

Torbay Great Pond Update

Drinking Water System Potential

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Agenda

- Safety Moment
- Planning Review
- Water Quality
- Hydrology
- Water Balance
- Aquatic Studies
- Future Work



Safety Moment

Don't underestimate the power of water!



6 inches of fast-moving water can knock over and carry away an adult.

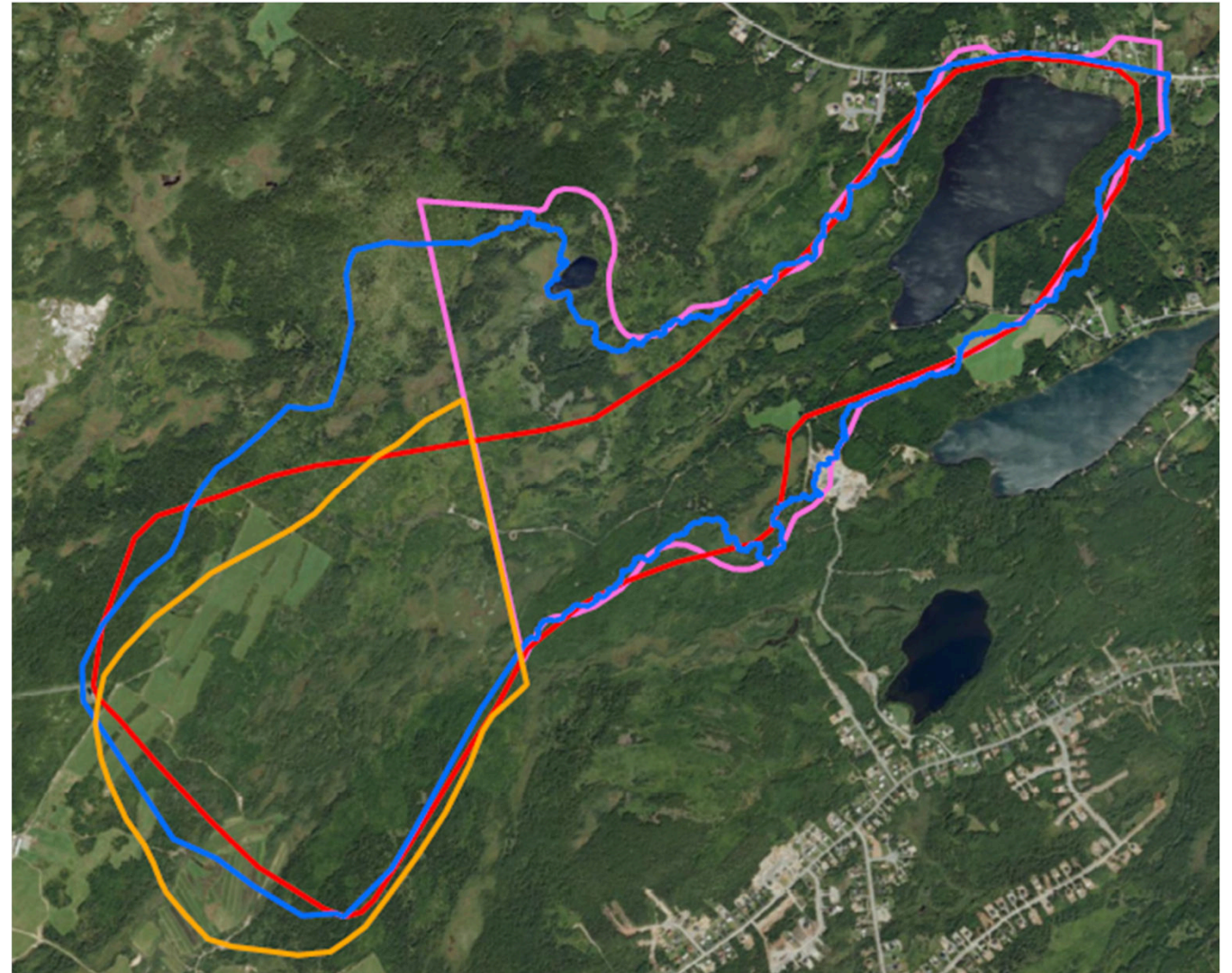
12 inches of fast-moving water can carry away a small car.

18-24 inches of fast-moving water can carry away most large SUVs, vans and trucks.



Watershed Delineations

- The watershed area that was delineated for this study using LiDAR is approximately 80 ha larger than the previously delineated watershed area (NDAL, 2008), as well as the watershed areas used in municipal zoning.

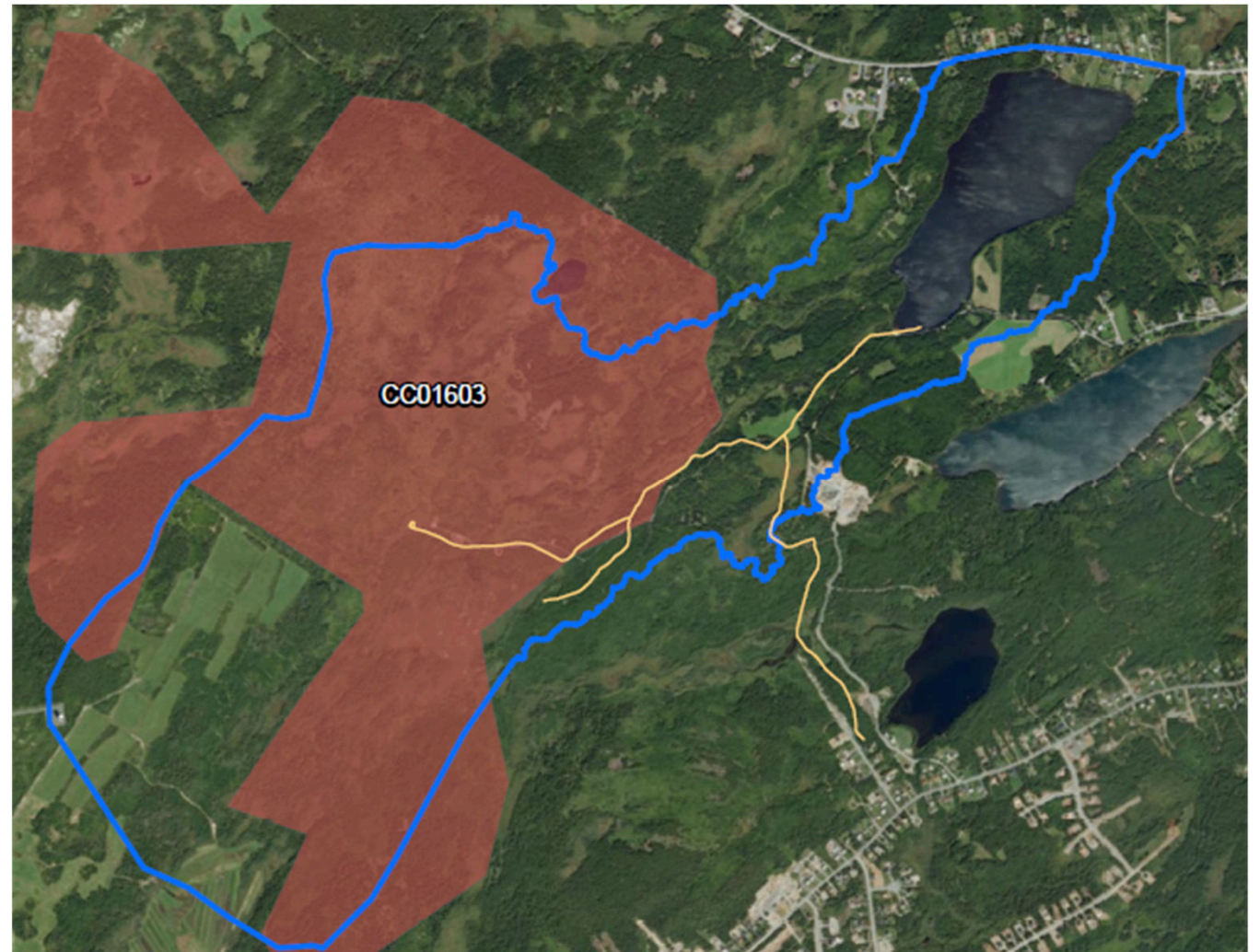


Legend

-  Great Pond Watershed (2020)
-  Great Pond Watershed (NDAL 2008)
-  Torbay Zoning Watershed
-  Portugal Cove-St. Philips Zoning Watershed

Domestic Cutting

- Current domestic cutting area shown



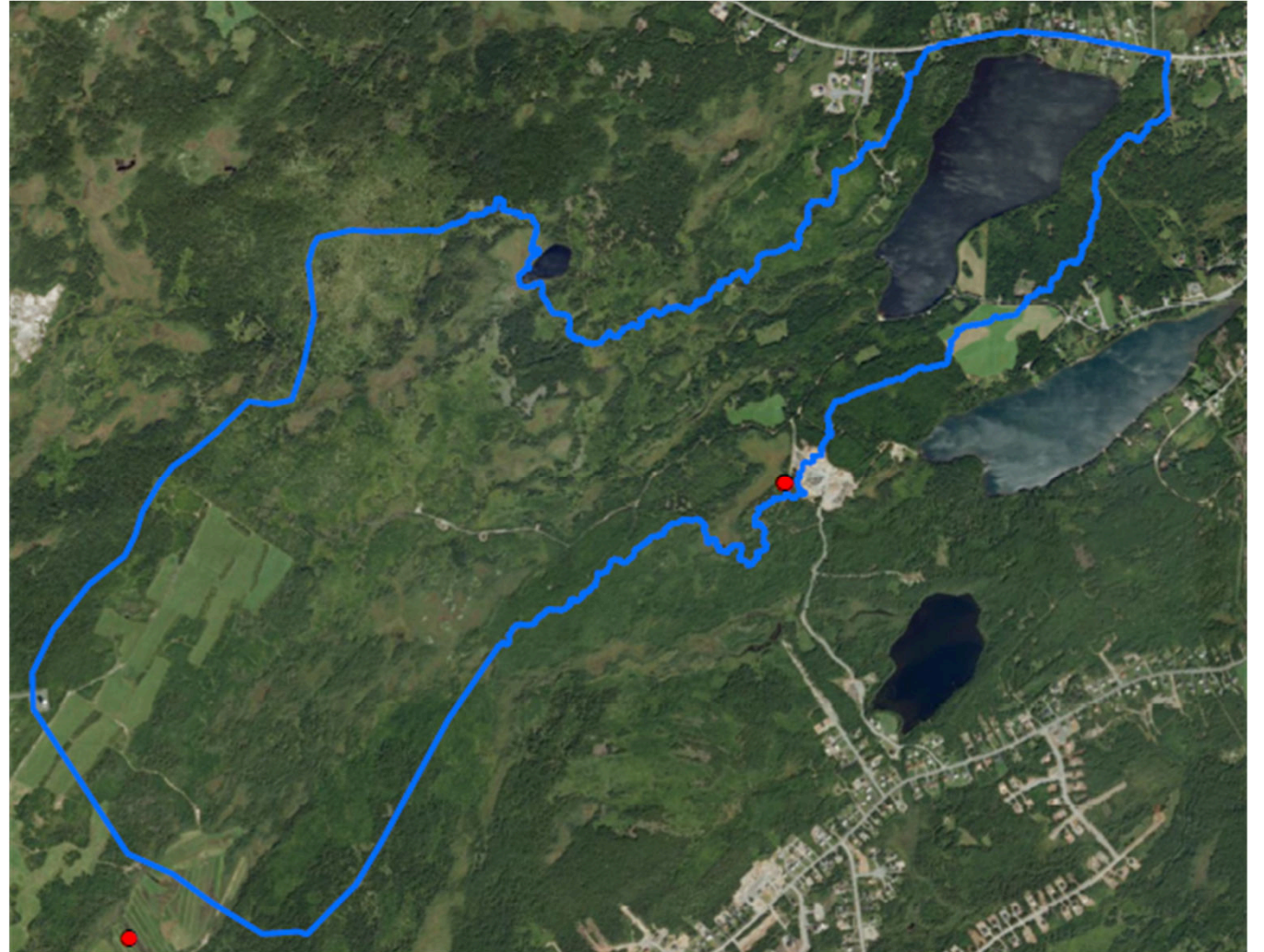
Agricultural Areas

- Agricultural area shown
- Great Pond Road / Whiteway Pond Road
- PCSP



Quarry Permit

- One quarry permit that may not be active



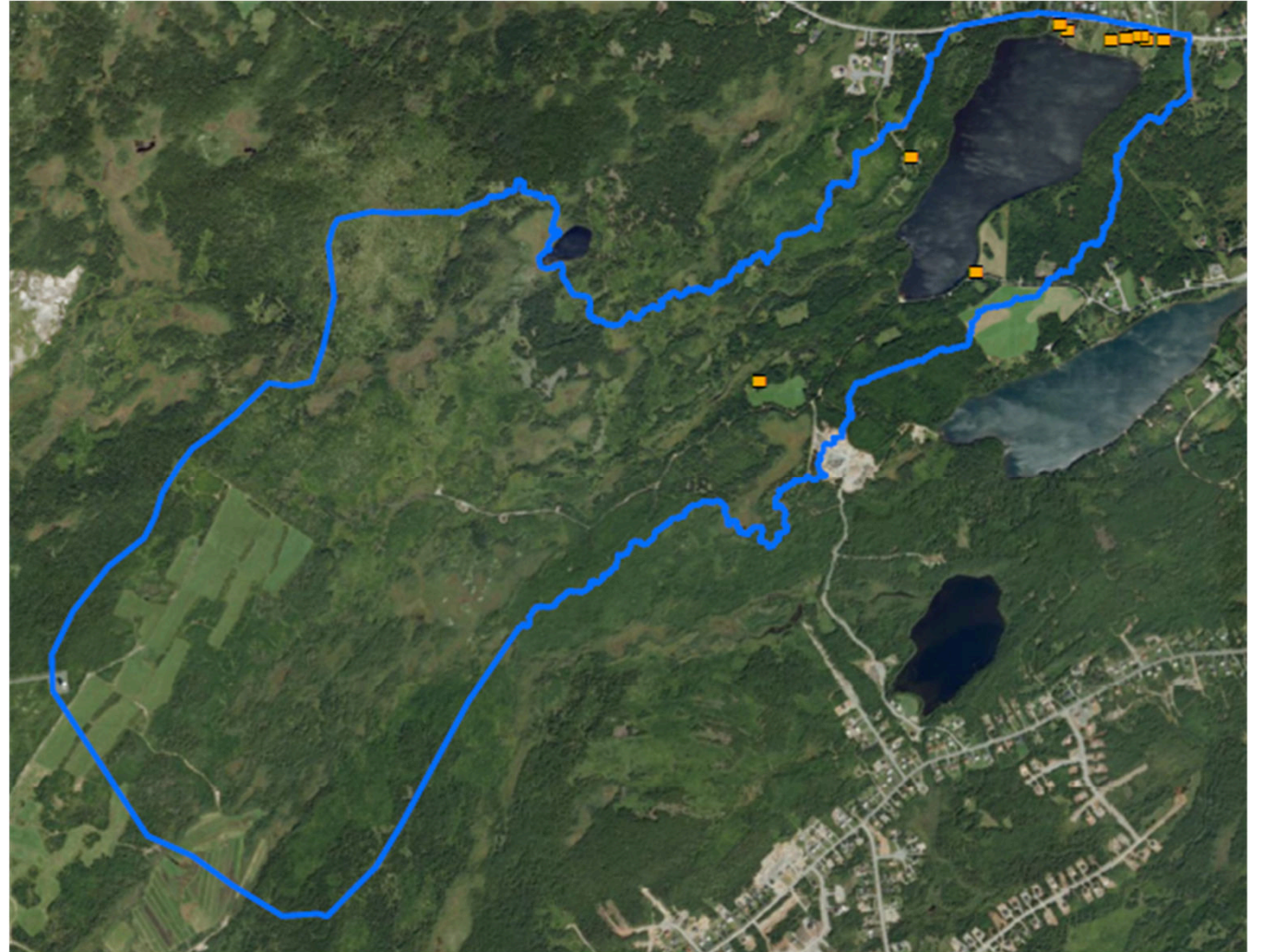
Habitat Management Units

- Habitat management units related to Big River and headwaters



Private Properties

- One property on an extension of Pondsides Lane and another on Great Pond Road / Whiteway Pond Road.
- 10 to 15 properties on either side of Bauline Line are within the watershed



Great Pond General Chemistry and Metals

- Consistently elevated turbidity, some colour, low pH.

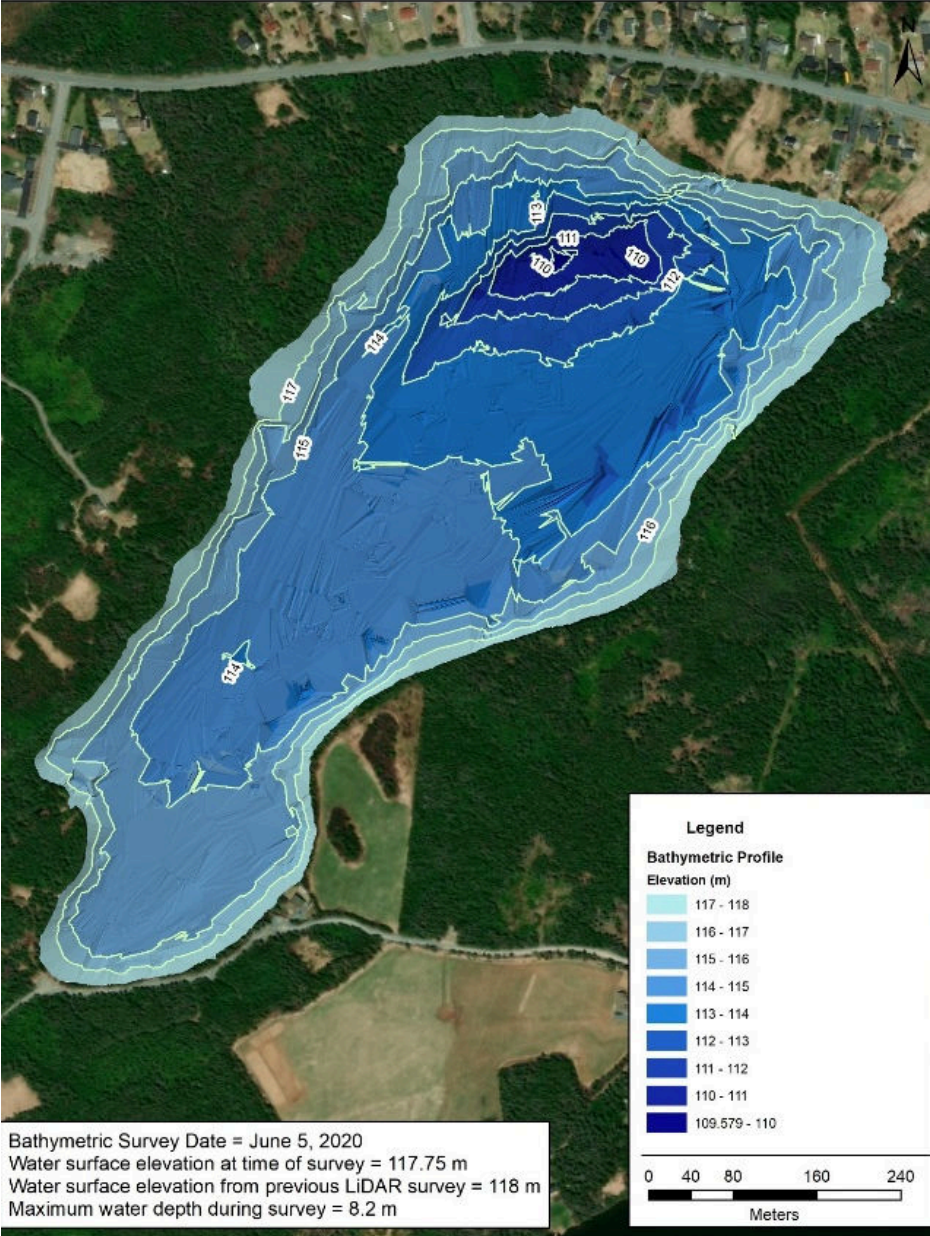
Parameter	Unit	GCDWQ	RDL	Great Pond			
				26/06/2019	18/07/2019	08/06/2020	15/10/2020
Sample Date (DD/MM/YYYY)				26/06/2019	18/07/2019	08/06/2020	15/10/2020
pH		7-10.5	-	6.48	6.31	6.08	6.14
Reactive Silica as SiO ₂	mg/L	-	0.5	<0.5	2.2	1.6	1.7
Chloride	mg/L	250 ²	1	14	12	11	12
Fluoride	mg/L	1.5 ¹	0.12	<0.12	<0.12	<0.12	<0.12
Sulphate	mg/L	500 ²	2	3	2	2	<2
Alkalinity	mg/L	-	5	<5	<5	<5	<5
True Color	TCU	15 ²	5	10	21	25	21
Turbidity	NTU	<0.3/<1/<0.1	0.1	3.3	1.5	0.9	0.9
Electrical Conductivity	umho/cm	-	1	66	60	60	56
Nitrate + Nitrite as N	mg/L	-	0.05	<0.05	<0.05	<0.05	0.17
Nitrate as N	mg/L	10 ¹	0.05	<0.05	<0.05	<0.05	0.17
Nitrite as N	mg/L	1 ¹	0.05	<0.05	<0.05	<0.05	<0.05
Ammonia as N	mg/L	-	0.03	0.10	0.10	0.08	<0.03
Total Organic Carbon	mg/L	-	0.5	3.6	4.3	3.5	5.3

Hydrocarbons, Pesticides, Herbicides

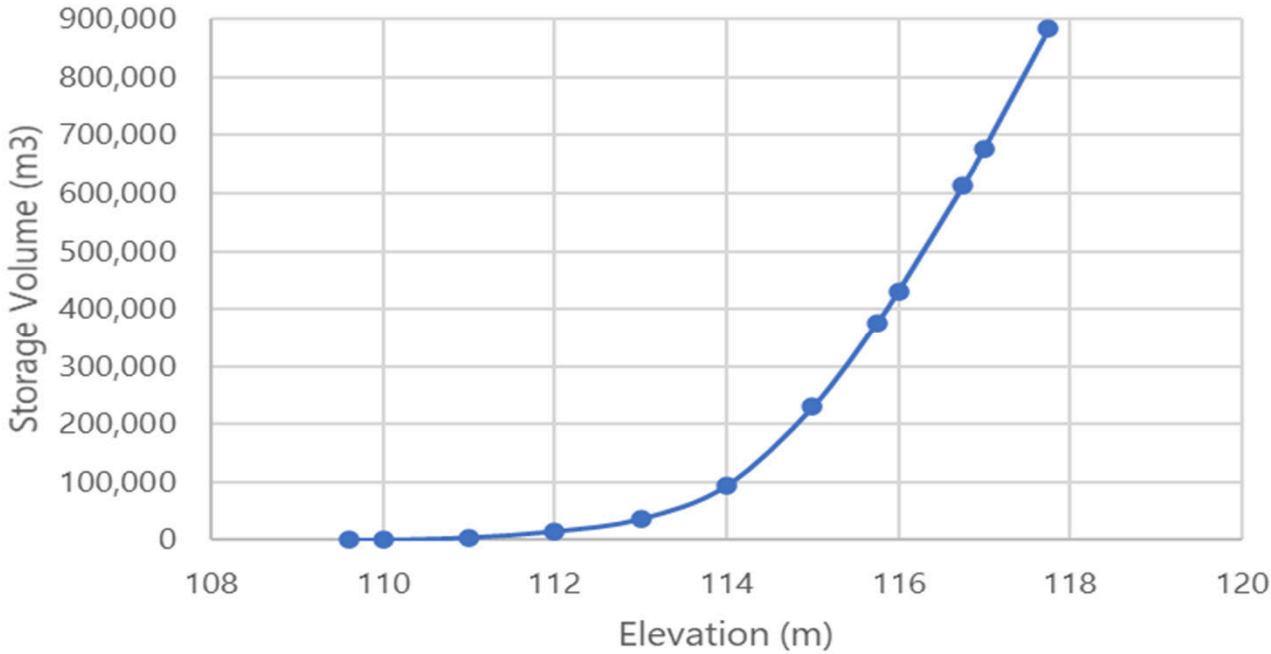
Parameter	Great Pond			
	6/26/2019	7/18/2019	06/08/2020	15/10/2020
Benzene, Toluene, Ethylbenze, Xylene (BTEX)	ND	ND	ND	ND
Polyaromatic Hydrocarbons	ND	ND	ND	ND
Herbicides	ND	ND	ND	ND
Pesticides	ND	ND	ND	ND

All hydrocarbons, pesticides, herbicides were non-detectable (ND) for each sampling event.

Great Pond Hydrology



Reference Elevation	2D Surface Area (m ²)	Volume Below Reference Plane (m ³)	Volume difference between this elevation and the one below (m ³)
117.75	286,716	884,192	206,343
115	173,232	228,972	135,387
110	584	51	51
109.6	Bottom of Pond	0	0



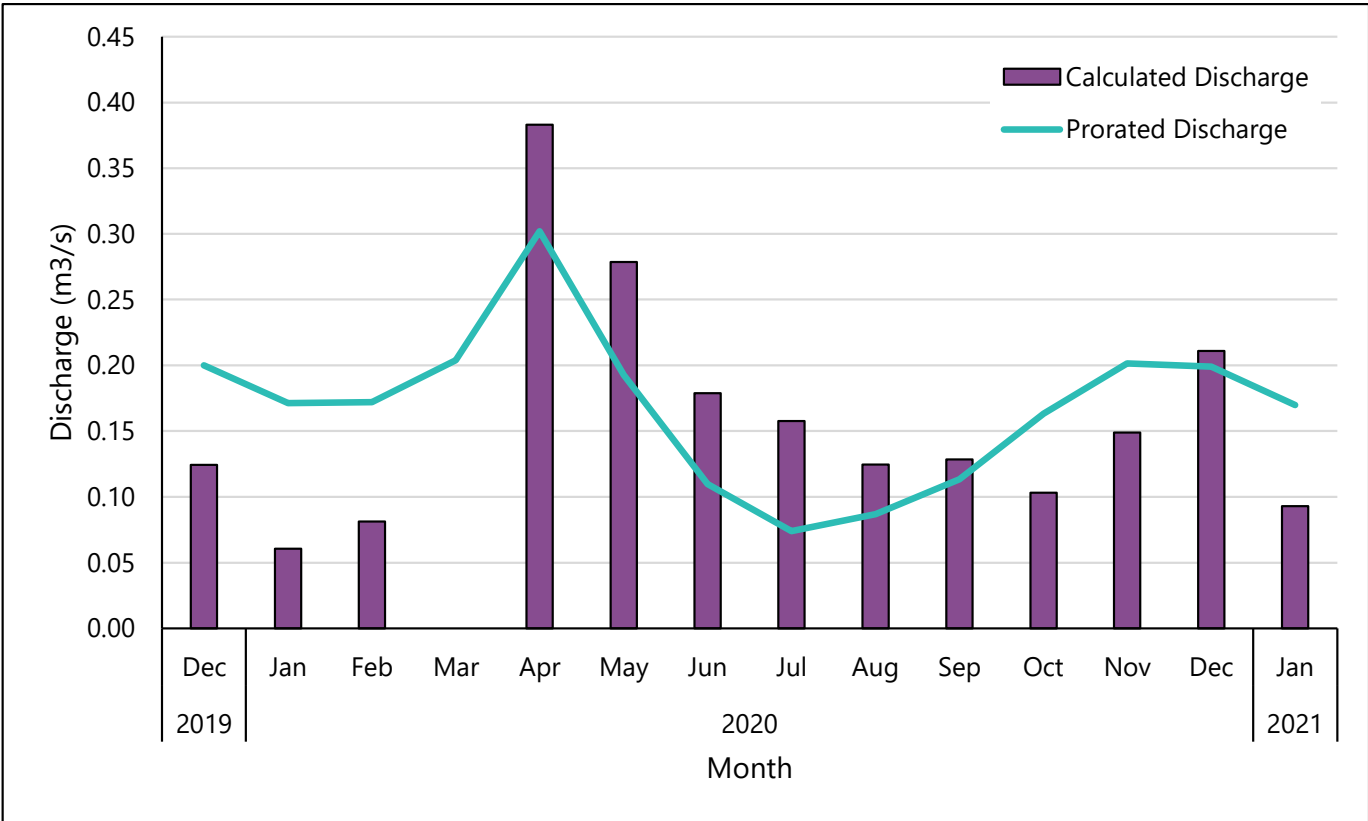
Water Balance

- Average year: total surplus is 3,890,133 m³ and total infiltration is 1,079,993 m³ resulting in a total surface runoff is 2,810,140 m³.
 - Average flow rate is 0.09 m³/s (89 L/s).
- Wet year: total surface runoff is 4,521,893 m³
 - Average flow rate of 0.14 m³/s or 143 L/s).
- Dry year: total surface runoff is 1,640,032 m³
 - Average flow rate of 0.05 m³/s or 52 L/s

NL Design Guidelines
for Water Systems
require use of dry
year flows

Discharge

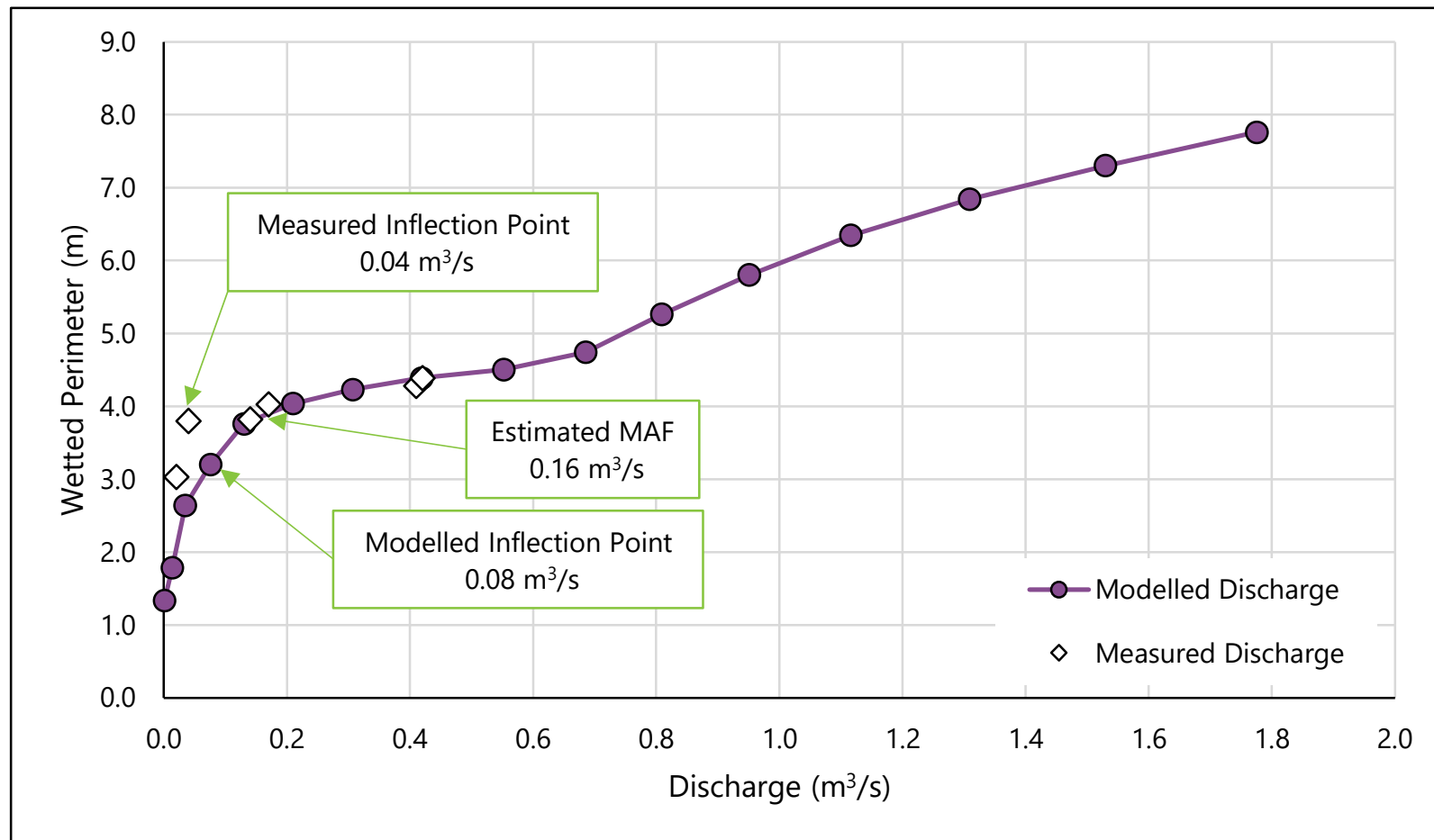
- Measured water levels since December 2019 and correlated to measured flow rates.



The measured mean annual discharge for 2020 is 0.16 m³/s corresponding to a wet year.

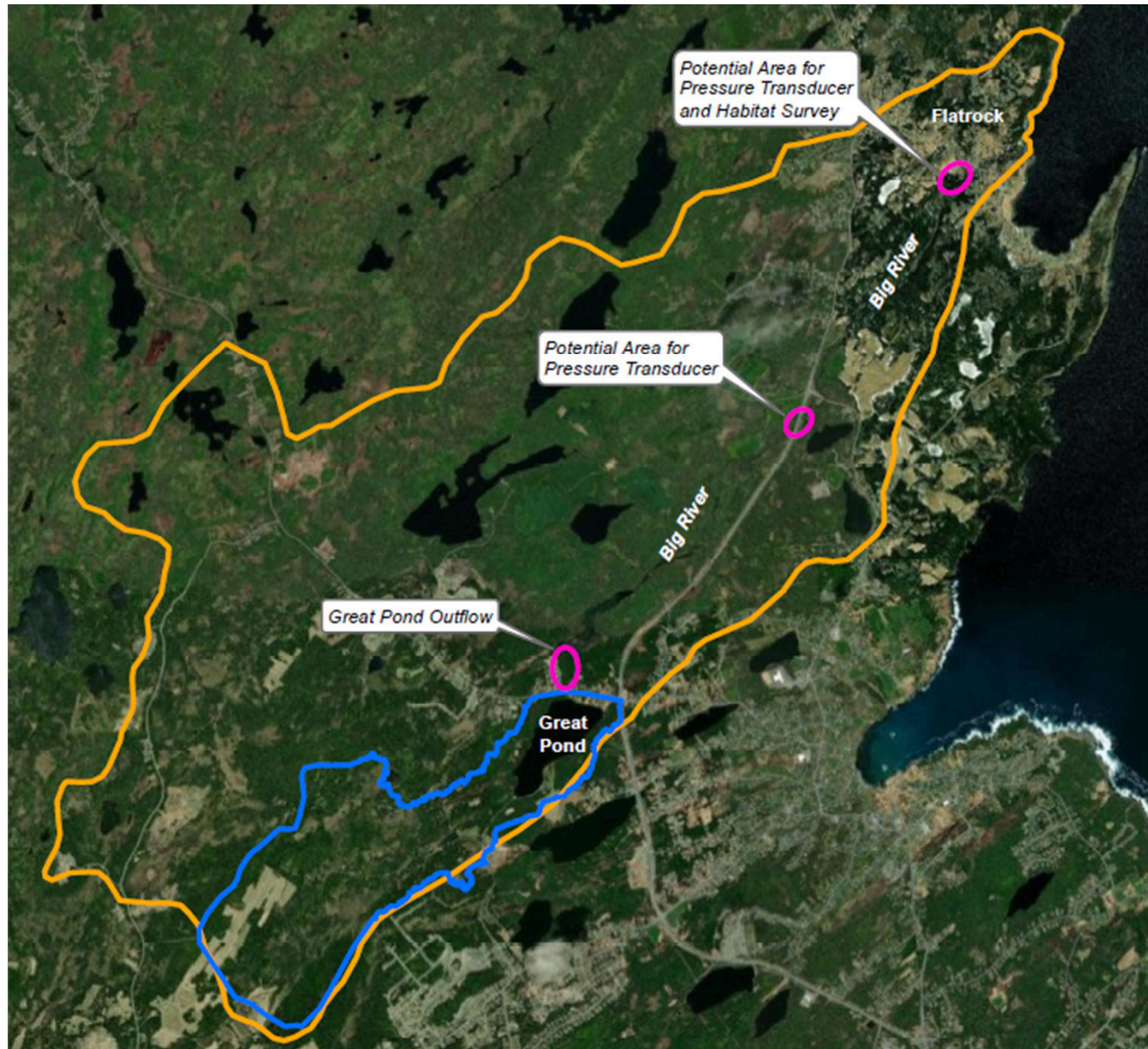
Wetted Perimeter Model

- Wetted perimeter models are done to determine the flow rate required to maintain aquatic habitat.



The modelled flow rate to maintain habitat based on current data is 0.04 m³/s

Aquatic Studies



Watershed size:

- Great Pond: 383 ha
- Big River: 3160 ha

Will be important to understand the effect of taking water from small section of overall watershed.

Water Balance

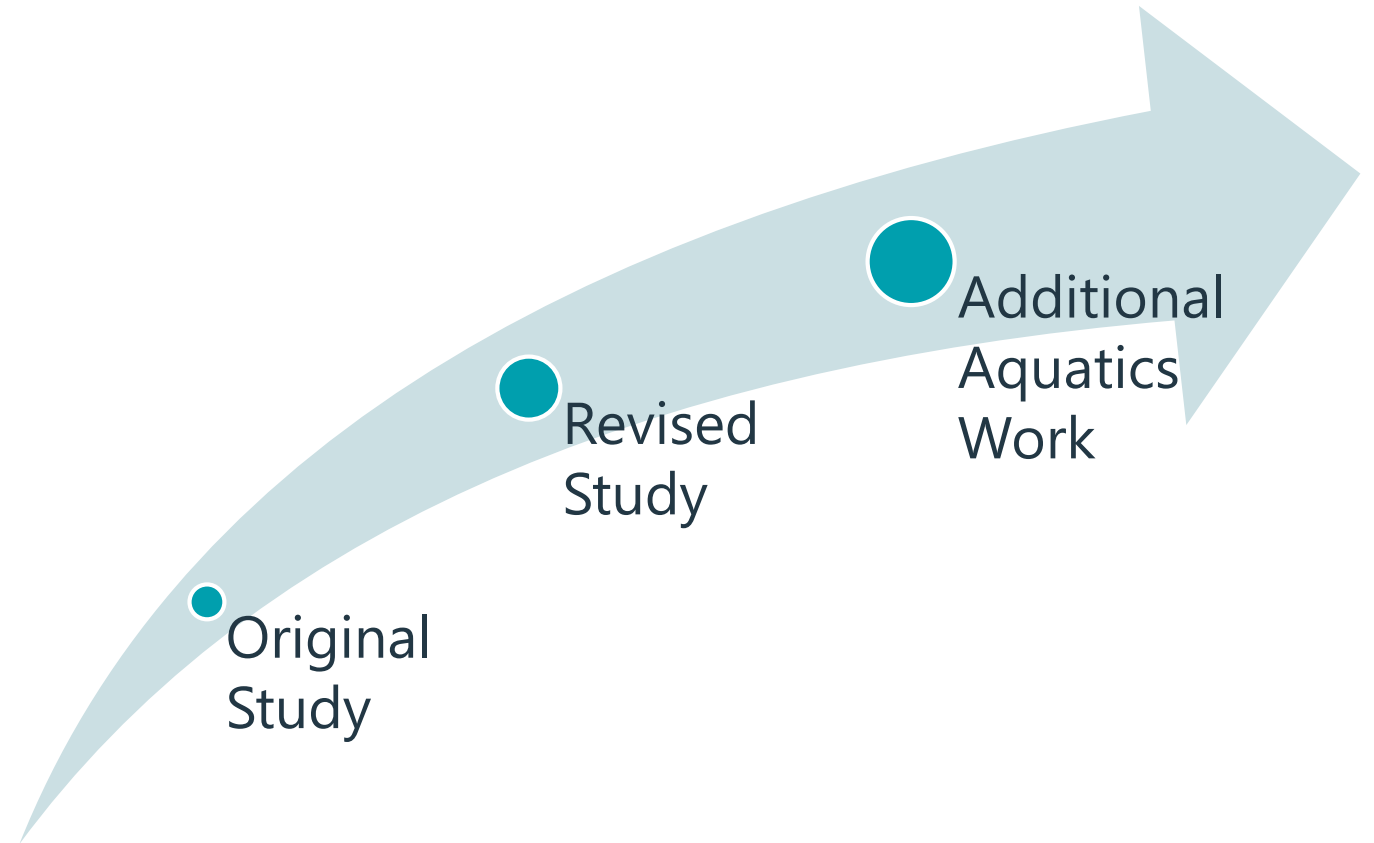
- Dry year = 0.05 m³/s flow available
- Measured discharge in 2020 = 0.16 m³/s
 - Similar to wet year (0.14 m³/s)
- Wetted perimeter study indicates 0.04 m³/s required to maintain aquatic life in stream to Big River.

	North Pond (m ³ /day)	Great Pond (m ³ /day)
Average demand	1300	2000
Peak demand	2600	4000
Instantaneous	2600	4000

Recommend further aquatic studies to determine long-term discharge and to understand habitat in section of stream.

Remaining Work

- Original study included distribution system review and water treatment plant study
 - ~\$10k budget remaining
- Revised study included more collection of flow data, due to results of wetted perimeter study
- Additional aquatics study recommended
 - Cost estimate: \$27,155

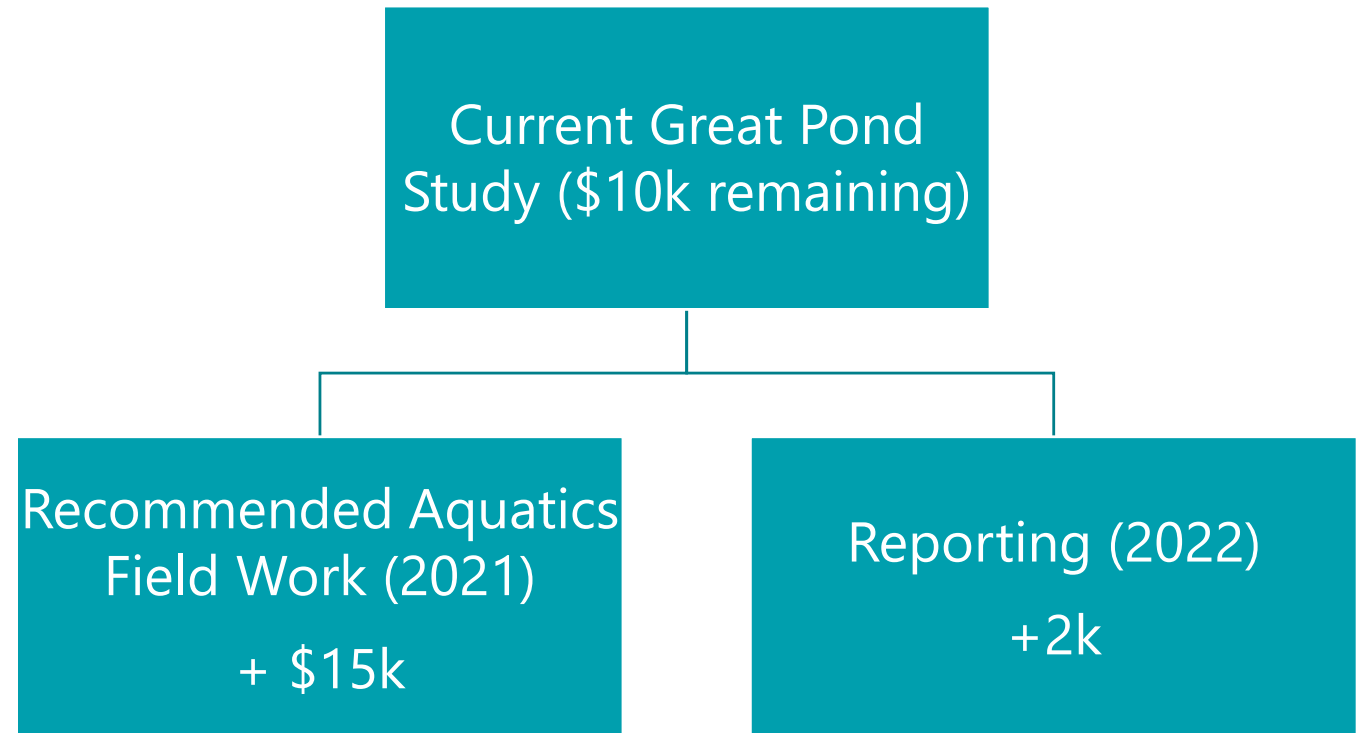


Recommended Study

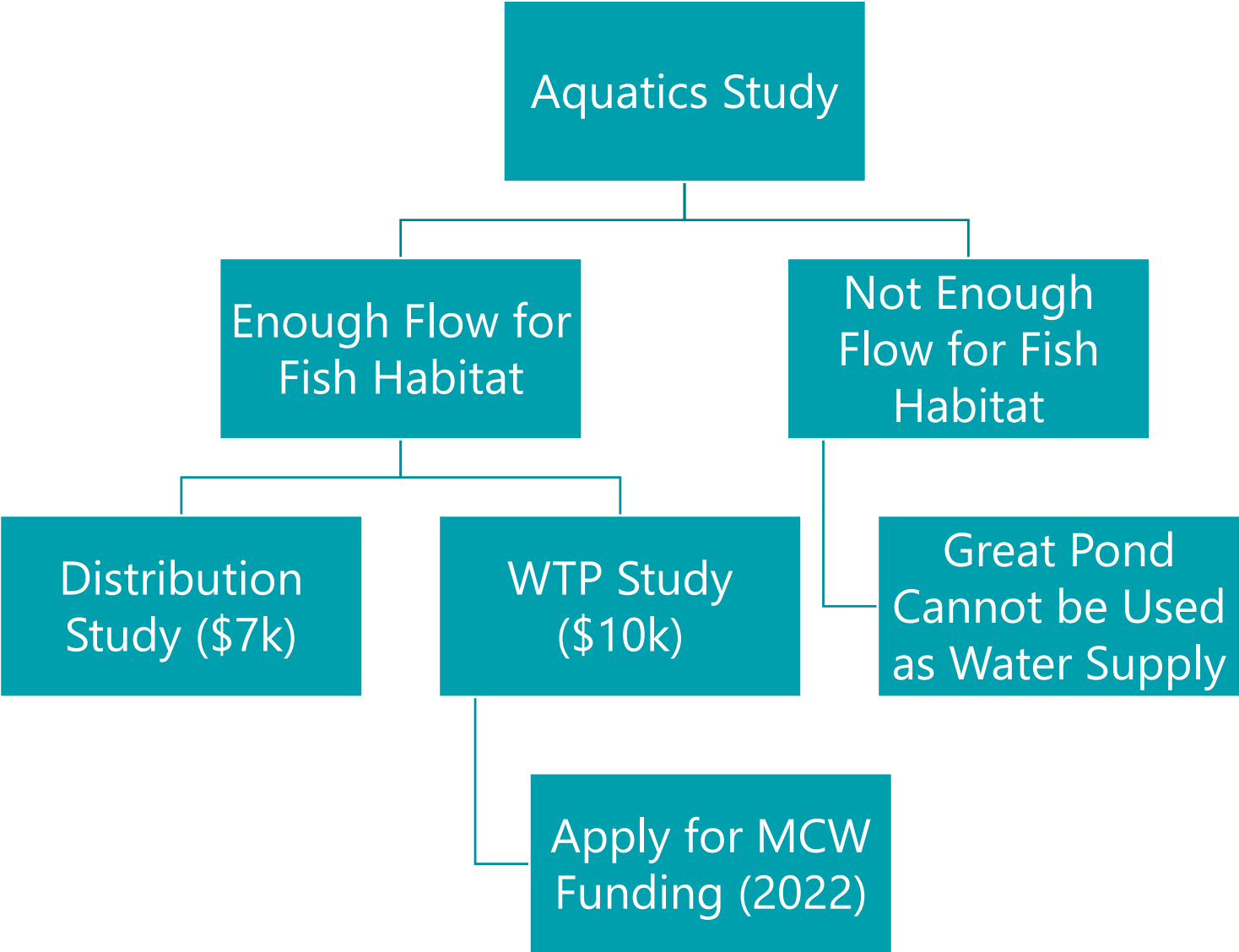
- Fish species presence and relative abundance in Great Pond;
- Fish species presence and abundance in Great Pond outflow;
- Fish species presence and abundance in Big River;
- Detailed habitat surveys in Great Pond;
- Detailed habitat surveys in Great Pond outflow; and,
- Selected habitat surveys in Big River downstream of Great Pond outflow.

Future Study Schedule

- Field Work
- Reporting including recommendations for future work



Moving Forward



wood.