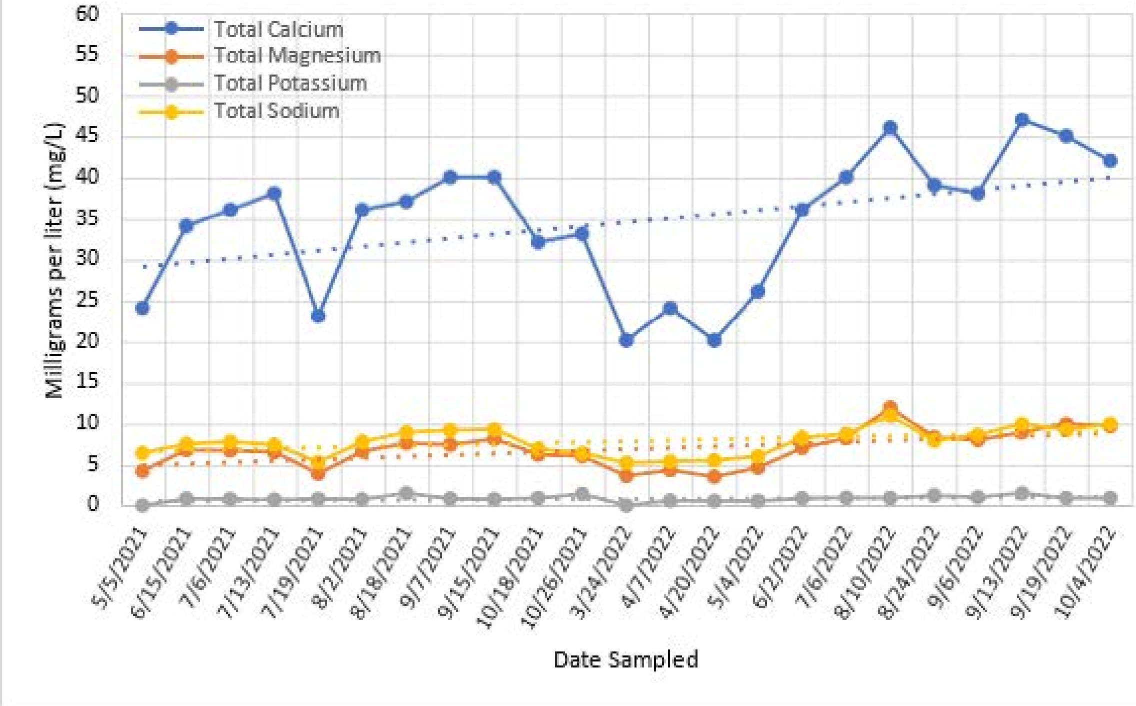


Figure 1.3.1h: Total calcium, total magnesium, total potassium, and total sodium milligrams per liter (mg/L) concentrations from seasonal water quality sampling dates for McKenzie Brook downstream.

McKenzie Brook Upstream

McKenzie Brook Downstream

Stony Brook: Total Calcium, Magnesium, Potassium and Sodium

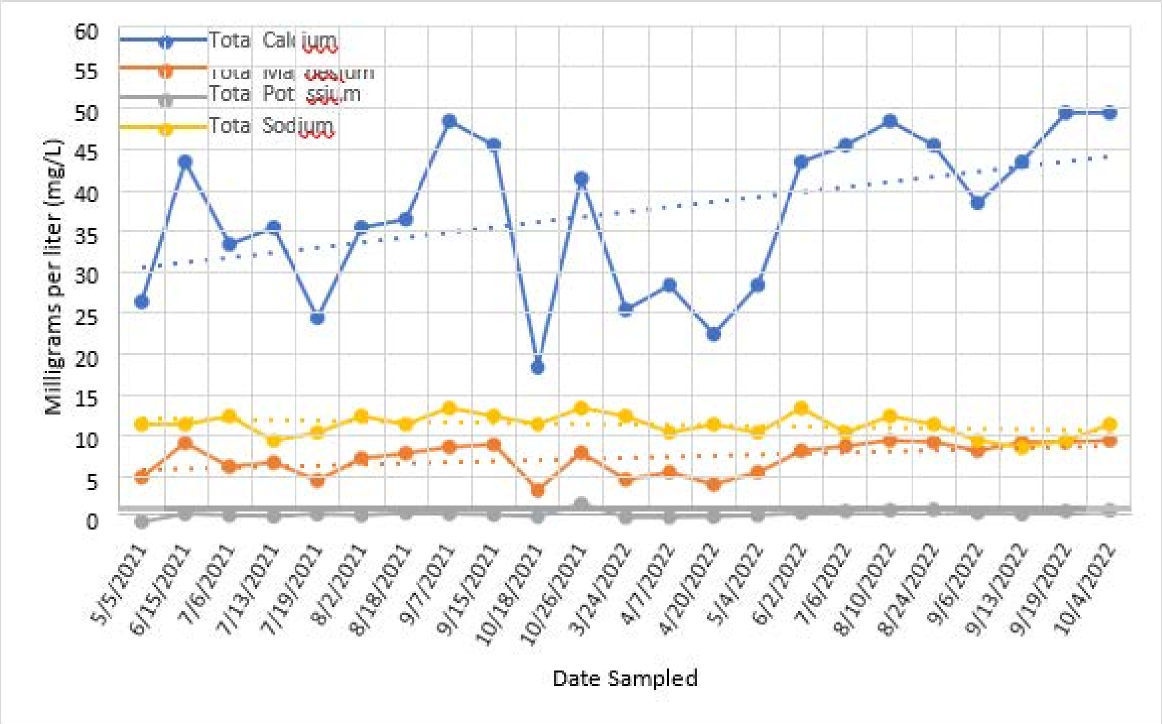


Figure 1.3.1i: Total calcium, total magnesium, total potassium, and total sodium milligrams per liter (mg/L) concentrations from seasonal water quality sampling dates for Stony Brook upstream.

Stony Brook Upstream

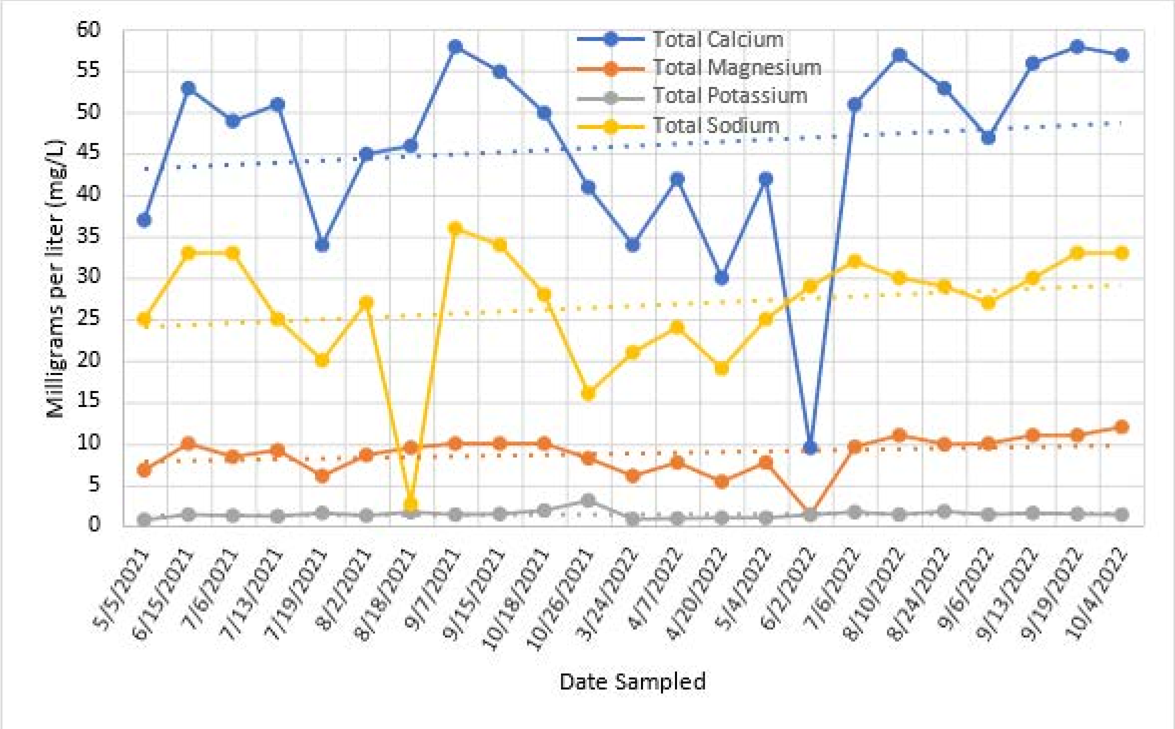


Figure 1.3.1j: Total calcium, total magnesium, total potassium, and total sodium milligrams per liter (mg/L) concentrations from seasonal water quality sampling dates for Stony Brook downstream.

Stony Brook Downstream

Mill Brook: Total Calcium, Magnesium, Potassium and Sodium

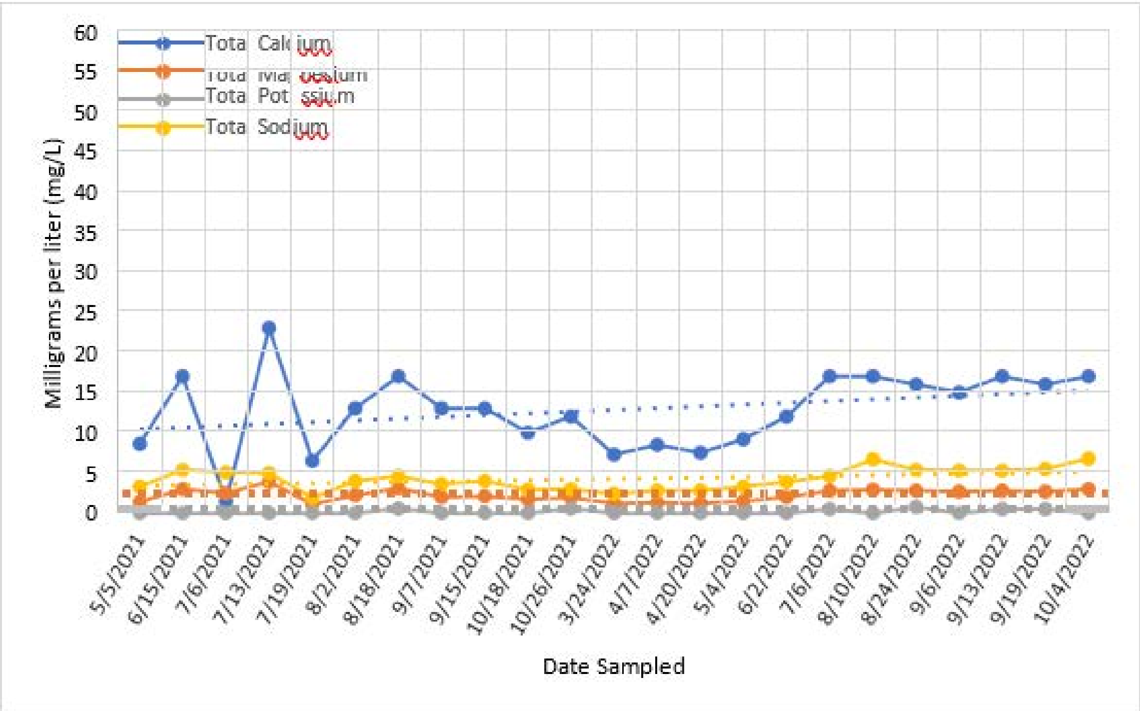


Figure 1.3.1k: Total calcium, total magnesium, total potassium, and total sodium milligrams per liter (mg/L) concentrations from seasonal water quality sampling dates for Mill Brook upstream.

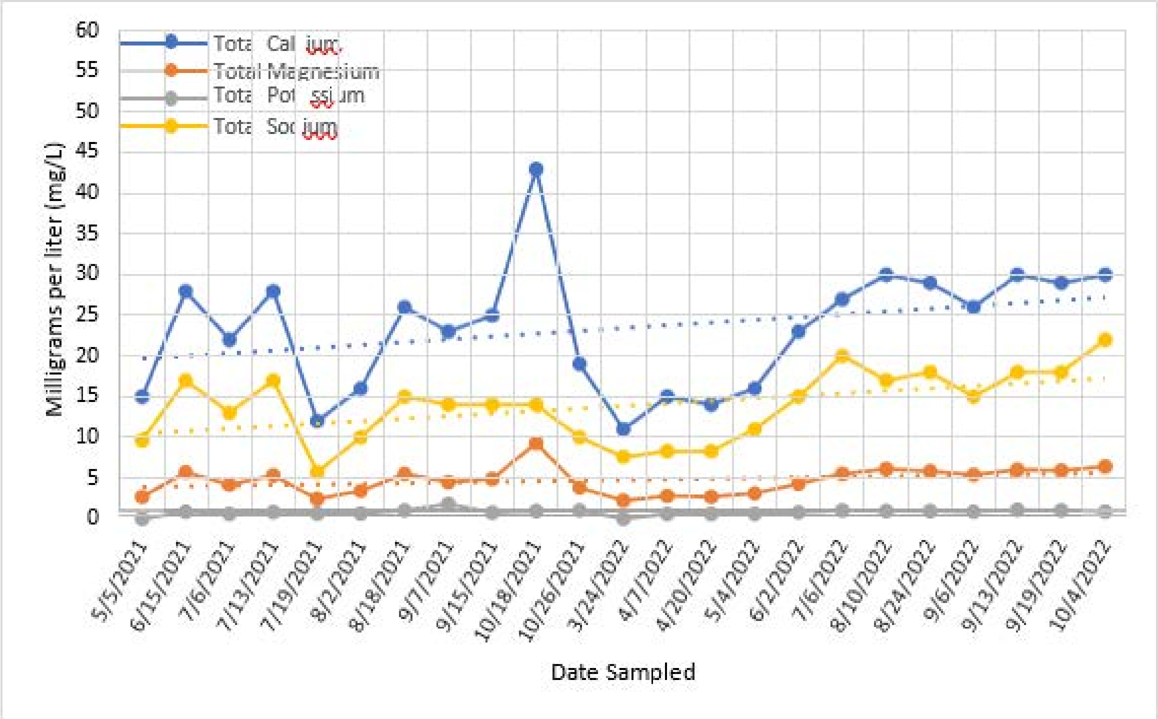


Figure 1.3.1l: Total calcium, total magnesium, total potassium, and total sodium milligrams per liter (mg/L) concentrations from seasonal water quality sampling dates for Mill Brook downstream.

Mill Brook Upstream

Mill Brook Downstream

Nitrate/Nitrite

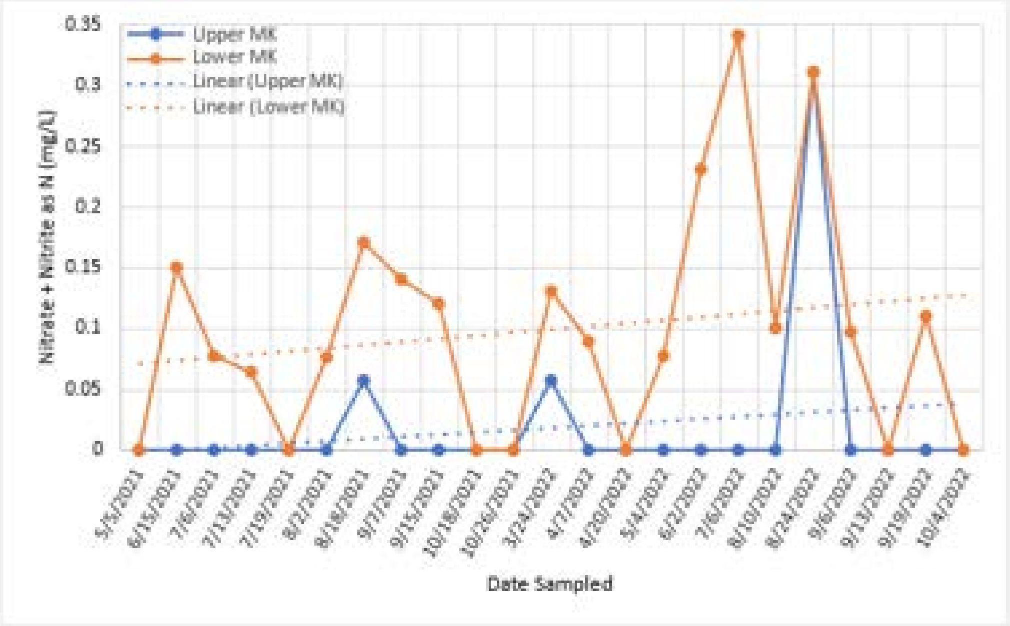


Figure 1.3.2a: Nitrate + nitrite as N (mg/L) concentrations from seasonal water quality sampling dates for McKenzie Brook.

McKenzie Brook

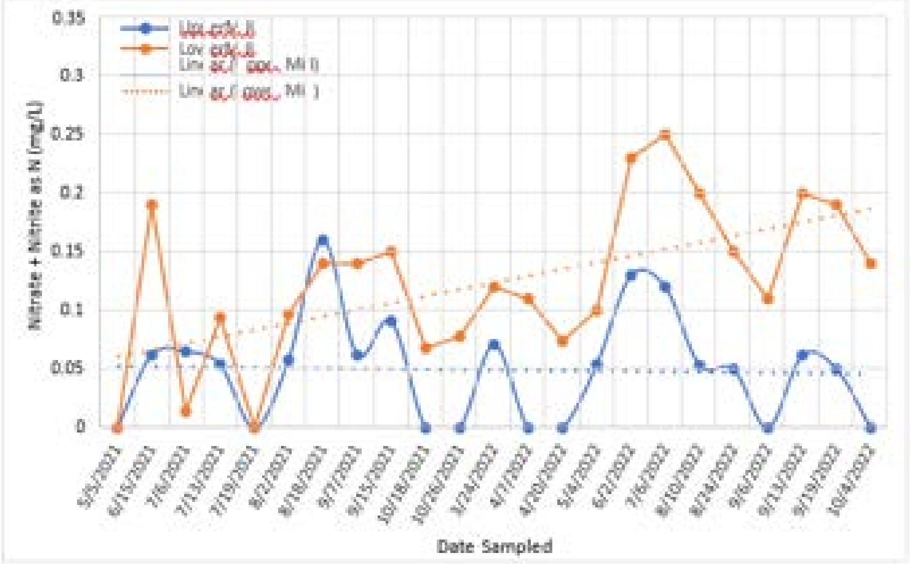


Figure 1.3.2c: Nitrate + nitrite as N (mg/L) concentrations from seasonal water quality sampling dates for Mill Brook.

Mill Brook

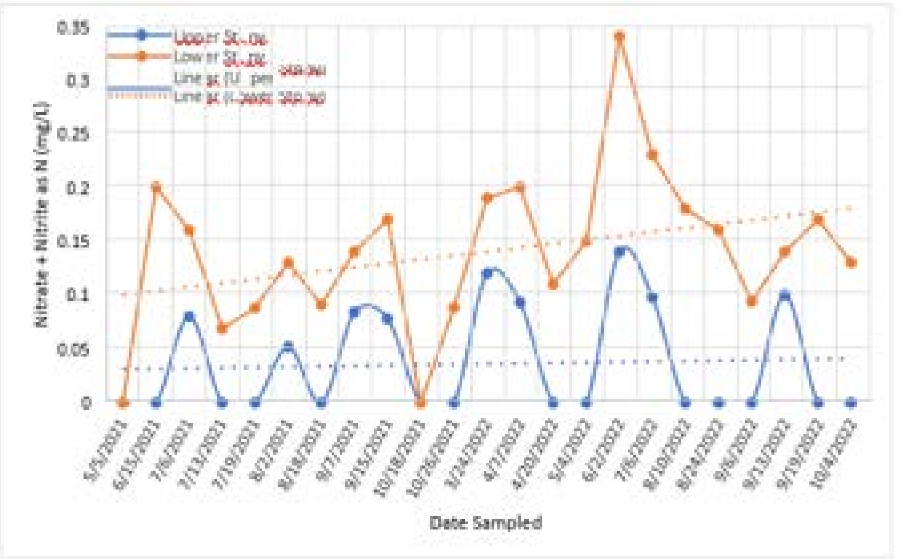


Figure 1.3.2b: Nitrate + nitrite as N (mg/L) concentrations from seasonal water quality sampling dates for Stony Brook.

Stony Brook

Mean TKN

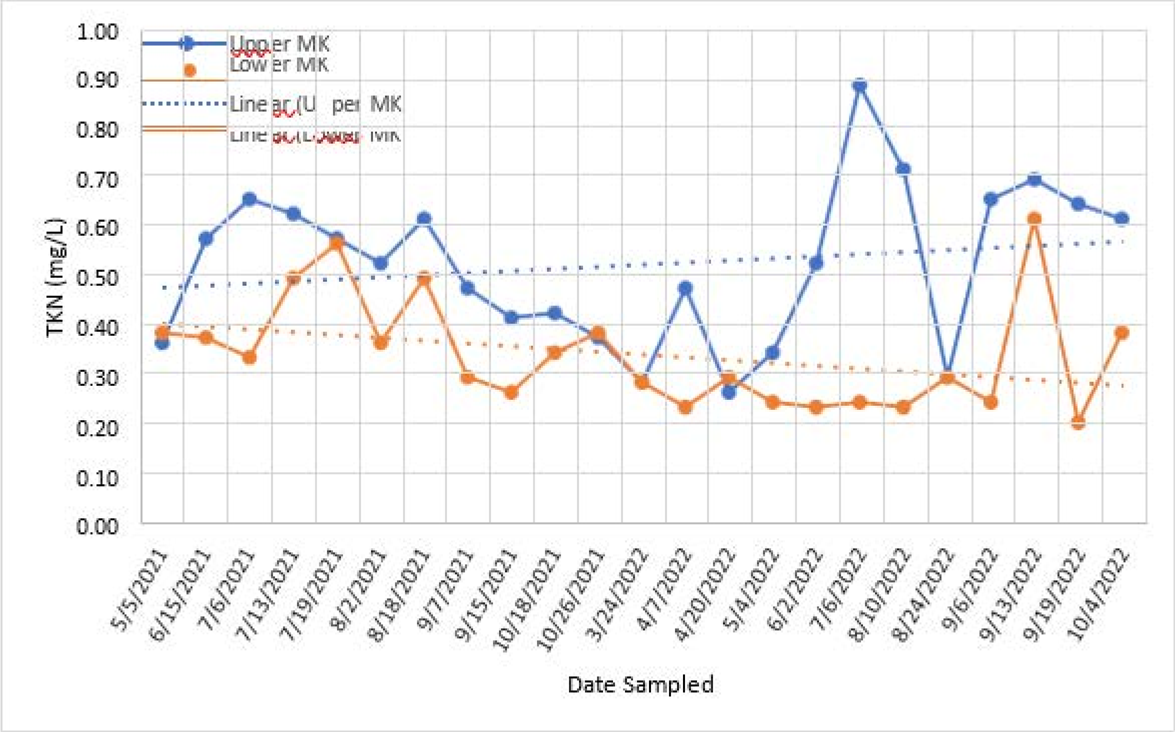


Figure 1.3.2d: TKN (mg/L) concentrations from seasonal water quality sampling dates for McKenzie Brook.

McKenzie Brook

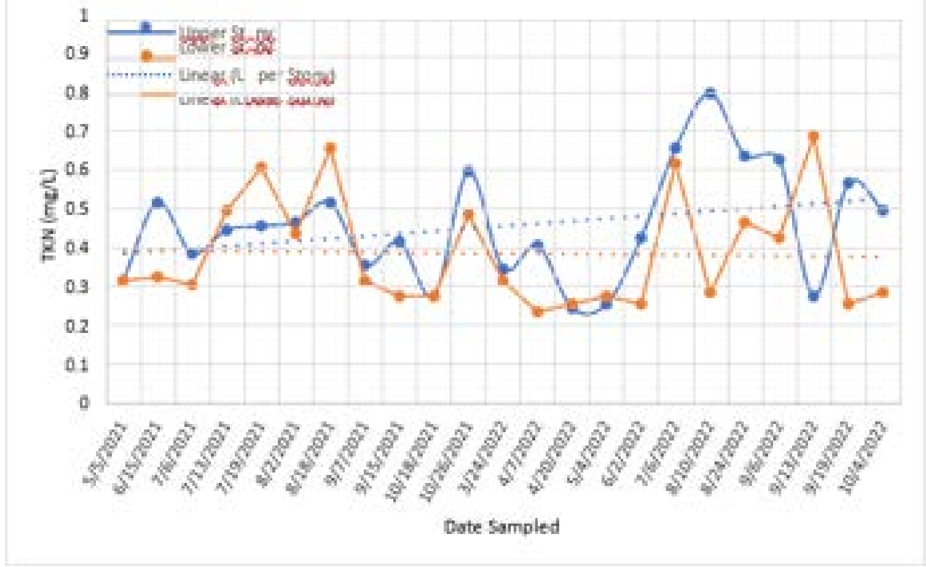


Figure 1.3.2e: Total Kjeldahl nitrogen (mg/L) concentrations from seasonal water quality sampling dates for Stony Brook.

Stony Brook

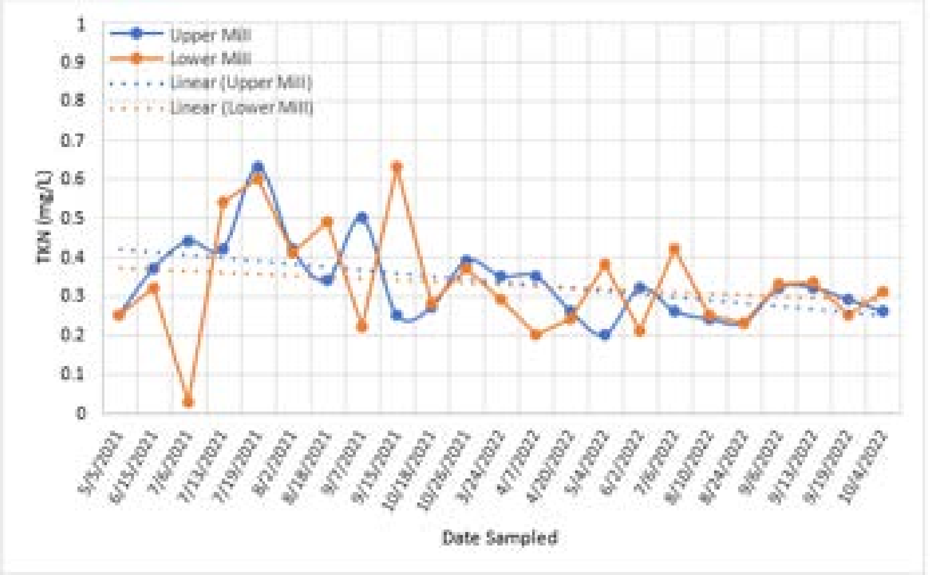


Figure 1.3.2f: Total Kjeldahl nitrogen (mg/L) concentrations from seasonal water quality sampling dates for Mill Brook.

Mill Brook

Total Nitrogen

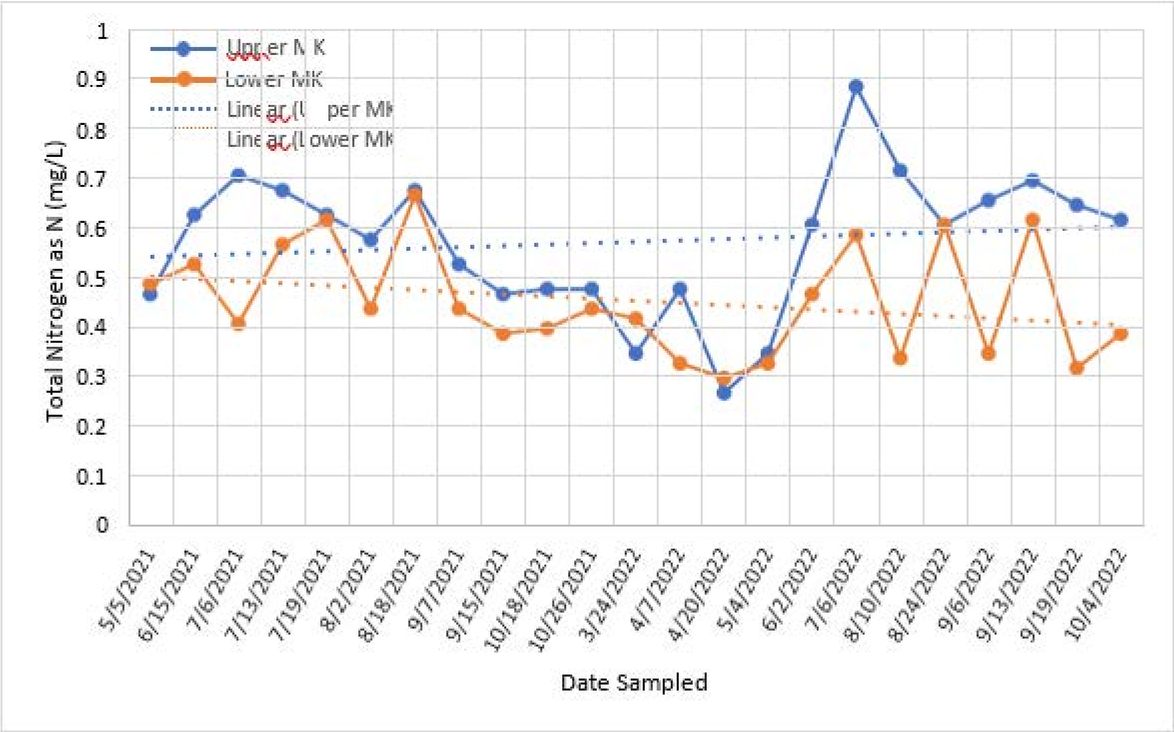


Figure 1.3.2g: Total nitrogen (mg/L) concentrations from seasonal water quality sampling dates for McKenzie Brook.

McKenzie Brook

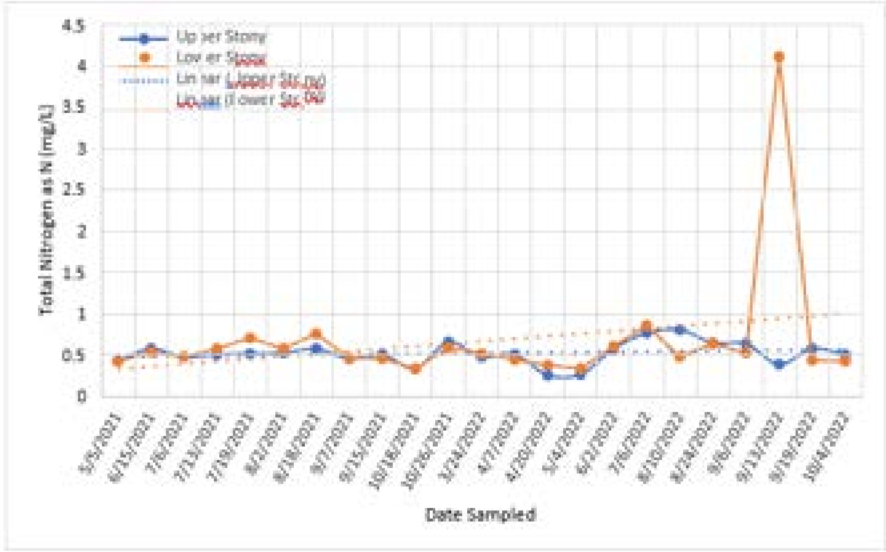


Figure 1.3.2h: Total nitrogen (mg/L) concentrations from seasonal water quality sampling dates for Stony Brook.

Stony Brook

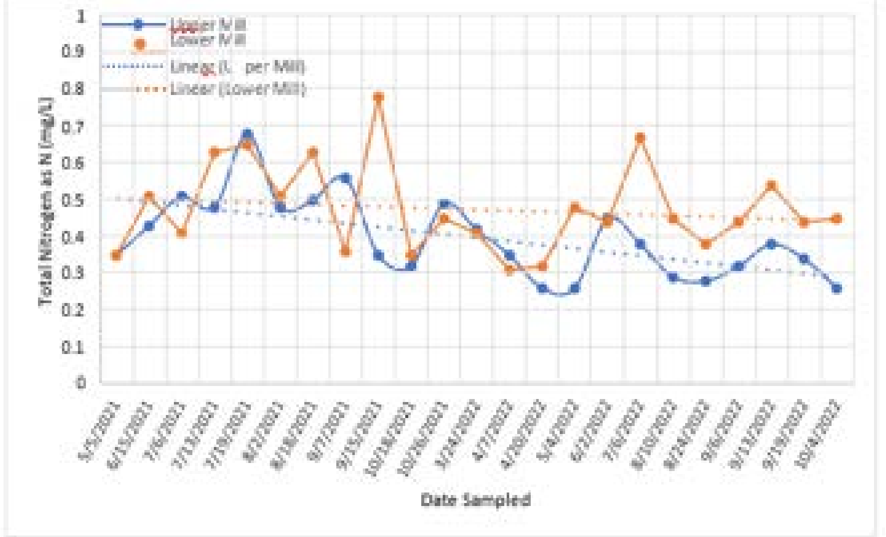


Figure 1.3.2i: Total nitrogen (mg/L) concentrations from seasonal water quality sampling dates for Mill Brook.

Mill Brook

Total Dissolved Phosphorus

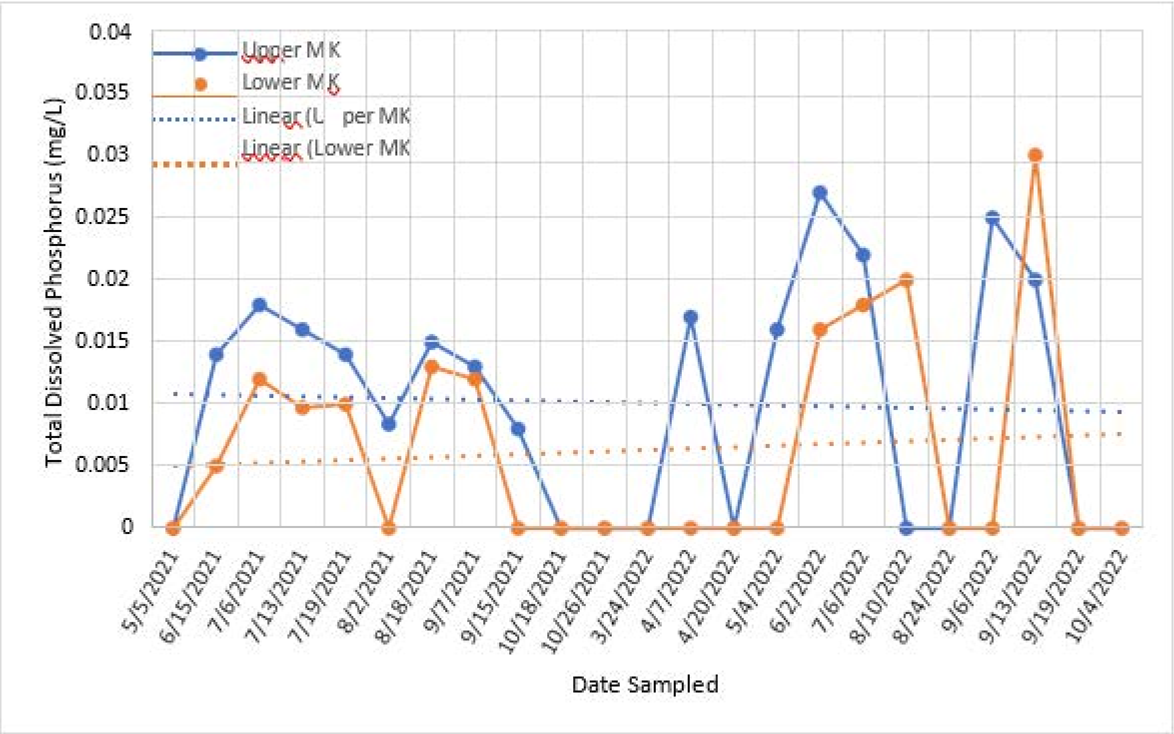


Figure 1.3.3a: Total dissolved phosphorus (mg/L) concentrations from seasonal water quality sampling dates for McKenzie Brook.

McKenzie Brook

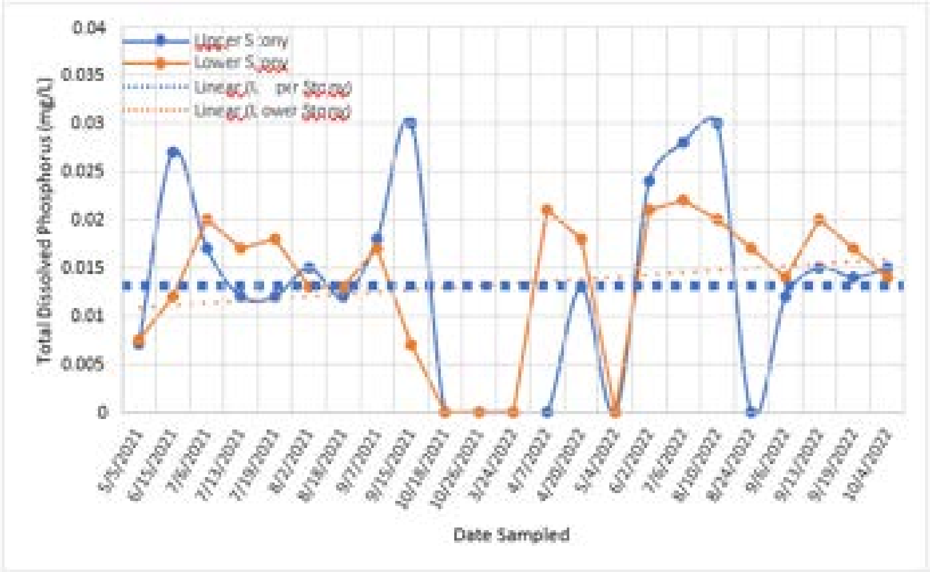


Figure 1.3.3b: Total dissolved phosphorus (mg/L) concentrations from seasonal water quality sampling dates for Stony Brook.

Stony Brook

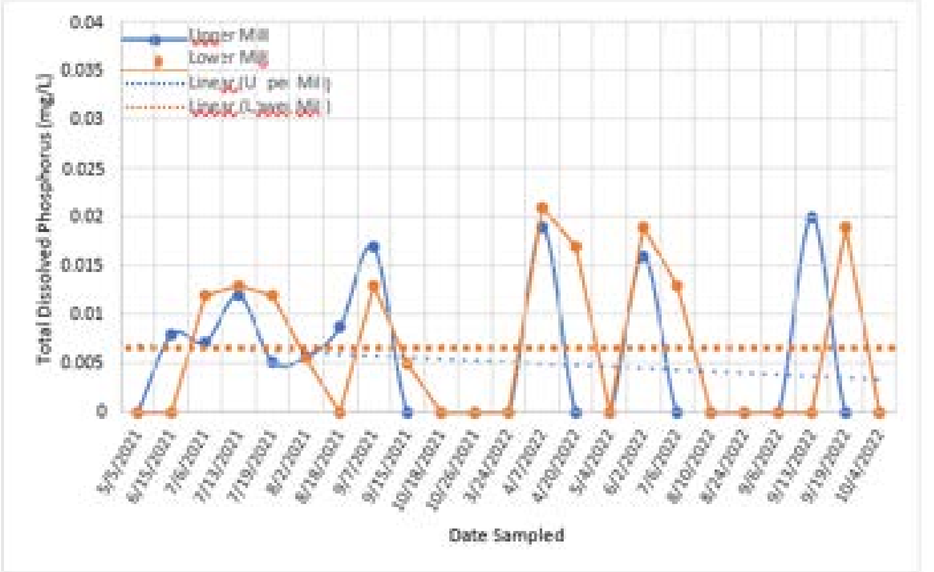


Figure 1.3.3c: Total dissolved phosphorus (mg/L) concentrations from seasonal water quality sampling dates for Mill Brook.

Mill Brook

Total Phosphorus

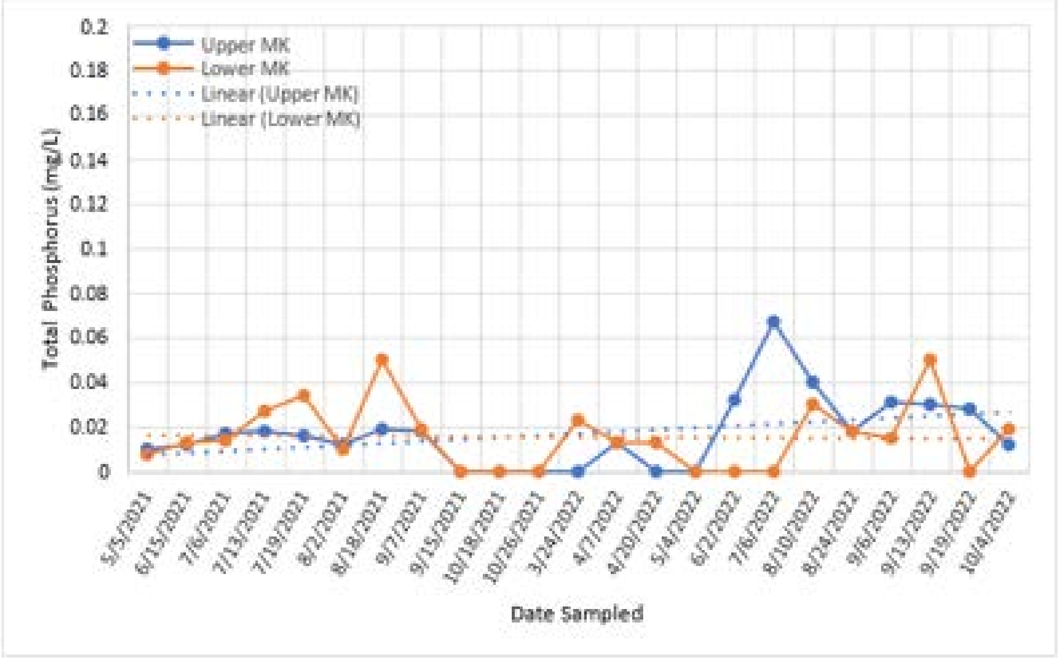


Figure 1.3.3d: Total phosphorus (mg/L) concentrations from seasonal water quality sampling dates for McKenzie Brook.

McKenzie Brook

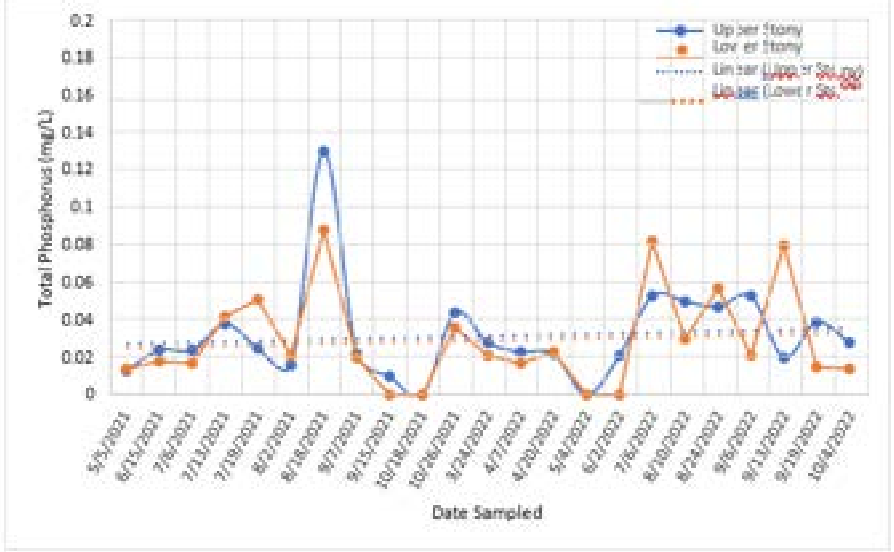


Figure 1.3.3e: Total phosphorus (mg/L) concentrations from seasonal water quality sampling dates for Stony Brook.

Stony Brook

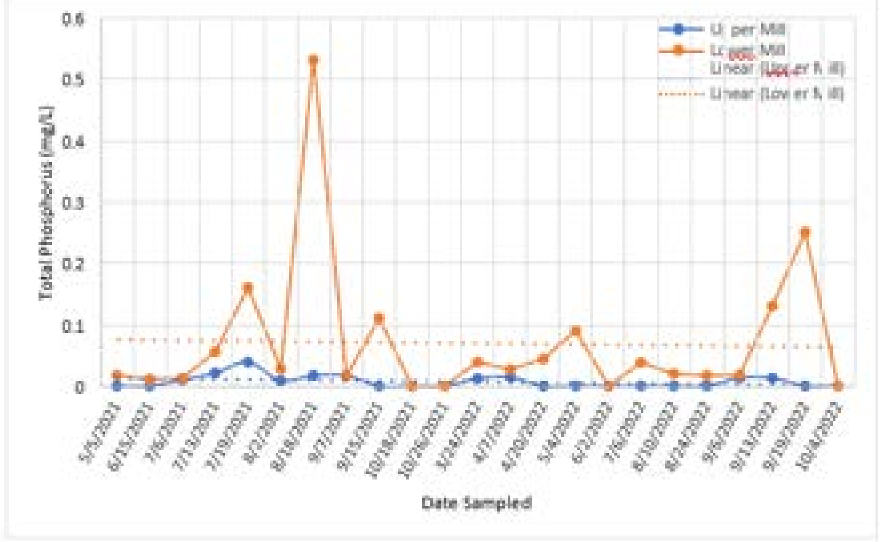


Figure 1.3.3f: Total phosphorus (mg/L) concentrations from seasonal water quality sampling dates for Mill Brook.

Mill Brook

Total Suspended Solids

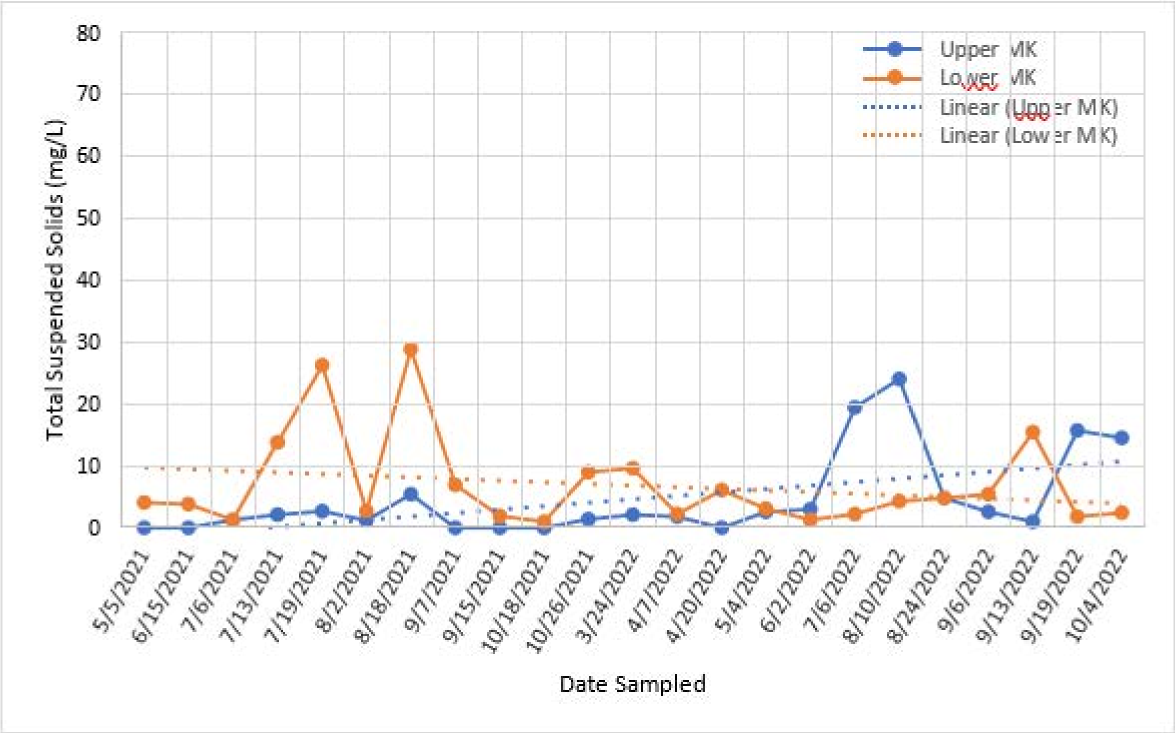


Figure 1.3.4a: Total suspended solids (mg/L) concentrations from seasonal water quality sampling dates for McKenzie Brook.

McKenzie Brook

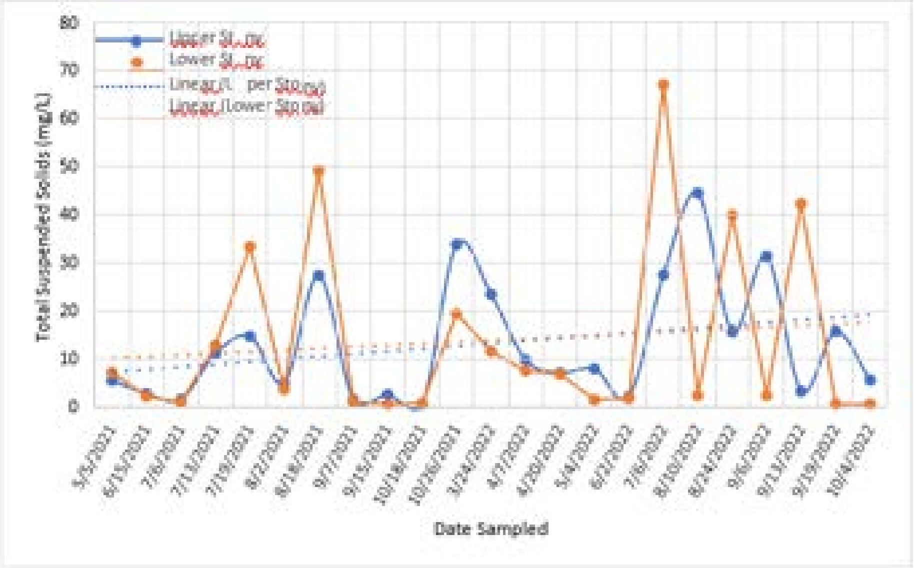


Figure 1.3.4b: Total suspended solids (mg/L) concentrations from seasonal water quality sampling dates for Stony Brook.

Stony Brook

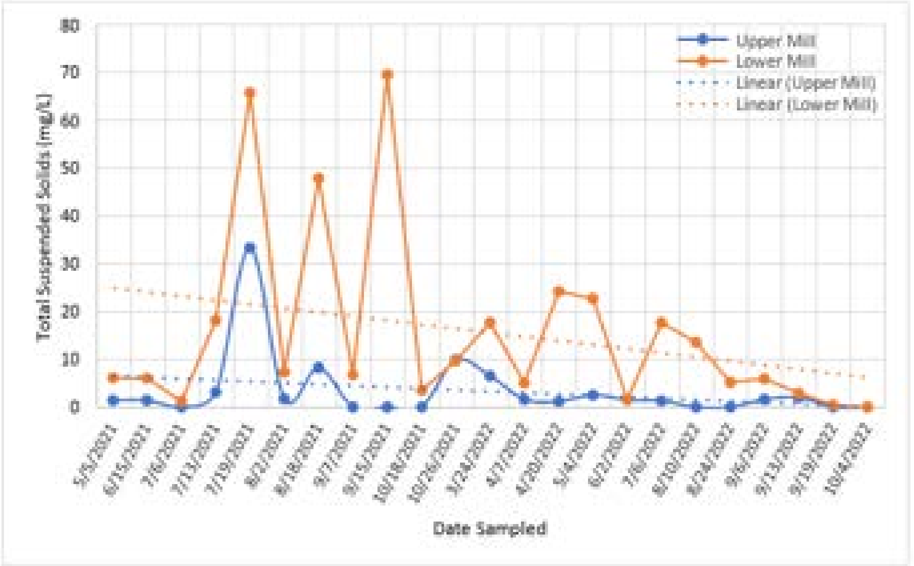


Figure 1.3.4c: Total suspended solids (mg/L) concentrations from seasonal water quality sampling dates for Mill Brook.

Mill Brook

Mean Concentration Ranking Of Streams

Parameter (mg/L)	Highest Concentration	Intermediate Concentration	Lowest Concentration
Alkalinity at pH 4.5	Stony Brook	McKenzie Brook	Mill Brook
Chloride	Stony Brook	Mill Brook	McKenzie Brook
Nitrate + Nitrite as N	Stony Brook	Mill Brook	McKenzie Brook
TKN	McKenzie Brook	Stony Brook	Mill Brook
Total Nitrogen as N	McKenzie Brook	Stony Brook	Mill Brook
Total Dissolved Phosphorus	Stony Brook	McKenzie Brook	Mill Brook
Total Phosphorus	Mill Brook	Stony Brook	McKenzie Brook
Total Suspended Solids	Stony Brook	Mill Brook	McKenzie Brook
Total Calcium	Stony Brook	McKenzie Brook	Mill Brook
Total Magnesium	Stony Brook	McKenzie Brook	Mill Brook
Total Potassium	Stony Brook	McKenzie Brook	Mill Brook
Total Sodium	Stony Brook	Mill Brook	McKenzie Brook

How Can We Assist Our Municipalities?

- Identify and create a prioritized replacement list of culverts and bridges
- Help with grant-funded upgrades to crossings
- Get nuisance crossings into County Hazard Mitigation Plan
  - Will enable faster response and greater likelihood of FEMA assistance for future destructive events

Aquatic Crossings

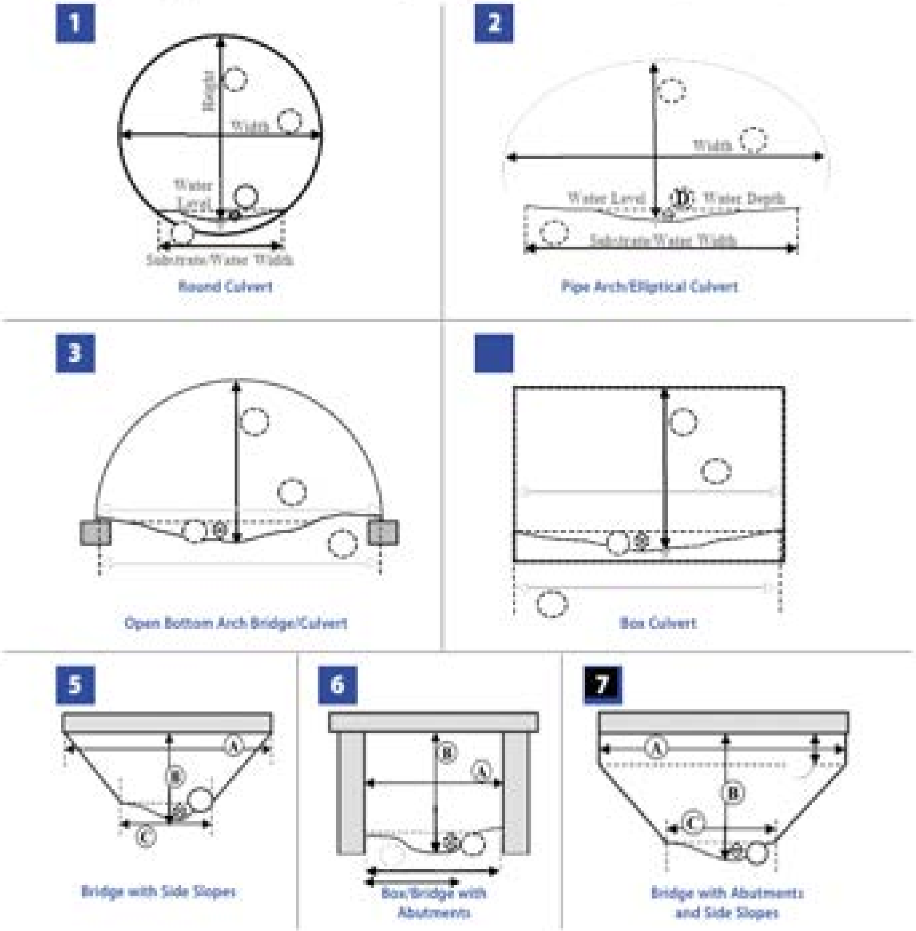
- How is our aging infrastructure faring?
- Are the crossings that were built 100 years ago still doing their intended job? Have we learned anything that we can change as we repair and replace structures
- As flood events impact the county with greater frequency, are we keeping up with the changing needs for these structures?
  - When a culvert is replaced, are we making it easier for aquatic organisms to pass by and continue up/downstream?
    - If we replace our manmade barriers with better ones, the Brook Trout and Atlantic Salmon have a greater chance of returning

How do we know?

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).
culvert (grey arrows below show measuring to bottom, black arrows show measuring to substrate).



Stream:	NAACC Crossing #:	Structure Type:	Priority Rank:	Priority Points:
McKenzie Brook #11	xy4403007373541475	Multi-Culvert	1	12

Concern:	Crossing Score:
Structural	3 – deformed and inappropriate sizing
AOP	3 – severe limitation for AOP
Catchment	3 – high risk
Flood	3 – high risk

Specifics: McKenzie crossing #11 is a dual-culvert which is undersized and deformed, fails to provide AOP, is a catchment risk for debris, and lies within a flood-prone section of river. While this site has a low risk to the community if it were to fail, it is expected that this crossing would be a lower cost replacement and should be prioritized for future replacement.

Stream:	NAACC Crossing #:	Structure Type:	Priority Rank:	Priority Points:
McKenzie Brook #7	xy4403630773502655	Box Culvert	2	11

Concern:	Crossing Score:
Structural	3 – deformed and fill beginning to fall through gap in structure
AOP	2 – limited AOP
Catchment	3 – debris clearly an issue as removal was necessary to take measurements
Flood	3 – flooded entrance to farm preventing access for days according to farmer

Specifics: McKenzie crossing #7 is a private entrance to a farm. This box culvert was washed away and replaced in July of 2024. The very same box culvert was recovered and reused by the landowner once the flooding subsided. It is expected that this culvert will create issues again, as its replacement already shows signs of structural failure. AOP is reduced and could be improved with an open bottom culvert or bridge. Failure of this structure would prevent access to the farm. It is recommended that this structure be upgraded and replaced.

What Did We Find?

Crossing Number	River	NAACC Crossing Code	Crossing Type	NAACC Evaluation	Road	NAACC Culvert ID	Structure Length (ft)	Structure Height (ft)	Structure Width (ft)	NAACC Priority of Crossing Replacement	Aquatic Passability Score	Constriction Severity	Crossing Condition	Last Checked	Structural Need	AOP Need	Flood Risk	Catchment risk for debris	Community Threat - Consequences for community if crossing fails	Difficulty of replacement (access and expenses)	priority points	rank
1	McKenzie Brook	xy4403564473461340	Bridge	Minor barrier	Railroad	71415	10.2	4.4	43.5	Low	0.8	none	OK	2019	med	low	low	high	Massive--	extreme	7	6
2	McKenzie Brook	xy4403564873461887	Bridge	No barrier	9N	49561	32	6.5	50	Low	0.97	none	OK	2024	low	low	v. low	low	high--mai	high	4	9
3	McKenzie Brook	xy4403632773471356	Bridge	No barrier	unknown	104942	100	23	34	Low	0.91	minor	OK	2024	OK	low	low	low	Low--old	no need unt	4	10
4	McKenzie Brook	xy4403685773471960	Bridge	Insignificant b	Lake view R	37014	30	11.1	14.5	Low	0.87	none	OK	2017	low	low	low	med	low	low	5	8
5	McKenzie Brook	xy4403593073474091	Bridge	Insignificant b	Lakeview A	105366	23	23	34	Low	0.92	none	OK	2024	low	low	low	low	low	no need unt	4	11
6	McKenzie Brook	xy4402903273486893	Culvert	Severe barrie	Fisk rd	37017	48.5	8.7	14.2	Med	0.09	none	OK	2016	high	high	med	med	low	med	10	3
7	McKenzie Brook	xy4403630773502655	Box Culver	Moderate ba	Sprague dri	105611	23.5	6.5	4.5	High	0.44	severe	poor	2024	high	med	high	high	low	med	11	2
8	McKenzie Brook	xy4403704373503395	Culvert	Insignificant b	S. Moriah r	37015	29	7	12	Med	0.87	none	OK	2016	low	low	low	med	low	med	5	7
9	McKenzie Brook	xy4404534773513842	Bridge	Severe barrie	Windy Hill R	48268	31.2	4.3	9.1	Med	0	none	OK	2017	med	high	low	med	low	med	8	5
10	McKenzie Brook	xy4404031373538787	Culvert	Moderate ba	Windy hill r	37022	29	5.2	8.8	Low	0.52	none	OK	2016	med	med	high	high	low	med	10	4
11	McKenzie Brook	xy4403007373541475	Multi-Culv	Severe barrie	Mutton hol	37021	35	2	2	High	0.19	minor	OK	2016	high	high	high	high	low	low	12	1
1	Mill Brook	xy4405131773452480	Bridge	Insignificant b	Dock Ln	37016	25.5	4.8	10.7	Low	0.94	none	OK	2016	low	low	med	med	low	med	6	10
2	Mill Brook	xy4405176673455522	Bridge	Insignificant b	Railroad	71320	16	9	41.5	High	0.94	none	OK	2019	low	low	med	high	massive	extreme	6	8
3	Mill Brook	xy4405246673455702	Bridge	No barrier	Dock St	49563	25	5	30	Low	0.95	minor	OK	2024	low	low	med	med	low	med	6	9
4	Mill Brook	xy4405387973456526	Bridge	No barrier	N Main St	49562	40	33	150	Low	0.87	none	OK	2024	none	low	none	none	high--mai	extreme	4	18
5	Mill Brook	xy4404948373467952	Bridge	No barrier	Stone St	49564	25	12	30	Low	0.99	none	OK	2024	low	low	med	low	med	med	5	11
6	Mill Brook	xy4404862773475349	Bridge	old dam cross	Petro's RV	71321	16.5	23.5	85	High - l	0.94	minor	poor	2024	dangerous	low	low	low	low	med	danger (9)	public danger
7	Mill Brook	xy4405104473478881	Culvert	Insignificant b	Private (For	70322	13	10.3	30.1	Low	0.87	none	OK	2019	med	low	med	high	low	med	8	5
8	Mill Brook	xy4405267573479558	Bridge	No barrier	Forge Hollo	49360	18	12	18	Low	0.83	none	OK	2024	low	med	high	med	med--mai	high	8	6
9	Mill Brook	xy4406152973507947	Bridge	No barrier	Titus Rd	47296	30	16.5	70	Low	0.96	none	new	2024	low	low	low	low	high--mai	high	4	15
10	Mill Brook	xy4406142373510011	Bridge	No barrier	Witherbee	47295	40	13.6	32	Low	0.91	none	OK	2024	low	low	low	low	high--mai	high	4	14
11	Mill Brook	xy4405698873527925	Bridge	Insignificant b	before furn	105257	16.2	7.5	14	Low	0.9	minor	OK	2024	med	low	med	med	low	med	7	7
12	Mill Brook	xy4405341573539193	Bridge	Insignificant b	Driveway -	62314	13	7.5	21	High	0.97	none	OK	2018	high	med	high	high	low	low	11	4
13	Mill Brook	xy4405291973542738	Bridge	Minor barrier	old overgro	105246	12	4	13.5	High	0.62	severe	poor	2024	med	high	high	high	low	med	11	1
14	Mill Brook	xy4405274673550602	Bridge	Insignificant b	Crowfoot r	36892	31	6.8	25.5	Low	0.95	nonr	OK	2016	low	low	low	low	low	high	4	16
15	Mill Brook	xy4405007073556133	Bridge	Minor barrier	Unknown	105255	14.2	5	23	Low	0.96	none	new	2024	low	low	med	low	low	med	5	12
16	Mill Brook	xy4403967673566439	Bridge	Insignificant b	Ensign Pond	105247	30	14.5	56.5	Med	0.95	none	new, thou	2024	low	low	low	low	high--mai	high	4	17
17	Mill Brook	xy4403890873573004	Multi-Culv	Minor barrier	Ensign pond	36893	60	5.6	5.6	High	0.72	none	poor	2016	high	med	high	high	low	low	11	2
18	Mill Brook	xy4403709873586892	Bridge	Insignificant b	unnamed	105256	12	6.7	11	Low	0.89	none	new	2024	low	low	med	low	low	med	5	13
19	Mill Brook	xy4403568173597615	Culvert	Minor barrier	Ensign Pond	105248	40	5.6	12	High	0.68	severe	poor	2024	high	med	high	high	med	med	11	3
1	Stony Brook	xy4403886873460453	Culvert	Minor barrier	Harbour Ln	48609	250	5	6	Med	0.73	moderate	OK	2017	high	med	high	high	med	med	11	3
2	Stony Brook	xy4403892073461390	Bridge	Insignificant b	Railroad	71414	10	5	11	High	0.94	none	OK	2019	med	med	med	high	massive--	extreme	9	12
3	Stony Brook	xy4403891973461782	Bridge	Insignificant b	Main st	37011	44	6	8	High	0.95	none	OK	2016	high	med	med	high	low	med	10	10
4	Stony Brook	xy4403831173466611	Culvert	Severe barrie	Bridge st	37018	40	6.6	9.3	High	0.09	none	OK	2016	high	high	med	high	med	med	11	8
5	Stony Brook	xy4403830073469778	Bridge	Insignificant b	Unnamed t	51492	6.5	9.2	13.1	Med	0.91	moderate	poor	2024	dangerous	med	low	high	low	med	danger (10)	public danger
6	Stony Brook	xy4404518673474307	Culvert	Insignificant b	Golf course	105258	14	2.6	3.2	High	0.85	none	poor	2024	high	med	high	high	low	low	11	7
7	Stony Brook	xy4404435673473875	Culvert	Moderate ba	Golf course	105259	23.4	3.1	2.9	High	0.42	severe	deformati	2024	high	med	high	high	low	low	11	6
8	Stony Brook	xy4404309673474126	Culvert	Minor barrier	Golf course	105260	12	3.1	3	High	0.6	none	poor	2024	high	med	high	high	low	low	11	5
9	Stony Brook	xy4404189473474140	Culvert	Moderate ba	Golf course	105261	39.6	4	4	High	0.41	none	poor	2024	high	med	high	high	low	low	11	3
10	Stony Brook	xy4404240173474016	Culvert	Minor barrier	Golf course	105262	14	2.8	2.9	High	0.62	none	poor	2024	high	med	high	high	low	low	11	4
11	Stony Brook	xy4404538473475399	Culvert	Severe barrie	Golf Course	48596	176	8	7.9	low	0.45	severe	moderate	2024	low	high	high	high	massive--	extreme	10	11
12	Stony Brook	xy4404685473479540	Culvert	Moderate ba	Viking ln	104941	242	6.1	5	low...fi	0.48	severe	new	2024	high	high	high	high	massive--	extreme	12	1
13	Stony Brook	xy4404886273487578	Culvert	Severe barrie	Tarbell hill r	37013	80	6	5.8	High	0.01	none	OK	2016	high	high	high	high	med	low	12	2

Legend: prohibitively expensive; danger to public; top priority; medium priority; low priority

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Prioritization of Crossing Replacements

Crossing Number	River	NAACC Crossing Code	Crossing Type	Points in ranking	Priority Rank
11	McKenzie Brook	xy4403007373541475	Multi-Culvert	12	1
7	McKenzie Brook	xy4403630773502655	Box Culvert	11	2
6	McKenzie Brook	xy4402903273486893	Culvert	10	3
10	McKenzie Brook	xy4404031373538787	Culvert	10	4
9	McKenzie Brook	xy4404534773513842	Bridge	8	5
4*	McKenzie Brook	xy4403685773471960	Bridge	5	6
8	McKenzie Brook	xy4403704373503395	Culvert	5	7
1	McKenzie Brook	xy4403564473461340	Railroad Bridge	7	8
2	McKenzie Brook	xy4403564873461887	Bridge	4	9
3	McKenzie Brook	xy4403632773471356	Bridge	4	10
5	McKenzie Brook	xy4403593073474091	Bridge	4	11
6	Mill Brook	xy4404862773475349	Bridge	danger (6)	public danger
13	Mill Brook	xy4405291973542738	Bridge	11	1
17*	Mill Brook	xy4403890873573004	Multi-Culvert	11	2
19	Mill Brook	xy4403568173597615	Culvert	11	3
12	Mill Brook	xy4405341573539193	Bridge	11	4
7	Mill Brook	xy4405104473478881	Culvert	8	5
8	Mill Brook	xy4405267573479558	Bridge	8	6
11	Mill Brook	xy4405698873527925	Bridge	7	7
2	Mill Brook	xy4405176673455522	Railroad Bridge	6	8
3	Mill Brook	xy4405246673455702	Bridge	6	9
1	Mill Brook	xy4405131773452480	Bridge	6	10
5	Mill Brook	xy4404948373467952	Bridge	5	11
15	Mill Brook	xy4405007073556133	Bridge	5	12
18	Mill Brook	xy4403709873586892	Bridge	5	13
10	Mill Brook	xy4406142373510011	Bridge	4	14
9	Mill Brook	xy4406152973507947	Bridge	4	15
14	Mill Brook	xy4405274673550602	Bridge	4	16
16	Mill Brook	xy4403967673566439	Bridge	4	17
4	Mill Brook	xy4405387973456526	Bridge	4	18
5	Stony Brook	xy4403830073469778	Bridge	danger (10)	public danger
12	Stony Brook	xy4404685473479540	Culvert	12	1
13	Stony Brook	xy4404886273487578	Culvert	12	2
9	Stony Brook	xy4404189473474140	Culvert	11	3
10	Stony Brook	xy4404240173474016	Culvert	11	4
8	Stony Brook	xy4404309673474126	Culvert	11	5
7	Stony Brook	xy4404435673473875	Culvert	11	6
6	Stony Brook	xy4404518673474307	Culvert	11	7
4	Stony Brook	xy4403831173466611	Culvert	11	8
1	Stony Brook	xy4403886873460453	Culvert	11	9
3	Stony Brook	xy4403891973461782	Bridge	10	10
11	Stony Brook	xy4404538473475399	Culvert	10	11
2	Stony Brook	xy4403892073461390	Railroad Bridge	9	12

LEGEND

Culverts were replaced in 2024 after surveyed*

- Low
- Moderate
- High
- Danger
- Expensive

Quality Assurance

- QAPP – Quality Assurance Project Plan
- ELAP – Environmental Laboratory Approval Program (Endyne)
- VT Stream Protocols
- Technical Advisory Committee

Potential Projects Identified by Staff

- Implement more permeable surfaces in and around Moriah to reduce surface water runoff
- Remove impermeable structures from the streams where feasible ex: concrete, old metal pipes
- Improve riparian buffers in the more developed sections of the watershed
- Along streams/beaches in the watershed post signage showing what common invasive species look like and how to ID them compared to native species
- Continue to support boat washing/boat inspection initiatives in the ADK Park
- Remove invasive/non-native species along stream banks, start a yearly program to identify, monitor and remove dense beds of invasive vegetation
- Plant more native species along stream banks
- Educate and place signage along Mill and McKenzie Brook next to the campground to encourage people not to pollute the lake/stream
- Educate Town officials and landowners along the streams in this study on ecological benefits of not mowing right up to the stream/brook
- Restoration and protection of wetlands inside the PHSS watershed area
- Address and potentially replace any undersized culverts
- Promote cover crop and soil health practices to the farmers located within the watersheds to reduce erosion and soil run off from farms down to the streams and lake
- Implement best management practices in roadside drainage maintenance to prevent sediment loading into waterways and Lake Champlain.
- Continue long-term water quality monitoring across the watershed
- Completion of Certified Nutrient Management Plans (CNMP) for farms located within the watershed and implement best management practices identified in the those plans.
- Install catch basins to remove debris and sediment around railroad bridges
- Create and complete a hamlet stormwater assessment and management plan for the Town of Moriah in the Port Henry area
- As part of a NYS Local Waterfront Revitalization Program grant, develop a watershed wide green infrastructure plan to address open space protection, also advocate for low impact development going forward
- Continue to coordinate conservation and cleanup efforts between the Town/public and private landowners
- Restore spawning fish habitat where possible in Lake Champlain’s tributaries
- Work to protect and secure vernal pools that exist in the transitional areas between the wetlands and wooded areas
- Where feasible, maintain consistent water levels during peak freshwater bird nesting season
- Promote the use of the “NY iMapInvasives” app to the public for mapping and identifying potential invasive species. Also educate the public on how the app works and how to use it properly
- Set up a flow monitoring gage at the downstream sample locations to track changes in water level and water flow
- The Town could consider local standards for stormwater management

Programs

- Obstruction Investigation and Removal
- Riparian Buffer Program
- Invasive Species Management
- Education and Outreach
- Disadvantaged Community Engagement

Thank you

QUESTIONS?

ESSEX COUNTY
SOIL & WATER
CONSERVATION DISTRICT