



Port Henry Stream Study

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

Introduction

Alice Halloran - District Manager

Noah Weber – District Technician

Daniel Berheide - Senior Technician

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





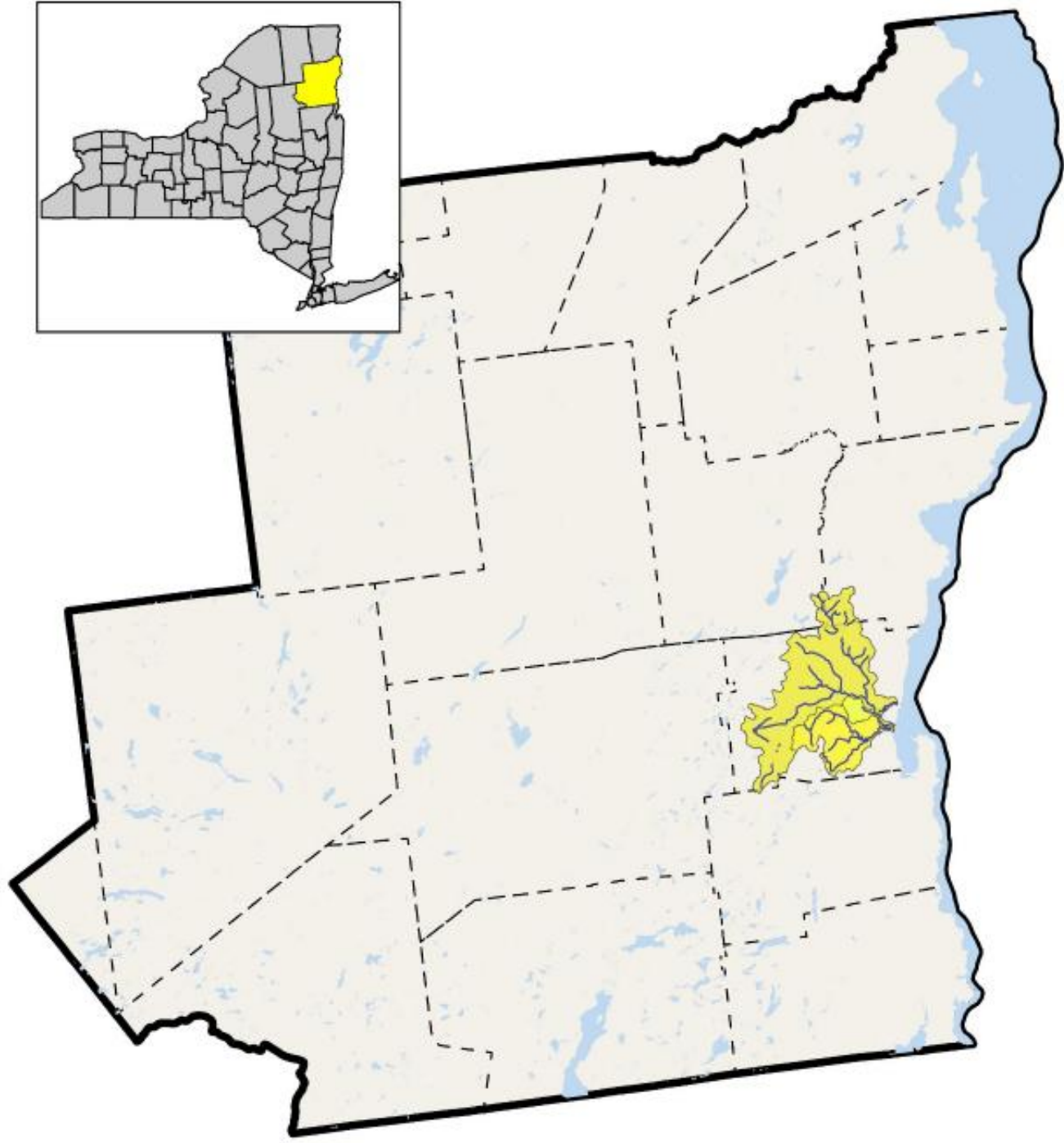
Reason for study

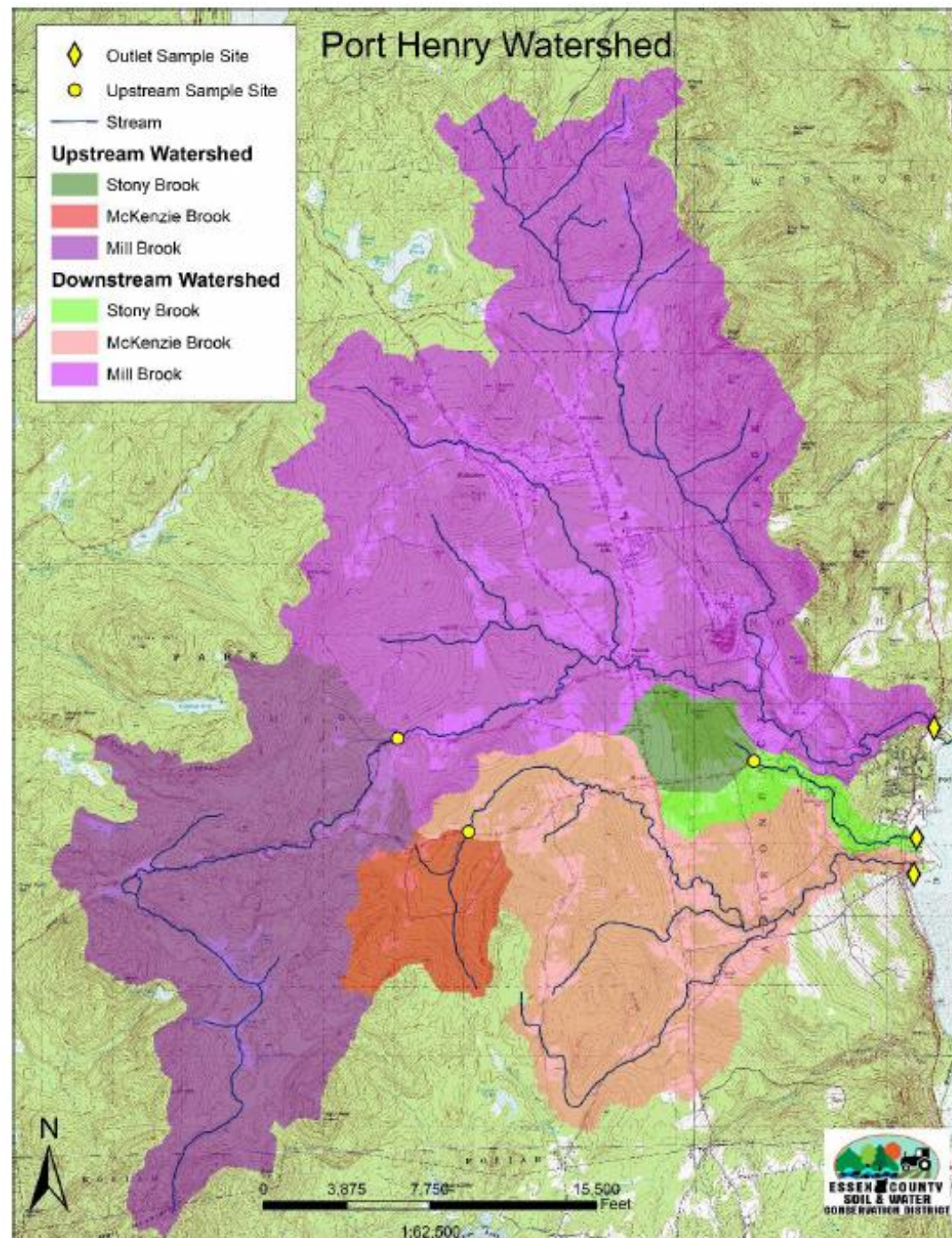
- HABs concerns

Aims and Objectives

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

Port Henry Stream Study Location

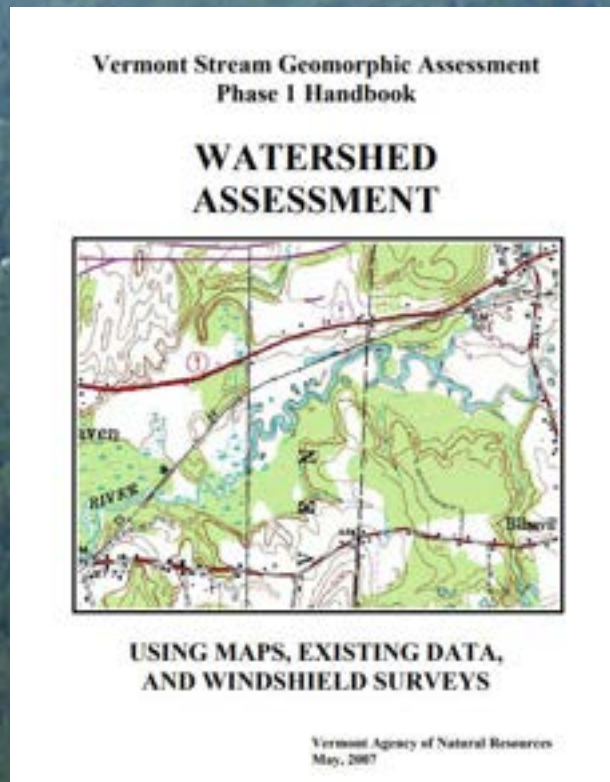




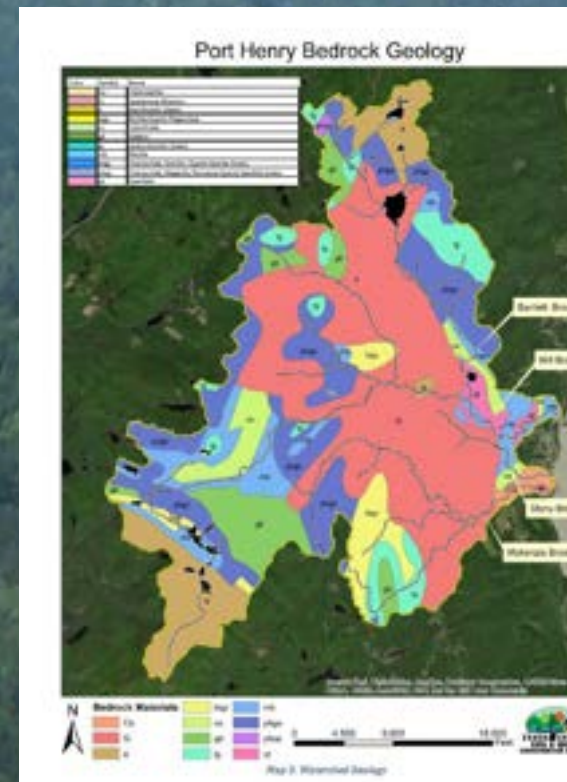
Map 2: Port Henry Watersheds

Phase 1

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



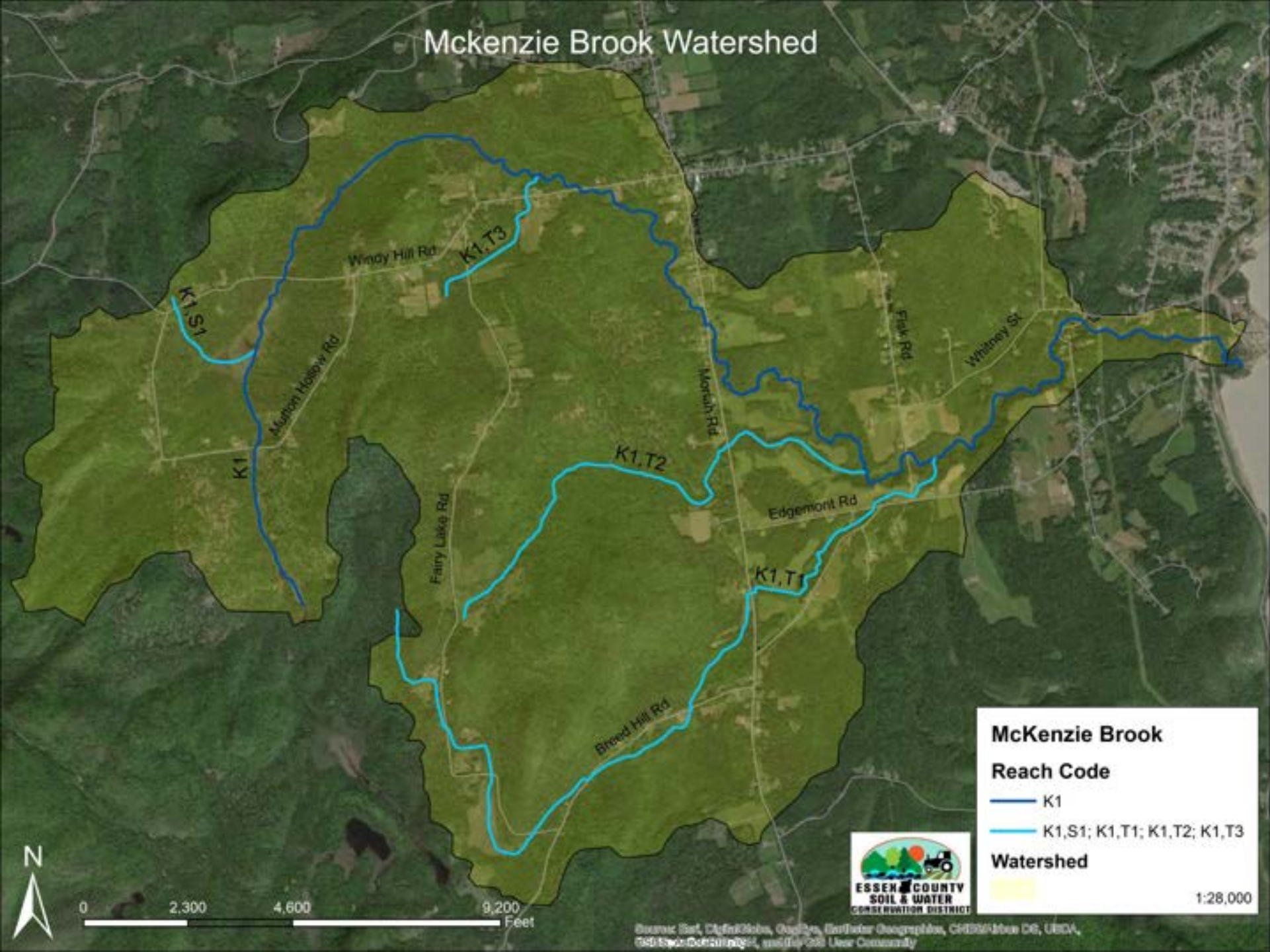
Aerial photographs
GIS
Existing maps
Windshield surveys
Other plans or studies



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



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 its 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

[illegible]

Upstream Start of Reach: -73.458188, 44.03407

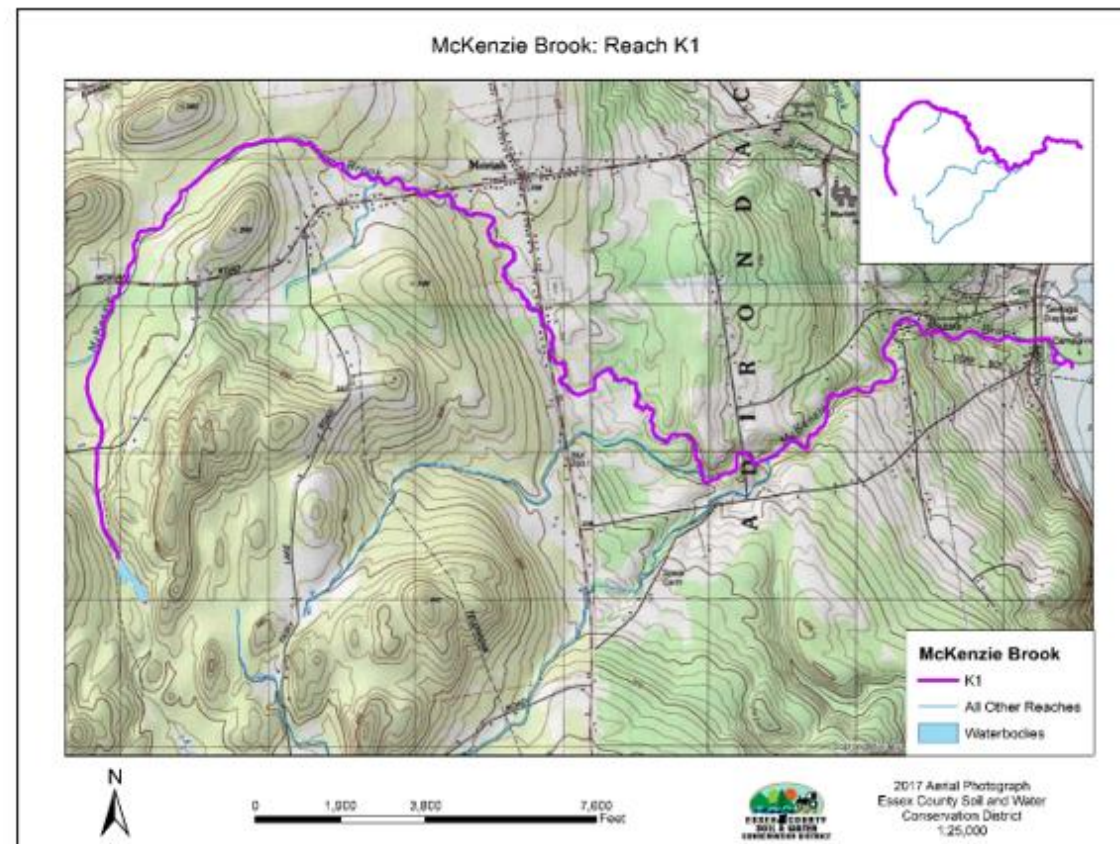
Downstream End of Reach: -73.540139, 44.023741



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 (mi ²)	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

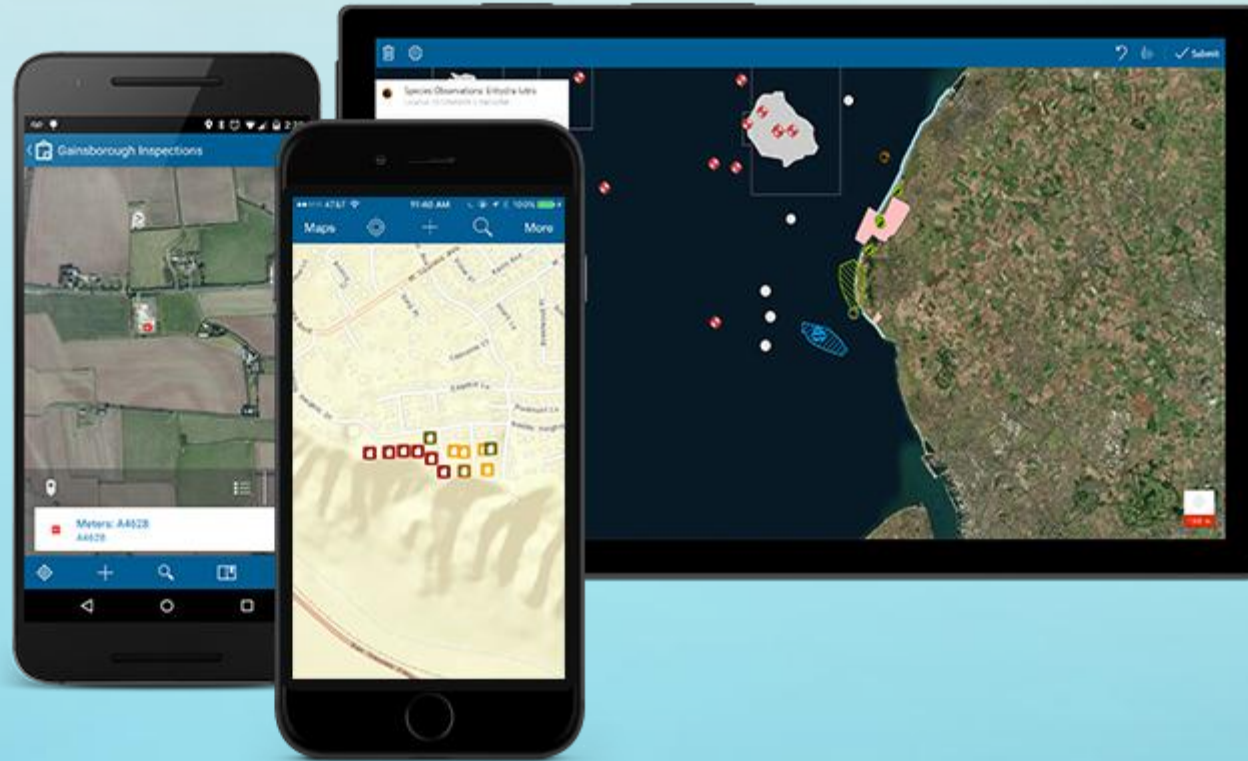
Reach Highlights: Longest reach out of McKenzie Brook, the start (upstream) is a wetland created by beavers. As you travel downstream there are two more wetland locations with beaver dams. The stream then runs into Lake Champlain on the south edge south of an RV campground.



Phase II

Rapid Stream Assessment Results and Corridor Planning

ArcGIS Collector App



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



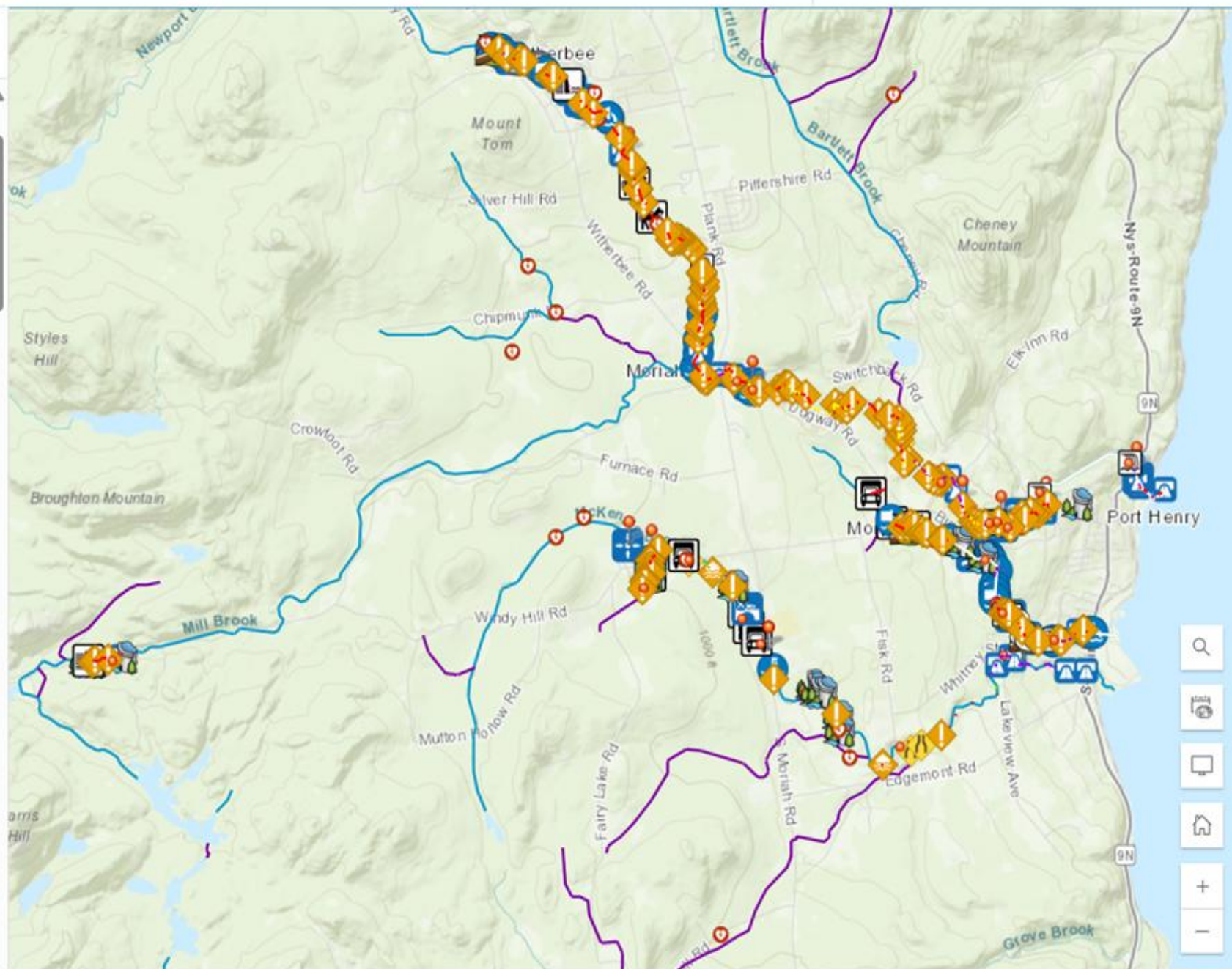
Grade Control

- Dam
- Ledge
- Waterfall
- Weir

Potential Water Quality Concerns

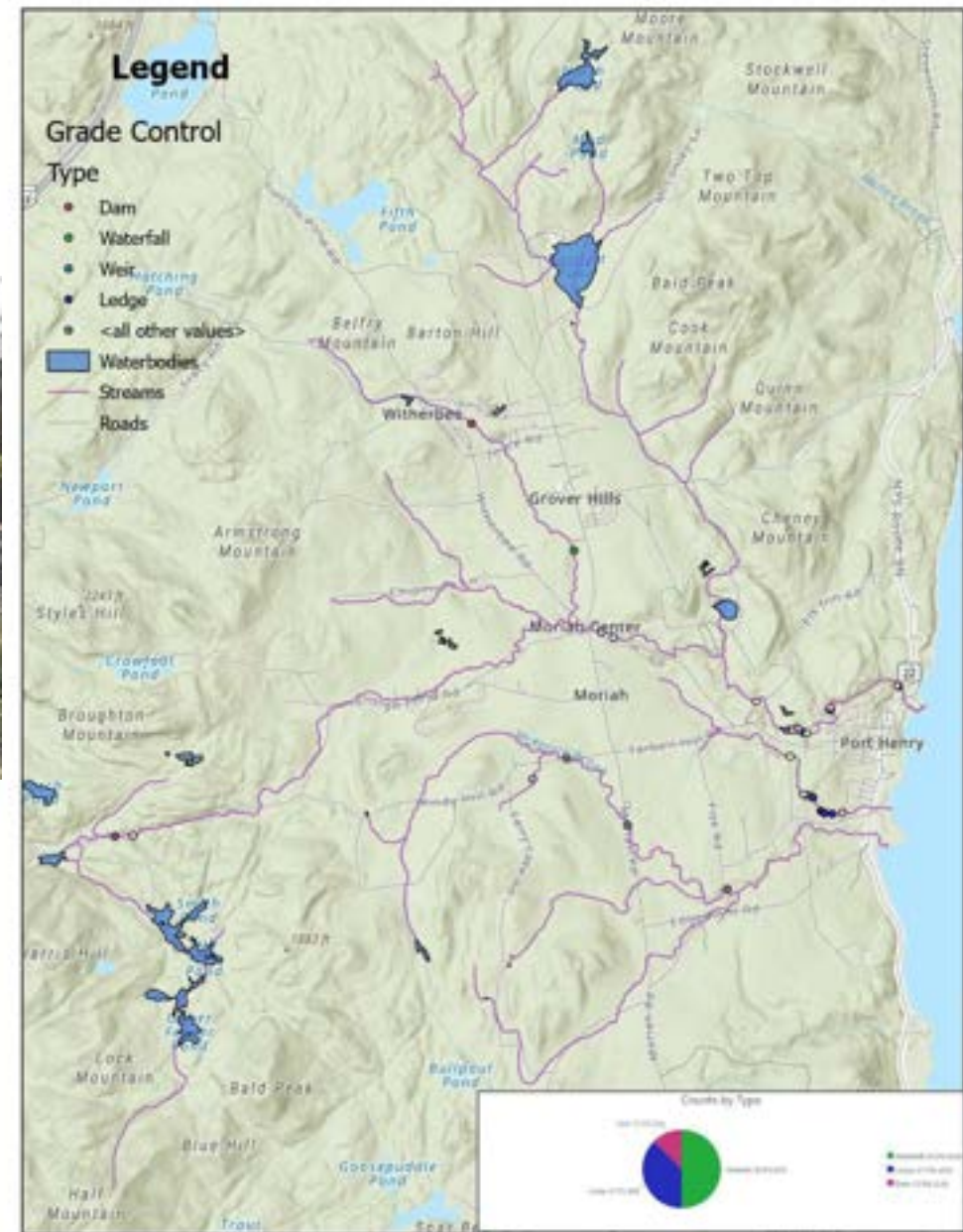


Seep_Trib

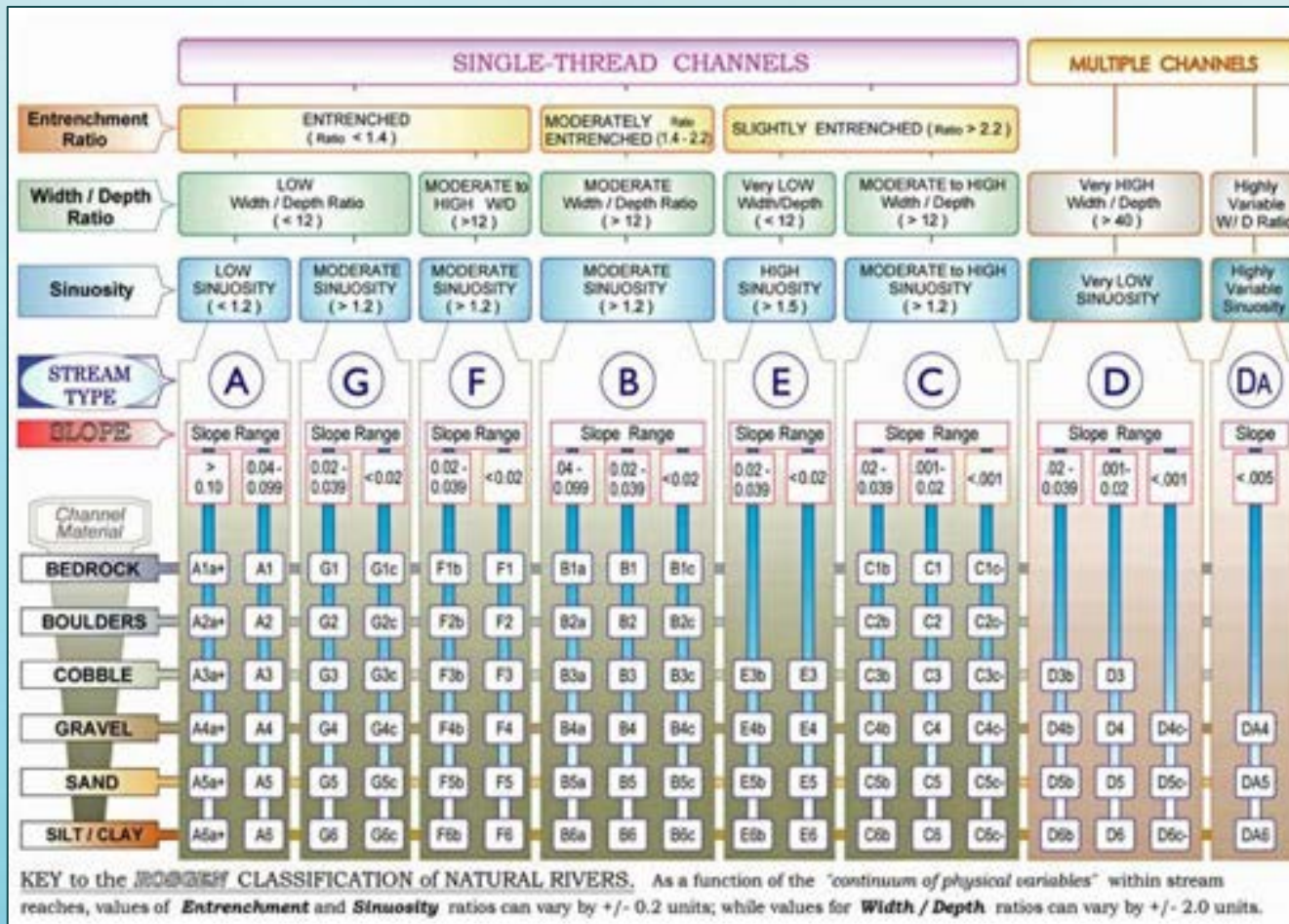


[illegible]

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

Rapid Stream Assessment Field Notes

Stream Name: Mill Brook
 Location: Waterfall down to the lake
 Segment ID: M1A ☐ Sub-Reach
 Date: 8/25/21 / 10/21/21
 Town: Port Henry
 Segment Length: 2.110 ft.
 Segment Not Assessed: W/N/G/B/Q
 Rain Storm within past 7 days: Y/N
 Weather: _____
 Flood history known: Y/N (date of known flood: 2011)
 Segment Impacted by TSI Flooding or recent flood (within last 1-5 yrs) Y/N; Segment Altered by Flood Work Y/N

1.1 Segmentation: GC/CD/SS/PS/DF/CE/BB/FS/PA/SR/YW/OT/None
 1.2 Alluvial Fan (FIT): Yes/No/UK

1.3 River Corridor Encroachments (FIT)	Reach or Segment Length		1.4 Slope of the Adjacent Terrace or Hillside	
	One Bank	Both Banks	Left Corridor	Right Corridor
Berms			flat (0-5%) hilly (5-15%) steep (15-25%)	flat (0-5%) hilly (5-15%) steep (15-25%)
Roads			very steep (15-25%) x-steep (>25%)	very steep (15-25%) x-steep (>25%)
Railroads			Continuous w/bank A / S / N	Continuous w/bank A / S / N
Improved Paths			Within 1x Whk A / S / N	Within 1x Whk A / S / N
Development		NA	Texture of Exposed Slope	Texture of Exposed Slope
1.5 Confinement	1.6 Grade Controls (FIT)		Total Height (0.0 ft)	
Fully width / Channel width	Location in Reach (record locations on field map)		Height Above Water Surface (0.0 ft)	
Valley Width: <u>266</u> Gauge	Waterfall / Ledge / Dam / Weir		Photo Yes / No	
Estimated / Measured				
Human caused change in valley width				
Narrowly Confined (>1 & <2)	<u>Water Fall</u>		<u>3.5 ft</u>	
Semi-confined (>2 & <4)			<u>30'</u>	
Narrow (>4 & <6)				
Broad (>6 & <10)				
Very Broad (>10)				

2. Stream Channel
 2.1 Bankfull Width: 22 ft. 2.1a Wetted Width: 23 ft.
 2.1b Ratio (W_{wetted} / W_{bank}): 0.85 2.2 Max. Bankfull Depth: 2.5 ft. 2.3 Mean Bankfull Depth: 2.14 ft.
 2.4 Floodproof Width: 5.5 ft. 2.5 Recently Abandoned FP: 7.2 ft. 2.6 Ratio W/d_{max} : 10.8
 2.7 Entrenchment: 2.04 2.8 Incision Ratio: 2.88 Bed: NA 2.9 Sinuosity: Low
 2.10 Riffles/Steps: complete / eroded / sediment / NA / NE 2.11 Riffle/Step Spacing: 469 ft.
 Dimensions Altered by Flood Y/N; Altered by Flood Work Y/N; Channel Enlargement Measure = _____

2.12 Bed Substrate Composition (percent):								2.13 Avg. Size of Largest Particles on:	
1 Bedrock	2 Boulder	3 Cobble	4 Gravel Coarse	5 Sand	6 Silt or Clay	7 Embeddedness	8	9 Bed	10 Bar
						Mass Channel	Mass Margin		
		64	26	6	4	63	39		

2.14 Stream Type: A G F B E C D 1 2 3 4 5 6 b c
 Cascade Step-Pool Plane Bed Riffle-Pool Ripple-Dune Braided
 Stream Type: Riffle-Pool

Step 1: Valley and Floodplain Corridor - Quick Ratio Tables and Tables

1.1 Stream Corridor

1.1a Stream Corridor	1.1b Stream Corridor	1.1c Stream Corridor
1.1a Stream Corridor	1.1b Stream Corridor	1.1c Stream Corridor

1.2 Stream Corridor

1.2a Stream Corridor	1.2b Stream Corridor
1.2a Stream Corridor	1.2b Stream Corridor

1.3 Stream Corridor

1.3a Stream Corridor	1.3b Stream Corridor
1.3a Stream Corridor	1.3b Stream Corridor

1.4 Stream Corridor

1.4a Stream Corridor	1.4b Stream Corridor
1.4a Stream Corridor	1.4b Stream Corridor

Cross-section Worksheet

Stream Name: Mill Brook
 Reach Segment: M1A
 Location: Waterfall down to the lake
 Date: 8/25/21 / 10/21/21
 Town: Port Henry
 Segment Length: 2.110 ft.
 Segment Not Assessed: W/N/G/B/Q
 Rain Storm within past 7 days: Y/N
 Weather: _____
 Flood history known: Y/N (date of known flood: 2011)
 Segment Impacted by TSI Flooding or recent flood (within last 1-5 yrs) Y/N; Segment Altered by Flood Work Y/N

Reach	Segment	Length	Valley	Stream	Height	Valley	Stream	Height

1.4 Stream Corridor

1.4a Stream Corridor	1.4b Stream Corridor
1.4a Stream Corridor	1.4b Stream Corridor

Step 1 and 2

1. Valley and River Corridor
2. Stream Channel

Tally Sheet (page 1)

Stream Name: Mill Brook
Location: Rock Island - 500 ft. S. of Mill Brook

Segment ID: M1A
Date: July 23, 2021

☐ Sub-Reach

Step 2.1 Height of bankfull above water surface

Bankfull Height	Chan. Width	Comments (describe indication)
-----------------	-------------	--------------------------------

Step 3. Channel Bed and Planform Changes

Record actual number of features		Tally
S.1	Mid	2/1
	Point	2/1
	Side	2/1
	Diagonal	2/1
	Delta	2/1
S.2	Flood Channel	2/1
	Neck Cut-offs	2/1
	Channel Avulsions	2/1
	Branding	2/1
	Migration	2/1
S.3	Aggrade	2/1
	Steep Riffles	2/1
	Degrade	2/1
	Head Cuts	2/1
	Tributary Rejuvenation?	Yes / No

Step 3.3 Mass Failures and Gullies

Gully - Length		Gully - Length		Length
Right	Height	Left	Right	Length
20'				

Obs?	GPS?	Ch. Constr.	FP. Constr.	DA	DB	SA	SB	A	Num
V	V	V	V	V	V	V	V	V	V

Tally

9	11
---	----

Step 4.6 Stormwater FTT

Field Ditch	Overland Flow	Road Ditch	Tile Drain	Urban Stormwater	Other

Vermont Agency of Natural Resources

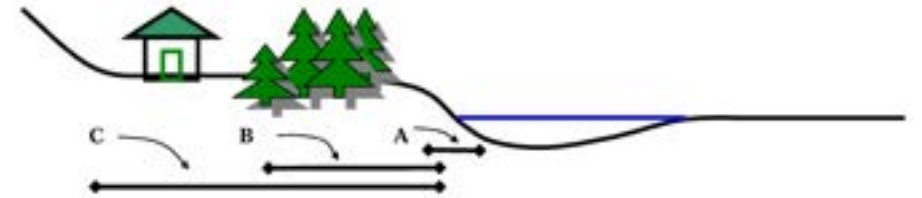


Figure 3.1 Stream bank (A), riparian buffer (B), and river corridor (C) further defined below.

Step 3, 4, and 5

3. Riparian Banks, Buffers and Corridors

4. Flow Modifiers

5. Channel Bed and Planform Changes

3. Riparian banks, Buffers, and Corridors

3.1	Typical Bank Slope	shallow	moderate	steep	undercut	(evaluate on the higher of the two banks)
Bank Texture-EB	Lower	bedrock	boulder/cobble	gravel	sand	silt/clay
	Upper	bedrock	boulder/cobble	gravel	sand	silt/clay
Bank Texture-LB	Lower	bedrock	boulder/cobble	gravel	sand	silt/clay
	Upper	bedrock	boulder/cobble	gravel	sand	silt/clay
Bank Erosion (FTT)	Left	Length: 10	Height: 10	Bank Rejuvenation Type: 10	Length: 10	Height: 10
	Right	Length: 10	Height: 10	Bank Rejuvenation Type: 10	Length: 10	Height: 10
Near Bank Vegetation Type	Trees	10	10	10	10	10
	Shrubs / Saps.	10	10	10	10	10
	Herbs	10	10	10	10	10
	Bank Canopy	10	10	10	10	10
3.2	Buffer Width (ft/m)	Left: 0-25 ft	Right: 0-25 ft	Left: 26-50 ft	Right: 26-50 ft	Left: 51-100 ft
	Buffer Vegetation Type	Left: 10	Right: 10	Left: 10	Right: 10	Left: 10
3.3	Riparian Corridor (ft/m)	Left: 10	Right: 10	Left: 10	Right: 10	Left: 10
	Riparian Corridor (ft/m)	Left: 10	Right: 10	Left: 10	Right: 10	Left: 10

4.1 Springs or Seeps: extensive / present / minimal / none

4.2 Current Debris Jams (FTT): #

4.3 Flow status: base / low / dry

4.4 Flow Regs. & Withdrawals (FTT): TYPE: withdrawal / bypass / store & release / lock

4.5 Upstream/Downstream Flow Regs.: upstream / downstream / both / none

4.6 Stormwater Inputs (FTT): tile drain / road ditch / urban stormwater / field ditch / overland flow

4.7 Constrictions ☐ none ☒ minor ☒ major

4.8 Constrictions ☐ none ☒ minor ☒ major

4.9 Beaver Dams (FTT): #

5. Channel Bed and Planform Changes (5.0 to 5.3 record on tally sheet)

5.1 Stream Food or Animal Crossing (FTT): Yes / No

5.2 Channel Alterations (FTT) (check all that apply): dredging / gravel mining / commercial mining / none

5.3 Length of Straightening: (With Widening: Yes / No) Alteration from Flood Work Yes/No

Flood Barriers: material from channel / material pushed out of field / notes

Comments:

Phase 2 Stream Geomorphic Assessment

Vermont Agency of Natural Resources

June 2012

Habitat Parameter	Condition (Departure) Category			
	Reference (None)	Good (Minor)	Fair (Major)	Poor (Severe)
6.5 Hydrologic Characteristics	<input checked="" type="checkbox"/> wetted width / $W_{wet} > 0.25$	<input type="checkbox"/> $0.15 \leq W_{wet} / W_{tot} > 0.50$	<input type="checkbox"/> $0.10 \leq W_{wet} / W_{tot} > 0.25$	<input type="checkbox"/> $W_{wet} / W_{tot} \leq 0.25$
	<input type="checkbox"/> exposed substrate $< 20\%$	<input checked="" type="checkbox"/> $20 \leq \text{exp. substrate} < 40\%$	<input checked="" type="checkbox"/> $40 \leq \text{exp. substrate} < 60\%$	<input type="checkbox"/> exposed substrate $\geq 60\%$
	<input type="checkbox"/> adjacent springs, seeps, and wetlands extensive	<input type="checkbox"/> adjacent springs, seeps, and wetlands moderate	<input checked="" type="checkbox"/> adjacent springs, seeps, and wetlands minimal	<input type="checkbox"/> adjacent springs, seeps, and wetlands absent

VTANH REACH HABITAT ASSESSMENT - RIFFLE-POOL STREAM TYPE

(Also use this form for dam-ripple stream type.)

Page 1

SCORE 15

6.6 Connectivity

Test results a higher/lower score for potential reach obstruction

SCORE 15

6.7 River Banks

Select different boxes for L.B. and R.B. if necessary

Channel size not suitable only test if ≥ 5 meters

Score each bank

SCORE 5 (L.B.)

SCORE 5 (R.B.)

6.8 Riparian Area

Select different boxes for L.B. and R.B. if necessary

Score each side of the channel

SCORE 3 (L.B.)

SCORE 3 (R.B.)

6.9 Score: final

Percentage: to

Overall Physic

SHED ☐ ExistStream Name: Mill Brook

Location: _____

Observer: Brandon Brown, Joe BrownOrganization (Agency): Mill Brook Co.

USGS Map Name(s): _____

Weather: Sunny, 20°C

Flow: base / low / avg: _____

State, within past 7 days: Y / N

Segment ID: MLBDate: 6/21/21Town: Rock Henry

Elevation: _____

Latitude (N/S): _____

Longitude (E/W): _____

Drainage Area: _____

Segment Length: 2.10

Habitat Parameter	Condition (Departure) Category			
	Reference (None)	Good (Minor)	Fair (Major)	Poor (Severe)
6.1 Woody Debris Cover	<input type="checkbox"/> LWD pieces / mile > 100	<input type="checkbox"/> $100 \leq \text{LWD} / \text{mile} > 50$	<input checked="" type="checkbox"/> $50 \leq \text{LWD} / \text{mile} > 25$	<input type="checkbox"/> LWD / mile ≤ 25
	<input checked="" type="checkbox"/> LWD size rank 3-6 $> 50\%$	<input type="checkbox"/> $50 \leq \text{LWD} \text{ size rank } 3-6 > 25\%$	<input type="checkbox"/> $25 \leq \text{LWD} \text{ size rank } 3-6 > 10\%$	<input type="checkbox"/> LWD size rank 3-6 $\leq 10\%$
	<input type="checkbox"/> debris jams / mile > 5	<input type="checkbox"/> $5 \leq \text{jams} / \text{mile} > 3$	<input checked="" type="checkbox"/> $3 \leq \text{jams} / \text{mile} > 1$	<input type="checkbox"/> debris jams absent
6.2 Bed Substrate Cover	<input type="checkbox"/> high woody debris recruitment potential	<input type="checkbox"/> moderate woody debris recruitment potential	<input checked="" type="checkbox"/> low woody debris recruitment potential	<input type="checkbox"/> no woody debris recruitment potential
	<input checked="" type="checkbox"/> CPOM present in channel and margins	<input type="checkbox"/> CPOM limited in channel and margins	<input type="checkbox"/> CPOM limited in both channel and margins	<input type="checkbox"/> CPOM absent
	<input type="checkbox"/> riffle embeddedness $< 20\%$	<input type="checkbox"/> $20 \leq \text{emb}_{\text{riffle}} < 40\%$	<input checked="" type="checkbox"/> $40 \leq \text{emb}_{\text{riffle}} < 60\%$	<input type="checkbox"/> riffle embeddedness $\geq 60\%$
6.3 Scour and Deposition Features	<input checked="" type="checkbox"/> $\text{fining}^* < 10\%$	<input type="checkbox"/> $10 \leq \text{fining}^* < 20\%$	<input type="checkbox"/> $20 \leq \text{fining}^* < 40\%$	<input type="checkbox"/> $\text{fining}^* \geq 40\%$
	<input checked="" type="checkbox"/> riffle mobility index $< 50\%$	<input type="checkbox"/> $50 \leq \text{RMI} < 60\%$	<input type="checkbox"/> $60 \leq \text{RMI} < 80\%$	<input type="checkbox"/> $\text{RMI} \geq 80\%$
	<input checked="" type="checkbox"/> substrate free of dense algal growth	<input checked="" type="checkbox"/> small substrate patches covered by dense algal growth	<input type="checkbox"/> large substrate patches covered by dense algal growth	<input type="checkbox"/> most of substrate covered by dense algal growth
6.4 Channel Morphology	<input type="checkbox"/> $5 \leq \text{riffle spacing} \leq 7$ bankfull channel widths (W_{bf})	<input type="checkbox"/> $5 \leq \text{riffle spacing} < 3$, or $7 < \text{riffle spacing} \leq 10 \times W_{bf}$	<input checked="" type="checkbox"/> $3 \leq \text{riffle spacing} < 3$, or $10 < \text{riffle spacing} \leq 12 \times W_{bf}$	<input type="checkbox"/> riffle spacing ≥ 12 bankfull channel widths
	<input type="checkbox"/> well-defined riffle-run-pool-glide pattern with all four depth-velocity combinations present	<input type="checkbox"/> well-defined riffle-run-pool-glide pattern with three depth-velocity combinations dominant	<input checked="" type="checkbox"/> moderately defined riffle-run-pool-glide pattern with two depth-velocity combinations dominant	<input type="checkbox"/> poorly defined riffle-run-pool-glide pattern with one depth-velocity combination dominant
	<input type="checkbox"/> fine deposition located entirely in slack water below larger substrate/debris, and along margins	<input type="checkbox"/> fine deposition located in slack water below larger substrate/debris, abundant mid-channel accumulation	<input checked="" type="checkbox"/> very large depositional features below larger substrate/debris, abundant mid-channel accumulation	<input type="checkbox"/> fine deposition throughout channel, even filling pools, large substrate absent
Channel Morphology	<input checked="" type="checkbox"/> $\text{emb}_{\text{riffle}} < 15$, natural	<input type="checkbox"/> $15 \leq \text{emb}_{\text{riffle}} < 25$, widening	<input type="checkbox"/> $25 \leq \text{emb}_{\text{riffle}} < 40$, widening	<input type="checkbox"/> $\text{emb}_{\text{riffle}} \geq 40$, over-widening
	<input type="checkbox"/> $\text{emb}_{\text{riffle}} \geq 1.4$, incision ratio < 1.2 , good floodplain across	<input type="checkbox"/> $\text{emb}_{\text{riffle}} \geq 1.4$, incision ratio < 1.4 , reduced floodplain across	<input checked="" type="checkbox"/> $\text{emb}_{\text{riffle}} \geq 1.4$, incision ratio < 1.4 , limited floodplain across	<input type="checkbox"/> $\text{emb}_{\text{riffle}} \geq 1.4$, incision ratio < 2.0 , floodplain across unlikely
	<input type="checkbox"/> no evidence of channel alteration	<input type="checkbox"/> evidence of minor historic channel alteration	<input checked="" type="checkbox"/> moderate historic or minor recent channel alteration	<input type="checkbox"/> extensive historic or major recent channel alteration

SCORE 17

SCORE 3

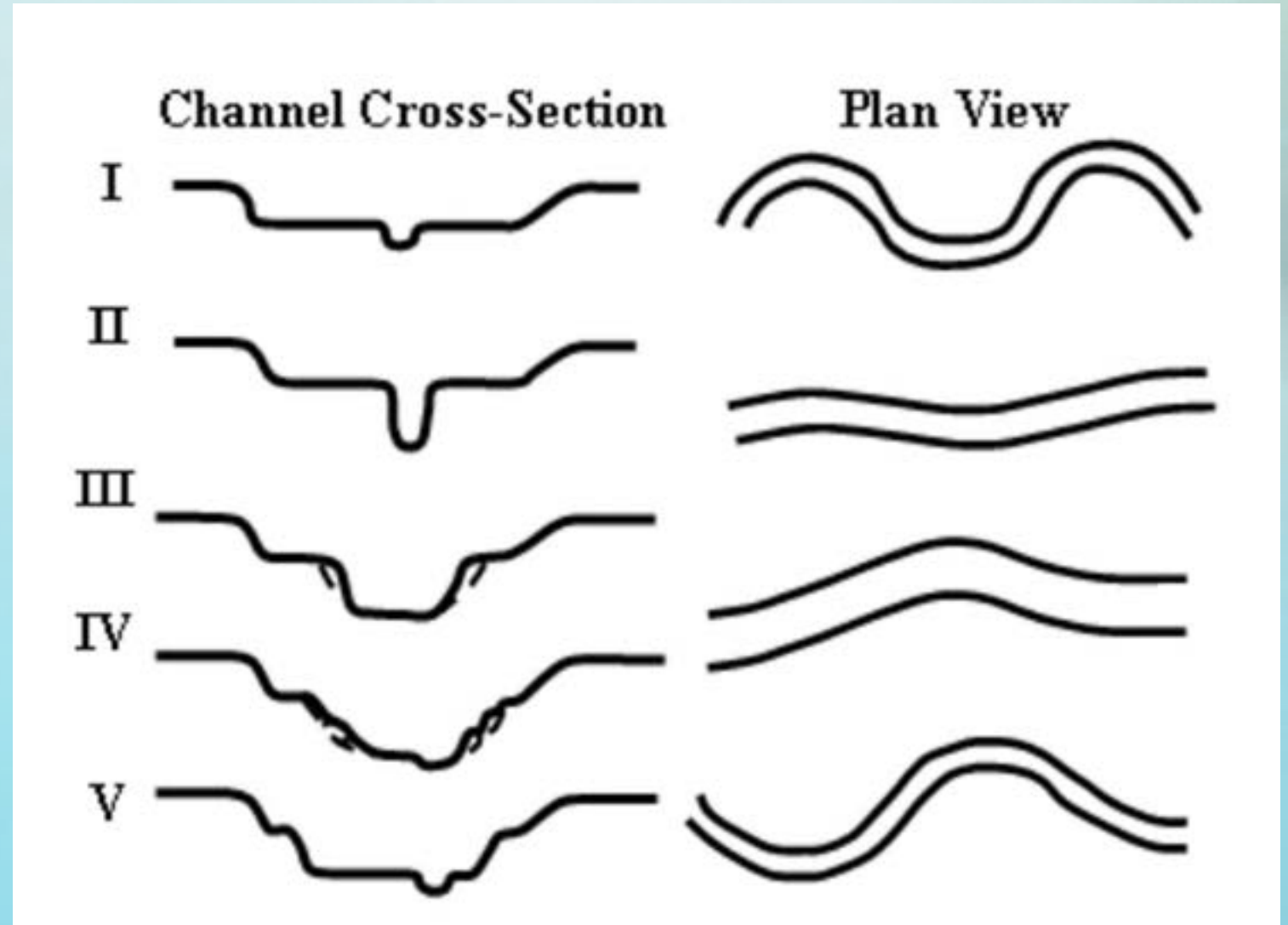
Step 6

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

CHANNEL EVOLUTION



Mill Brook – M1d

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

Channel Length (ft): 2,496.97 Channel Slope (%): 3.4 Location: Upstream Stone Street

Bridge

Stream Type Summary	
Parameter	P1 Assessed
Confinement	Semi-confined
Bedform	Step-Pool
Stream Type	R1b

Crossing/Constriction Summary			
Type	Location	Span	Impacts
Bridge		25	Channel Constriction

P1 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 Inlets	1
# Beaver Dams	0
# Flow Regulation and Withdrawal	0
# Debris Issues	7
# Grade Control	2

Reach Habitat Assessment

Habitat Parameter	Score
5.1 Woody Debris Cover	14
5.2 Bed Substrate Cover	18
5.3 Scum and Graps: Fishery	17
5.4 Channel Morphology	12
5.5 Hydraulic Characteristics	11
5.6 Channel Velocity	14
5.7 River Banks	20
5.8 Riparian Area	18
Total	112
Average	82.5
Condition	Good

Stream Measurements (ft)	
Bankfull Width	80
Wetted Width	31
Bank (Wetted) Slope	0.67
Max Bankfull Depth	2.4
Mean Bankfull Depth	1.51
Floodplain Width	75
BAF	7.6
Bank (W/T)	18.17
Encroachment	0.63
Stream Ratio	3.17
Stability	Moderate
SRPP Step Loading	150

Geomorphic Assessment

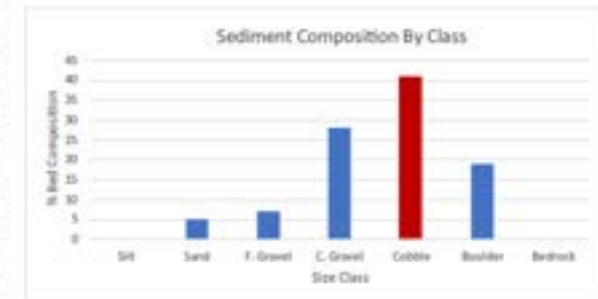
Adjustment Process	Score
Aggradation	10
Aggradation	10
Widening	10
Planform	18
Condition %	82.5
Condition	Good
Stream Type	R1b
Evolution Stage	4
Sensitivity	Moderate
Channel Adjustment Proc.	Stabilizing

Cross Section		
Measurement	Distance	Depth
1	0	0
2	4	0.5
3	8	0.7
4	12	1
5	16	2.1
6	20	2
7	24	1.9
8	28	2.1
9	32	2.1
10	36	2.4
11	40	0.7
Mean Depth	8	1.06

Distance (ft)

Depth (ft)

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):		



Rank	Diameter (ft)	L(Wbld)	n
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

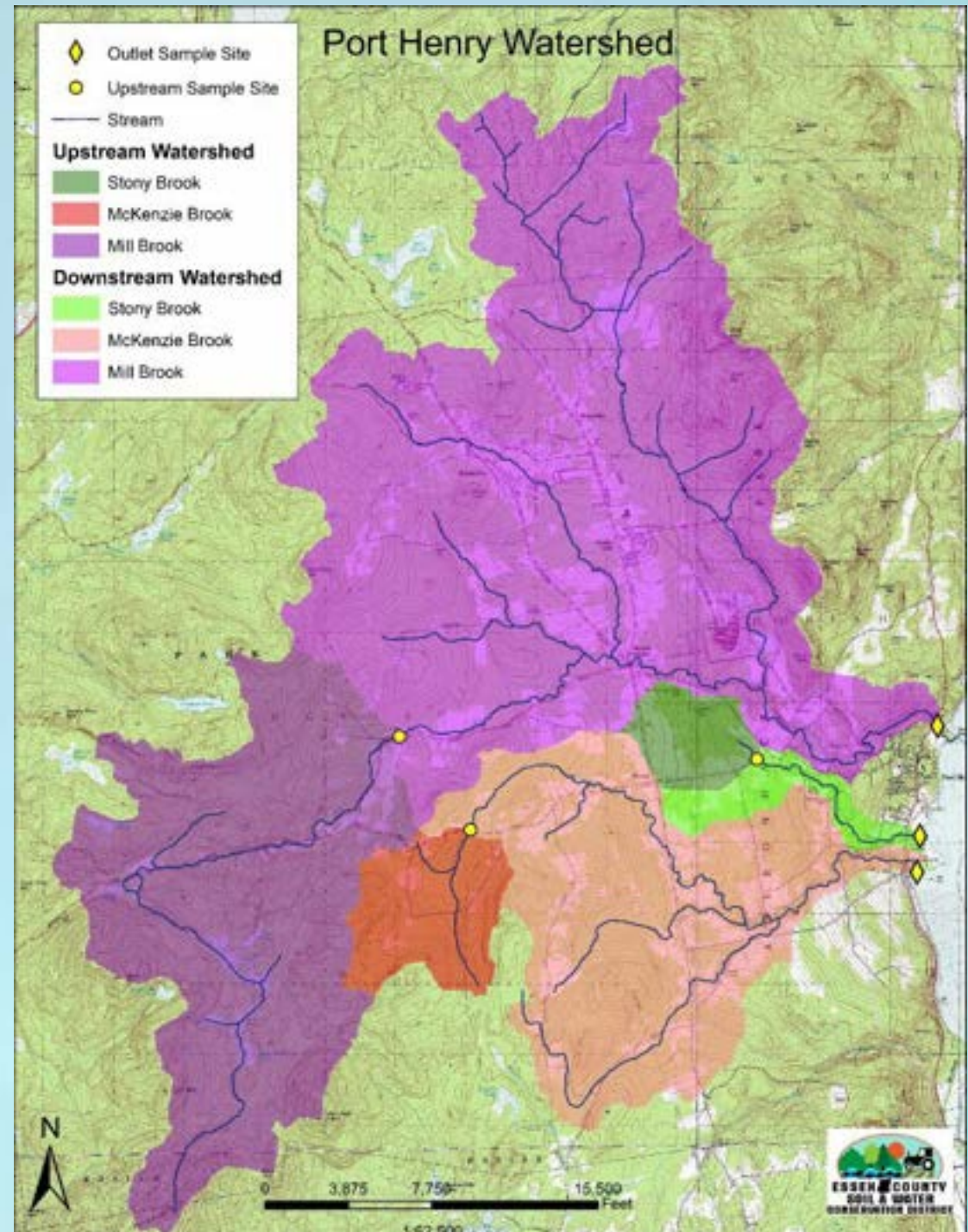
Water quality analysis of 3 tributaries of Lake Champlain:

- Mill Brook
- Stony Brook
- McKenzie Brook

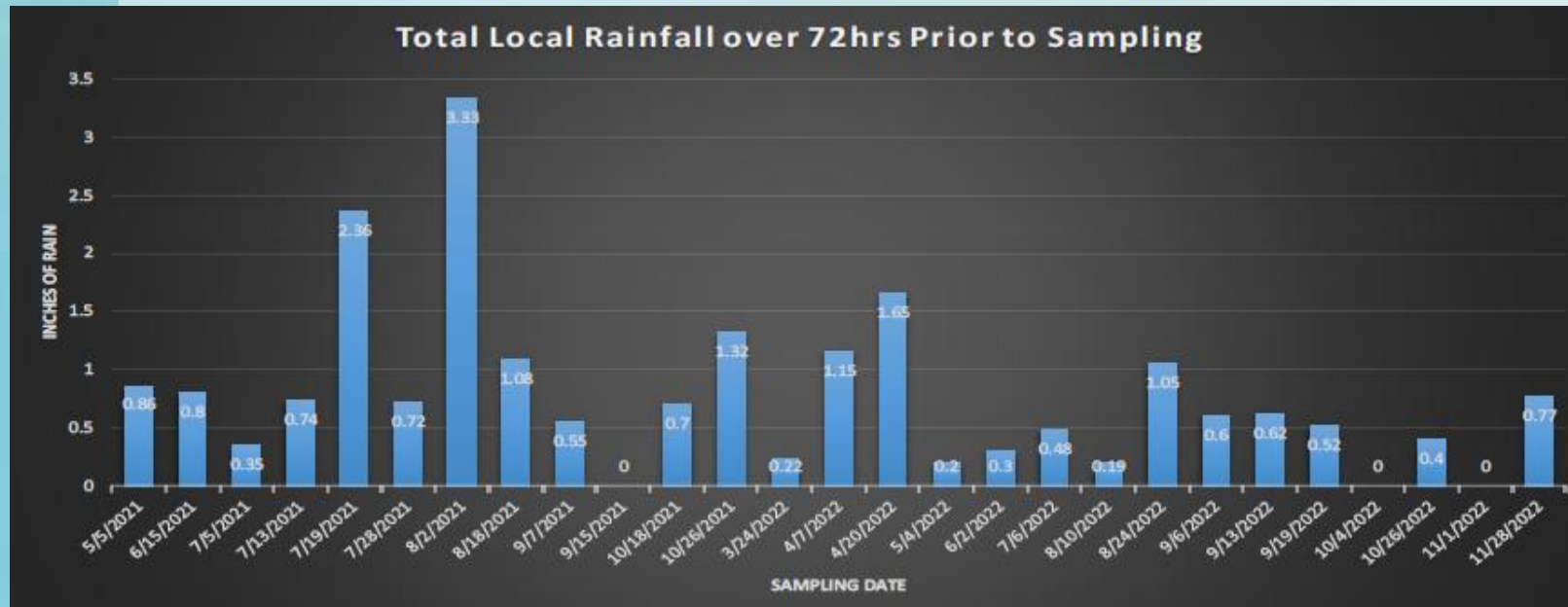
Total of 6 sites, with an upstream and downstream site on each stream

27 field days sampling water

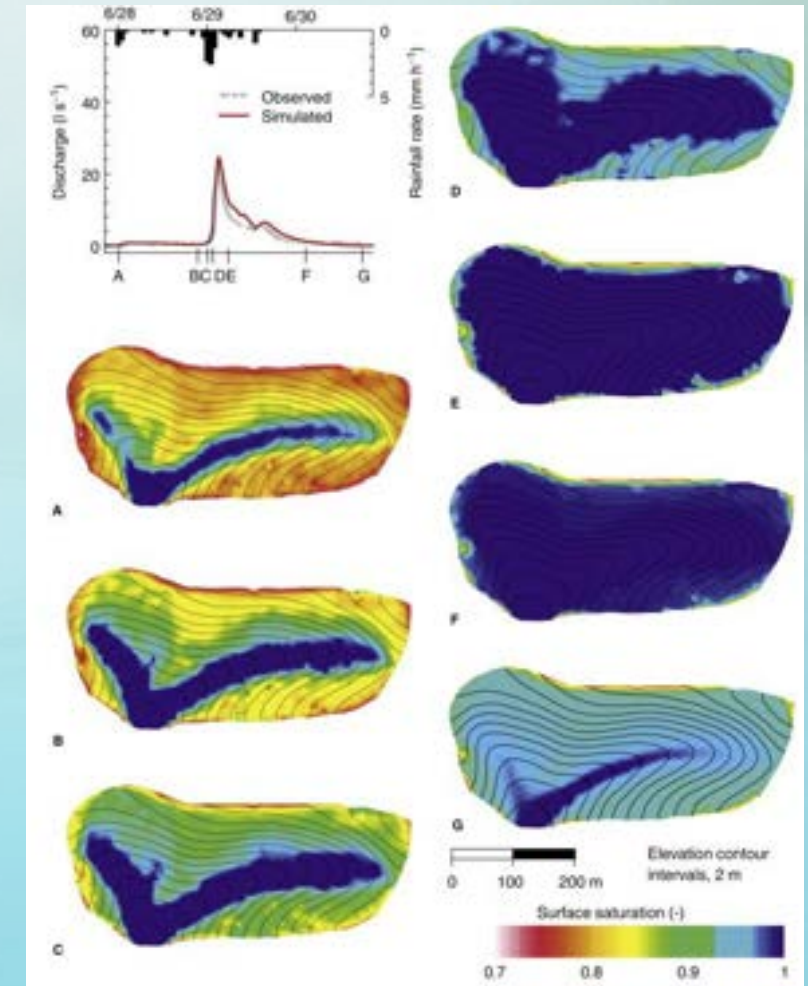
- Goal was to conduct at least half of the sampling days after a rain event...



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



- 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



Date	Location	STA Dataset #	Time	Temp	Bottle	Water Level	pH	Conductivity	Specific Conductance	Temperature (°C)	TSS
5/5/2021	Upstream Mill Brook	1	8:45 AM	5	5.4	7.52	80.1	11.2	9.1	59.1	49.1
5/16/2021	Upstream Mill Brook	7	8:42 AM	2	6	7.78	144.8	105.3	144.8	58.28	
5/20/2021	Upstream Mill Brook	19	9:05 AM	1	6	7.81	909	138.7	97	62.6	
7/1/2021	Upstream Mill Brook	20	11:00 AM	1	5.7	7.89	110.2	131	10.7	62.06	
7/19/2021	Upstream Mill Brook	26	10:00 AM	1	4.5	7.76	40.8	46.7	10.4	65.12	
7/28/2021	Upstream Mill Brook	32	9:22 AM	3	5.6	7.84	73.9	90.4	16.6	65.89	
8/9/2021	Upstream Mill Brook	41	8:55 AM	6	5.6	7.84	76.1	94.7	14.7	68.46	
8/18/2021	Upstream Mill Brook	1	11:32 AM	1	5.6	7.73	202.8	120.5	17.2	62.96	
8/27/2021	Upstream Mill Brook	7	9:25 AM	3	5.8	7.89	78.2	98.5	14.2	57.56	
9/1/2021	Upstream Mill Brook	13	10:50 AM	3	5.9	7.09	88.1	104.9	16.6	65.88	
9/16/2021	Upstream Mill Brook	19	9:23 AM	3	5.7	6.9	166.4	78	10.4	55.08	
10/26/2021	Upstream Mill Brook	25	9:05 AM	3	5.4	6.73	152.7	79.9	8.5	48.05	
10/26/2021	Upstream Mill Brook	32	9:10 AM	3	5.2	6.88	18.7	1.6	14.88	58.7	
4/7/2022	Upstream Mill Brook	38	9:35 AM	3	5.7	6.56	43.1	87.9	5.9	42.62	
4/20/2022	Upstream Mill Brook	46	10:10 AM	3	5.2	5.88	37	61.5	4.1	39.38	
5/4/2022	Upstream Mill Brook	1	9:30 AM	3	5.7	6.85	58.5	75.7	9.9	49.28	
6/2/2022	Upstream Mill Brook	3	9:02 AM	3	5.8	6.88	70	85.3	10.3	59.9	
7/9/2022	Upstream Mill Brook	1	9:54 AM	3	6.1	6.92	99.6	121.7	15.5	59.9	
8/23/2022	Upstream Mill Brook	20	8:37 AM	3	6.2	6.7	115.9	133.3	17.9	64.22	
8/24/2022	Upstream Mill Brook	17	8:15 AM	3	6.1	6.53	129.7	136.3	21.9	71.42	
9/2/2022	Upstream Mill Brook	44	10:10 AM	2	5.9	6.52	96.8	118.3	15.4	59.72	
9/15/2022	Upstream Mill Brook	50	9:40 AM	3	6.1	7.2	114.4	134.2	17.2	62.96	
9/19/2022	Upstream Mill Brook	6	9:43 AM	3	6.1	7.1	105.7	131	14.7	58.46	
10/4/2022	Upstream Mill Brook	11	11:06 AM	3	6.1	6.21	91.4	105.4	8	46.4	
10/26/2022	Upstream Mill Brook	17	10:34 AM	3	5.8	7.5	90.4	119.5	12.2	54.36	
11/1/2022	Upstream Mill Brook	17	9:58 AM	3	5.8	6.47	77.6	115.7	7.7	45.86	
12/28/2022	Upstream Mill Brook	28	9:00 AM	1.2	5.5	7.74	120.8	138.1	1.9	35.42	
5/5/2021	Downstream Mill Brook	6	11:30 AM	4	5.6	7.85	100.1	139	10.6	51.08	
6/15/2021	Downstream Mill Brook	10	10:09 AM	5	5.7	8.11	200.2	240.8	16.1	60.98	
7/5/2021	Downstream Mill Brook	16	10:16 AM	4/7	6.3	8.15	209.5	237.3	18.9	66.02	
7/13/2021	Downstream Mill Brook	25	1:30 PM	6	6.3	8.15	206.4	234.5	18.7	65.86	
7/19/2021	Downstream Mill Brook	31	11:40 AM	6	5.3	7.93	86	97.4	18.8	65.84	
7/28/2021	Downstream Mill Brook	37	10:40 AM	6	5.6	8.11	151.4	173.9	18.2	64.76	
8/2/2021	Downstream Mill Brook	46	10:15 AM	3	5.3	7.99	126.1	151.6	16.2	63.36	
8/24/2021	Downstream Mill Brook	6	12:43 PM	6	6.1	8.13	205.2	205.2	18.8	65.84	
8/25/2021	Downstream Mill Brook	12	10:42 AM	6	6.4	7.84	171.4	201.8	16.2	63.36	
9/16/2021	Downstream Mill Brook	18	12:15 PM	6	5.4	8.31	212.4	245.2	18	64.4	
10/14/2021	Downstream Mill Brook	24	10:45 AM	6	6.6	7.91	181.3	179.6	10.9	53.42	
10/26/2021	Downstream Mill Brook	30	10:27 AM	6	6.2	7.39	111.8	159.3	9.4	48.91	
10/27/2021	Downstream Mill Brook	37	11:04 AM	6	6.3	7.35	82.9	108.8	2.9	37.22	
4/7/2022	Downstream Mill Brook	44	10:55 AM	6	5.3	7.41	90.1	139.8	6.4	43.43	
4/29/2022	Downstream Mill Brook	51	11:31 AM	6	2.3	7.64	76.2	122.8			
5/4/2022	Downstream Mill Brook	6	11:04 AM	6/7	2.3	7.44	118	162.6			
6/2/2022	Downstream Mill Brook		10:08 AM	6	6.2	7.82	183.9	198.3			
7/5/2022	Downstream Mill Brook		11:30 AM	6	4.9	7.93	264.5	264.5			
8/13/2022	Downstream Mill Brook		9:40 AM	6	4.4	8.03	247.2	276.6			
8/14/2022	Downstream Mill Brook		10:30 AM	6	4.6	8.13	275.2	301.3			
9/2/2022	Downstream Mill Brook		11:18 AM	7	6.4	7.85	281.3	289			
9/15/2022	Downstream Mill Brook		9:34 AM	6		8.06	240	293.6			
9/19/2022	Downstream Mill Brook		11:00 AM	6	6.3	8.01	251.5	283.1			
10/4/2022	Downstream Mill Brook		12:11 PM	6	6.1	8.33	208.2	300.9			
10/26/2022	Downstream Mill Brook		11:37 AM	6	6.2	7.97	204	282			
11/1/2022	Downstream Mill Brook		10:30 AM	7	6.35	8.06	182.5	285.3			
11/18/2022	Downstream Mill Brook		11:00 AM	7	5.7	7.85	196.4	312.8			

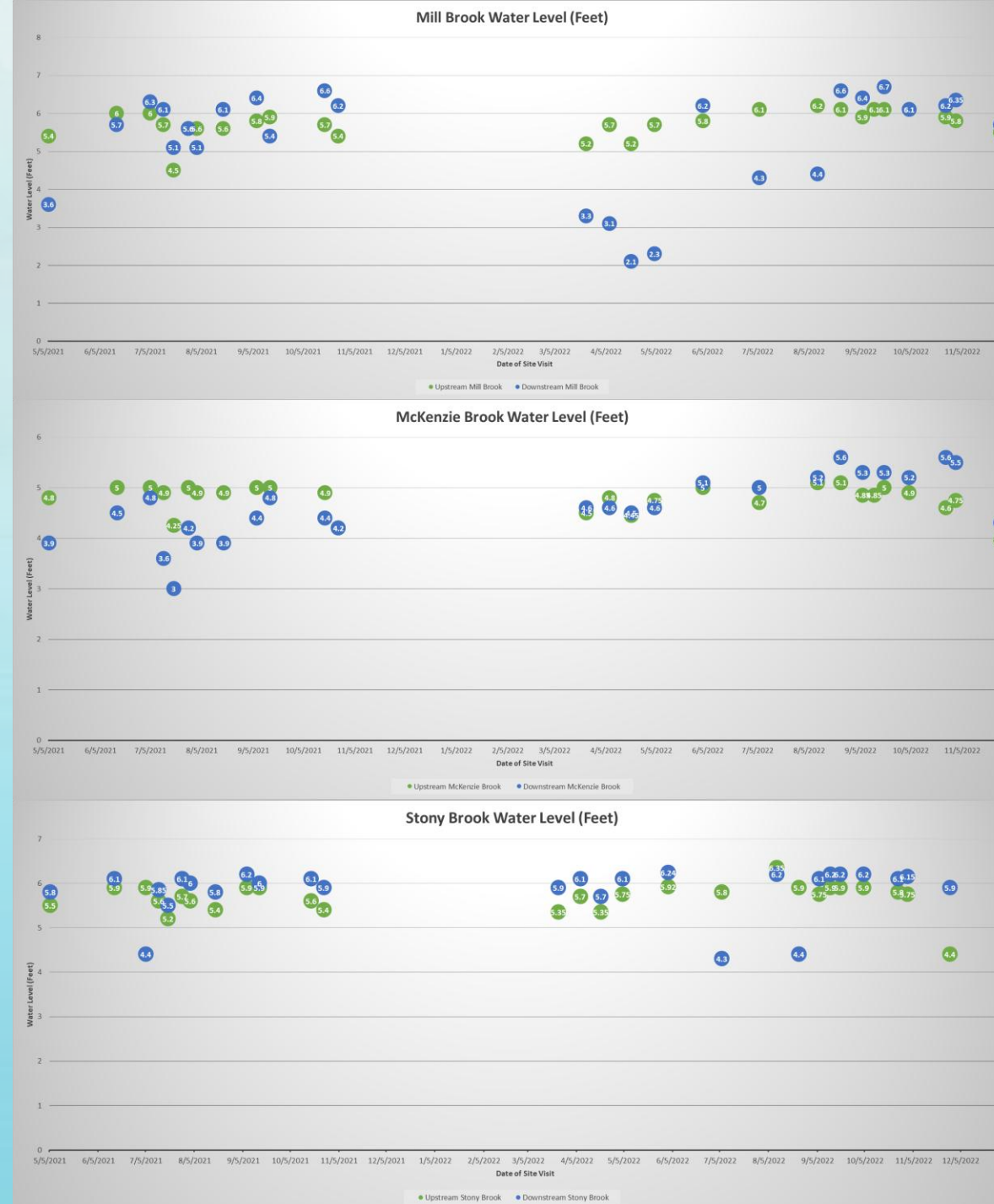
Data!
Now
what?

Date	Location	Dataset #	Time	Temp	Bottle	Water Level	pH	Conductivity	Specific Conductance	Temperature (°C)	TSS
5/5/2021	Upstream Stony Brook	3	9:35 AM	2	5.5	7.85	163	231.4	9.5	49.1	
5/13/2021	Upstream Stony Brook	3	9:47 AM	6	5.9	7.92	270.6	316.1	17.5	62.78	
5/25/2021	Upstream Stony Brook	17	9:35 AM	3	5.8	7.83	237.8	290.1	19.2	68.86	
7/13/2021	Upstream Stony Brook	22	11:45 AM	3	5.9	7.73	250.5	277.3	20	69	
7/19/2021	Upstream Stony Brook	28	10:40 AM	3	5.2	7.64	181.7	218.4	17.5	68.5	
7/28/2021	Upstream Stony Brook	34	10:03 AM	3	5.7	7.73	272.8	311.8	18.4	65.12	
8/9/2021	Upstream Stony Brook	43	9:30 AM	7	5.4	7.67	208.7	250.1	19.8	61.7	
8/18/2021	Upstream Stony Brook	1	12:00 PM	3	5.8	7.82	274.4	324.4	19.7	67.48	
8/27/2021	Upstream Stony Brook	3	9:55 AM	3	5.9	7.48	206.3	241.8	16	60.8	
9/1/2021	Upstream Stony Brook	15	11:21 AM	3/7	5.9	7.48	311.8	370.6	18.3	64.58	
10/16/2021	Upstream Stony Brook	21	9:52 AM	3	5.6	7.32	254.0	341.5	11.6	52.88	
10/26/2021	Upstream Stony Brook	34	9:35 AM	3	5.4	7.2	216.6	294	9	48.56	
4/7/2022	Upstream Stony Brook	41	9:34 AM	3	5.35	6.98	128.3	235.4	1.3	35.34	
4/20/2022	Upstream Stony Brook	45	10:00 AM	3	5.7	7.08	160.7	247.4	6.4	49.88	
5/4/2022	Upstream Stony Brook	58	10:48 AM	3	5.35	6.69	122	187.3	3	41	
5/16/2022	Upstream Stony Brook	3	10:15 AM	3	5.75	7.23	181.7	237.5	10.8	51.44	
6/2/2022	Upstream Stony Brook	3	9:50 AM	3	5.92	7.57	240.8	307.3	17.5	62.78	
7/6/2022	Upstream Stony Brook		10:15 AM	3	5.8	7.6	278.8	318.7	18.4	65.12	
8/15/2022	Upstream Stony Brook		8:23 AM	3	6.35	7.47	232	344	19.1	68.86	
8/25/2022	Upstream Stony Brook		9:25 AM	3	5.9	7.32	340.3	472	20.3	68.34	
9/8/2022	Upstream Stony Brook		11:08 AM	3	5.75	6.77	250.2	298.2	14.6	62.42	
9/13/2022	Upstream Stony Brook		10:15 AM	3	5.9	7.1	299.6	353.6	18.3	69.94	
9/19/2022	Upstream Stony Brook		8:10:13 AM	3	5.9	7.34	284.6	348.2	15.4	59.72	
10/4/2022	Upstream Stony Brook		11:14 AM	3	5.9	7.2	244.8	350.2	9.5	48.5	
10/26/2022	Upstream Stony Brook		11:00 AM	3	5.8	7.35	255.5	330.3	12.9	56.12	
11/1/2022	Upstream Stony Brook		9:57 AM	3	5.75	7.5	278.8	341.9	7.8	48.04	
11/28/2022	Upstream Stony Brook		10:10 AM	4	6.4	8.29	333.4	401.2	8.4	38.12	
5/5/2021	Downstream Stony Brook	5	11:01 AM	1	5.8	8.2	258.8	353.2	11	51.8	
5/16/2021	Downstream Stony Brook	17	10:30 AM	4	6.1	8.23	403.5	479	14.7	62.06	
7/5/2021	Downstream Stony Brook	27	10:47 AM	4	6.4	8.54	454.5	468	19	66.2	
7/13/2021	Downstream Stony Brook	34	1:00 PM	3	5.85	8.25	376.5	418.6	19.7	67.46	
7/19/2021	Downstream Stony Brook	40	11:20 AM	3	5.3	8.2	254.8	290.9	18.5	65.3	
7/28/2021	Downstream Stony Brook	46	10:20 AM	6	6.1	8.23	334.7	419.6	18.3	64.84	
8/9/2021	Downstream Stony Brook	45	10:00 AM	3	6	8.22	326.8	389.3	16.6	61.88	
8/18/2021	Downstream Stony Brook	5	11:34 PM	5	5.8	8.29	408.9	468.9	20.1	68.18	
9/1/2021	Downstream Stony Brook	11	10:25 AM	5	6.2	8.06	430.7	515	16.4	61.54	
9/15/2021	Downstream Stony Brook	17	12:25 PM	5	6	8.14	431	523	18.6	65.48	
10/16/2021	Downstream Stony Brook	23	10:38 AM	5	6.1	8.18	317.2	427.5	11.8	50.7	
10/26/2021	Downstream Stony Brook	29	10:07 AM	5	5.9	7.7	220.2	312.2	9.6	48.28	
3/24/2022	Downstream Stony Brook	36	10:44 AM	3/7	5.9	7.48	178	308.8	2.8	37.04	
4/7/2022	Downstream Stony Brook	43	10:40 AM	3	6.1	7.76	230	361.3	7	46.6	
5/16/2022	Downstream Stony Brook		11:08 AM	3	5.7	6.51	164.1	245.6	5	41	
5/16/2022	Downstream Stony Brook	5	10:51 AM	5	6.5	7.8	279.6	384.4	10.7	51.26	
6/2/2022	Downstream Stony Brook		8:38 AM	5	6.24	7.94	337.4	405	16.3	61.34	
7/6/2022	Downstream Stony Brook		11:20 AM	5	4.8	7.98	317.2	375.8	17.2	62.96	
8/10/2022	Downstream Stony Brook	25	10:05 AM	5	6.2	8.2	386.2	435	19	66.2	
8/24/2022	Downstream Stony Brook	33	10:03 AM	5	4.4	8.06	439.3	484	20.3	68.54	
9/6/2022	Downstream Stony Brook	48	11:30 AM	6	6.1	8.06	387.2	435.7	16.8	62.24	
9/13/2022	Downstream Stony Brook		10:40 AM	5	6.2	8.16	436.7	497	18.6	65.48	
9/19/2022	Downstream Stony Brook		9:48 AM	5	6.2	8.11	421.1	458	15.8	60.44	
10/16/2022	Downstream Stony Brook	15	11:52 AM	7	6.12	8.13	298.7	307	19	65.48	
10/26/2022	Downstream Stony Brook	23	11:20 AM	5	6.1	8.17	403.8	506	14.2	57.56	
11/1/2022	Downstream Stony Brook	38	10:14 AM	5.6	6.13	7.83	386.7	520	9.6	49.28	
11/28/2022	Downstream Stony Brook	52	10:40 AM	6	5.9	7.49	226.1	314.1	4.3	35.34	

Date	Location	Dataset #	Time	Bottle	Water Level
5/5/2021	Upstream McKenzie Brook	2	9:20 AM	7	4.8
5/15/2021	Upstream McKenzie Brook	6	9:17 AM	1	5
7/5/2021	Upstream McKenzie Brook	14	9:28 AM	2	5
7/13/2021	Upstream McKenzie Brook	23	11:25 AM	2	4.9
7/19/2021	Upstream McKenzie Brook	27	10:20 AM	2	4.25
8/2/2021	Upstream McKenzie Brook	31	9:45 AM	2	4.9
8/5/2021	Upstream McKenzie Brook	42	9:10 AM	3/4	4.9
8/18/2021	Upstream McKenzie Brook	2	11:47 AM	2	4.9
8/17/2021	Upstream McKenzie Brook	8	9:32 AM	2	4.9
8/15/2021	Upstream McKenzie Brook	14	11:03 AM	2	5
10/18/2021	Upstream McKenzie Brook	20	9:58 AM	2	4.9
10/26/2021	Upstream McKenzie Brook	24	9:45 AM	2	4.9
8/24/2022	Upstream McKenzie Brook	28	9:37 AM	2	4.5
4/7/2022	Upstream McKenzie Brook	40	9:50 AM	2	4.8
4/20/2022	Upstream McKenzie Brook	57	10:23 AM	2	4.65
5/4/2022	Upstream McKenzie Brook	2	9:50 AM	2	4.75
6/2/2022	Upstream McKenzie Brook	9	9:16 AM	2	5
6/16/2022	Upstream McKenzie Brook	9	10:08 AM	2	4.9
8/10/2022	Upstream McKenzie Brook	31	9:13 AM	2	5.1
8/24/2022	Upstream McKenzie Brook	28	9:25 AM	2	5.1
9/6/2022	Upstream McKenzie Brook	45	10:50 AM	3	4.85
9/13/2022	Upstream McKenzie Brook	51	9:48 AM	2/7	4.85
9/18/2022	Upstream McKenzie Brook	7	9:44 AM	3	4.9
10/4/2022	Upstream McKenzie Brook	12	11:18 AM	2	4.9
10/16/2022	Upstream McKenzie Brook	18	10:45 AM	2	4.6
11/1/2022	Upstream McKenzie Brook	23	9:40 AM	2	4.75
11/28/2022	Upstream McKenzie Brook	26	10:07 AM	3	5.05
7/5/2021	Downstream McKenzie Brook	10	9:20 AM	3/5	5.3
8/15/2021	Downstream McKenzie Brook	12	10:45 AM	6	4.8
7/5/2021	Downstream McKenzie Brook	18	11:15 AM	6	4.8
7/13/2021	Downstream McKenzie Brook	23	12:55 PM	4	5.6
7/19/2021	Downstream McKenzie Brook	29	11:00 AM	2	5.3
7/28/2021	Downstream McKenzie Brook	35	10:10 AM	4	5.2
8/7/2021	Downstream McKenzie Brook	47	9:46 AM	4	5.3
8/18/2021	Downstream McKenzie Brook	4	12:13 PM	4	4.9
9/7/2021	Downstream McKenzie Brook	10	10:09 AM	4	4.8
9/15/2021	Downstream McKenzie Brook	16	11:46 AM	4	4.8
10/18/2021	Downstream McKenzie Brook	22	10:17 AM	4	4.8
10/26/2021	Downstream McKenzie Brook	28	9:55 AM	4	4.2
8/24/2022	Downstream McKenzie Brook	37	10:10 AM	3	4.8
6/7/2022	Downstream McKenzie Brook	42	10:30 AM	4	4.6
6/20/2022	Downstream McKenzie Brook	49	10:56 AM	4	4.5
5/4/2022	Downstream McKenzie Brook	4	10:30 AM	4	4.6
6/1/2022	Downstream McKenzie Brook	9	9:53 AM	4	5.1
7/6/2022	Downstream McKenzie Brook	15	11:00 AM	4	5.3
8/10/2022	Downstream McKenzie Brook	25	9:50 AM	4	5.2
8/24/2022	Downstream McKenzie Brook	30	9:51 AM	4	5.6
6/6/2022	Downstream McKenzie Brook	47	11:17 AM	5	5.3
8/13/2022	Downstream McKenzie Brook	2	10:26 AM	4	5.3
9/19/2022	Downstream McKenzie Brook	10	10:20 AM	4	5.3
10/6/2022	Downstream McKenzie Brook	14	11:05 AM	4	5.3
10/26/2022	Downstream McKenzie Brook	20	11:15 AM	4	5.3
11/1/2022	Downstream McKenzie Brook	24	10:07 AM	4	5.5
11/28/2022	Downstream McKenzie Brook	31	10:16 AM	5	4.9

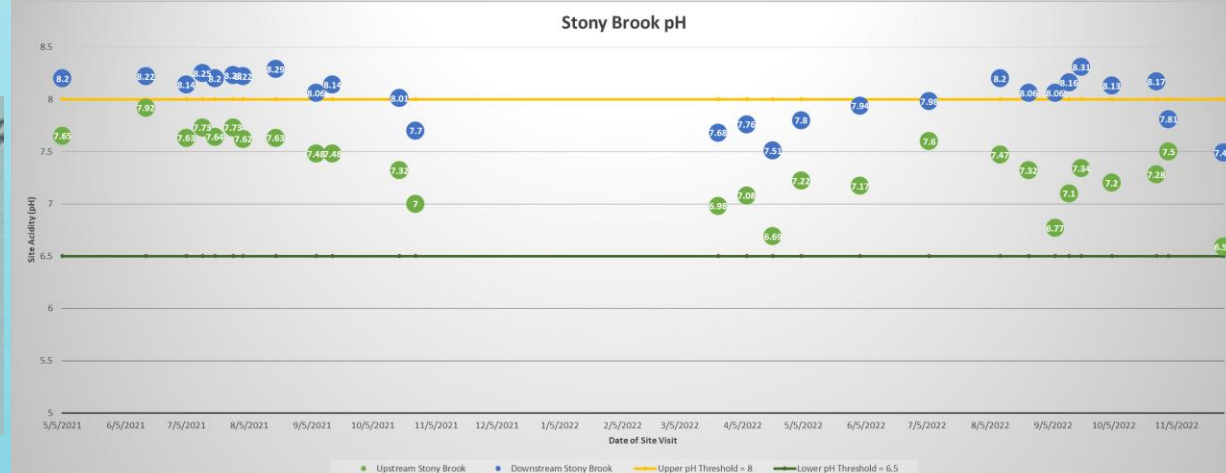
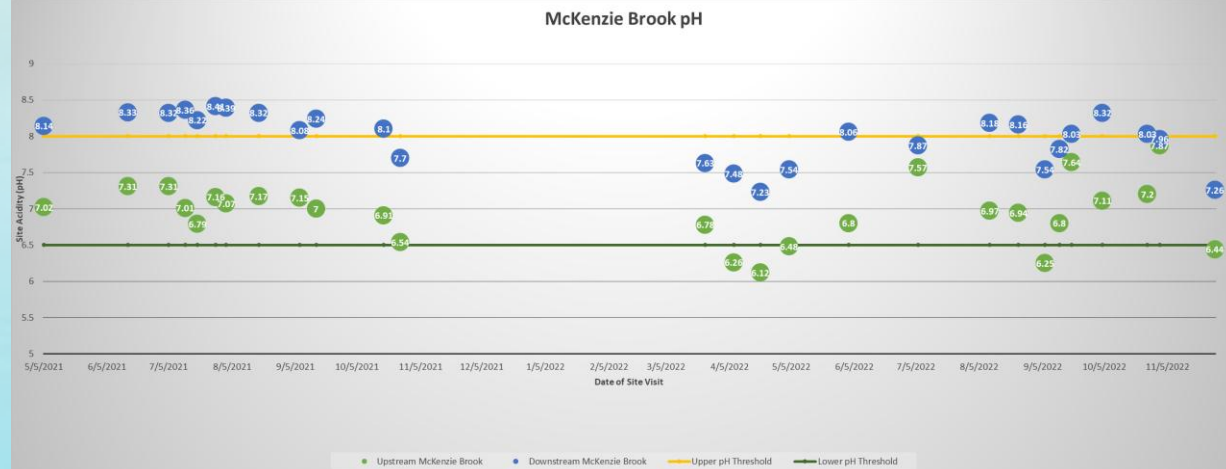
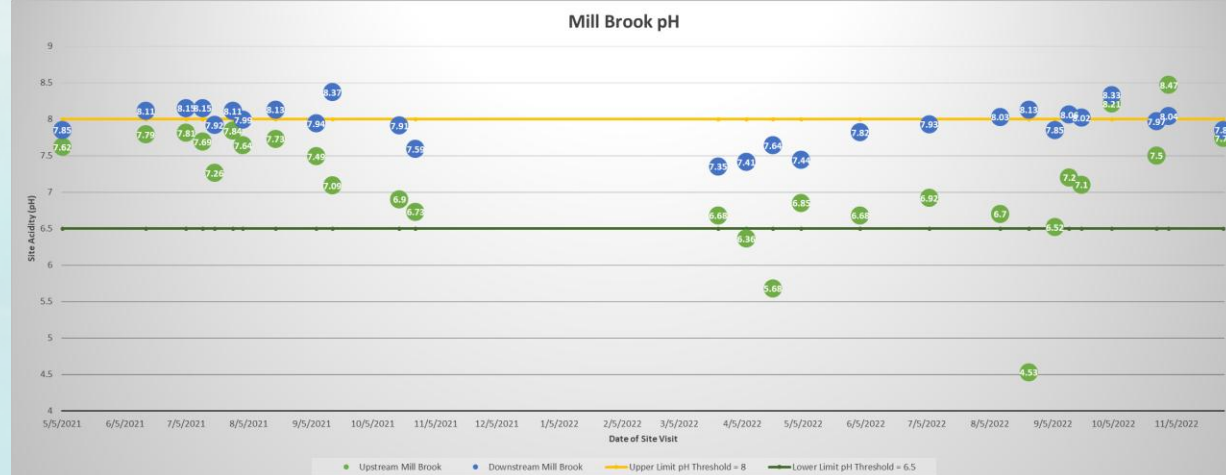
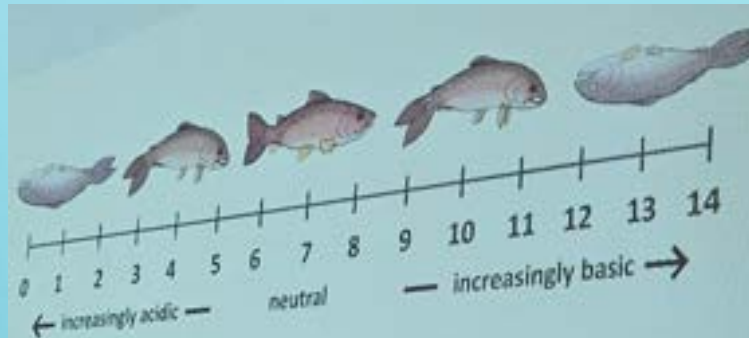
Water Level

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



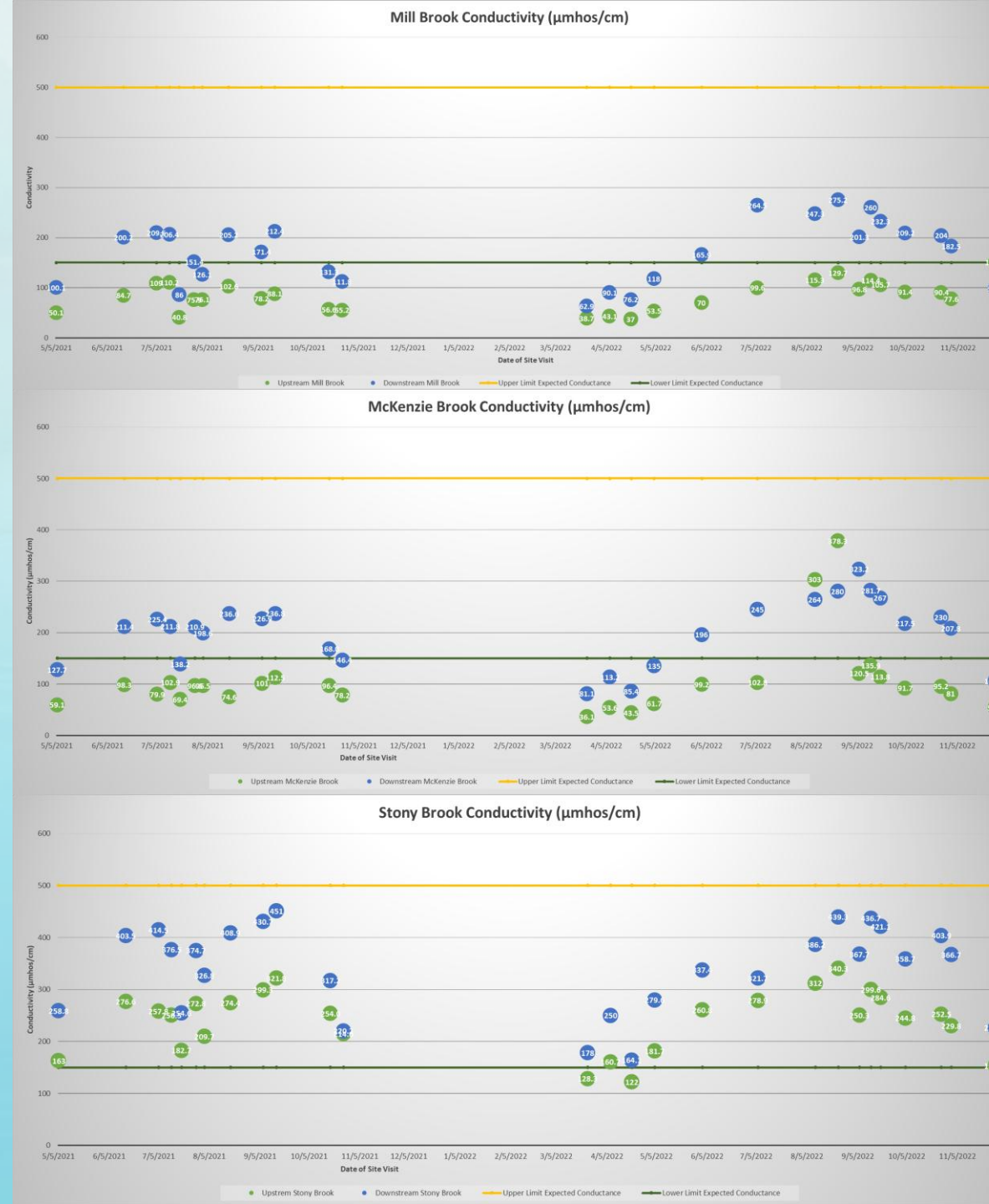
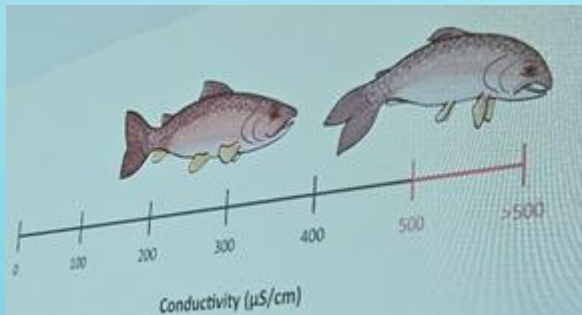
pH

- 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



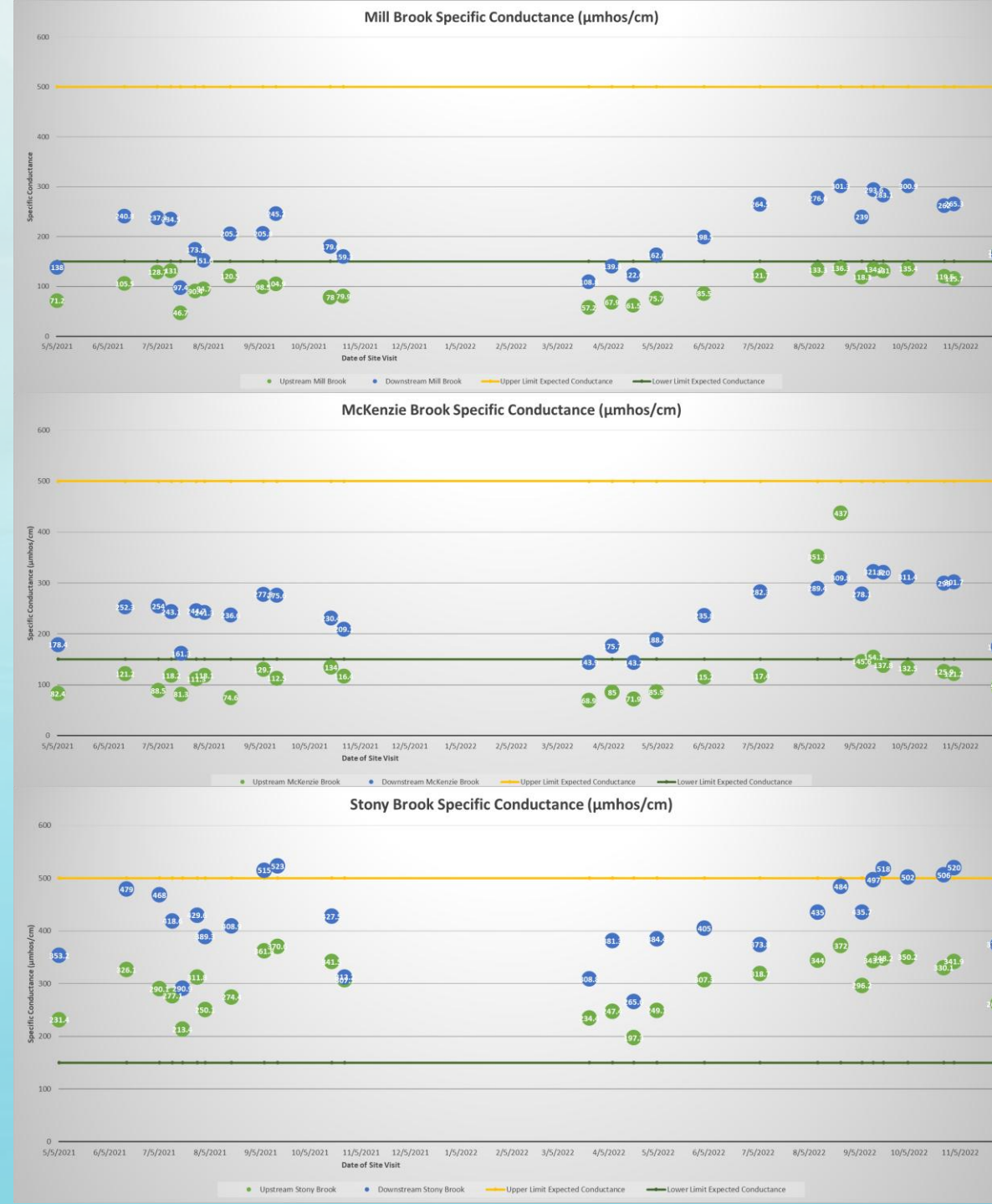
Conductivity

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



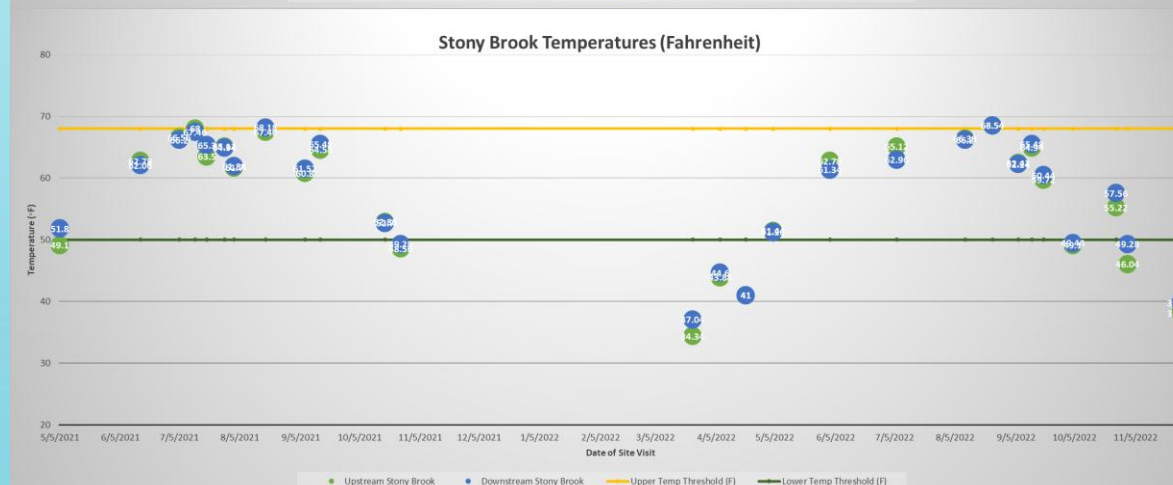
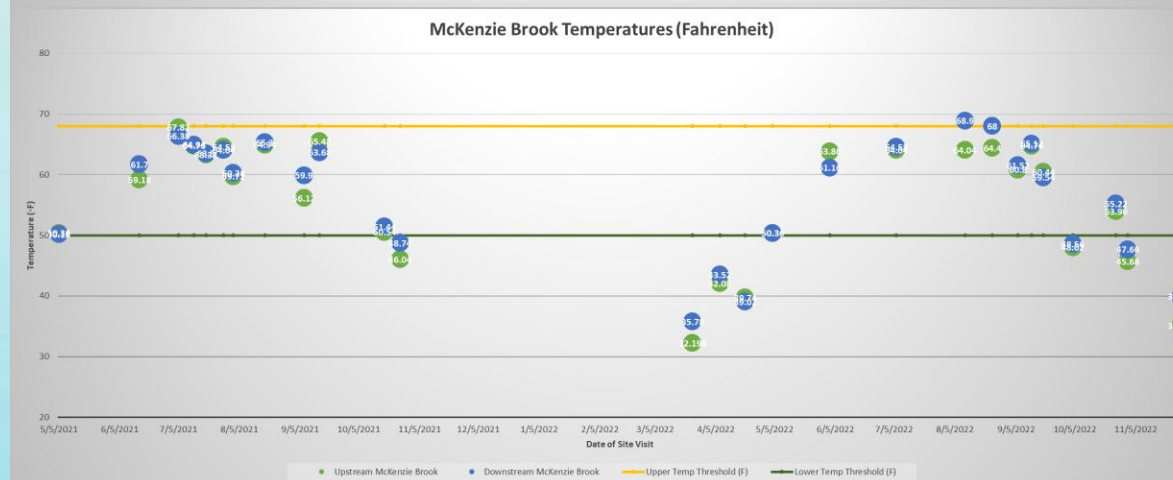
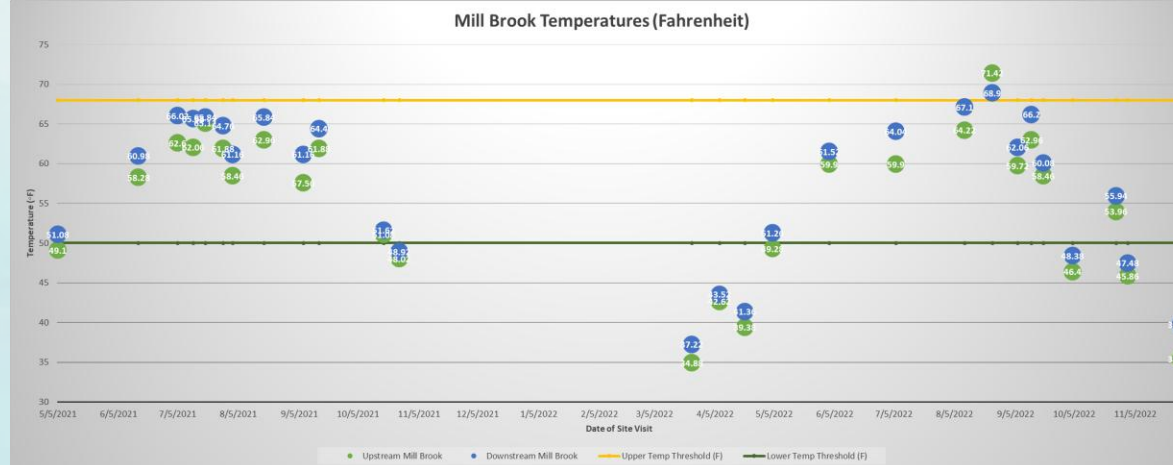
Specific Conductance

- The calculated conductivity of the river at a standardized temperature of 25°C (77°F)
- 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



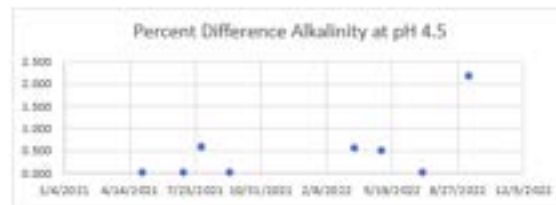
Temperature

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



Quality Analysis

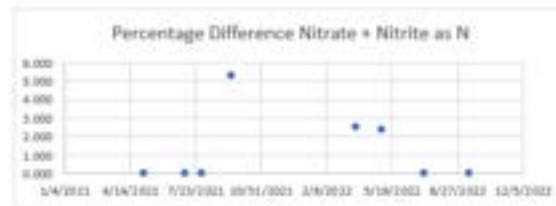
	Alkalinity at pH 4.5	Control bottle	% Difference
5/5/2021 Lower MK	74	74	0.000
7/6/2021 Lower Mill	71	71	0.000
8/2/2021 Upper MK	42	43	0.588
9/15/2021 Upper Stony	150	150	0.000
3/24/2022 Lower Stony	90	92	0.549
5/4/2022 Lower Mill	50	49	0.505
7/6/2022 Upper MK	62	62	0.000
9/13/2022 Upper MK	55	60	2.174



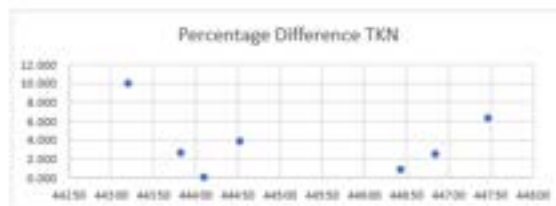
	Chloride	Control bottle	% Difference
5/5/2021 Lower MK	9.9	10	0.251
7/6/2021 Lower Mill	22	22	0.000
8/2/2021 Upper MK	4.9	5	0.505
9/15/2021 Upper Stony	25	25	0.000
3/24/2022 Lower Stony	38	39	0.649
5/4/2022 Lower Mill	17	18	1.429
7/6/2022 Upper MK	<2.5	<2.5	0.000
9/13/2022 Upper MK	3.7	2.9	6.061



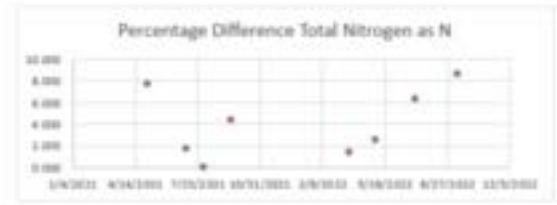
	Nitrate + Nitrite as N	Control bottle	% Difference
5/5/2021 Lower MK	<0.1	<0.1	0.000
7/6/2021 Lower Mill	0.14	0.14	0.000
8/2/2021 Upper MK	<0.05	<0.05	0.000
9/15/2021 Upper Stony	0.078	0.063	5.319
3/24/2022 Lower Stony	0.19	0.21	2.500
5/4/2022 Lower Mill	0.1	0.11	2.381
7/6/2022 Upper MK	<0.05	<0.05	0.000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



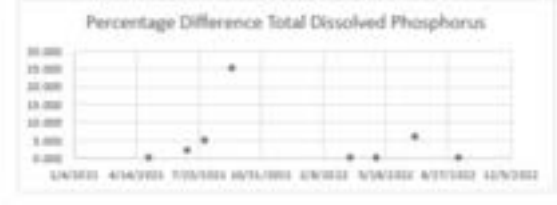
	TKN	Control bottle	% Difference
5/5/2021 Lower MK	0.39	0.26	10.000
7/6/2021 Lower Mill	0.27	0.3	2.632
8/2/2021 Upper MK	0.53	0.53	0.000
9/15/2021 Upper Stony	0.42	0.36	3.846
3/24/2022 Lower Stony	0.32	0.33	0.769
5/4/2022 Lower Mill	0.38	0.42	2.500
7/6/2022 Upper MK	0.89	0.69	6.329
9/13/2022 Upper MK	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	1.763
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	0.01	0.01	0.000
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	0.023	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	0.001	8.824
7/6/2021 Lower Mill	0.013	0.005	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	1.363
5/4/2022 Lower Mill	0.09	0.043	17.649
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	9	5	12.500
3/24/2022 Lower Stony	12	12.2	0.413
5/4/2022 Lower Mill	22.4	20.3	2.881
7/6/2022 Upper MK	19.4	15.4	5.767
9/13/2022 Upper MK	1	29.4	8.580



Lower Mill >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	0.06	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



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.

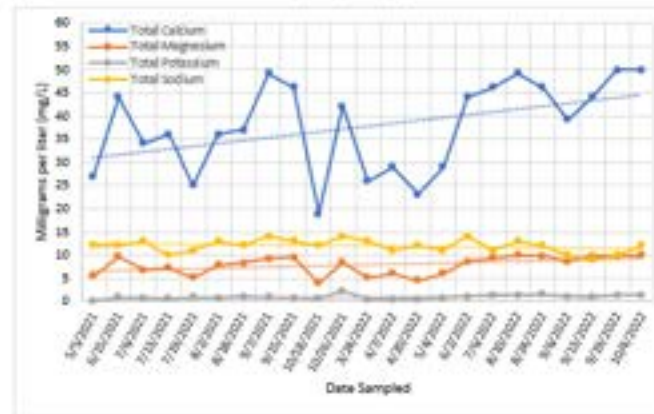


Figure 1.3.1i: Total calcium, total magnesium, total potassium, and total sodium milligrams per liter (mg/L) concentrations from seasonal water quality sampling dates for Stony Brook upstream.

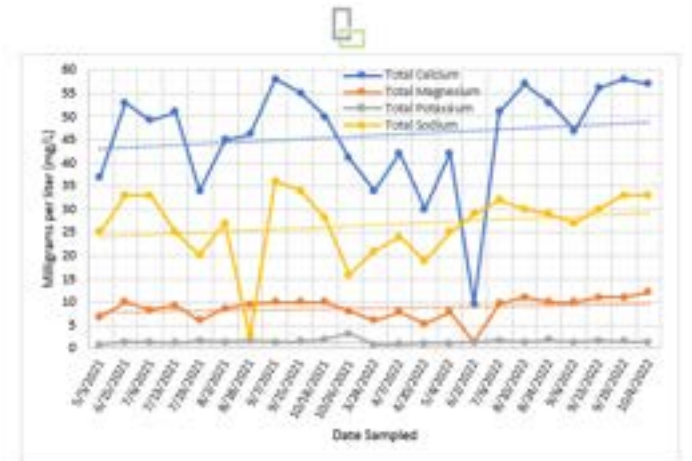


Figure 1.3.1j: Total calcium, total magnesium, total potassium, and total sodium milligrams per liter (mg/L) concentrations from seasonal water quality sampling dates for Stony Brook downstream.

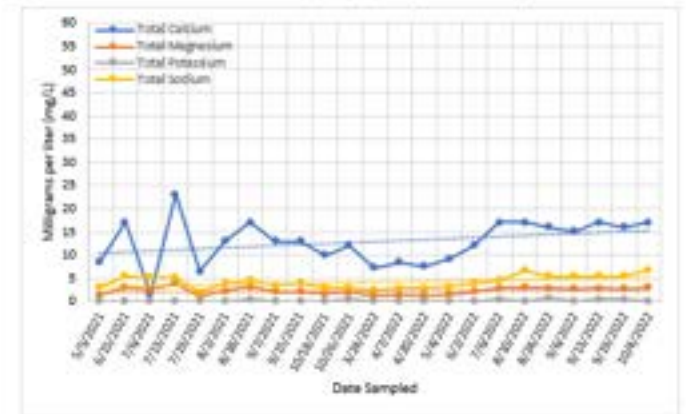


Figure 1.3.1k: Total calcium, total magnesium, total potassium, and total sodium milligrams per liter (mg/L) concentrations from seasonal water quality sampling dates for Mill Brook upstream.

Alkalinity

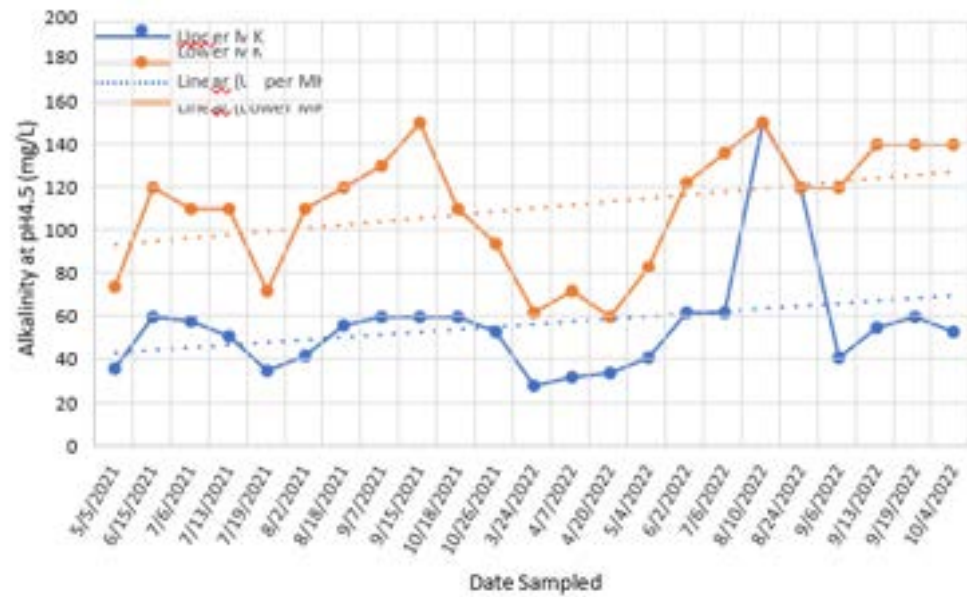


Figure 1.3.1a: Alkalinity at pH 4.5 (mg/L) concentrations from seasonal water quality sampling dates for McKenzie Brook.

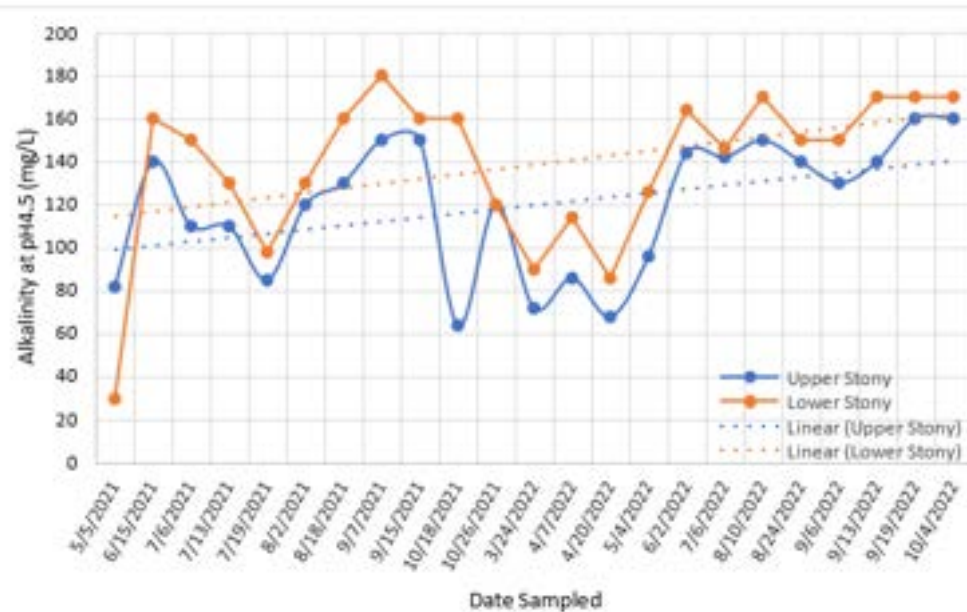


Figure 1.3.1b: Alkalinity at pH 4.5 (mg/L) concentrations from seasonal water quality sampling dates for Stony Brook.

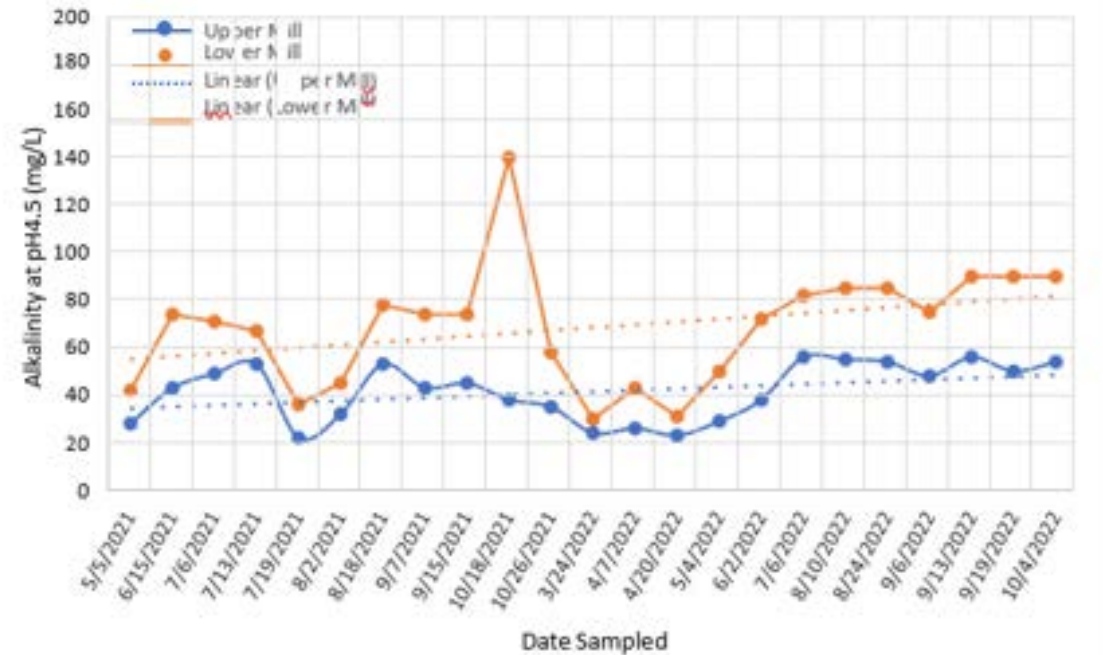


Figure 1.3.1c: Alkalinity at pH 4.5 (mg/L) concentrations from seasonal water quality sampling dates for Mill Brook.

Chloride

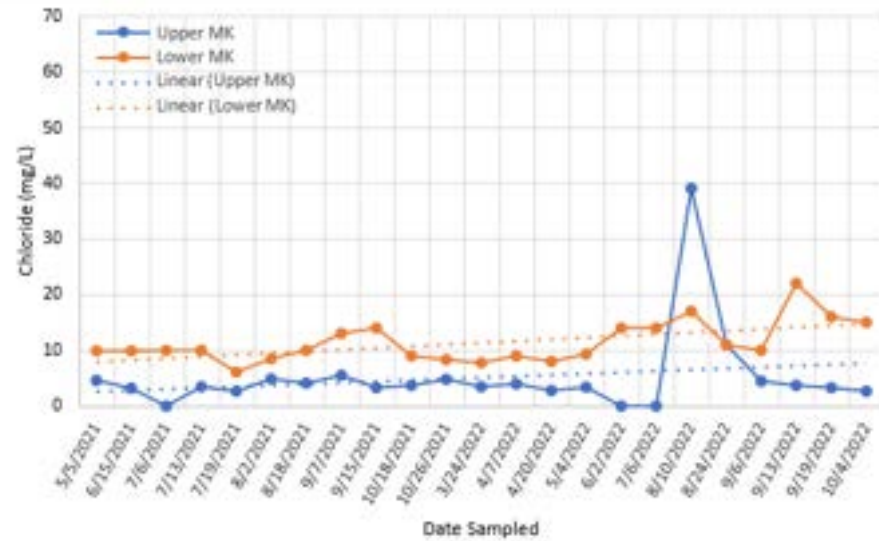


Figure 1.3.1d: Chloride (mg/L) concentrations from seasonal water quality sampling dates for McKenzie Brook.

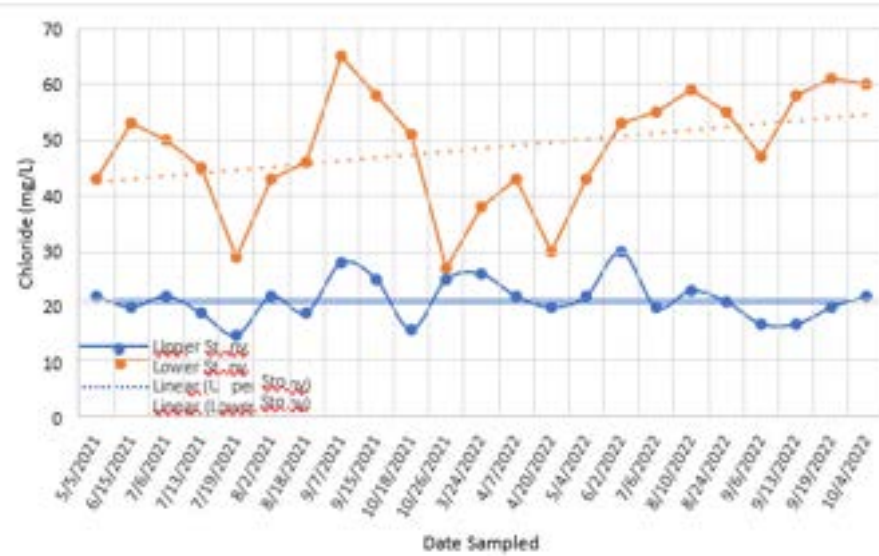


Figure 1.3.1e: Chloride (mg/L) concentrations from seasonal water quality sampling dates for Story Brook.

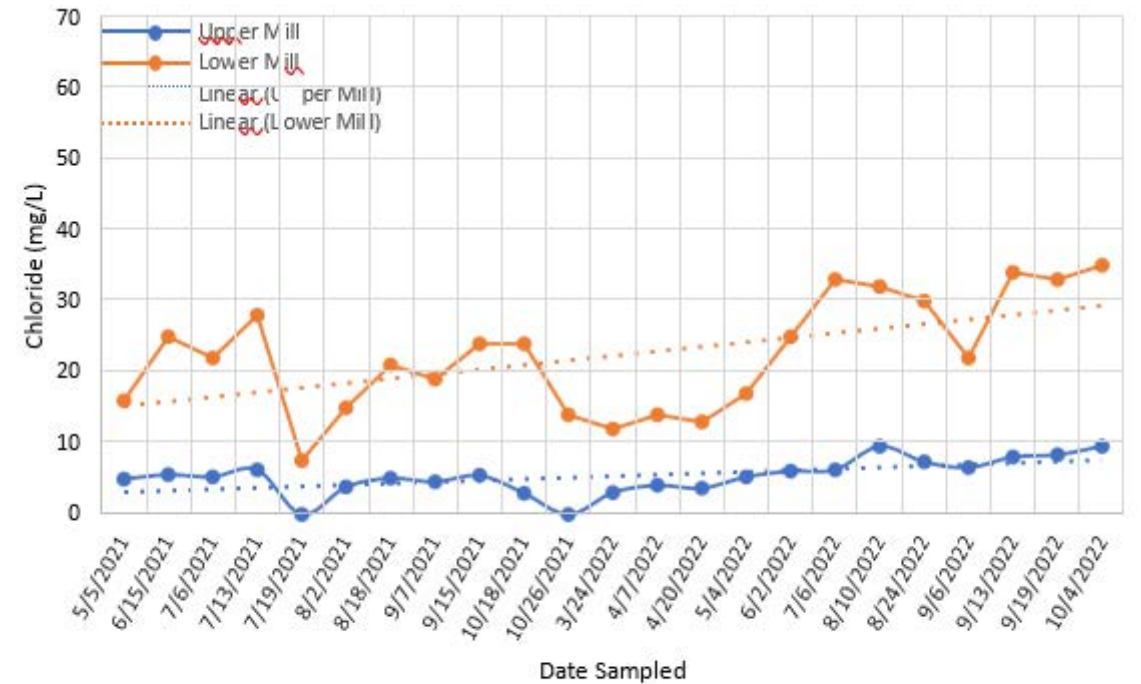


Figure 1.3.1f: Chloride (mg/L) concentrations from seasonal water quality sampling dates for Mill Brook.

McKenzie Brook: Total Calcium, Magnesium, Potassium and Sodium

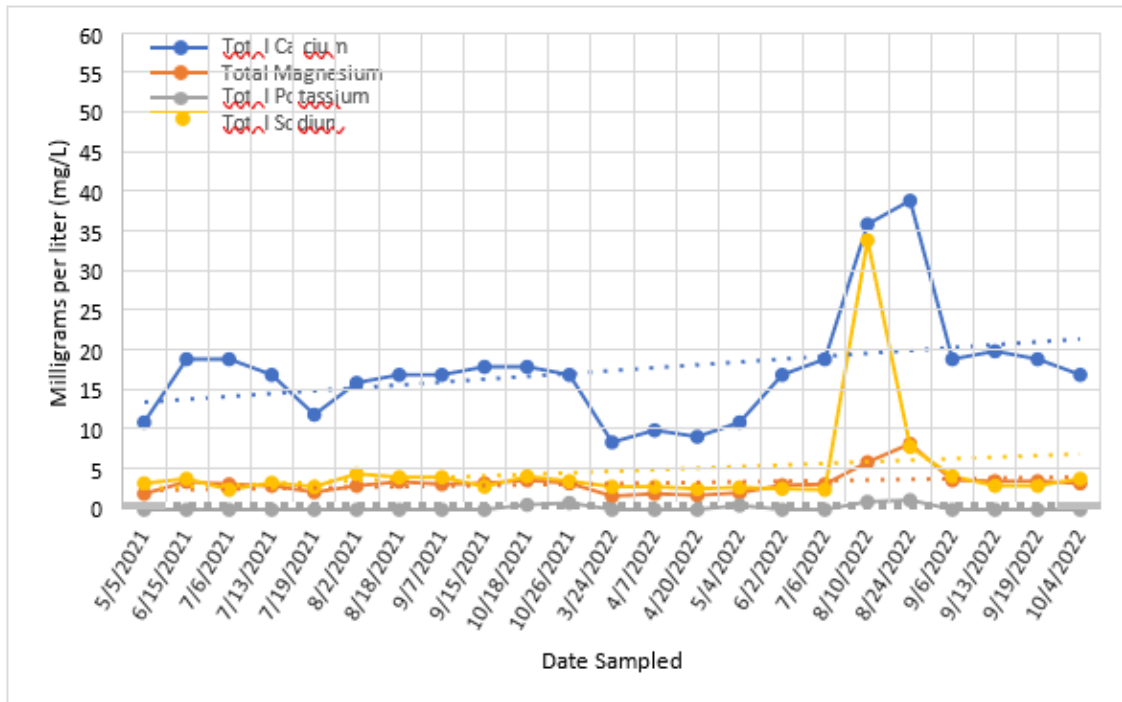


Figure 1.3.1g: Total calcium, total magnesium, total potassium, and total sodium milligrams per liter (mg/L) concentrations from seasonal water quality sampling dates for McKenzie Brook upstream.

McKenzie Brook Upstream

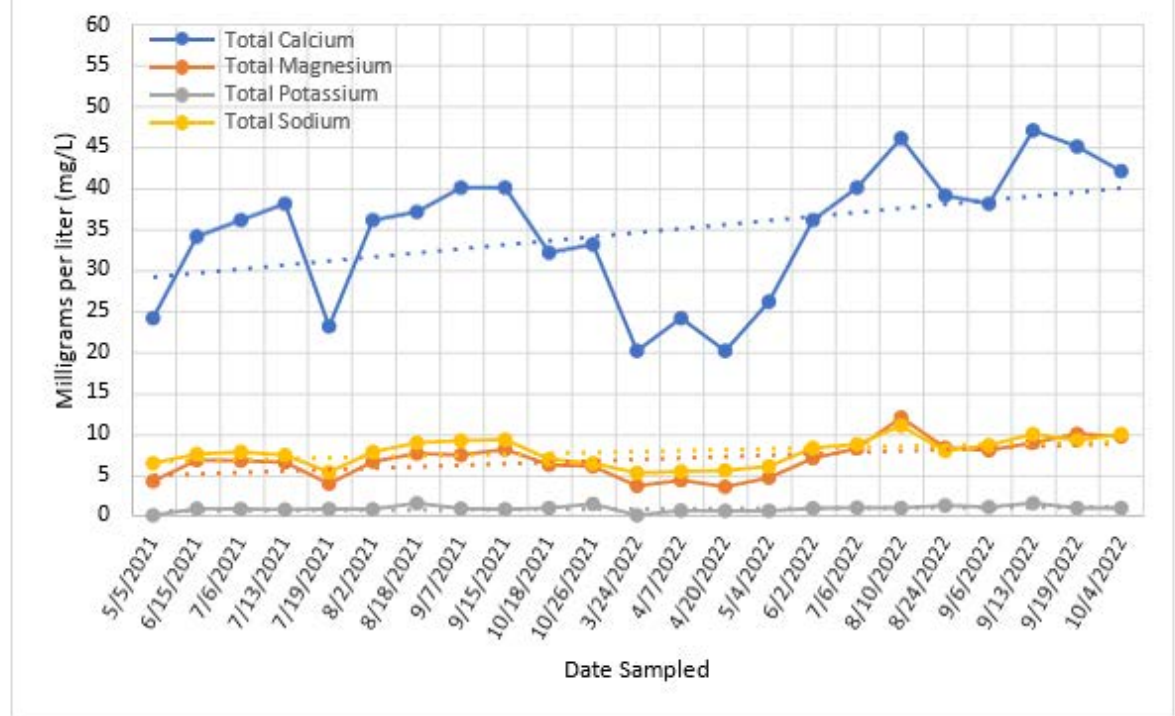


Figure 1.3.1h: Total calcium, total magnesium, total potassium, and total sodium milligrams per liter (mg/L) concentrations from seasonal water quality sampling dates for McKenzie Brook downstream.

McKenzie Brook Downstream

Stony Brook: Total Calcium, Magnesium, Potassium and Sodium

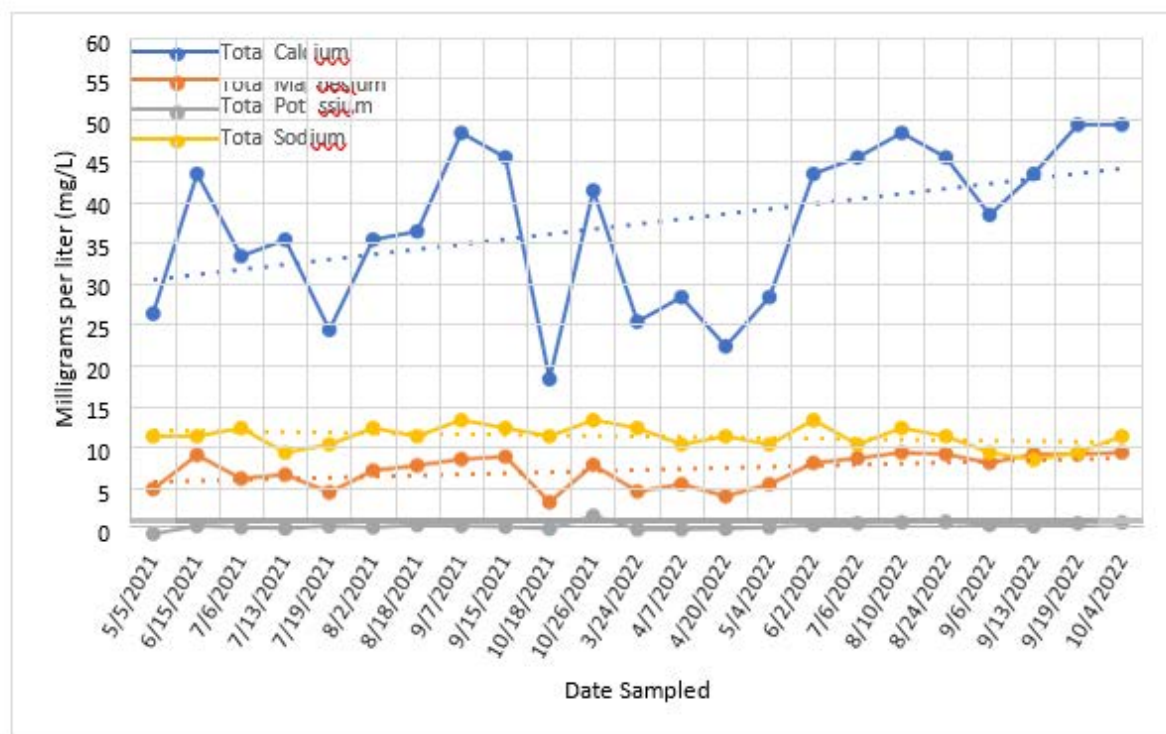


Figure 1.3.1i: Total calcium, total magnesium, total potassium, and total sodium milligrams per liter (mg/L) concentrations from seasonal water quality sampling dates for Stony Brook upstream.

Stony Brook Upstream

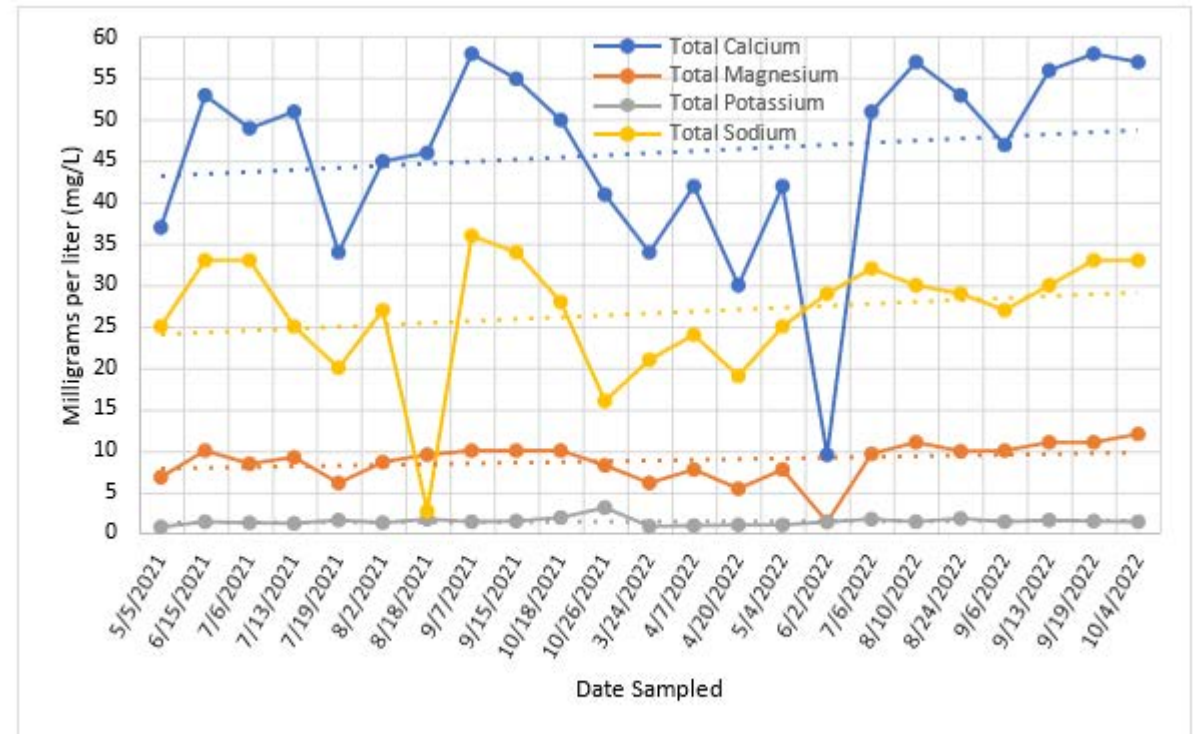


Figure 1.3.1j: Total calcium, total magnesium, total potassium, and total sodium milligrams per liter (mg/L) concentrations from seasonal water quality sampling dates for Stony Brook downstream.

Stony Brook Downstream

Mill Brook: Total Calcium, Magnesium, Potassium and Sodium

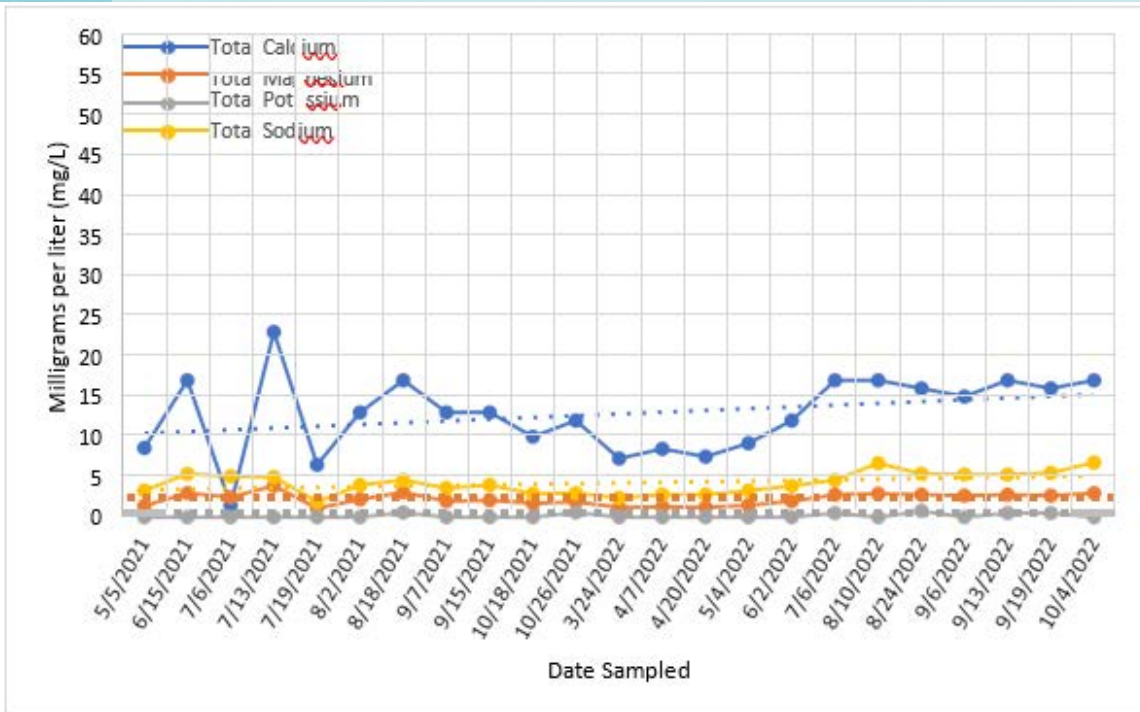


Figure 1.3.1k: Total calcium, total magnesium, total potassium, and total sodium milligrams per liter (mg/L) concentrations from seasonal water quality sampling dates for Mill Brook upstream.

Mill Brook Upstream

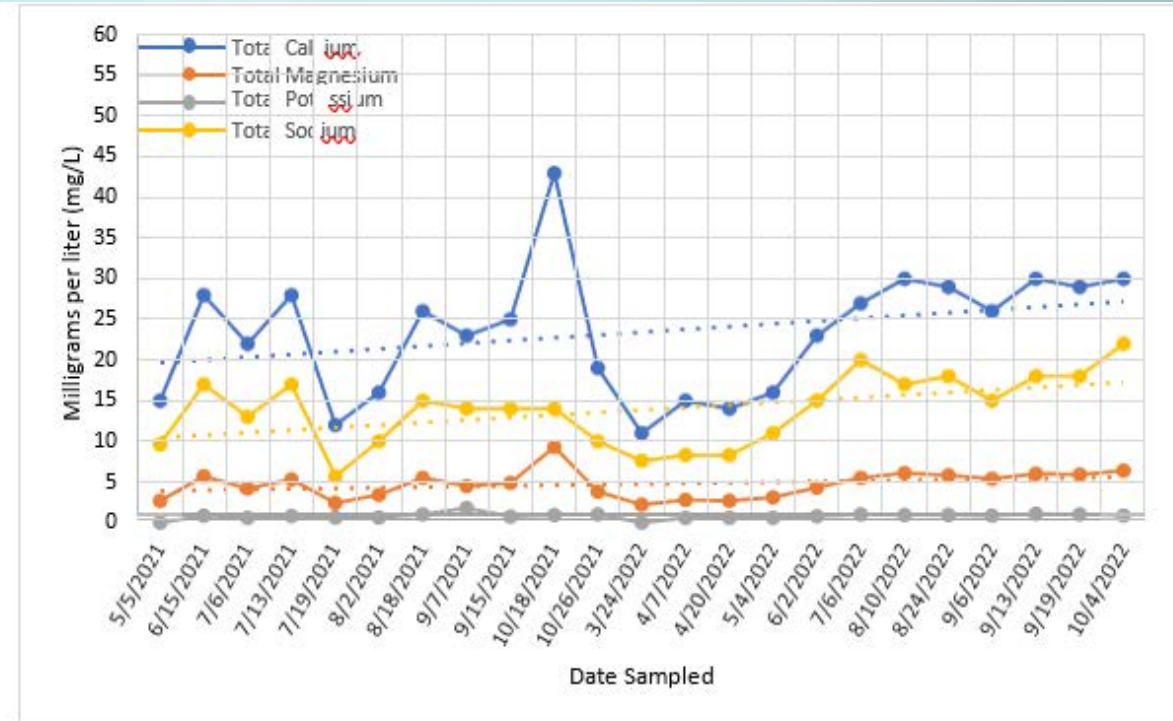


Figure 1.3.1l: Total calcium, total magnesium, total potassium, and total sodium milligrams per liter (mg/L) concentrations from seasonal water quality sampling dates for Mill Brook downstream.

Mill Brook Downstream

Nitrate/Nitrite

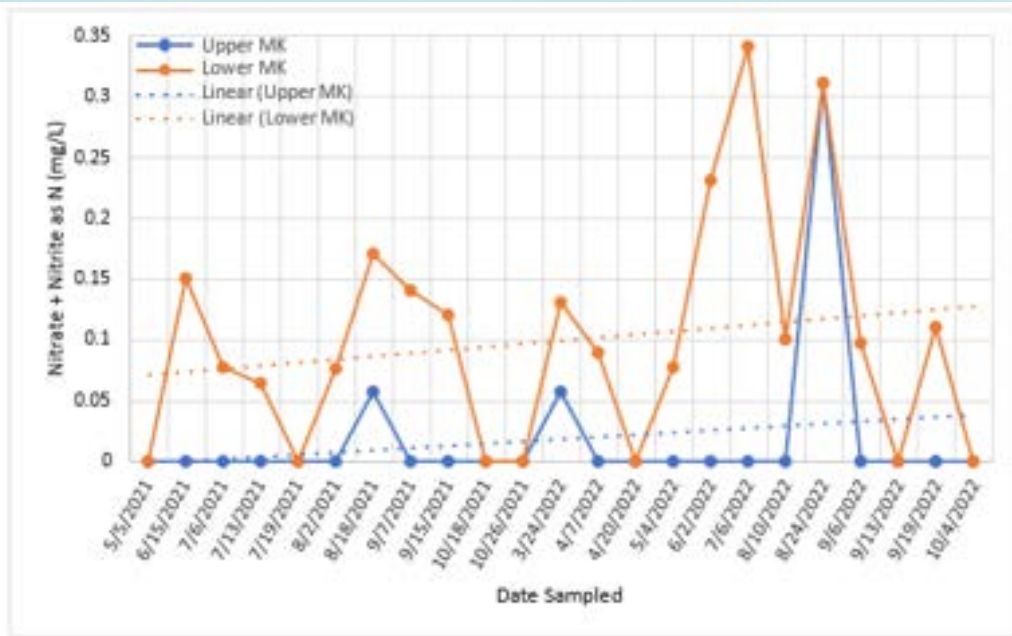


Figure 1.3.2a: Nitrate + nitrite as N (mg/L) concentrations from seasonal water quality sampling dates for McKenzie Brook.

McKenzie Brook

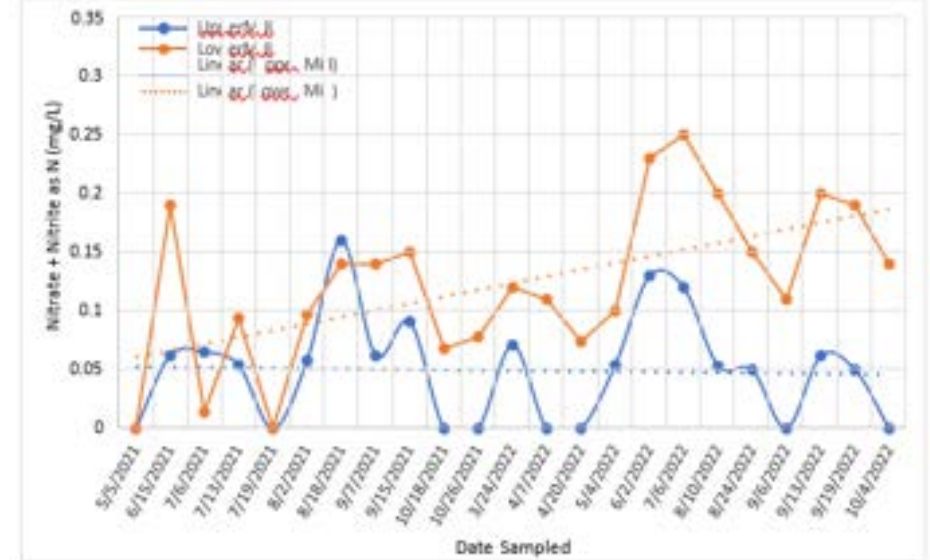


Figure 1.3.2c: Nitrate + nitrite as N (mg/L) concentrations from seasonal water quality sampling dates for Mill Brook.

Mill Brook

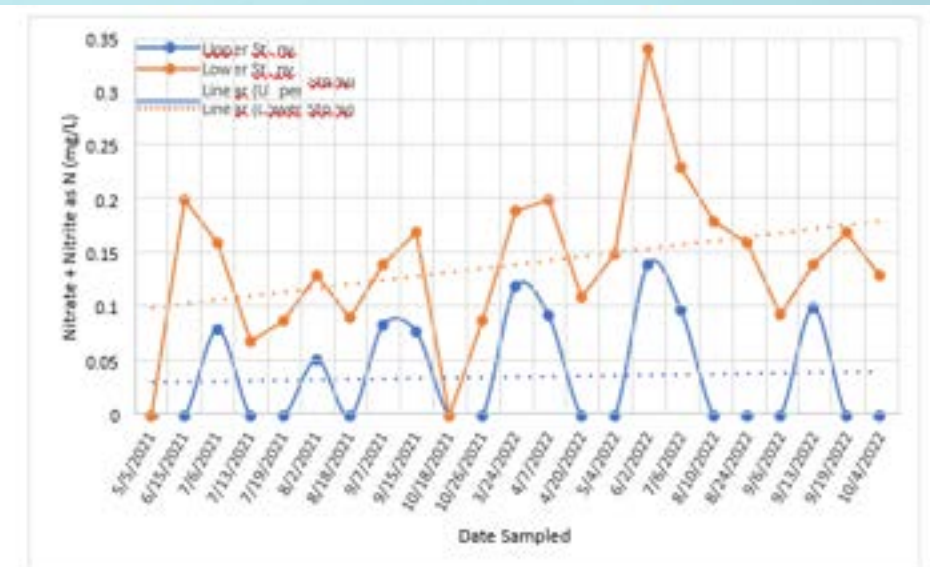


Figure 1.3.2b: Nitrate + nitrite as N (mg/L) concentrations from seasonal water quality sampling dates for Stony Brook.

Stony Brook

Mean TKN

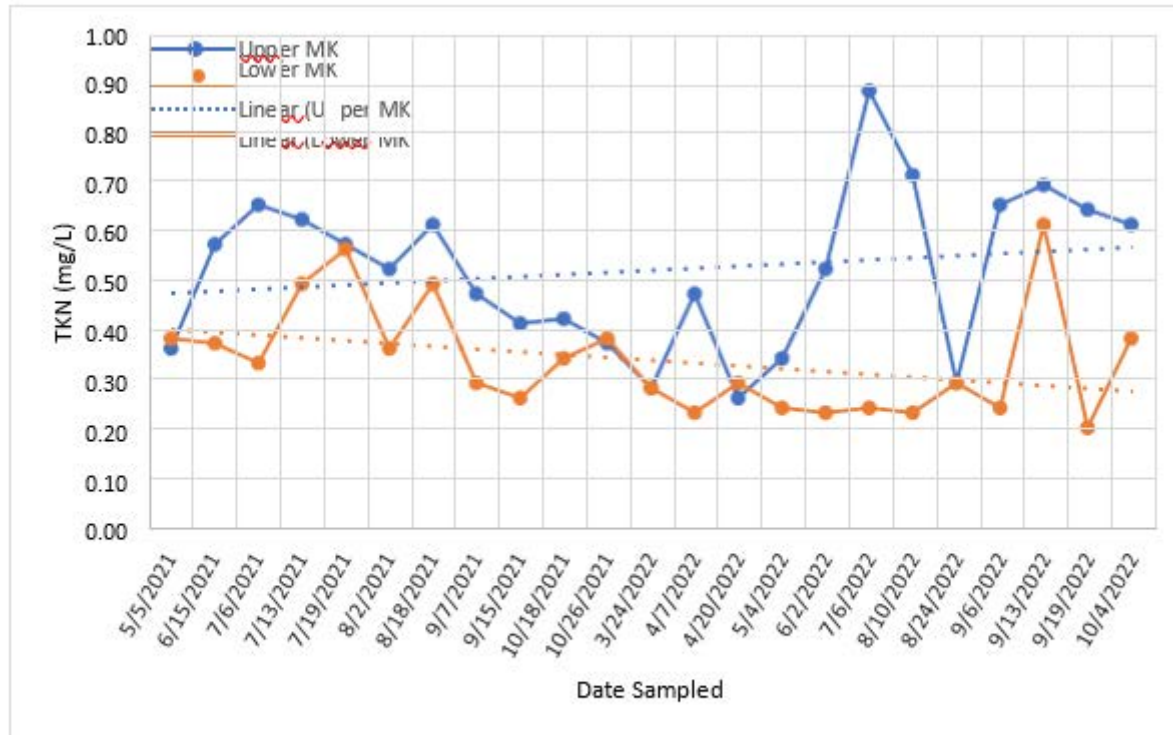


Figure 1.3.2d: TKN (mg/L) concentrations from seasonal water quality sampling dates for McKenzie Brook.

McKenzie Brook

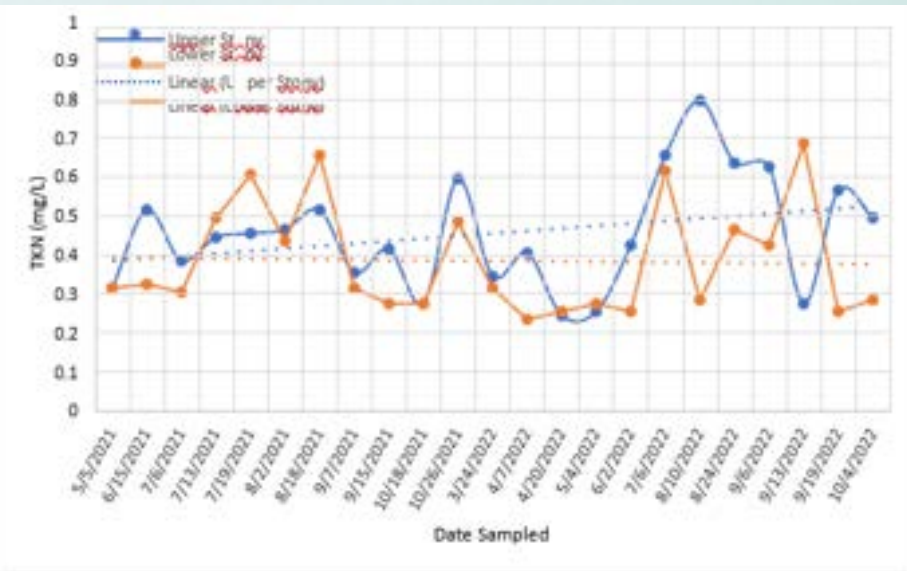


Figure 1.3.2e: Total Kjeldahl nitrogen (mg/L) concentrations from seasonal water quality sampling dates for Stony Brook.

Stony Brook

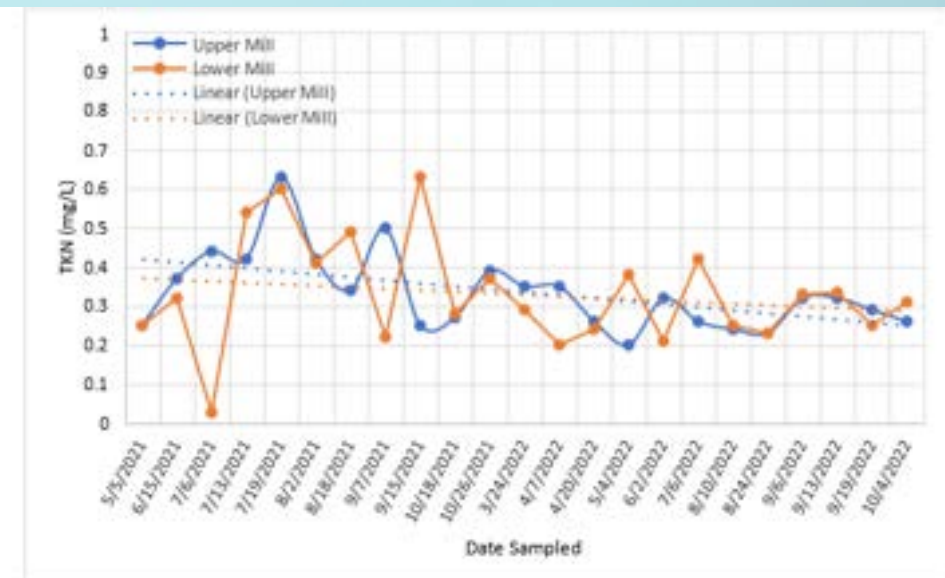


Figure 1.3.2f: Total Kjeldahl nitrogen (mg/L) concentrations from seasonal water quality sampling dates for Mill Brook.

Mill Brook

Total Nitrogen

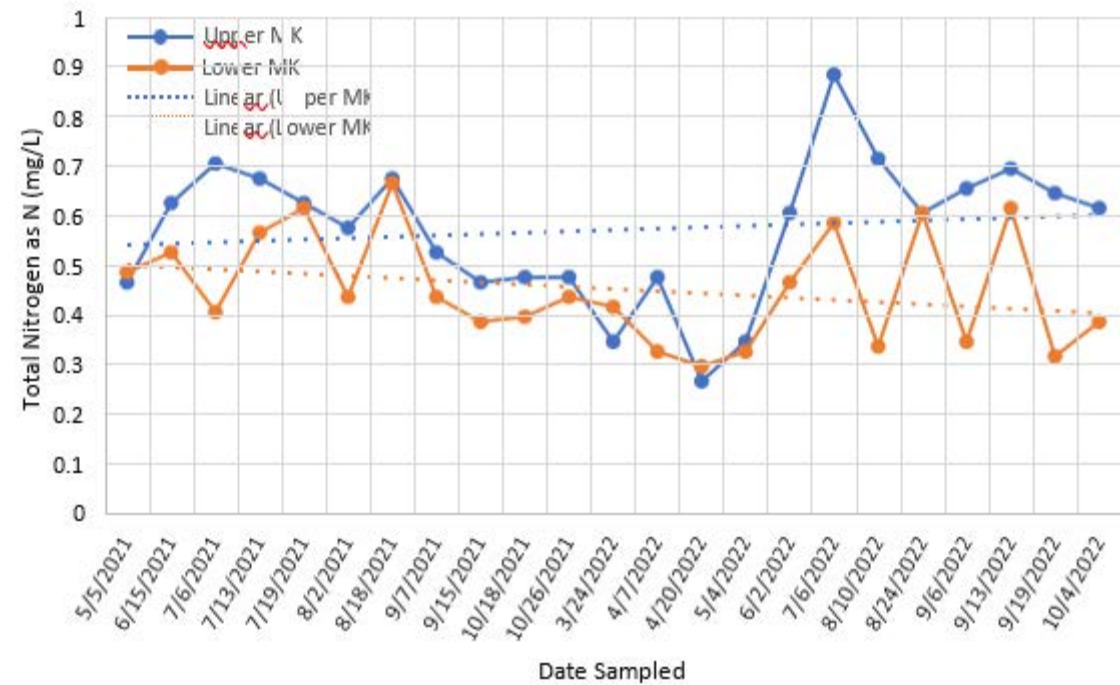


Figure 1.3.2g: Total nitrogen (mg/L) concentrations from seasonal water quality sampling dates for McKenzie Brook.

McKenzie Brook

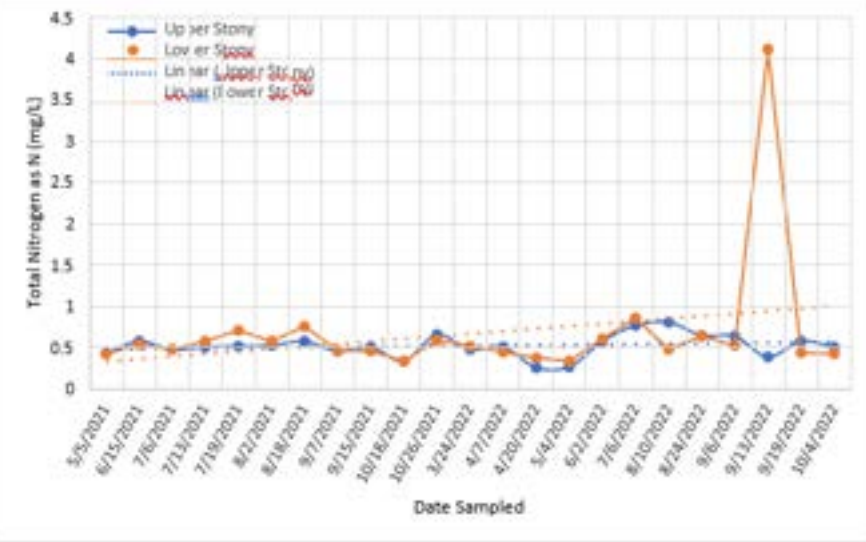


Figure 1.3.2h: Total nitrogen (mg/L) concentrations from seasonal water quality sampling dates for Stony Brook.

Stony Brook

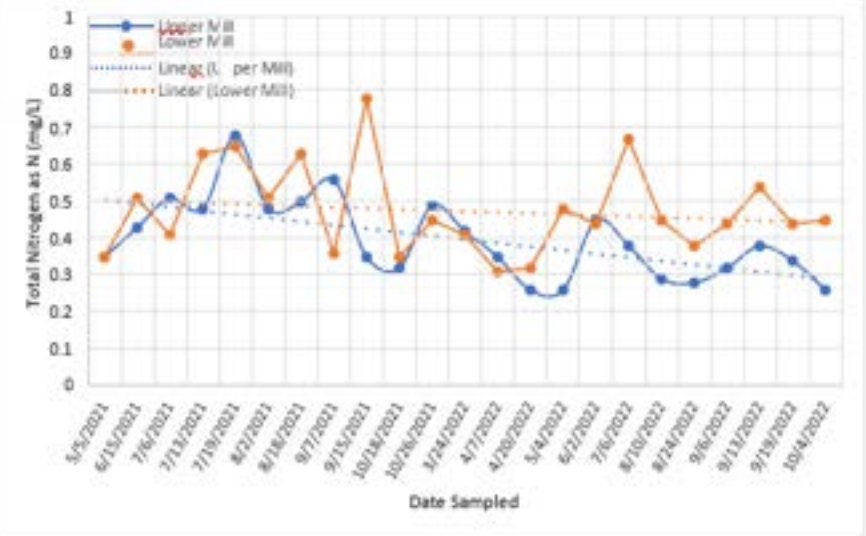


Figure 1.3.2i: Total nitrogen (mg/L) concentrations from seasonal water quality sampling dates for Mill Brook.

Mill Brook

Total Dissolved Phosphorus

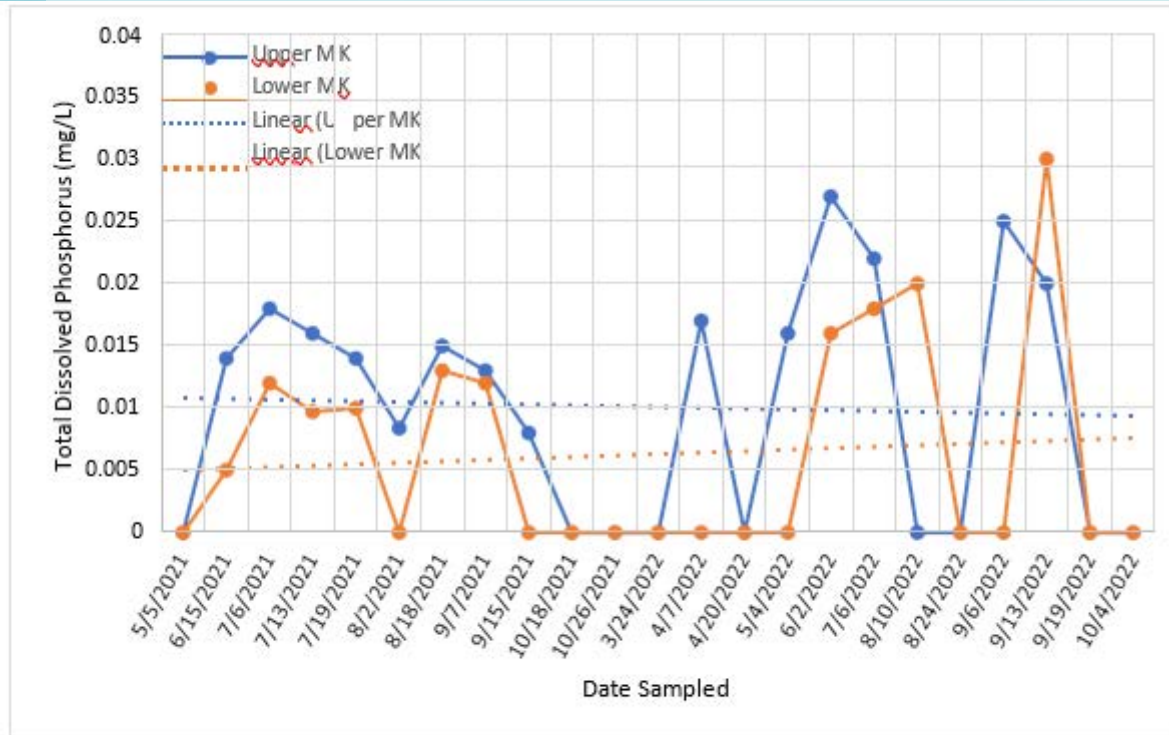


Figure 1.3.3a: Total dissolved phosphorus (mg/L) concentrations from seasonal water quality sampling dates for McKenzie Brook.

McKenzie Brook



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

Stony Brook

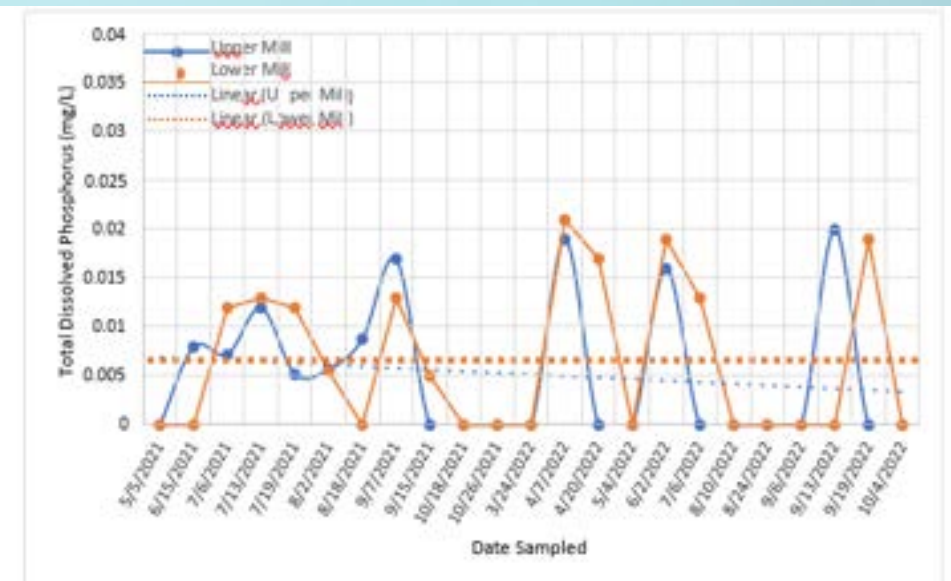


Figure 1.3.3c: Total dissolved phosphorus (mg/L) concentrations from seasonal water quality sampling dates for Mill Brook.

Mill Brook

Total Phosphorus

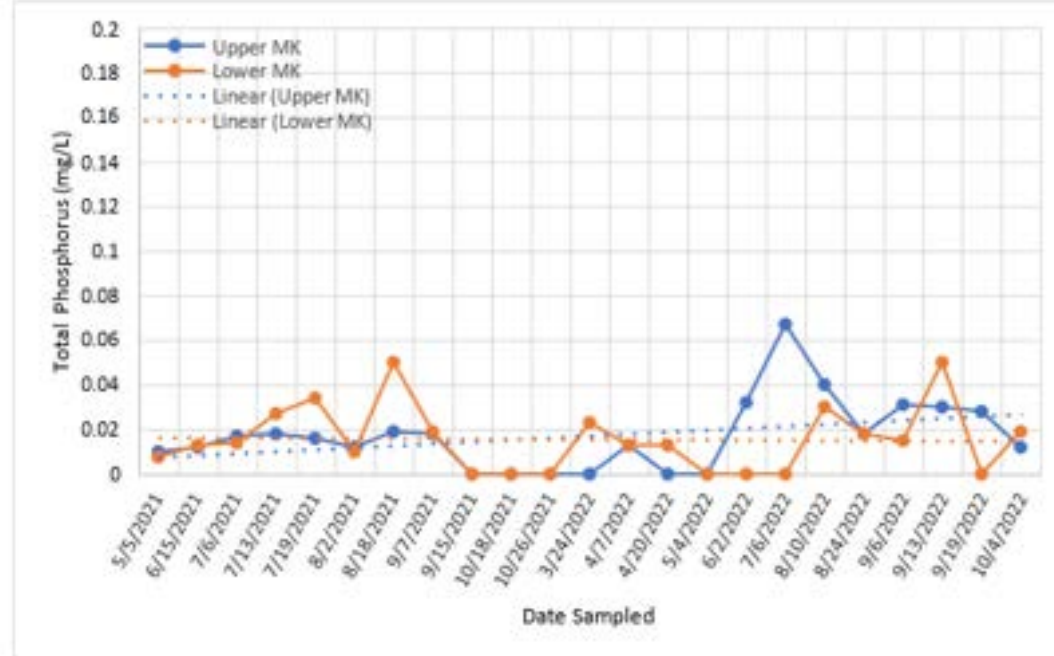


Figure 1.3.3d: Total phosphorus (mg/L) concentrations from seasonal water quality sampling dates for McKenzie Brook.

McKenzie Brook

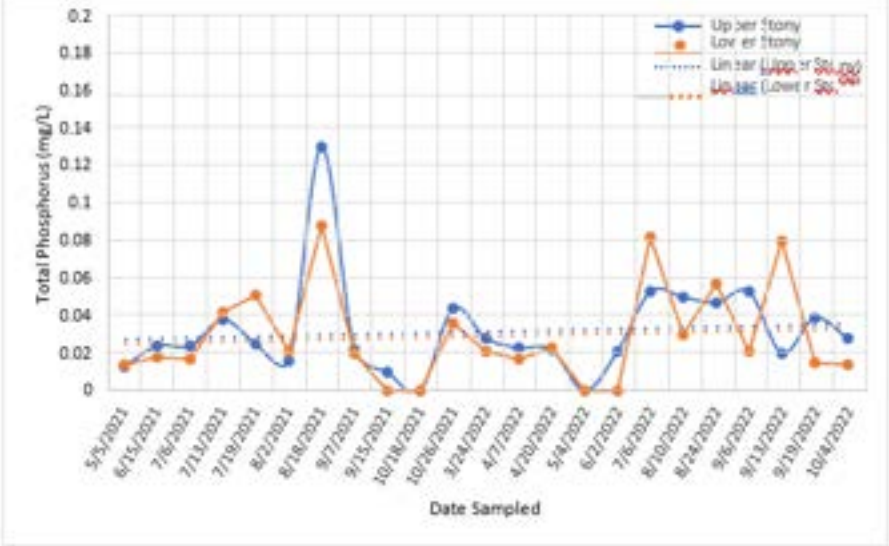


Figure 1.3.3e: Total phosphorus (mg/L) concentrations from seasonal water quality sampling dates for Stony Brook.

Stony Brook

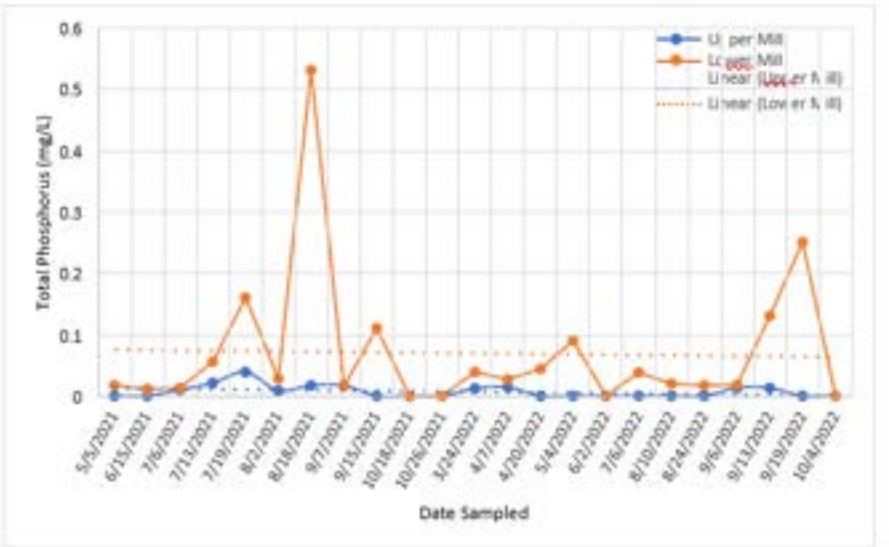


Figure 1.3.3f: Total phosphorus (mg/L) concentrations from seasonal water quality sampling dates for Mill Brook.

Mill Brook

Total Suspended Solids

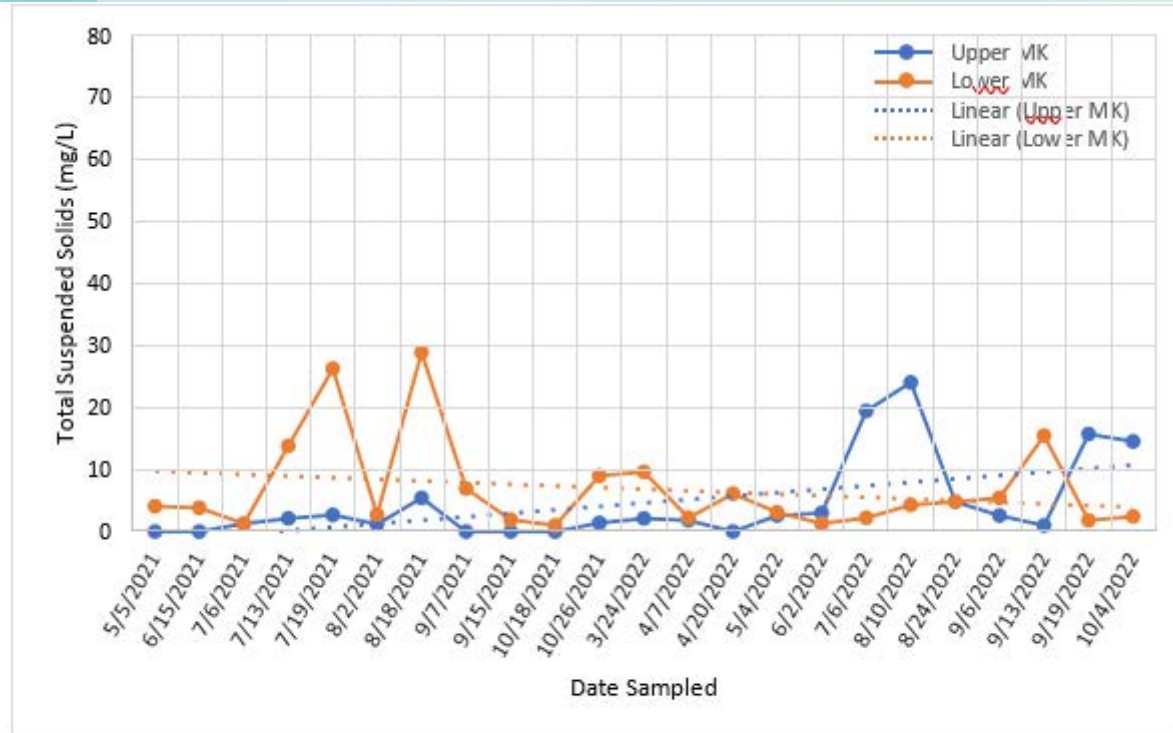


Figure 1.3.4a: Total suspended solids (mg/L) concentrations from seasonal water quality sampling dates for McKenzie Brook.

McKenzie Brook

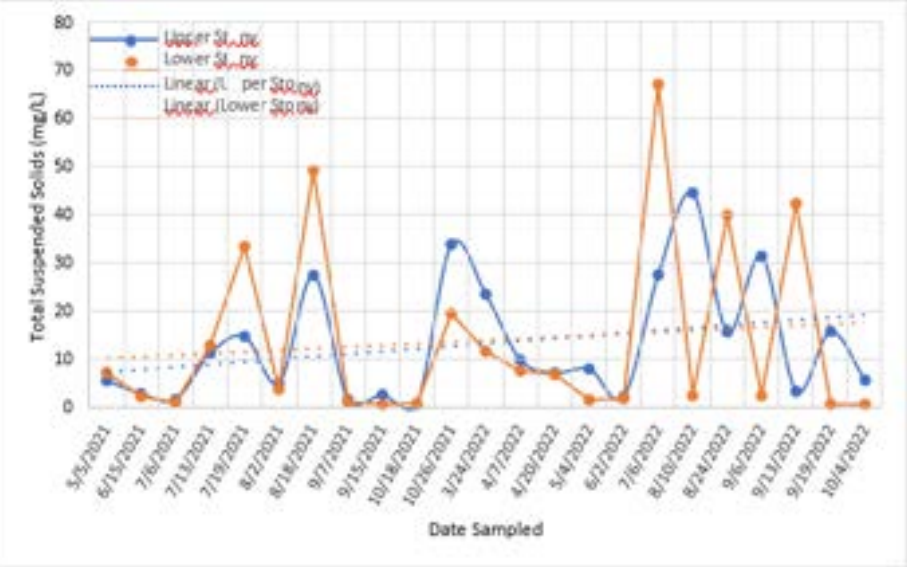


Figure 1.3.4b: Total suspended solids (mg/L) concentrations from seasonal water quality sampling dates for Stony Brook.

Stony Brook

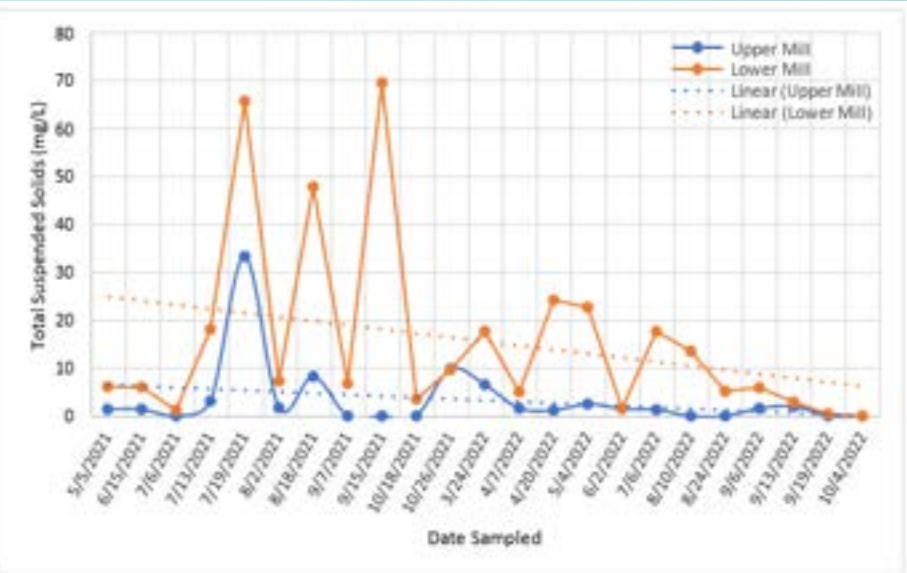


Figure 1.3.4c: Total suspended solids (mg/L) concentrations from seasonal water quality sampling dates for Mill Brook.

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).

1



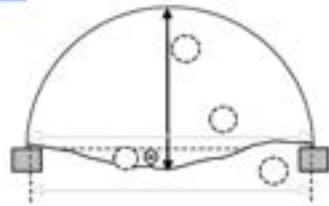
Round Culvert

2



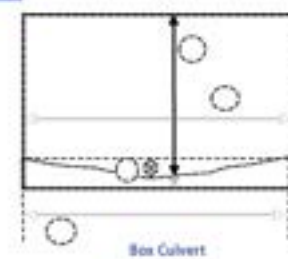
Pipe Arch/Elliptical Culvert

3



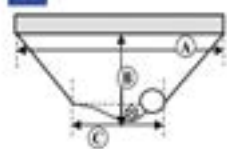
Open Bottom Arch Bridge/Culvert

4



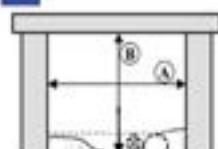
Box Culvert

5



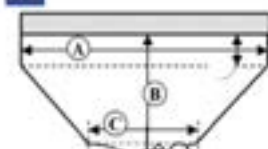
Bridge with Side Slopes

6



Box/Bridge with Abutments

7



Bridge with Abutments and Side Slopes

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	moderate	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-mal	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	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	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 barrier	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 Culvert	Moderate barrier	Sprague dr	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	S. Moriah rd	37015	29	7	12	Med	0.87	none	OK	2016	low	low	low	med	low	med	5	7
9	McKenzie Brook	xy4404534773513842	Bridge	Severe barrier	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 barrier	Windy hill rd	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 barrier	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	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	Railroad	71320	16	9	41.5	High	0.94	none	OK	2019	low	low	med	high	extreme	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-mal	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 - li	0.94	minor	poor	2024	dangerous	low	low	low	low	med	danger (10)	public danger
7	Mill Brook	xy4405104473478881	Culvert	Insignificant	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-mal	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-mal	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-mal	high	4	14
11	Mill Brook	xy4405698873527925	Bridge	Insignificant	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	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	3
14	Mill Brook	xy4405274673550602	Bridge	Insignificant	Crowfoot rd	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	Ensign Pond	105247	30	14.5	56.5	Med	0.95	none	new, thou	2024	low	low	low	low	high-mal	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	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	2
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	2
2	Stony Brook	xy4403892073461390	Bridge	Insignificant	Railroad	71414	10	5	11	High	0.94	none	OK	2019	med	med	med	high	extreme	extreme	9	12
3	Stony Brook	xy4403891973461782	Bridge	Insignificant	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 barrier	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	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	Golf course	105258	14	2.6	3.2	High	0.85	none	poor	2024	high	med	high	high	low	low	11	5
7	Stony Brook	xy4404435673473875	Culvert	Moderate barrier	Golf course	105259	23.4	3.1	2.9	High	0.42	severe	deformat	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	9
9	Stony Brook	xy4404189473474140	Culvert	Moderate barrier	Golf course	105261	39.6	4	4	High	0.41	none	poor	2024	high	med	high	high	low	low	11	5
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	6
11	Stony Brook	xy4404538473475399	Culvert	Severe barrier	Golf course	48596	176	8	7.9	low	0.45	severe	moderate	2024	low	high	high	high	moderate	extreme	10	11
12	Stony Brook	xy4404685473479540	Culvert	Moderate barrier	Viking Ln	104941	242	6.1	5	low-fl	0.48	severe	new	2024	high	high	high	high	extreme	extreme	12	1
13	Stony Brook	xy4404886273487578	Culvert	Severe barrier	Tarbell Hill	37013	80	6	5.8	High	0.01	none	OK	2016	high	high	high	high	med	low	12	2

prohibitively expensive

danger to public

top priority

medium priority

low priority

Prioritization of Crossing Replacements

Crossing Number	River	NAACC Crossing Code	Crossing Type	Points in ranking	Priority Rank
11	McKenzie Brook	xy4403007373541475	Multi-Culvert	11	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 (10)	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	11	1
13	Stony Brook	xy4404886273487578	Culvert	11	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?

