Subject: Review of Lake Quality **Date: DRAFT August 13, 2011**

To Mountain LakesDistrict:
Commissioners, Planning Board, ZBA, Office, Home & Lot Owners

From: Tom Eighmy, Planning Board (tbeighmy@rcn.com)

BACKGROUND:

This is a revision of the 2010 Review incorporating the New Hampshire **VLAP** (Voluntary Lake Assessment Program) data for July 2010 and preliminary figures for the June 2011 sampling. The printed volumes for 2009 and 2010 will be available for viewing in the District Office. The most measurable and reliable long term indicators of lake quality are ***Total Phosphorus*** and ***Chlorophyl-a.*** Graphs of these are available in limited quantities in the Office showing the data points and trend lines from 1990, superimposed with the NH and Similar lake median**s.**

Phosphorus is the limiting nutrient in our lakes checking algae's ability to grow and reproduce. Small increases from human and animal sources (septic effluent, lawn fertilizer, dishwasher detergents, runoff from roads or land clearing and fecal matter—including goose poop) can disproportionately increase pollution. In the Table and Graphs available through VLAP, the following concentrations (ug/L—milligrams per liter) can be used as a general guide to lake quality:

1-10 Low (Good), 11-20 Average, 21-40 High, >40 Excessive

Chlorphhyll naturally occurs in plants but too much can lead to weed growth. It is an indicator of algae abundance measured in mg/m3 (milligrams per cubic meter) categorized as:

0-5.0 Good, 5.1-15.0 More Than Desirable, >15.1 Nuisance Amounts

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As northern New Hampshire recreational and water supply lakes in a forested, non-agricultural watershed and zoned residential community, there is little reason for our results to be anything but **Good.**

VLAP also tests for *Phytoplankton and Cyanobacteria, Secchi Disk Transparency, pH, Acid Neutralizing Capacity, Conductivity, Dissolved Oxygen* and *Temperature at different depths and e-coli.* All of these are measures of some aspect of lake quality.

VLAP is under budgetary pressure to go to a reduced sampling schedule with selectively fewer measurements and biennial lake sampling and reporting. This year in Mountain Lakes there were fewer sampled sites and no count of blue-green algae as there was no record of occurrence in the District. However we hope that Mountain Lakes will remain on an annual sampling basis. With more local volunteers, we could go to a second late season sampling, or in case of further budget constraints, a totally volunteer effort.

Interested readers can turn to the website (http://des.nh.gov) . This has printable links to VLAP and its summary annual reports, graphs and Special Topics such as "Lake Drawdowns: Friend or Foe", harmful exotic species (Eurasian Milfoil, "Rock Snot", certain cyanobacteria, septic systems), goose poop etc.

I have placed in the District Office various printouts of many of these fact sheets from the NH Department of Environmental Services' including the "Shoreland Water Quality Protection Act" (formerly known as the "Comprehensive Shoreland Protection Act) and "Wetlands Act". Prospective house owners and builders need to know that these are applicable to our lakes.

Comparative Values: 2009-2011 for South and North Lakes, Phosphorus and Chlorophyll-a *

	South Lake (Upper Inlet Lake)			North Lake (Lower Outlet Lake)	
	Phosphorus ug/L			**Phosphorus ug/L**	
2009	**Inlet**	**8.8**	*moushavm*	**Beach**	*nmouhavb*
	Deep Spot	**8.4**	*moushavd*	**Deep Spot Comp 14.0 (8.0 Epi, 20 Hyp)**	*nmouhavd*
	Outlet	**7.8**	*moushavo*	**Outlet 7.5**	*nmouhavo*
2010	**Composite 14.0 (Epi=Hyp)**			**Composite 9.0 (Epi 6.9, Hypo 11)**	
2011	**Inlet**	**12.0**	*moushavm*		
	Beach	**9.5**	*moushavb*		
	Deep Spot 13.3 Comp (9.6 Epi, 7.0 Hyp)			**Deep Spot Comp 20.0 (9.1 Epi, Hyp 11.0)**	*nmouhavd*
				Outlet NA *(Labelling Error?)*	*nmouhavo*
	Chlorophyll-a			**Chlorophyll-a**	
2009	**Deep Spot**	**3.152**	*moushavd*	**Deep Spot 5.4244**	*nmouhavd*
	(Below median of 4.58)			(Above median of 4.58)	
2010	**“ “**	**4.95**		**“ “ 5.27**	
	(Above Median of 4.58)			(Above Median of 4.58)	
2011	Not Sampled			Not Sampled	

*****Subject to VLAP final reports for 2010 & 2011

Graphs of Historical data from 1990 – 2011*
(Limited Copies Available in the Office)

Phosphorus –
Inlet Lake
There is some indication that phosphorus levels drop from Waterman Brook Inlet on South Lake to the Outlet on North Lake (with some high concentrations in the North Lake Deep Spot due to deep buried vegetative decay). It would be good to test this trend through time.

There is much variability and clustering around the NH Medians for both Upper (Epi) and Lower (Hypo) Levels. The trend is not considered significant, but it is upward, and many values are above 10 which is not good.

Outlet Lake
A flat trend at the Epi level well below NH medians, and some values below 10 which is good.
A highly variable but steadily rising Hypo level now above the NH medians with some values exceeding 10 which is not good.

Chlorophyll-a
Inlet Lake
Highly Variable but declining trend with many values below 5 which is good.

Outlet Lake
Highly variable but close to NH medians and flat with recent values coming down which is good.

***Subject to VLAP final reports for 2010 and 2011

Summary

As noted last year, our lakes are man-made and shallow, with variable inflow. The Inlet (South/Upper) Lake is shallower, has less than one third the volume and half the area of the Outlet (North/Lower) Lake but has a faster estimated flow through. In a sense, the Inlet Lake is a settling basin for the Outlet Lake, but is preserved from faster *eutrophication* (ageing) by the presence of preserved *wetlands* (the so- called Third Lake) upstream on Waterman Brook, the main inlet stream.

In general, the quality of our lakes remains good. Relish the view. Enjoy swimming, fishing and non-motorized boating. Despite the geese, *e-coli* measures are negligible. Safely drink the tap water. However all of these desirable activities and ultimately property values, and public health within the District are under continuing threat as indicated in some of the measures reproduced above from VLAP. I urge you also to look at the District Website (www.mtlakesnh.net) under Planning Board for the *"Watersh*ed *Management Plan"* , *"Master Plan"* and links to the *"Wetlands Inventory"(* Two Reports and photos) as well as the *"Zoning Ordinance"*

The bothersome phosphorus and chlorophyll figures noted elsewhere will be reflected in heavy weed growth, especially at the inlet and shallower waters. Heavy rainfall and land clearing in the watershed will result in runoff in both lakes. Siltation from runoff translates to deep bottom muck and weed growth. *Eutrophication* (lake ageing) is speeded by human activity (septic effluent, farm animal waste, fertilizer, and as noted, erosion from land clearing or road runoff) as well as by some natural processes. Threats from the transfer of exotic algae and weed species continues especially with the use of uncleaned kayaks which have travelled in infected waters .

What We All Can Do

* Keep Septic Systems Pumped and in Working Order (Zoning Ordinance 404.1,2);
* Reduce or Eliminate Fertilizer Use on Gardens and Especially Lawns;
* Plant and Sustain Native Vegetative Buffers on Shoreline and Lotlines;
* Clean Boats, Paddles, Shoes (bleach solution) and feet and body (soap) if used outside the District (District Owned Boats may not be used outside the District);
* Keep Snowmobiles on Designated Routes only, and never on Lakes, and ATVs Off District Land (Zoning Ordinance 406.14);
* Support, if eligible, vote and enforce for your District Planning Board and ZBA efforts to curb logging (described as "lot clearing") and harmful runoff within the District unless the clearing is directly related to home construction and in accord with the District Zoning Ordinance.

Cc: Sara Steiner, VLAP Coordinator

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