OBSERVATIONS & RECOMMENDATIONS

After reviewing data collected from **Eastman Pond, Grantham,** the program coordinators have made the following observations and recommendations.

Thank you for your continued hard work sampling the pond this year! Your monitoring group sampled the deep spot **four** times, and has done so for many years! Your monitoring group also conducted additional tributary monitoring for chloride, iron and manganese. As you know, conducting multiple sampling events each year enables DES to more accurately detect water quality changes. Keep up the good work!

We encourage your monitoring group to continue utilizing the Colby Sawyer College Water Quality Laboratory in New London. This laboratory was established to serve the large number of lakes/ponds in the greater Lake Sunapee region of the state. This laboratory is inspected by DES and operates under a DES approved quality assurance plan. We encourage your monitoring group to utilize this laboratory next summer for all sampling events, except for the annual DES biologist visit. To find out more about the Colby Sawyer College Water Quality Laboratory, and/or to schedule dates to pick up bottles and equipment, please call Bonnie Lewis, laboratory manager, at (603) 526-3486.

A Weed Watcher training was conducted at **Eastman Pond** during **2008**. Volunteers were trained to survey the pond once a month from **May** through **September**. To survey, volunteers slowly boat, or even snorkel, around the perimeter of the pond and any islands it may contain. Using the materials provided in the Weed Watcher kit, volunteers look for any species that are suspicious. After a trip or two around the pond, volunteers will have a good knowledge of its plant community and will immediately notice even the most subtle changes. If a suspicious plant is found, the volunteers immediately send a specimen to DES for identification. If the plant specimen is an exotic species, a biologist will visit the site to determine the extent of the problem and to formulate a management plan to control the nuisance infestation. Remember that early detection is the key to controlling the spread of exotic plants.

Volunteers from your pond participated in the Lake Host™ Program this year. The Lake Host™ Program was initiated in 2002 by NH LAKES and DES to educate and prevent boaters from spreading exotic aquatic plants to lakes/ponds in New Hampshire. Since then, the number of participating lakes/ponds has doubled, the number of volunteers has doubled, the number of boats inspected has tripled, and the number of "saves" (exotic plants discovered) has increased from four in 2002 to a total of 157 in 2007. The program is invaluable in educating boaters and protecting NH's waterbodies from exotic aquatic plant infestations, thereby preventing recreational hazards, property value decline, aquatic ecosystem decline, aesthetic issues, and saving costly remediation efforts. Lake Host™ staff discovered the following aquatic vegetation entering or leaving your pond in 2008:

Bladderwort (native)

Great work! We encourage volunteers to continue participating in the Lake Host™ Program to protect the future of your pond.

FIGURE INTERPRETATION

CHLOROPHYLL-A

- **Figure 1 and Table 1:** Figure 1 in Appendix A shows the historical and current year chlorophyll-a concentration in the water column. Table 1 in Appendix B lists the maximum, minimum, and mean concentration for each sampling year that the pond has been monitored through VLAP.

  Chlorophyll-a, a pigment found in plants, is an indicator of the algal abundance. Algae (also known as phytoplankton) are typically microscopic, chlorophyll producing plants that naturally occur in lake ecosystems. The chlorophyll-a concentration measured in the water gives biologists an estimation of the algal concentration or lake productivity. **The median summer chlorophyll-a concentration for New Hampshire's lakes and ponds is 4.58 mg/m^3.**

  The current year data (the top graph) show that the chlorophyll-a concentration ***increased*** from **June** to **July**, and then ***decreased*** from **July** to **September**.

  The historical data (the bottom graph) show that the **2008** chlorophyll-a mean is ***slightly greater than*** the state and similar lake medians. For more information on the similar lake median, refer to Appendix F.

Overall, the statistical analysis of the historical data shows that the chlorophyll-a concentration has ***significantly decrease*d** (meaning ***improved***) on average **by *approximately 2.766 percent*** per year during the sampling period **1987** to **2008**. Please refer to Appendix E for the detailed statistical analysis explanation and data print-out. We are encouraged by this improving trend and hope chlorophyll-a concentrations continue to decrease!

While algae are naturally present in all ponds, an excessive or increasing amount of any type is not welcomed. In freshwater ponds, phosphorus is the nutrient that algae typically depend upon for growth in New Hampshire lakes. Algal concentrations may increase as nonpoint sources of phosphorus from the watershed increase, or as in-lake phosphorus sources increase. Therefore, it is extremely important for volunteer monitors to continually educate all watershed residents about management practices that can be implemented to minimize phosphorus loading to surface waters.

TRANSPARENCY

- **Figure 2 and Tables 3a and 3b:** Figure 2 in Appendix A shows the historical and current year data for transparency with and without the use of a viewscope. Table 3a in Appendix B lists the maximum, minimum and mean transparency data without the use of a viewscope and Table 3b lists the maximum, minimum and mean transparency data with the use of a viewscope for each year that the pond has been monitored through VLAP.

  Volunteer monitors use the Secchi disk, a 20 cm disk with alternating black and white quadrants, to measure how far a person can see into the water. Transparency, a measure of water clarity, can be affected by the amount of algae and sediment in the water, as well as the natural color of the water. **The median summer transparency for New Hampshire's lakes and ponds is 3.2 meters.**

  The current year data (the top graph) show that the non-viewscope in-lake transparency ***decreased slightly*** from **June** to **July**, ***increased slightly*** from **July** to **August**, and then ***decreased slightly*** from **August** to **September**.

  The historical data (the bottom graph) show that the **2008** mean non-viewscope transparency is ***slightly less than*** the state median and is ***slightly greater than*** the similar lake median. Please refer to Appendix F for more information about the similar lake median.

The current year data (the top graph) show that the viewscope in-lake transparency ***decreased gradually*** from **June** through **September**. The transparency measured with the viewscope was generally ***greater than*** the transparency measured without the viewscope this summer. As discussed previously, a comparison of the transparency readings taken with and without the use of a viewscope shows that the viewscope typically increases the depth to which the Secchi disk can be seen into the lake, particularly on sunny and windy days. We recommend that your group measure Secchi disk transparency with and without the viewscope on each sampling event.

It is important to note that viewscope transparency data are not compared to a New Hampshire median or similar lake median. This is because lake transparency with the use of a viewscope has not been historically measured by DES. At some point in the future, the New Hampshire and similar lake medians for viewscope transparency will be calculated and added to the appropriate graphs.

Overall, the statistical analysis of the historical data (the bottom graph) shows that the mean annual non-viewscope transparency has ***not significantly changed*** since monitoring began. Specifically, the transparency has ***fluctuated between approximately 2.30 and 4.28 meters,*** but has ***not continually increased or decreased*** since **1987**. Please refer to Appendix E for the detailed statistical analysis explanation and data print-out.

Typically, high intensity rainfall causes sediment-laden stormwater runoff to flow into surface waters, thus increasing turbidity and decreasing clarity. Efforts should continually be made to stabilize stream banks, pond shorelines, disturbed soils within the watershed, and especially dirt roads located immediately adjacent to the edge of tributaries and the pond. Guides to best management practices that can be implemented to reduce, and possibly even eliminate, nonpoint source pollutants, are available from DES upon request.

TOTAL PHOSPHORUS

- **Figure 3 and Table 8:** The graphs in Figure 3 in Appendix A show the amount of epilimnetic (upper layer) phosphorus and hypolimnetic (lower layer) phosphorus; the inset graphs show current year data. Table 8 in Appendix B lists the annual maximum, minimum, and median concentration for each deep spot layer and each tributary since the pond has been sampled through VLAP.

Phosphorus is typically the limiting nutrient for vascular plant and algae growth in New Hampshire’s lakes and ponds. Excessive phosphorus in a pond can lead to increased plant and algal growth over time. **The median summer total phosphorus concentration in the epilimnion (upper layer) of New Hampshire's lakes and ponds is 12 ug/L. The median summer phosphorus concentration in the hypolimnion (lower layer) is 14 ug/L.**

The current year data for the epilimnion (the top inset graph) show that the phosphorus concentration ***decreased slightly*** from **June** to **July**, ***increased greatly*** from **July** to **August**, and then ***decreased*** from **August** to **September**.

The ***elevated*** epilimnetic phosphorus concentration measured on the **August** sampling event may be a result of phosphorus-enriched stormwater runoff that flowed into the surface layer of the pond. Weather records show that approximately **0.25 inches** of rain fall was measured **24-72 hours** prior to sampling.

The historical data show that the **2008** mean epilimnetic phosphorus concentration is ***slightly greater than*** the state median and is ***slightly less than*** the similar lake median. Refer to Appendix F for more information about the similar lake median.

The current year data for the hypolimnion (the bottom inset graph) show that the phosphorus concentration ***decreased slightly*** from **June** to **July**, ***increased greatly*** from **July** to **August**, and then ***decreased*** from **August** to **September**.

The hypolimnetic (lower layer) turbidity sample was ***elevated*** on the **July** sampling event (**6.97 NTUs**). This suggests that the pond bottom may have been disturbed by the anchor or by the Kemmerer Bottle while sampling and/or that the pond bottom is covered by an easily disturbed thick organic layer of sediment. When the pond bottom is disturbed, phosphorus rich sediment is released into the water column. When collecting the hypolimnion sample, make sure that there is no sediment in the Kemmerer Bottle before filling the sample bottles.

The historical data show that the **2008** mean hypolimnetic phosphorus concentration is ***slightly greater than*** the state median and is ***slightly less than*** the similar lake median. Please refer to Appendix F for more information about the similar lake median.

Overall, the statistical analysis of the historical data shows that the phosphorus concentration in the epilimnion (upper layer) has ***not significantly changed*** (either *increased* or *decreased*) since monitoring began. Specifically, the epilimnetic phosphorus concentration has remained ***relatively stable, ranging between***

approximately 2.8 and 12.6 ug/L since **1987**. Please refer to Appendix E for the statistical analysis explanation and data print-out.

Overall, the statistical analysis of the historical data shows that the phosphorus concentration in the hypolimnion (lower layer) has ***not significantly changed*** since monitoring began. Specifically, the hypolimnetic phosphorus concentration has ***fluctuated between approximately 9.2 and 32.5 ug/L*** since **1987**. Please refer to Appendix E for the detailed statistical analysis explanation and data print-out.

One of the most important approaches to reducing phosphorus loading to a waterbody is to continually educate watershed residents about the watershed sources of phosphorus and how excessive phosphorus loading can negatively affect the ecology and the recreational, economical, and ecological value of lakes and ponds.

TABLE INTERPRETATION

- **Table 2: Phytoplankton**
  Table 2 in Appendix B lists the current and historical phytoplankton and/or cyanobacteria observed in the pond. Specifically, this table lists the three most dominant phytoplankton and/or cyanobacteria observed in the sample and their relative abundance in the sample.

  The dominant phytoplankton and/or cyanobacteria observed in the **June** sample were ***Synura*** **(Golden-Brown),** ***Asterionella*** **(Diatom),** and ***Rhizosolenia*** **(Diatom)**.

  Phytoplankton populations undergo a natural succession during the growing season. Please refer to the "Biological Monitoring Parameters" section of this report for a more detailed explanation regarding seasonal plankton succession. Diatoms and golden-brown algae populations are typical in New Hampshire's less productive lakes and ponds.

- **Table 2: Cyanobacteria**
  A **small amount** of the cyanobacterium ***Anabaena*** was observed in the **June** plankton sample. ***This cyanobacteria, if present in large amounts, can be toxic to livestock, wildlife, pets, and humans.*** Please refer to the "Biological Monitoring Parameters" section of this report for a more detailed explanation regarding cyanobacteria.

  Cyanobacteria can reach nuisance levels when phosphorus loading from the watershed to surface waters is increased and favorable environmental conditions occur, such as a period of sunny, warm weather.

The presence of cyanobacteria serves as a reminder of the pond's delicate balance. Watershed residents should continue to act proactively to reduce nutrient loading to the pond by eliminating lawn fertilizer use, keeping the pond shoreline natural, re-vegetating cleared areas within the watershed, and properly maintaining septic systems and roads.

In addition, residents should also observe the pond in September and October during the time of fall turnover (lake mixing) to document any algal blooms that may occur. Cyanobacteria have the ability to regulate their depth in the water column by producing or releasing gas from vesicles. However, occasionally lake mixing can affect their buoyancy and cause them to rise to the surface in high concentrations. Wind and currents tend to "pile" cyanobacteria into scums that accumulate in one section of the pond. If a fall bloom occurs, please collect a sample in any clean jar or bottle and contact the VLAP Coordinator.

- **Table 4: pH**

Table 4 in Appendix B presents the in-lake and tributary current year and historical pH data.

pH is measured on a logarithmic scale of 0 (acidic) to 14 (basic). pH is important to the survival and reproduction of fish and other aquatic life. A pH below 6.0 typically limits the growth and reproduction of fish. A pH between 6.0 and 7.0 is ideal for fish. The median pH value for the epilimnion (upper layer) in New Hampshire's lakes and ponds is **6.6**, which indicates that the state surface waters are slightly acidic. For a more detailed explanation regarding pH, please refer to the "Chemical Monitoring Parameters" section of this report.

The mean pH at the deep spot this year ranged from **6.27** in the hypolimnion to **6.84** in the epilimnion, which means that the water is ***slightly acidic***.

It is important to point out that the hypolimnetic (lower layer) pH was ***lower (more acidic)*** than in the epilimnion (upper layer). This increase in acidity near the pond bottom is likely due to the decomposition of organic matter and the release of acidic by-products into the water column.

Due to the state's abundance of granite bedrock and acid deposition received from snowmelt, rainfall, and atmospheric particulates, there is little that can be feasibly done to effectively increase pond pH.

- **Table 5: Acid Neutralizing Capacity**
  Table 5 in Appendix B presents the current year and historical epilimnetic ANC for each year the pond has been monitored through VLAP.

  Buffering capacity (ANC) describes the ability of a solution to resist changes in pH by neutralizing the acidic input. The median ANC value for New Hampshire's lakes and ponds is **4.8 mg/L**, which indicates that many lakes and ponds in the state are at least "moderately vulnerable" to acidic inputs. For a more detailed explanation about ANC, please refer to the "Chemical Monitoring Parameters" section of this report.

  The mean acid neutralizing capacity (ANC) of the epilimnion (upper layer) was **6.0 mg/L**, which is ***slightly greater than*** the state median. In addition, this indicates that the pond is ***moderately vulnerable*** to acidic inputs.

- **Table 6: Conductivity**
  Table 6 in Appendix B presents the current and historical conductivity values for tributaries and in-lake data. Conductivity is the numerical expression of the ability of water to carry an electric current, which is determined by the number of negatively charged ions from metals, salts, and minerals in the water column. The median conductivity value for New Hampshire's lakes and ponds is **38.4 uMhos/cm**. For a more detailed explanation, please refer to the "Chemical Monitoring Parameters" section of this report.

  The mean annual epilimnetic conductivity at the deep spot this year was **157.8 uMhos/cm**, which is ***much greater than*** the state median.

  The conductivity continued to remain ***much greater than*** the state median in the pond and tributaries this year, and particularly in **Tamari Brook, Stroing Brook** and **Stoney Brook**. Typically, elevated conductivity indicates the influence of pollutant sources associated with human activities. These sources include failed or marginally functioning septic systems, agricultural runoff, and road runoff, which contains road salt during the spring snow-melt. New development in the watershed can alter runoff patterns and expose new soil and bedrock areas, which could also contribute to increasing conductivity. In addition, natural sources, such as iron and manganese deposits in bedrock, can influence conductivity.

We recommend that your monitoring group conduct stream surveys and rain event sampling along the tributaries with ***elevated*** conductivity so that we can determine what may be causing the increases.

For a detailed explanation on how to conduct rain event sampling and stream surveys, please refer to the 2002 VLAP Annual Report special topic article, which is posted on the VLAP website at ***http://www.des.nh.gov/organization/divisions/water/wmb/vlap/categories/publications.htm****, or contact the VLAP Coordinator.*

It is likely that de-icing materials applied to nearby roadways during the winter months may be influencing the conductivity in the pond. The most commonly used de-icing material in New Hampshire is salt (sodium chloride).

Chloride sampling was conducted during ***2008****. Please refer to the discussion of* ***Table 13*** *for more information.*

A limited amount of iron and manganese sampling was conducted at **Northeast Brook, North Cove West Brook, Stroing Brook, Tamari Brook, and West Cove C Lagoon** on the **April** sampling event to determine their relative contributions to tributary conductivity levels. The average concentration of iron in world surface waters (lakes and rivers) is **40 ug/L**. The average concentration of manganese in world surface waters is **35 ug/L**. Table 14 includes the iron and manganese raw data for the 2008 sampling event.

Iron and manganese concentrations in **North Cove West Brook** were **124 and 196 ug/L**, and were **241 and 176 ug/L** in **Tamari Brook**. These concentrations are ***greater than*** what you would normally expect to see in surface waters indicating that iron and manganese contribute to elevated conductivity levels at these tributaries. You may also notice a reddish brown precipitate on the stream bottom, cloudy growth, or a sulfur smell to the water.

The iron concentration in **West Cove C Lagoon** was ***slightly elevated*** **(106 ug/L)**; however the manganese concentration was not **(33 ug/L)**. Iron may be a contributing factor at this station as well.

- **Table 8: Total Phosphorus**
  Table 8 in Appendix B presents the current year and historical total phosphorus data for in-lake and tributary stations. Phosphorus is the nutrient that limits the algae's ability to grow and reproduce.

Please refer to the "Chemical Monitoring Parameters" section of this report for a more detailed explanation.

The total phosphorus concentrations were ***elevated*** in **Anderson Pond, Mill Pond, Stroing Brook, Northeast Brook, Eastman Brook Outlet, Stoney Brook,** and **Stoney Brook at Robin Lane** on the **August** sampling event. Turbidity levels were not elevated at these stations. Weather records indicate **0.25 inches** of rainfall **24-72 hours** prior to sample collection. Stormwater runoff likely influenced phosphorus concentrations in the tributaries. Watershed sources of phosphorus can include agricultural runoff, construction site runoff, septic systems, and fertilizers.

*For a detailed explanation on how to conduct rain event sampling and stream surveys, please refer to the 2002 VLAP Annual Report special topic article, which is posted on the VLAP website at **http://www.des.nh.gov/organization/divisions/water/wmb/vlap/categories/publications.htm**, or contact the VLAP Coordinator.*

The total phosphorus concentration in **Tamari Brook** was ***slightly elevated*** (**20 ug/L**) on the **August** sampling event. The turbidity of the sample was also ***slightly elevated*** (**4.69 NTUs**), which suggests that the stream bottom may have been disturbed while sampling or that erosion is occurring in the watershed.

When the stream bottom is disturbed, phosphorus rich sediment is released into the water column. When collecting tributary samples, please be sure to sample where the tributary is flowing and where the stream is deep enough to collect a "clean" sample free from organic debris and sediment.

If you suspect that erosion is occurring in this area of the watershed, we recommend that your monitoring group conduct a stream survey and rain event sampling along this tributary. This additional sampling may allow us to determine what is causing the ***elevated*** levels of turbidity and phosphorus.

*For a detailed explanation on how to conduct rain event sampling and stream surveys, please refer to the 2002 VLAP Annual Report special topic article, which is posted on the VLAP website at **http://www.des.nh.gov/organization/divisions/water/wmb/vlap/categories/publications.htm**, or contact the VLAP Coordinator.*

- **Table 9 and Table 10: Dissolved Oxygen and Temperature Data**
  Table 9 in Appendix B shows the dissolved oxygen/temperature profile(s) collected during **2008**. Table 10 in Appendix B shows the

historical and current year dissolved oxygen concentration in the hypolimnion (lower layer). The presence of sufficient amounts of dissolved oxygen in the water column is vital to fish and amphibians and bottom-dwelling organisms. Please refer to the "Chemical Monitoring Parameters" section of this report for a more detailed explanation.

The dissolved oxygen concentration was ***lower in the hypolimnion (lower layer) than in the epilimnion (upper layer)*** at the deep spot on the **June** sampling event. As stratified ponds age, and as the summer progresses, oxygen typically becomes ***depleted*** in the hypolimnion by bacterial decomposition. Specifically, the reduction of hypolimnetic oxygen is primarily a result of biological organisms using oxygen to break down organic matter, both in the water column and particularly at the bottom of the pond where the water meets the sediment. When the hypolimnetic oxygen concentration is depleted to less than 1 mg/L, the phosphorus that is normally bound up in the sediment may be re-released into the water column, a process referred to as ***internal phosphorus loading***.

Lower hypolimnetic oxygen levels are a sign of the pond's ***aging*** health. This year the DES biologist collected the dissolved oxygen profile in **June**. We recommend that the annual biologist visit for the **2009** sampling year be scheduled during **September** so that we can determine if oxygen is depleted in the hypolimnion ***later*** in the sampling year.

- **Table 11: Turbidity**

Table 11 in Appendix B lists the current year and historical data for in-lake and tributary turbidity. Turbidity in the water is caused by suspended matter, such as clay, silt, and algae. Water clarity is strongly influenced by turbidity. Please refer to the "Other Monitoring Parameters" section of this report for a more detailed explanation.

As discussed previously, the hypolimnetic (lower layer) turbidity was ***elevated*** (**6.97 NTUs**) on the **July** sampling event. In addition, the hypolimnetic turbidity has been elevated on many sampling events during previous sampling years. This suggests that the pond bottom may have been disturbed by the anchor or by the Kemmerer Bottle while sampling and/or that the lake bottom is covered by an easily disturbed, thick organic layer of sediment. When the pond bottom is disturbed, phosphorus rich sediment is released into the water column. When collecting the hypolimnion sample, make sure that there is no sediment in the Kemmerer Bottle before filling the sample bottles.

The turbidity in the **Anderson Pond** sample was ***elevated*** (**31.9**

NTUs) on the **September** sampling event. Field notes indicate low flow conditions and sedimentation. When collecting tributary samples, please be sure to sample where the stream is flowing and where the stream is deep enough to collect a "clean" sample free from debris and sediment.

- **Table 12: Bacteria (*E.coli*)**

  Table 12 in Appendix B lists the current year and historical data for bacteria *(E.coli*) testing. *E. coli* is a normal bacterium found in the large intestine of humans and other warm-blooded animals. *E.coli* is used as an indicator organism because it is easily cultured and its presence in the water, in defined amounts, indicates that sewage **may** be present. If sewage is present in the water, potentially harmful disease-causing organisms **may** also be present.

  The *E.coli* concentration was **low** on each sampling event at each of the sites tested this year. We hope this trend continues!

  If residents are concerned about sources of bacteria, such as failing septic systems, animal waste, or waterfowl waste, it is best to conduct *E. coli* testing when the water table is high, when beach use is heavy, or immediately after rain events.

- **Table 13: Chloride**

  Table 13 in Appendix B lists the current year and the historical data for chloride sampling. The chloride ion (Cl^-) is found naturally in some surfacewaters and groundwaters and in high concentrations in seawater. Research has shown that elevated chloride levels can be toxic to freshwater aquatic life. In order to protect freshwater aquatic life in New Hampshire, the state has adopted **acute and chronic** chloride criteria of **860 and 230 mg/L** respectively. The chloride content in New Hampshire lakes is naturally low, generally less than 2 mg/L in surface waters located in remote areas away from habitation. The median epilimnetic chloride value for New Hampshire lakes and ponds is **5 mg/L**. Higher values are generally associated with salted highways and, to a lesser extent, with septic inputs. Please refer to the "Chemical Monitoring Parameters" section of this report for a more detailed explanation.

  The **epilimnion** was sampled for chloride during the **September** sampling event. The result was **39 mg/L**, which is ***much less than*** the state acute and chronic chloride criteria. However, this concentration is ***greater than*** what we would normally expect to measure in undisturbed New Hampshire surface waters.

We recommend that your monitoring group continue to conduct chloride sampling in the epilimnion at the deep spot, particularly in the spring soon during snow-melt and rain events during the summer. This will establish a baseline of data that will assist your monitoring group and DES to determine lake quality trends in the future.

Tamari Brook was sampled for chloride on the **4/8/08, 9/22/08 and 9/28/08** sampling events. The results were **180, 270 and 220 mg/L**, which are ***much less than*** the state acute chloride criteria and ***approximately equal to*** the state chronic chloride criteria.

Tamari Brook NE of Loon Drive was sampled for chloride on the **9/28/08** sampling event. The result was **260 mg/L** which is ***much less than*** the state acute chloride criteria, and ***slightly greater than*** the state chronic chloride criteria. The chloride value is slightly greater than the 9/28/08 Tamari Brook result.

Tamari Brook NW of Loon Drive was sampled for chloride on the **9/28/08** sampling event. The result was **180 mg/L** which is ***much less than*** the state acute chloride criteria, and ***slightly less than*** the state chronic chloride criteria. The chloride value is slightly less than the 9/28/08 Tamari Brook result.

North Cove West Brook was sampled for chloride on the **4/8/08, 9/22/08 and 9/28/08** sampling events. The results were **200, 250 and 240 mg/L** which are ***much less than*** the state acute chloride criteria, and ***approximately equal to*** the state chronic chloride criteria.

North Cove West Brook Upstream was sampled for chloride on the **9/28/08** sampling event. The result was **270 mg/L** which is ***much less than*** the state acute chloride criteria, and ***slightly greater than*** the state chronic chloride criteria.

These stations experience elevated chloride concentrations that fluctuate around the state chronic chloride criteria. We recommend that your monitoring group continue to conduct chloride sampling in these tributaries, particularly in the spring during snow-melt and during rain events during the summer. This will establish a baseline of data that will assist your monitoring group and DES to determine lake quality trends in the future.

In addition, if your group is concerned about salt use on a particular roadway, we recommend contacting the town road agent or the Department of Transportation to discuss the implementation of a low-salt area near the lake and/or its major tributaries. We also recommend that your group work with watershed residents to reduce the application of chloride containing de-icing agents to driveways and walkways.

To learn more about conductivity and chloride pollution and what can be done about to minimize it, please refer to the 2004 VLAP Annual Report special topic article, which is posted on the VLAP website at ***http://www.des.nh.gov/organization/divisions/water/wmb/vlap/categories/publications.htm****, or contact the VLAP Coordinator.*

West Cove D Lagoon was sampled for chloride on the **4/8/08** sampling event. The result was **26 mg/L** which is ***much less than*** the state acute and chronic chloride criteria.

West Cove C Lagoon was sampled for chloride on the **4/8/08 and 9/22/08** sampling events. The results were **24 and 59 mg/L** which are ***much less than*** the state acute and chronic chloride criteria.

Stroing Brook was sampled for chloride on the **4/8/08 and 9/22/08** sampling events. The results were **8.6 and 24 mg/L** which are ***much less than*** the state acute and chronic chloride criteria.

Northeast Brook was sampled for chloride on the **4/8/08, 6/16/08 and 9/22/08** sampling events. The results were **43, 88 and 54 mg/L** which are ***much less than*** the state acute and chronic chloride criteria.

Northeast Brook Upstream was sampled for chloride on the **4/8/08 and 9/22/08** sampling events. The results were **27 and 41 mg/L** which are ***much less than*** the state acute and chronic chloride criteria. Chloride concentrations are also less than the Northeast Brook results indicating that chloride concentrations increase between the upstream and downstream stations.

Stoney Brook and Stoney Brook at Robin Lane were sampled for chloride on the **9/22/08** sampling event. The results were **110 and 63 mg/L** which are ***much less than*** the state acute chloride criteria, and ***less than*** the state chronic chloride criteria.

These stations do not appear to be major contributors to chloride concentrations; however levels are elevated above what we would normally expect to see in tributaries. We recommend that your monitoring group continue to conduct chloride sampling in the tributaries near salted roadways, particularly in the spring soon during snow-melt and during rain events during the summer. This will establish a baseline of data that will assist your monitoring group and DES to determine lake quality trends in the future.

- **Table 14: Current Year Biological and Chemical Raw Data**
  Table 14 in Appendix B lists the most current sampling year results. Since the maximum, minimum, and annual mean values for each parameter are not shown on this table, this table displays the current year "raw," meaning unprocessed, data. The results are sorted by station, depth, and then parameter.

- **Table 15: Station Table**
  As of the spring of 2004, all historical and current year VLAP data are included in the DES Environmental Monitoring Database (EMD). To facilitate the transfer of VLAP data into the EMD, a new station identification system had to be developed. While volunteer monitoring groups can still use the sampling station names that they have used in the past and are most familiar with, an EMD station name also exists for each VLAP sampling location. Table 15 in Appendix B identifies what EMD station name corresponds to the station names you have used in the past and will continue to use in the future.

DATA QUALITY ASSURANCE AND CONTROL

Annual Assessment Audit:

During the annual visit to your pond, the biologist conducted a sampling procedures assessment audit for your monitoring group. Specifically, the biologist observed the performance of your monitoring group and completed an assessment audit sheet to document the volunteer monitors' ability to follow the proper field sampling procedures, as outlined in the VLAP Monitor's Field Manual. This assessment is used to identify any aspects of sample collection in which volunteer monitors failed to follow proper procedures, and also provides an opportunity for the biologist to retrain the volunteer monitors as necessary. This will ultimately ensure samples that the volunteer monitors collect are truly representative of actual lake and tributary conditions.

Overall, your monitoring group did an ***excellent*** job collecting samples on the annual biologist visit this year! Specifically, the members of your monitoring group followed the proper field sampling procedures and there was no need for the biologist to provide additional training. Keep up the good work!

Sample Receipt Checklist:

Each time your monitoring group dropped off samples at the laboratory this summer, the laboratory staff completed a sample receipt checklist to assess and document if your group followed proper sampling techniques when collecting the samples. The purpose of the sample receipt checklist is to minimize, and hopefully eliminate, improper sampling techniques.

Overall, the sample receipt checklist showed that your monitoring group did a ***very good*** job when collecting samples this year! Specifically, the members of your monitoring group followed the majority of the proper field sampling procedures when collecting and submitting samples to the laboratory. However, the laboratory did identify a few aspects of sample collection that your group could improve upon, as follows:

- **Tributary sampling:** Please do not sample tributaries that are not flowing. Due to the lack of flushing, stagnant water typically contains ***elevated*** amounts of chemical and biological constituents that will lead to results that are not representative of the quality of water that typically flows into the lake.

- **Tributary sampling:** Sediment and or organic debris were observed in the white sample bottle for **Anderson Pond Outlet** on the **September** sampling event. Please do not sample tributaries that are too shallow to collect a "clean" sample free from organic debris and sediment and do not sample the stream if the stream bottom has been disturbed. You may need to move upstream or downstream to collect a "clean" sample. If you disturb the stream bottom while sampling, please rinse out the bottle and move to an upstream location and sample in an undisturbed area.

USEFUL RESOURCES

Best Management Practices to Control Nonpoint Source Pollution: A Guide for Citizens and Town Officials, DES Booklet WD-03-42, (603) 271-2975 or www.des.nh.gov/organization/commissioner/pip/publications/wd/documents/wd-03-42.pdf.

Cyanobacteria in New Hampshire Waters Potential Dangers of Blue-Green Algae Blooms, DES fact sheet WMB-10, (603) 271-2975 or www.des.nh.gov/organization/commissioner/pip/factsheets/wmb/documents/wmb-10.pdf.

Erosion Control for Construction in the Protected Shoreland Buffer Zone, DES fact sheet WD-SP-1, (603) 271-2975 or www.des.nh.gov/organization/commissioner/pip/factsheets/sp/

documents/sp-1.pdf.

Impacts of Development Upon Stormwater Runoff, DES fact sheet WD-WQE-7, (603) 271-2975 or www.des.nh.gov/organization/commissioner/pip/factsheets/aot/documents/wqe-7.pdf.

Lake Protection Tips: Some Do's and Don'ts for Maintaining Healthy Lakes, DES fact sheet WD-BB-9, (603) 271-2975 or www.des.nh.gov/organization/commissioner/pip/factsheets/bb/documents/bb-9.pdf.

Proper Lawn Care In the Protected Shoreland, The Comprehensive Shoreland Protection Act, DES fact sheet WD-SP-2, (603) 271-2975 or www.des.nh.gov/organization/commissioner/pip/factsheets/sp/documents/sp-2.pdf.

Road Salt and Water Quality, DES fact sheet WD-WMB-4, (603) 271-2975 or www.des.nh.gov/organization/commissioner/pip/factsheets/wmb/documents/wmb-4.pdf.

Shorelands Under the Jurisdiction of the Comprehensive Shoreland Protection Act, DES fact sheet SP-4, (603) 271-2975 or www.des.nh.gov/organization/commissioner/pip/factsheets/sp/documents/sp-4.pdf.

Soil Erosion and Sediment Control on Construction Sites, DES fact sheet WQE-6, (603) 271-2975 or www.des.nh.gov/organization/commissioner/pip/factsheets/aot/documents/wqe-6.pdf.

Watershed Districts and Ordinances, DES fact sheet WD-WMB-16, (603) 271-2975 or www.des.nh.gov/organization/commissioner/pip/factsheets/wmb/documents/wmb-16.pdf.