Aerial Photo of Russell Lake looking south

Policy Review: Russell Lake Water Quality

Dartmouth Lakes Advisory Board

December 2012

Summary

At the direction of Harbour East Community Council, the Dartmouth Lakes Advisory Board undertook a policy review project during calendar year 2012 with respect to water quality in Russell Lake.

The project was initiated following a series of water monitoring results that exceeded the Dartmouth Municipal Planning Strategy objectives for Total Phosphorus in Russell Lake.

The Board and Project Team would like to specifically acknowledge the effort and contributions from:

- Pierre Clement
- Pierre Connor
- Mark McLean
- Christina Hoehne
- Dr. Mark Trevorrow
- Johanna Campbell

Following a review of the policy, the Board notes that existing policy is progressive and that opportunities for improvement lay in two primary areas:

1. Erosion and Sediment Control
2. Green Infrastructure / Remediation

The objective for future development should consider the opportunity to have a restorative effect on the watershed to reflect the ongoing impacts of extreme weather, major storm events, and past development.

1994 Russell Lake Management Plan

Following initial review of the policy set within the Dartmouth Municipal Planning Strategy, DLAB members directed the review be undertaken through the lens of the 1994 Russell Lake Management Plan.

The 1994 Management Plan was initiated by the former City of Dartmouth for the purpose of guiding future development management within the watershed.

The Plan resulted in seventeen planning, design, and management policies:

1. Designate buffer areas along the shoreline as conservation area or parkland
2. Protect wetlands as conservation area
3. Designate slopes over 25% as areas where no construction can take place
4. Designate slopes over 15% as sensitive areas requiring special construction methods
5. Require variable width of buffer strip to respond to slope and soil conditions, but no less than 15 metres
6. Require development proposal to minimize width and length of road network and maximize clustering of lots
7. Design roads, driveways & sidewalks with shallow slopes
8. Require a stormwater analysis comparing pre- and post-development flows.
9. Require the developer to provide information on the design and management of contaminant control devices to be used during construction and for the detention and treatment of stormwater on the fully developed site.
10. Minimize disturbance of the shoreline and its vegetation
11. Minimize the disturbance of land-based natural vegetation
12. Conserve natural drainage channels especially if vegetated. Conserve wetland for stormwater detention and contaminant control
13. Use natural landscaping wherever possible and minimize the use of lawns on public and private common use land
14. Enforce the D200 Dog Bylaw
15. Re-examine policies and practices governing the distribution of deicing salt
16. Promote and evaluate participation in the municipal leaf collection program.
17. Provide no developed access (ramps, wharves) for power boats on the lake

Community Expectations for Russell Lake

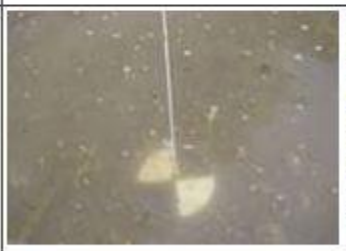
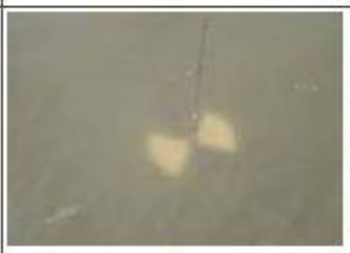
An important component of this work is the development of an understanding what the reasonable expectations can be for Russell Lake.

Overview of Characteristics

- Highly erodible soil
- Historical high levels of nutrients
- Historical levels of high algal growth and turbidity
- Historically one of the most eutrophic lakes in the municipality

Lake Trophic State Index

Lakes are generally classified into the following classes:

Trophic Status	Total Phosphorus (mg/L)	Description	Effects in lakes	Effects in streams
Ultra-oligotrophic	<0.004	Very Low nutrients and plant growth, high water clarity		
Oligotrophic	0.004-0.010			
Mesotrophic	0.010-0.020	Moderate levels of nutrients and plant growth, reduced water clarity		
Meso-eutrophic	0.020-0.035			
Eutrophic	0.035-0.100	High levels of nutrients and plant growth, low water clarity		
Hyper-eutrophic	>0.100	Very high levels of nutrients and plant growth, very limited water clarity		

Source: Environment Canada.
http://www.ec.gc.ca/eaudouce-freshwater/default.asp?lang=En&n=0A77A85E-1&offset=2&toc=show

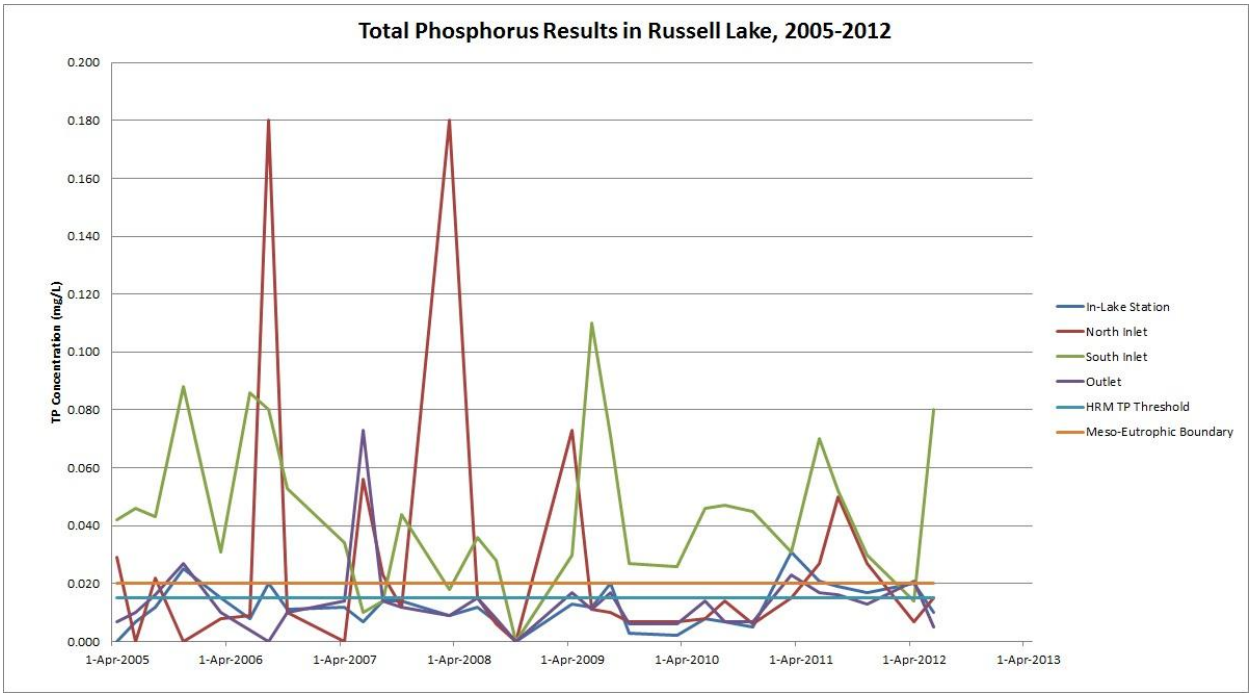
Russell Lake has demonstrated a history of being eutrophic and mesotrophic. The original Dartmouth Municipal Planning Strategy established an objective of 15 µg / mL for phosphorus levels. This mid-range mesotrophic objective will yield moderate nutrient and plant growth and reduced water clarity.

Based on historical data, it would be unreasonable to expect Russell Lake to become an oligotrophic / clear lake.

Efforts to maintain the lake to an objective limit of 15 µg / mL need to consider restorative and stewardship remedies, as non-activity will ultimately result in the objective being exceeded regardless of development activities.

Data

Since 2005 Clayton Developments have contracted Stantec to carry out a water quality monitoring program. Monitoring events include one spring, two summer, and one fall sampling event each year. The Dartmouth Municipal Planning Strategy requires a policy review should annual average results of the In-Lake station exceed the 15 µg/mL threshold.

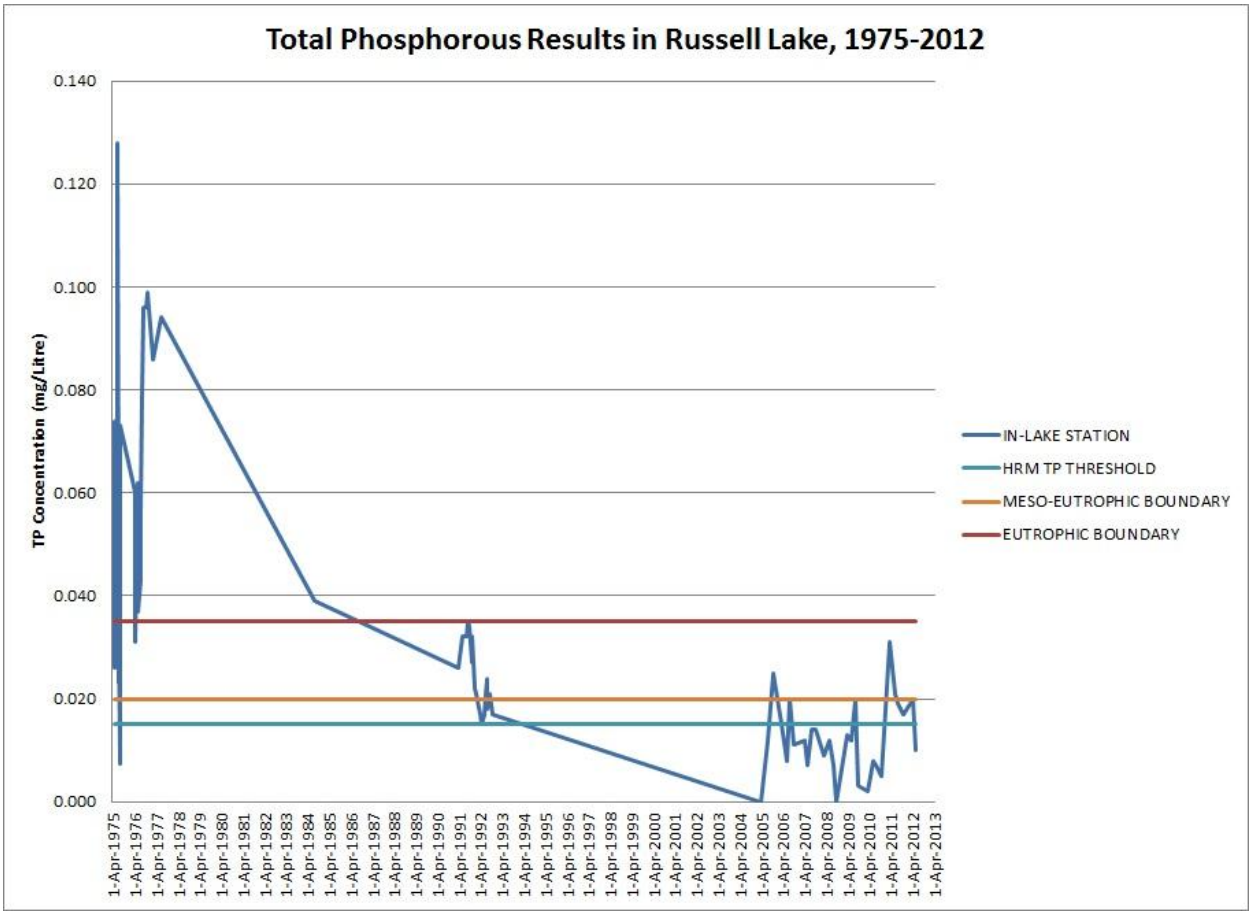


Staff compiled the data provided by the Water Quality Monitoring program in Russell Lake and presented for interpretation. The data comments generally indicated:

- Without more data points, it is not possible to ascertain what is causing variances to the water quality data.
- With the data compiled, it is not possible to confidently conclude that development is or is not the primary causal factor to variances in data.

- The data generally indicates that Russell Lake is in similar health now as it was prior to development.

The concentration data is not sufficient for effective analysis and decision support, and flow rates of inputs and outputs to the lake, which would enable the calculation of nutrient loadings and yield more complete and useful information.



Pictures

The following aerial photos were taken during the summer of 2012 to provide context for the review and to demonstrate the current status of Russell Lake

Russell Lake, looking South

Russell Lake, looking Southeast, with Morris Lake in background

Russell Lake, looking East, showing riparian buffer

South end of Russell Lake, looking West South-West, showing siltation booms

Policy Set Reviewed[1]

The primary activity completed by Dartmouth Lakes Advisory Board was an assessment of the policy adoption of objectives of the 1994 Russell Lake Management Plan (as overviewed below) as the basis of the recommendations contained within this report.

Policy #	Policy	Policy Objective	Current Policy Application	Does Policy meet Objective?
P1	Designate buffer areas along the shoreline as conservation area or parkland	• Provide recreational amenity • Contaminant control	SPS: Parkland & Open Space paragraph identifies HRM's intent to acquire shoreline buffer areas. The intended use of these areas is generally recreational in nature but not specified. ML22 specifies acquisition of shoreline parcels for public trails adjacent to lakes / watercourses; limits private shoreline ownership to 50% RMPS adopted four policies (E-10 through E-13) to establish & protect riparian buffers. Policies E-10, E-11 & E-12 apply to Russell Lake. ML-24: all shorelines protected by 100' buffer zones; zone width may be 75' if study etc. warrants. No vegetation or soil may be removed unless done under auspices of approved vegetation management plan - Wetlands protected by buffer of 25' for areas of <0.5 acres and 50' for areas ≥ 0.5 acres RMPS policies In essence, - 20 metre buffer - Certain uses permitted within this area - Through DAs, HRM shall consider RBs as public open space as well as alternative uses RB By-law requirements relaxed for lots in existence on effective date of this plan and those shown on subdivision applications	Yes
P2	Protect wetlands as conservation area	• Stormwater management • Contaminant control	- Not designated as conservation area - ML24 (b) excludes wetlands from development - ML24(d) specifies minimum buffer widths for wetlands of different size classes (see above)	Yes
P3	Designate slopes over 25% as areas where no construction can take place	• Erosion prevention	- ML18(l) prohibits development on steep slopes adjacent to Russell Lake on Parcels 10 and 11 - ML24(a) cautions that lands with slopes of 15% or greater should not be developed "unless additional environmental control measures are implemented to minimize the amount of erosion generated from the site;"	Yes
P4	Designate slopes over 15% as sensitive areas requiring special construction methods	• Erosion prevention	ML24(a) cautions that lands with slopes of 15% or greater should not be developed "*unless additional environmental control measures are implemented to minimize the amount of erosion generated from the site;"*	Yes
P5	Require variable width of buffer strip to respond to slope and soil conditions, but no less than 15 metre	• Minimize erosion and allow for trapping of contaminants	- Generally, buffer width not variable with slope and soil conditions; - Shoreline buffer may be REDUCED from 100 to 75 feet given appropriate conditions	Yes
P6	Require development proposal to minimize width and length of road network and maximize clustering of lots	• Minimize runoff • Conserve natural vegetation	No such language was used in the MPS. ML-5 specified a road classification.	Not Evident in Dartmouth MPS, but appears to be direction of Regional Plan policy.

[1] RMPS = Regional Municipal Planning Strategy;
MPS = Municipal Planning Strategy;
SPS = Secondary Planning Strategy

Policy #	Policy	Policy Objective	Current Policy Application	Does Policy meet Objective?
P7	Design roads, driveways & sidewalks with shallow slopes	• Minimize requirement for deicing salt	The Red Book mentions slopes for roads, sidewalks, walkways, etc. (i.e. max grades 6 to 10% {table 5.5} for roads depending on the road classifications).	Not in policy, but in Redbook
P8	1) Require a stormwater analysis comparing pre- and post-development flows. 2) Require the developer to demonstrate how increase in the volume of water discharged to the lake via the storm drainage system during the 1-year storm event will be kept to an absolute minimum and preferably prevented through the use of site design and stormwater Best Management Practices.	• Provide suitable runoff management • Provide adequately for interception of contaminants	- ML-23 states Council's intention to reproduce the pre-development flows - Policies ML-27 to ML-29 require the developer to meet recommendations provided in the Morris Lake Stormwater Management Plan. This plan does not require pre- and post-development flow analysis - No adoption of point 2 - Appears to be required under the Stormwater Management Plan requirement in the Subdivision ByLaw	Not evident in policy, but appears to be addressed in Subdivision ByLaw
P9	1) Require the developer to provide information on the design and management of contaminant control devices to be used during construction and 2) for the detention and treatment of stormwater on the fully developed site.	• Short and long term management of contamination	- ML-18(d) identifies the function of Parcel 4 as conveying stormwater flows originating from the west side of the Circumferential Highway (111). This area was to be expanded to include additional lands to control and treat post-development stormwater flows; it was to be transferred to HRM upon completion & acceptance of approved stormwater management systems - ML-24 specifies a number of contaminant controls during and post development, including: mandatory buffers, buffer widths, vegetation retention, non-development of lands >15% slope, and maximum percentage of impermeable surfaces for the developed area - ML-25 specifies techniques to minimize erosion and maximize sediment control, such as restriction of ground disturbance, specific vegetation controls (marking/ retention etc.), construction phasing and the timing and implementation of erosion control devices; - MLs 27-29 specifically address stormwater management provisions	Yes
P10	Minimize disturbance of the shoreline and its vegetation	• Contaminant Control	ML-24 specifies buffer zones, widths and vegetation detention	Yes
P11	Minimize the disturbance of land-based natural vegetation	• Erosion prevention • Contaminant control	ML-24 specifies buffer zones, widths and vegetation detention	Yes
P12	Conserve natural drainage channels especially if vegetated. Conserve wetland for stormwater detention and contaminant control	• Contaminant control	- ML-23 (e) specifies Council's intention to preserve and utilize the natural drainage system - ML-24 (B) excludes wetlands from development - ML-29 commits HRM to conduct stormwater wetland projects in Ellenvale Run and other locations (where deemed appropriate), and to negotiate the establishment of similar projects with other land owners through the CDD process C-28 (Commercial Policy) holds developers responsible for the design & construction of "adequate detention pond/wetland stormwater management system and a monitoring program for Russell Lake to determine the effectiveness of the system"	Yes

Policy #	Policy	Policy Objective	Current Policy Application	Does Policy Meet Objective?
P13	Use natural landscaping wherever possible and minimize the use of lawns on public and private common use land	• Reduce the requirement for lawn care products	This clause is not addressed. There are references to "landscaping measures"	Not evident
P14	Enforce the D200 Dog Bylaw	• Minimize pet excrement	ML-26 identifies Council's intention to create a Public Awareness and Education Program; clause (c) specifies the application of an Animal Defecation By-Law throughout the entire area that should be actively enforced HRM By-Law A-300 (Respecting Animals and Responsible Pet Ownership), section 7 (1)(c), makes it an offense for a dog to defecate on any public or private property, other than that of its owner, without the owner immediately removing the defecation.	Not evident in policy, but ByLaw present
P15	Re-examine policies and practices governing the distribution of deicing salt	• Minimize salt availability	HRM Municipal Operations has demonstrated progress in this.	Not evident
P16	Promote and evaluate participation in the municipal leaf collection program. Adjust program if necessary	• Reduce the availability of garden waste	Not of concern	
P17	Provide no developed access (ramps, wharves) for power boats on the lake	• Minimize contamination • Minimize noise	Requires policy adoption in Dartmouth MPS. This is the case, but not directed in policy set.	Not evident

Recommendations

Development Management

- For any future development, a stormwater analysis and stormwater management plan must be provided to meet a higher and restorative objective to reflect the precarious nature of Russell Lake.

- It is recommended that the developer funded water quality program be reviewed for future development to provide a mechanism whereby the program will provide more specific and forensic data for decision support should the program indicate objectives have been comprised.

Erosion and Sediment Control

- It is recommended that Halifax Regional Municipality request the Province of Nova Scotia to update the Erosion and Sediment Control Guidelines to reflect the experience of increased extreme weather and major storm events to create a highest level consistent standard for environmental management. And that the HRM participate in the activity of updating the Guidelines.

- It is recommended that Halifax Regional Municipality seek and confirm the legislative authority to require erosion and sediment control plans, meeting the Provincial Guidelines, for any and all types of development in the municipality, including As-of-Right, Site Plan Approval, Development Agreement and Subdivision Agreement types of development management. Dartmouth Lakes Advisory Board submits that HRM has this authority under the HRM Charter.

- It is recommended that Halifax Regional Municipality to require all road and large construction site contractors to take an Erosion and Sediment Control Course overviewing the Provincial Guidelines as a mandatory requirement for bidder compliance.

- It is recommended that Halifax Regional Municipality enact programming to ensure the diligent proactive compliance and enforcement of approved Erosion and Sediment Control Plans in the following scenarios:

    - Property under construction by HRM
    - Property under development
    - Property post-development and under all forms of building, including new home construction

- It is recommended that Halifax Regional Municipality collaborate with Nova Scotia Environment, NS Road Builders Association, Construction Association of NS, and the NS Home Builders Association on an education and training program to ensure that all builders in HRM are aware of Erosion and Sediment Control Guidelines.

Water Quality Monitoring

- It is recommended that future water quality monitoring programs examine flow rates, phosphorus samples at depth, and dissolved oxygen & temperature profiles, in addition to current parameters.

Green Infrastructure

- It is recommended that Halifax Regional Municipality embed the neighbourhood tree canopy objectives of the Urban Forest Master Plan in the secondary planning strategy and land use bylaw as best able.
- It is recommended that Halifax Regional Municipality develop and adopt a remediation program to complement the hard infrastructure renewal and deployment anticipated under CCME specifically for the most heavily stressed urban lakes including: Chocolate Lake, Whimsical Lake, Frog Lake, Lake Banook, Albro Lake, Lake Micmac, Penhorn Lake, and Russell Lake.

Other

- Off-leash parks near lakes require the same buffer zone as other land uses.

Observations and ideas

The existing policy set is quite progressive. In particular, the riparian buffers, which can be seen in aerial photographs earlier in this report, demonstrate commitment to environmental protection of the lake and watershed. As such, the Board offers the following observations and ideas:

General

- Staff need to review policy to ensure that all lakes have equivalent and highest protection. In Dartmouth MPS, there are times in policy where it appears Morris Lake is referenced and Russell Lake not, and conversely, or times where both lakes are specifically referenced. As such, it appears there are omissions which may be unintended.
- Prior to any development in the lands remaining, HRM should require the developer to submit the results of a model that determines the effects of proposed land use changes on Russell Lake. The model must demonstrate how development will not only maintain existing lake quality objectives, but provide a restorative role on the watershed to reflect the ongoing impacts of extreme weather events, major storm events, and past development.
- HRM has improved its corporate Road Salt Management practices and embraced a number of best practices, including the use of an alternative to traditional road salt, brine. These improvements have led to a reduction in the amount of road salt applied to HRM roads. HRM should entrench such continuous improvements in official municipal policy.

Further reductions in road salt applications are possible through the adoption of additional best practices employed by others through contracts, regulations, public education or other means. These measures could include the prohibition of open storage (i.e., in parking lots) and encouragement of commercial and residential use of environmentally preferable alternatives, among others.

- The primary activity of the Policy Review was the examination of current policy to ensure the adoption of recommendations found in the Russell Lake Management Plan. The review benefitted greatly from the existence of that Plan, and recommends that the development of such Lake-based Management Plans become standard practice in regional planning policy, and that future policy review projects use these efforts as a framework.

<u>Green Infrastructure</u>

- In order to fund lake remediation projects, instead of cash-in-lieu parkland dedications, funding could be directed to a reserve to fund remediation projects.

- In order to fund lake remediation and urban forest canopy projects, a small percentage of funding from hard infrastructure projects, or standard project specifications for them, should be designated for this purpose.