# OBSERVATIONS & RECOMMENDATIONS

After reviewing data collected from **LAKE WAUKEWAN, MEREDITH,** the program coordinators have made the following observations and recommendations.

Thank you for your continued hard work sampling the lake this year! As you know, conducting multiple sampling events each year enables DES to more accurately detect water quality changes. Keep up the good work!

A refresher Weed Watcher training was conducted at **LAKE WAUKEWAN** during **2006.** Volunteers were trained to survey the lake once a month from **June** through **September**. To survey, volunteers slowly boat, or even snorkel, around the perimeter of the lake and any islands it may contain. Using the materials provided in the Weed Watchers kit, volunteers look for any species that are of suspicion. After a trip or two around the lake, 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 will 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 of to control the nuisance infestation. Remember that early detection is the key to controlling the spread of exotic plants.

### FIGURE INTERPRETATION

- **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 lake has been monitored through VLAP.

  Chlorophyll-a, a pigment found in plants, is an indicator of the algal abundance. Because algae are usually microscopic plants that contain chlorophyll-a, and are naturally found in lake ecosystems, the chlorophyll-a concentration measured in the water gives 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$^3$.**

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

The historical data (the bottom graph) show that the **2006** chlorophyll-a mean is ***less than*** the state median and is ***greater than*** the similar lake median. For more information on the similar lake median, refer to Appendix F.

Overall, visual inspection of the historical data trend line (the bottom graph) shows a ***variable*** in-lake chlorophyll-a trend since monitoring began. Specifically, the mean chlorophyll concentration has ***fluctuated between approximately 1.45 and 3.79 mg/m$^3$*** since **1991**.

**Winona Station Deep Spot**
The current year data (the top graph) show that the chlorophyll-a concentration ***decreased*** from **July to August**, and then ***decreased slightly*** from **August** to **September.**

The historical data (the bottom graph) show that the **2006** chlorophyll-a mean is ***less than*** state median and is ***approximately equal to*** the similar lake median. For more information on the similar lake median, refer to Appendix F.

Overall, visual inspection of the historical data trend line (the bottom graph) shows a ***variable*** in-lake chlorophyll-a trend. Specifically, the mean chlorophyll concentration has ***fluctuated between approximately 1.43 and 3.74 mg/m$^3$*** since **2006**.

In the **2007** biennial annual report, since the lake will have been sampled for at least **ten** consecutive years for chlorophyll, we will conduct a statistical analysis of the historical data to objectively determine if there has been a significant change in the annual mean chlorophyll-a concentration since monitoring began. Please refer to Appendix E for a detailed statistical analysis explanation.

While algae are naturally present in all lakes, an excessive or increasing amount of any type is not welcomed. In freshwater lakes, 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.

- **Figures 2a and 2b and Tables 3a and 3b:** Figure 2a in Appendix A shows the historical and current year data for transparency without the use of a viewscope and Figure 2b shows the current year data for transparency with 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 lake 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.**

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

  The historical data (the bottom graph) show that the **2006** mean non-viewscope transparency is ***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.

  The viewscope in-lake transparency was ***greater than*** the non-viewscope transparency on the **August and September** sampling events. The transparency was ***not*** measured with the viewscope on the **July** sampling event. As discussed previously, a comparison of 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 has not been historically measured by DES with a viewscope. 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, visual inspection of the historical data trend line (the bottom graph) shows a ***variable*** trend for in-lake non-viewscope transparency. Specifically, the transparency has ***fluctuated between approximately 5.03 and 7.53 meters*** since monitoring began in **1991**.

**Winona Station Deep Spot**
The current year data (the top graph) show that the non-viewscope in-lake transparency ***increased steadily*** from **July** to **September.**

It is important to note that as the chlorophyll concentration ***decreased*** at the deep spot as the summer progressed, the transparency ***increased***. We typically expect this ***inverse*** relationship in lakes. As the amount of algal cells in the water ***decreases,*** the depth to which one can see into the water column typically ***increases***.

The historical data (the bottom graph) show that the **2006** mean non-viewscope transparency is ***greater 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 viewscope in-lake transparency was ***greater than*** the non-viewscope transparency on the **August and September** sampling events. The transparency was ***not*** measured with the viewscope on the **July** sampling event.

Overall, visual inspection of the historical data trend line (the bottom graph) shows a ***variable*** trend for in-lake non-viewscope transparency. Specifically, the transparency has ***fluctuated between approximately 5.10 and 7.33 meters*** since monitoring began in **1991**.

In the **2007** biennial annual report, since your lake will have been sampled for at least **ten** consecutive years for transparency, we will conduct a statistical analysis of the historical data to objectively determine if there has been a significant change in the annual mean chlorophyll-a concentration since monitoring began. Please refer to Appendix E for a detailed statistical analysis explanation.

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, lake shorelines, disturbed soils within the watershed, and especially dirt roads located immediately adjacent to the edge of tributaries and the lake. Guides to best management practices that can be implemented to reduce, and possibly even eliminate, nonpoint source pollutants, are available from DES upon request.

- **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 lake has been sampled through VLAP.

  Phosphorus is typically the limiting nutrient for plant and algae growth in New Hampshire's lakes and ponds. Excessive phosphorus in a lake 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.**

  **Mayo Station Deep Spot**
  The current year data for the epilimnion (the top inset graph) show that the phosphorus concentration ***decreased*** from **July** to **August**, and then ***remained stable*** from **August** to **September.**

  The historical data show that the **2006** mean epilimnetic phosphorus concentration is ***less than*** the state median and is ***approximately equal to*** 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 gradually*** from **July** to **September.**

  The historical data show that the **2006** mean hypolimnetic phosphorus concentration is ***less 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, visual inspection of the historical data trend line for the epilimnion shows a ***stabilizing*** phosphorus trend that is ***approximately equal to*** the similar lake median.

  Overall, visual inspection of the historical data trend line for the hypolimnion shows a ***variable*** phosphorus trend since monitoring began. Specifically, the mean annual concentration has ***fluctuated between approximately 7.3 and 17.7 ug/L*** since monitoring began in **1991**.

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

The historical data show that the **2006** mean epilimnetic phosphorus concentration is ***less than*** the state median and is ***approximately equal to*** 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*** from **July** to **August**, and then ***increased greatly*** from **August** to **September.**

The turbidity of the hypolimnion (lower layer) sample was ***elevated*** on each sampling event **(ranging from 1.21 to 4.08 NTUs).** In addition, the hypolimnetic turbidity has been ***at least slightly elevated*** on many sampling events during previous years. This suggests that the lake bottom is covered by a thick organic layer of sediment which is easily disturbed. When the lake bottom is disturbed, sediment, which typically contains attached phosphorus, 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 **2006** mean hypolimnetic phosphorus concentration is ***greater than*** the state median and the similar lake median. Please refer to Appendix F for more information about the similar lake median.

Overall, visual inspection of the historical data trend line for the epilimnion shows a ***stabilizing*** phosphorus trend that is ***approximately equal to*** the similar lake median.

Visual inspection of the historical data trend line for the hypolimnion shows a ***variable, but overall increasing, meaning worsening,*** phosphorus trend since monitoring began in **1991**.

As discussed previously, in the **2007** biennial annual report, since your lake will have been sampled for phosphorus for at least **ten** consecutive years, we will conduct a statistical analysis of the historical data to objectively determine if there has been a significant change in the annual mean phosphorus concentration since monitoring began.

One of the most important approaches to reducing phosphorus loading to a waterbody is to continually educate watershed residents about the sources of phosphorus in a watershed 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 species observed in the lake. Specifically, this table lists the three most dominant phytoplankton species observed in the sample and their relative abundance in the sample.

  The dominant phytoplankton species observed in the **July** sample at both deep spots were ***Rhizosolenia*** **(diatom),** ***Asterionella*** **(diatom),** and ***Dinobryon*** **(golden-brown).**

  Phytoplankton populations undergo a natural succession during the growing year. Please refer to the "Biological Monitoring Parameters" section of this report for a more detailed explanation regarding yearly plankton succession. Diatoms and golden-brown algae 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 **July** plankton sample collected at both deep spots. ***This species, 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 lake's delicate balance. Watershed residents should continue to act proactively to reduce nutrient loading to the lake by eliminating fertilizer use on lawns, keeping the lake shoreline natural, re-vegetating cleared areas within the watershed, and properly maintaining septic systems and roads.

In addition, residents should also observe the lake 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 and bloom. Wind and currents tend to “pile” cyanobacteria into scums that accumulate in one section of the lake. 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 surface waters in the state 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 **6.11** in the hypolimnion to **6.77** in the epilimnion at the **Mayo Station** deep spot, and from **6.29** in the hypolimnion to **6.89** in the epilimnion at the **Winona Station** deep spot, which means that the water is ***slightly acidic.***

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

  Due to the presence of granite bedrock in the state and acid deposition received from snowmelt, rainfall, and atmospheric particulates, there is not much that can be feasibly done to effectively increase lake pH.

- **Table 5: Acid Neutralizing Capacity**
  Table 5 in Appendix B presents the current year and historical epilimnetic ANC for each year the lake 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 **4.9 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 **6.2 mg/L** at the **Mayo Station** deep spot, and **6.9 mg/L** at the **Winona Station** deep spot, both of which are ***greater than*** the state median. In addition, this indicates that the lake 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 **40.0 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 **Mayo Station** deep spot was **96.90 uMhos/cm**, and at the **Winona Station** deep spot was **97.34 uMhos/cm,** both of which are ***greater than*** the state median.

  The **2006** conductivity results for the deep spot and tributaries were ***lower than*** has been measured **during the past several years**. It is likely that the high water levels during **2006** diluted the ion concentration in surface waters throughout the watershed. Specifically, the unusually large amount of watershed runoff from the significant late spring rain events likely exceeded the amount of groundwater contribution to the tributaries and lake. In addition, any winter contribution of chloride to surface waters from road salt was likely flushed out of the tributaries and the lake before the lake stratified during the summer.

Overall, the conductivity has ***increased*** in the lake and tributaries since monitoring began. Typically, increasing 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 a shoreline conductivity survey of the lake and the tributaries with ***elevated*** conductivity to help identify the sources of conductivity.

*To learn how to conduct a shoreline or tributary conductivity survey, please refer to the 2004 special topic article, which is posted on the VLAP website at http://www.des.nh.gov/wmb/vlap/2004/documents/Appendix_D.pdf or contact the VLAP Coordinator.*

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

Therefore, we recommend that the **epilimnion at both deep spots** and the **tributaries** be sampled for chloride next year. This additional sampling may help us identify what areas of the watershed are contributing to the increasing in-lake conductivity.

*Please note that there will be an additional cost for each of the chloride samples and that these samples must be analyzed at the DES laboratory in Concord. In addition, it is best to conduct chloride sampling in the spring as the snow is melting and during rain events.*

- **Table 7a and Table 7b: Total Kjeldahl Nitrogen and Nitrite+Nitrate Nitrogen**
  Table 7a in Appendix B presents the current year and historical Total Kjeldahl Nitrogen and Table 7b presents the current year and historical nitrite and nitrate nitrogen. Nitrogen is another nutrient that is essential for the growth of plants and algae. Nitrogen is typically the limiting nutrient in estuaries and coastal ecosystems. However, in freshwater, nitrogen is not typically the limiting nutrient. Therefore, nitrogen is not typically sampled through VLAP. However, if phosphorus concentrations in freshwater are elevated, then nitrogen loading may stimulate additional plant and algal

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

During the most recent DES Lake Assessment Program survey, which was conducted during Summer **1994**, the ratio of the total nitrogen concentration to total phosphorus (TN:TP) concentration in the epilimnion sample at the **Mayo Station** deep spot was **approximately 14**, and in the epilimnion sample at the **Winona Station** deep spot was **approximately 19.**

A ratio ***greater than 15*** indicates that the waterbody is **phosphorus-limited**, meaning that any additional **phosphorus** loading to the lake will stimulate additional plant and algal growth.

A ratio ***less 15*** indicates that the waterbody is **nitrogen-limited** meaning that any additional **phosphorus** loading to the lake will stimulate additional plant and algal growth.

Therefore, we recommend that the lake and its tributaries be sampled for phosphorus and nitrogen on a routine basis.

*For more information regarding nitrogen sampling, contact the VLAP Coordinator.*

- **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 phosphorus concentration in the **inlets** was ***relatively low*** this season, which is good news. However, we recommend that your monitoring group sample the major tributaries to the lake ***upstream of where the tributary flows into the lake*** during snow-melt and periodically during rain storms to determine if the phosphorus concentration is ***elevated*** in the tributaries during these times. Typically, the majority of nutrient loading to a lake occurs in the spring during snowmelt and during intense rain storms that cause surface runoff and erosion within the watershed.
watershed.

*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/wmb/vlap/2002/documents/Appndxd_monitoring.pdf, 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 **2006**. Table 10 in Appendix B shows the historical and current year dissolved oxygen concentration in the hypolimnion (lower layer). The presence of dissolved oxygen is vital to fish and amphibians in the water column and also to bottom-dwelling organisms. Please refer to the "Chemical Monitoring Parameters" section of this report for a more detailed explanation.

  The dissolved oxygen concentration was ***much lower in the hypolimnion (lower layer) than in the epilimnion (upper layer)*** at the **Mayo Station** deep spot on the **July** sampling event. As stratified lakes age, and as the summer progresses, oxygen typically becomes ***depleted*** in the hypolimnion by the process of 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 lake where the water meets the sediment. When hypolimnetic oxygen concentration is depleted to less than 1 mg/L, **as it was on the annual biologist visit this year and on many previous annual visits,** 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***.

  Since an internal source of phosphorus in the lake may be present, it is even more important that watershed residents act proactively to minimize phosphorus loading from the watershed.

  *Due to an equipment malfunction, a dissolved oxygen and temperature profile was not collected at the Winona Station deep spot on the July sampling event.*

- **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 turbidity in the **Winona Station** deep spot sample was ***elevated*** on each sampling event this year. In addition, the hypolimnetic turbidity has been ***at least slightly elevated*** on many sampling events during previous years. This suggests that the lake bottom is covered by a thick organic layer of sediment which is easily disturbed. When the lake bottom is disturbed, sediment, which typically contains attached phosphorus, 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 tributary turbidity was ***relatively low*** this year, which is good news.

However, we recommend that your group sample the tributaries ***in an upstream location before they flow into the lake*** and any surface water runoff areas during significant rain events to determine if stormwater runoff contributes turbidity and phosphorus to the lake.

*For a detailed explanation on how to conduct rain event sampling, please refer to the 2002 VLAP Annual Report special topic article, which is posted on the VLAP website at http://www.des.nh.gov/wmb/vlap/2002/documents/Appndxd_monitoring.pdf, or contact the VLAP Coordinator.*

- **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.

  Bacteria sampling was **not** conducted during 2006. 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. 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.

Chloride sampling was **not** conducted during **2006.**

- **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 lake, the biologist conducted a sampling procedures assessment audit for your monitoring group. Specifically, the biologist observed the performance of your monitoring group while sampling and filled-out an assessment audit sheet to document the ability of the volunteer monitors 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 that the 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!

***And, thank you for sampling with the biologist in the rain!***

**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, future re-occurrences of improper sampling techniques.

Overall, the sample receipt checklist showed that your monitoring group did an ***excellent*** job when collecting samples and submitting them to the laboratory this year! Specifically, the members of your monitoring group followed the proper field sampling procedures and there was no need for the laboratory staff to contact your group with questions, and no samples were rejected for analysis.

## USEFUL RESOURCES

*Acid Deposition Impacting New Hampshire's Ecosystems,* DES fact sheet ARD-32, (603) 271-2975 or www.des.nh.gov/factsheets/ard/ard-32.htm.

*Best Management Practices to Control Nonpoint Source Pollution: A Guide for Citizens and Town Officials*, DES Booklet WD-03-42, (603) 271-2975.

*Best Management Practices for Well Drilling Operations,* DES fact sheet WD-WSEB-21-4, (603) 271-2975 or www.des.nh.gov/factsheets/ws/ws-21-4.htm.

*Biodegradable Soaps and Water Quality,* DES fact sheet BB-54, (603) 271-2975 or www.des.nh.gov/factsheets/bb/bb-54.htm.

*Canada Geese Facts and Management Options,* DES fact sheet BB-53, (603) 271-2975 or www.des.nh.gov/factsheets/bb/bb-53.htm.

*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/factsheets/wmb/wmb-10.htm.

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

*Freshwater Jellyfish In New Hampshire,* DES fact sheet WD-BB-5, (603) 271-2975 or www.des.nh.gov/factsheets/bb/bb-51/htm.

*Impacts of Development Upon Stormwater Runoff,* DES fact sheet WD-WQE-7, (603) 271-2975 or www.des.nh.gov/factsheets/wqe/wqe-7.htm.

*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/factsheets/bb/bb-9.htm.

*Low Impact Development Hydrologic Analysis.* Manual prepared by Prince George's County, Maryland, Department of Environmental Resources. July 1999. To access this document, visit www.epa.gov/owow/nps/lid_hydr.pdf or call the EPA Water Resource Center at (202) 566-1736.

*Low Impact Development: Taking Steps to Protect New Hampshire's Surface Waters,* DES fact sheet WD-WMB-16, (603) 271-2975 or www.des.nh.gov/factsheets/wmb/wmb-17.htm.

*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/factsheets/sp/sp-2.htm.

*Road Salt and Water Quality,* DES fact sheet WD-WMB-4, (603) 271-2975 or www.des.nh.gov/factsheets/wmb/wmb-4.htm.

*Sand Dumping - Beach Construction*, DES fact sheet WD-BB-15, (603) 271-2975 or www.des.nh.gov/factsheets/bb/bb-15.htm.

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

*Soil Erosion and Sediment Control on Construction Sites,* DES fact sheet WQE-6, (603) 271-2975 or www.des.nh.gov/factsheets/wqe/wqe-6.htm.

*Weed Watchers: An Association to Halt the Spread of Exotic Aquatic Plants*, DES fact sheet WD-BB-4, (603) 271-2975 or www.des.nh.gov/factsheets/bb/bb-4.htm.

*Watershed Districts and Ordinances,* DES fact sheet WD-WMB-16, (603) 271-2975 or www.des.nh.gov/factsheets/wmb/wmb-16.htm.