



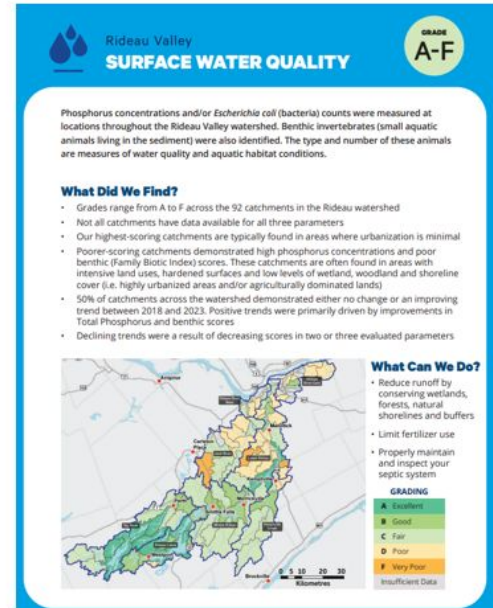
Water Quality & Invasive Species: Pike Lake

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RVCA's Reporting Update

- Rideau Lakes Subwatershed Report published in 2014
- Upcoming Watershed Wide report
 - Report will aim to identify major trends and changes throughout the watershed
 - Report will focus on higher level detail i.e. major nutrient trends, etc.
 - Aimed to be published by the end of 2023
- Conservation Ontario – 2023 Watershed report Cards:
 - <https://www.rvca.ca/watershed-monitoring-reporting/reporting/watershed-report-card>



2022 Lake Sampling Results

Deep Point								
Lake	Date Sampled	Site	Calcium (mg/L)	Carbon (mg/L)	E.Coli (CFU/100mL)	TP (mg/L)	TKN (mg/L)	Secchi (m)
Pike Lake - RVL01	5/18/2022	DP1				0.004	0.44	3.25
Pike Lake - RVL01	7/12/2022	DP1		6.7		0.011	0.4	4
Pike Lake - RVL01	8/24/2022	DP1	17.2			0.006	0.39	5
Pike Lake - RVL01	11/2/2022	DP1				0.004	0.34	5
Shoreline Samples								
Pike Lake - RVL01	7/12/2022	A			14	0.017	0.4	
Pike Lake - RVL01	7/12/2022	D			5	0.014	0.4	
Pike Lake - RVL01	7/12/2022	F			11	0.014	0.4	
Pike Lake - RVL01	7/12/2022	G			25	0.007	0.4	
Pike Lake - RVL01	8/24/2022	A			14	0.007	0.41	
Pike Lake - RVL01	8/24/2022	D			16	0.005	0.41	
Pike Lake - RVL01	8/24/2022	F			27	0.005	0.41	
Pike Lake - RVL01	8/24/2022	G			2	0.009	0.49	
Water Quality Guidelines and Recommendations								
Type	Guideline Source					Guideline		
Total Phosphorus (TP)	Provincial Water Quality Objective (PWQO) - Lakes					<0.020mg/L		
TKN - Nitrogen	Secondary Indicator, Ministry of the Environment Recommended Guideline					<0.500mg/L		
E.Coli	Provincial Water Quality Objective (PWQO)					<100 CFU/100mL		

2021 Lake Sampling Results

Deep Point								
Lake	Date Sampled	Site	Calcium (mg/L)	Carbon (mg/L)	E.Coli (CFU/100mL)	TP (mg/L)	TKN (mg/L)	Secchi (m)
Pike Lake - RVL01	5/26/2021	DP1				0.01	0.4	4
Pike Lake - RVL01	6/28/2021	DP1		7.1		0.017	0.36	3.5
Pike Lake - RVL01	8/20/2021	DP1	18.4			0.008	0.4	4.5
Pike Lake - RVL01	10/4/2021	DP1				0.01	0.4	3.5
Shoreline Samples								
Pike Lake - RVL01	6/28/2021	A			5	0.026	0.38	
Pike Lake - RVL01	6/28/2021	B			2	0.013	0.36	
Pike Lake - RVL01	6/28/2021	C			3	0.021	0.35	
Pike Lake - RVL01	6/28/2021	D			3	0.014	0.37	
Pike Lake - RVL01	6/28/2021	E			1	0.021	0.42	
Pike Lake - RVL01	6/28/2021	F			3	0.045	0.5	
Pike Lake - RVL01	6/28/2021	G			2	0.008	0.43	
Pike Lake - RVL01	6/28/2021	H			15	0.013	0.84	
Pike Lake - RVL01	8/20/2021	A			4	0.006	0.41	
Pike Lake - RVL01	8/20/2021	B			1	0.006	0.4	
Pike Lake - RVL01	8/20/2021	C			1	0.015	0.41	
Pike Lake - RVL01	8/20/2021	D			7	0.016	0.51	
Pike Lake - RVL01	8/20/2021	E			0	0.008	0.45	
Pike Lake - RVL01	8/20/2021	F			1	0.006	0.39	
Pike Lake - RVL01	8/20/2021	G			2	0.01	0.38	
Pike Lake - RVL01	8/20/2021	H			49	0.014	0.38	

Monitoring Locations

North End



South End

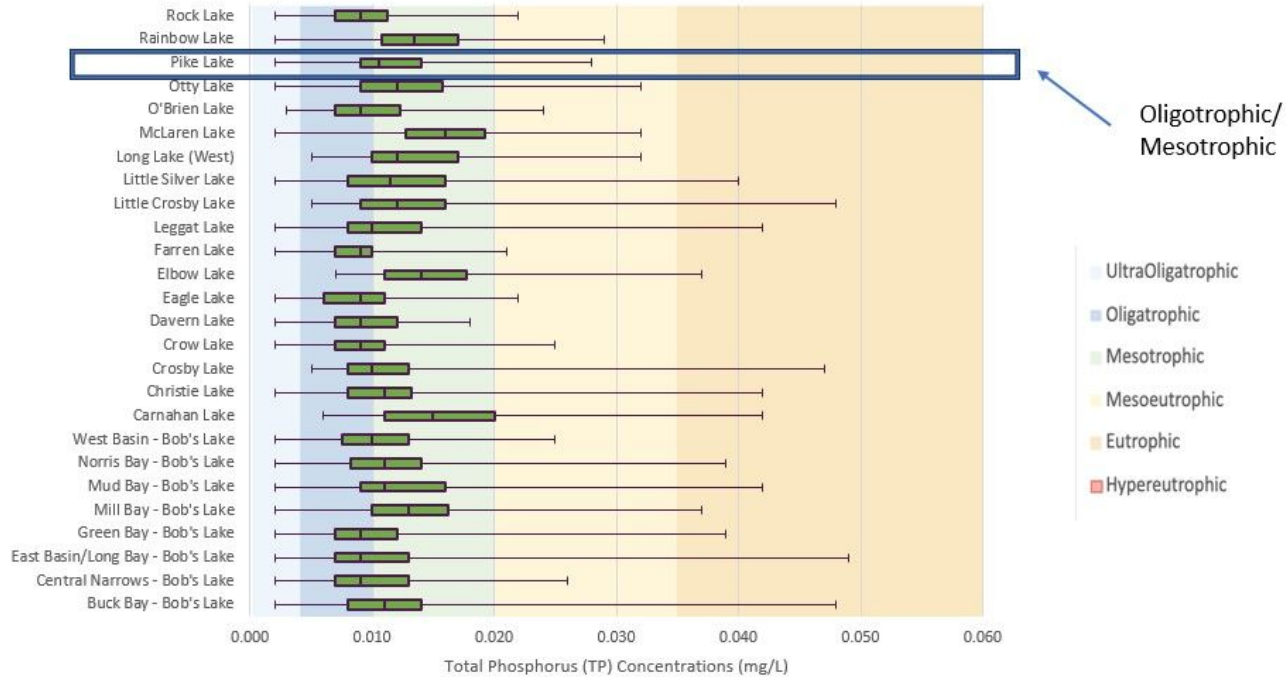


Current Trends (2001-2021)

Table X. Watershed Watch Lake parameter 75th Percentiles and/or median values and trends (p value<0.1) on collected data from 2001-2021

Lake	Total Phosphorus (TP, mg/L)		Total Kjeldahl Nitrogen (TKN, mg/L)		Dissolved Organic Carbon (DOC, mg/L)		Calcium (Ca, mg/L)		Secchi (m)		pH	
	75th Percentile	Trend	75th Percentile	Trend	Median	Trend	Median	Trend	75th Percentile	Trend	75th Percentile	Trend
Tay River Subwatershed												
Bob's Lake - Buck Bay	0.014	↔	0.41	↓	5.7	↔	14.9	↔	3.5	↓	8.2	↔
Bob's Lake - Central Narrows	0.013	↓	0.40	↓	5.7	↔	16.1	↔	3.8	↔	8.2	↓
Bob's Lake - East Basin/Long Bay*	0.013	↓	0.40	↓	5.5	↑	16.4	↔	4.0	↓	8.2	↔
Bob's Lake - Green Bay	0.012	↔	0.37	↔	4.4	↑	27.2	↓	4.1	↓	8.4	↓
Bob's Lake - Mill Bay	0.017	↓	0.52	↓	6.1	↑	16.3	↓	2.6	↔	8.5	↓
Bob's Lake - Mud Bay	0.016	↓	0.41	↓	4.8	↔	16.2	↓	3.4	↔	8.4	↓
Bob's Lake - Norris Bay	0.014	↔	0.41	↔	5.5	↔	16.0	↔	3.3	↓	8.1	↓
Bob's Lake - West Basin	0.013	↔	0.41	↔	5.9	↔	15.7	↓	3.3	↓	8.2	↓
Carnahan Lake	0.020	↔	0.53	↓	9.2	↔	14.6	↔	2.5	↓	7.9	↓
Christie Lake	0.013	↔	0.38	↓	5.3	↔	18.2	↓	4.5	↔	8.1	↔
Crosby Lake	0.013	↔	0.43	↔	6.7	↔	14.5	↔	4.0	↓	8.1	↔
Crow Lake	0.011	↔	0.32	↔	4.4	↑	17.7	↓	4.5	↓	8.4	↓
Davern Lake	0.012	↔	0.43	↔	5.7	↑	30.5	↔	3.5	↓	8.6	↔
Eagle Lake	0.011	↔	0.36	↔	4.6	↔	14.5	↔	4.5	↓	8.5	↓
Elbow Lake*	0.018	↔	0.50	↔	7.8	↑	7.3	↔	2.0	↓	7.9	↓
Farren Lake	0.010	↔	0.37	↔	4.7	↔	26.8	↔	4.6	↓	8.5	↓
Leggatt Lake	0.014	↔	0.38	↔	4.1	↑	8.3	↔	4.2	↓	8.1	↔
Little Crosby Lake	0.017	↓	0.44	↔	6.8	↔	15.8	↓	3.0	↓	8.1	↔
Little Silver Lake*	0.016	↓	0.45	↔	5.3	↑	17.4	↔	3.5	↓	8.1	↓
Long Lake West	0.017	↔	0.47	↔	6.6	↔	10.4	↔	2.5	↓	8.1	↔
McLaren Lake	0.020	↓	0.67	↔	10.1	↔	20.8	↔	2.5	↓	8.3	↔
O'Brien Lake	0.012	↔	0.44	↓	6.5	↑	22.0	↔	4.0	↓	8.1	↔
Otty Lake	0.016	↔	0.47	↔	6.5	↔	27.8	↔	4.4	↓	8.4	↓
Pike Lake	0.014	↔	0.43	↓	5.7	↔	17.5	↔	3.5	↓	8.3	↔
Rainbow Lake	0.017	↓	0.55	↔	7.0	↔	19.3	↔	2.6	↔	8.0	↔
Rock Lake	0.011	↔	0.40	↔	6.8	↔	5.0	↔	3.4	↓	7.8	↔

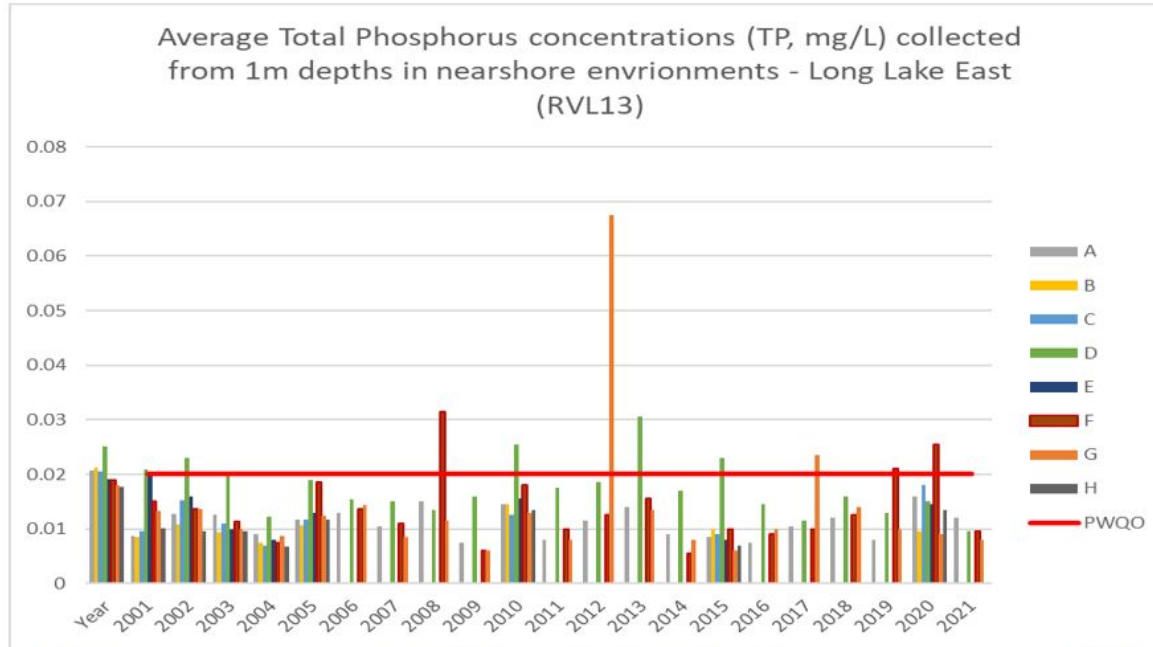
Lake trophic status within the Tay River subwatershed as determined by collected euphotic zone Total Phosphorus concentrations (TP, mg/L) results between 2001 and 2021



WQI Score Updates:

Lake	WQI Score						Trend	
	2001-2003	2004-2006	2007-2009	2010-2012	2013-2015	2016-2018		2019-2021
Tay River Subwatershed								
Bob's Lake - Buck Bay	100	100	65.1	53.5	88.4	88.4	88.2	↔
Bob's Lake - Central Narrows	88.4	100	76.7	88.3	76.8	88.4	88.4	↔
Bob's Lake - East Basin/Long Bay*	100	100	76.7	76.9	76.8	76.7	88.3	↔
Bob's Lake - Green Bay	100	100	88.1	88.4	88.4	88.4	88.3	↔
Bob's Lake - Mill Bay	69.5	65.7	88.4	65.2	88	75.8	76.5	↔
Bob's Lake - Mud Bay	100	100	88.4	65	76.7	100	76.8	↔
Bob's Lake - Norris Bay	76.6	100	100	88.4	65.1	65.1	88.4	↔
Bob's Lake - West Basin	76.7	100	88.4	88.4	88.3	88.4	88.4	↔
Carnahan Lake		69.8	62.7	53.4	75.5	76.8	64.7	↔
Christie Lake	80.5	88.2	100	100	100	76.5	88.2	↔
Crosby Lake	100	100	76.8	88.4	76.8	76.7	76.2	↓
Crow Lake	100	100	88.4	64.8	100	100	76.7	↔
Davern Lake	100	100	88.4	74.3	100	88.4	88.2	↔
Eagle Lake	100	100	100	76.8	100	76.7	88.1	↔
Elbow Lake*		87.1	88.4	53.3	64.2	41.3	53	↔
Farren Lake	100	87.7	88.4	88.4	100	88.4	88.4	↔
Leggatt Lake		100	76.7	86.7	76.7	76.8	76.5	↔
Little Crosby Lake	58.9	74.9	75.1	65.1	88.2	76.7	87.6	↑
Little Silver Lake*	60.5	62.8	76.4	76.8	76.5	76.9	65.1	↔
Long Lake West		76.1	65	64.9	41.9	76.5	64.5	↔
McLaren Lake		82.9	71.7	61.7	59.4	51.2	60.6	↓
O'Brien Lake	100	87.4	76.5	76.8	76.5	88.4	100	↔
Otty Lake	80.4	74.8	88.4	88.3	88.4	76.3	88.4	↔
Pike Lake	75.5	88.2	100	76.8	100	100	100	↑
Rainbow Lake	73.8	73.3	73.8	76.6	74.9	75.7	76.1	↑
Rock Lake		100	100	76.8	76.8	100	100	↔

Nearshore Environment



What are we observing?

- Extended growing season
 - Impacts of climate change
 - Increased algae and aquatic plant growth
 - Extended depleted oxygen zones at water depths
- 2023 Observations
 - Above average flooding
 - Elevated flows in regions
 - Higher than normal spring TP/TKN levels on many lakes
 - Pike Lake:
 - TP = 0.016
 - TKN = 0.3



Invasive Species:

- Organisms that are **NOT** native to an area that causes harm and/or threatens the environment, as well as affects human and other organismal health
- Aquatic Plants:
 - *Eurasian Milfoil, Curly Leaf Pondweed, European Water Chestnut, European Frog-bit, Yellow Iris*
- Terrestrial Plants
 - *Buckthorn, Manitoba Maple, Garlic Mustard, Phragmites, Dog Strangling Vine, Japanese Knotweed, Wild Parsnip, Purple Loosestrife*
- Invertebrates
 - *Rusty Crayfish, Banded Mystery Snails*
- Forest pests
 - *Emerald Ash Borer*
- Fish
 - *Round Goby, Asian Carp, Goldfish*
- Aquatic vertebrates
 - *Zebra mussels, Quagga mussels*

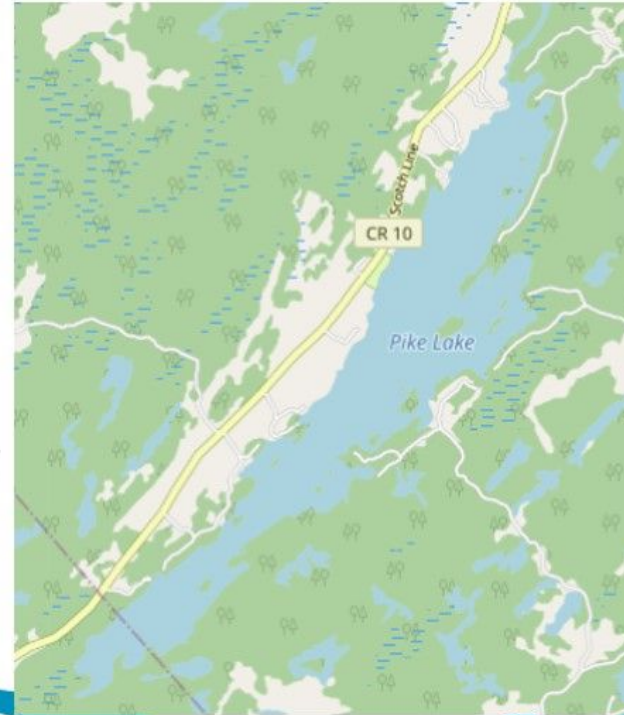


At Pike Lake

Currently Reported:

- Zebra mussels (via communications with Lake Association Staff)
- Common buckthorn (reported to EDDMaps)

Unfortunately, no up to date surveying we have been unable to do a more up-to-date surveying of what invasives are living in Pike Lake. **Please keep on the lookout and REPORT any invasives** you see to EDDMaps! If unsure, we recommend using iNaturalist or asking around for confirmed ID.



How to Identify: Zebra Mussels

Zigzagged stripes



Flat ventral surface
with prominent ridge



Bilaterally
symmetrical; straight
midventral line

Zebra Mussels vs Quagga Mussels

- Quagga mussels
 - Larger
 - Rounder
 - Wider
 - Convex ventral surface
 - Lighter in color
 - Prefer deeper habitats (10-13m)



Zebra Mussel Habitat

- Juveniles will be found attached to submerged aquatic vegetation
- Adults found attached on hard surfaces
- They eat phytoplankton and zooplankton
- Can survive in calcium concentrations as low as 12mg/L^{-1} but ranges between $12\text{-}20\text{mg/L}^{-1}$
- Limiting factor is calcium carbonate availability in lakes



Zebra Mussel Management

Once Zebra Mussels have established themselves in a body of water it is nearly impossible to remove them. Therefore, management options are very limited.

So, what can we do?

- **Clean, Drain, Dry:**
 - Clean everything that has been in contact with the water!
 - Drain all water once done at the lake (ballast, bails, etc...) BUT do not empty your bait/bails within 30m of the shoreline
 - Spray down all equipment with HOT water to remove any particulates that may remain
 - Dry all equipment
 - Dispose
 - Decontaminate
- **Monitor Populations:**
 - Dock hangers:
 - Tie an empty plant pot to your dock so it's in the water and check occasionally for zebra mussels that could have attached



Incoming threats

- Zebra mussels
- Quagga mussels
- Eurasian Water-Milfoil
 - Feather-like green leaves
- Curly Leaf Pondweed
 - Looks like green bacon
- European Water Chestnut
- European Frog-bit
 - Smaller lily pads
- Yellow iris
- Carp



Early Detection & Distribution Mapping System

If you spot any invasive species, please REPORT it!!!

- It is very easy to operate, and you can search the species by name, and it will show you where people have previously reported seeing it.
- Best part is it can be for any invasive species
 - Plants
 - Insects
 - Fungi and diseases
 - Wildlife



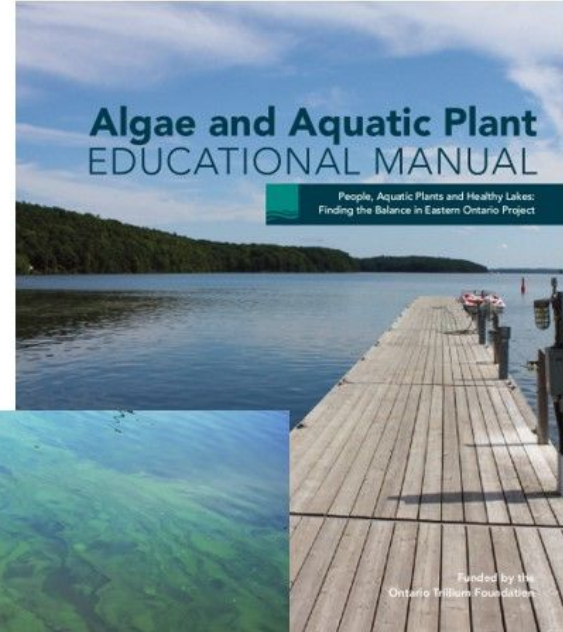
For more information or to Report Invasive Species

- Canadian Council on Invasive Species
 - <https://canadainvasives.ca/>
- Invasive Species Centre
 - <https://www.invasivespeciescentre.ca/>
- Ontario Federation of Anglers and Hunters Invading Species Hotline: 1-800-563-7711
- Early Detection & Distribution Mapping System (EDD MapS)
 - <https://www.eddmaps.org/>
- Ontario's Invading Species Awareness Program
 - <https://www.invadingspecies.com/>



Algae & Aquatic Plants

- RVCA Algae and Aquatic Plant Education Manual
- Blue-Green Algae Identifiers:
 - Blue Green in color
 - Appears as paint stains and/or pea soup on the water
- Suspect Blue-Green Algae? Report it to the MECP Spills line
 - <https://www.ontario.ca/page/report-pollution-and-spills>
 - [1-800-268-6060](tel:1-800-268-6060)



Existing RVCA Programs- Shoreline Naturalization

- Suitable for any shoreline property, No minimum requirements
- Benefits of Shoreline Naturalization- natural erosion control, slows and filters runoff, contributes to the “ribbon of life” habitat, deters geese
- Full-service planting available as well as over the counter sales
- Includes native trees and shrubs, site visits, planting plans, advice, etc.
- Covers 75% of the cost of the planting projects (limits apply)

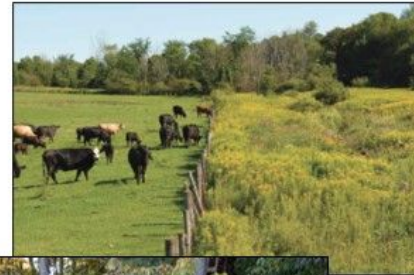
Contact:
Brandon Holden: brandon.holden@rvca.ca



Existing RVCA Programs- Rural Clean Water Program

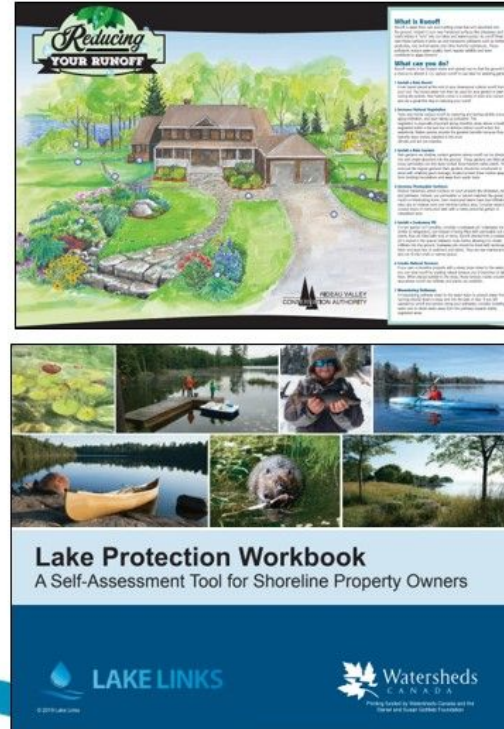
- Provides incentive grants for a variety of project categories aimed at improving water quality in rural areas
- Project categories that may of interest:
 - **Erosion Control- Shoreline:** 90% up to \$3,500
 - **Buffer grants** (usually used to top-up Shoreline Naturalization Program)
 - **Livestock Restriction Fencing**
 - **Septic Repair**- 50% up to \$1000
 - **Well Projects** (decommissioning, upgrades, replacements): \$500 to \$2000
 - **Education Projects**- 75% up to \$1000
 - Several more categories for farmers with an Environmental Farm Plan

Contact:
Derek Matheson: derek.matheson@rvca.ca



Other Opportunities for Stewardship

- Runoff Reduction Projects
 - Rain barrels
 - Redirected downspouts
 - Rain gardens and soak ways
 - Reducing hardened surfaces and naturalizing
- Invasive Species Management
- Lake Protection Workbook
- Wildlife Enhancement
- Partnership Opportunities
 - Targeted outreach campaign with RVCA Stewardship Team
 - Project Fundraising through Rideau Valley Conservation Foundation



Questions/Concerns?

Contact – Haley Matschke:

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or

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