OBSERVATIONS & RECOMMENDATIONS

After reviewing data collected from **Pawtuckaway Lake, Nottingham,** the program coordinators have made the following observations and recommendations.

Thank you for your continued hard work sampling the lake this year! Your monitoring group sampled the deep spots **five** times this year and has done so for many years! As you know, conducting multiple sampling events each year enables DES to more accurately detect water quality changes. Keep up the good work!

Clean Lakes Program Update

As a result of phosphorus loading from tributaries and direct runoff, algal blooms and more specifically Cyanobacteria blooms have become increasingly more frequent in recent years. Cyanobacteria blooms have lead to Pawtuckaway Lake as being impaired and not meeting state water quality standards.

To reduce algal blooms and eliminate Cyanobacteria blooms, phosphorus loading as a result of watershed runoff must be prioritized and addressed. In 2006, the Town of Nottingham, with support of the Pawtuckaway Advisory Committee and Pawtuckaway Lake Improvement Association received a DES local watershed initiative grant to assist with this process. Pollutant load allocation will occur through the development of a watershed based plan. In addition, several shoreline properties will be selected for landscape best management practice (BMP) design and implementation targeted at reducing stormwater runoff rates and volumes through storage and infiltration. GeoSyntec, Inc. was selected by DES to assist with development of the watershed based plan and BMP design. The Town of Nottingham has offered time and materials assistance to construct the BMPs.

Landscape BMPs will likely include native vegetation buffer plantings, stream bank stabilization, vegetated swales along lake roads, and stormwater detention/infiltration areas within the watershed. BMP installation along the shoreline will likely reduce the sediment load and phosphorus runoff to the lake.

In addition to the watershed based plan and BMP design and implementation the Town will lead an education campaign targeting landowners within the watershed about their individual impact on the watershed, stormwater runoff and the lake. Education will be accomplished through development and distribution of a Waterfront and Watershed property owner's brochure.

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. Algae are typically microscopic plants that are naturally occurring in lake ecosystems and contain chlorophyll-a. 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.**

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

  The historical data (the bottom graph) show that the **2007** chlorophyll-a mean is ***greater than*** the state median and is ***much greater than*** the similar lake median. 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 increased*** (meaning ***worsened***) on average by ***approximately 0.164 percent*** per year during the sampling period **1988** to **2007.** Please refer to Appendix E for the statistical analysis explanation and data print-out.

  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 non-point 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.

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

The historical data (the bottom graph) show that the **2007** chlorophyll-a mean is ***much 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 (the bottom graph) shows that the mean annual chlorophyll-a concentration has ***not significantly changed*** since monitoring began. Specifically, the mean annual chlorophyll-a concentration has ***fluctuated between approximately 3.01 and 10.63 mg/m³,*** but has ***not continually increased or decreased*** since **1992**. Please refer to Appendix E for a detailed statistical analysis explanation and data print-out.

- **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 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.**

NORTH STATION
The current year data (the top graph) show that the non-viewscope in-lake transparency ***decreased*** from **May** to **June**, ***remained stable*** from **June** through **August**, and ***increased*** from **August** to **September**.

The historical data (the bottom graph) show that the **2007** mean non-viewscope transparency is ***slightly less than*** the state median and is ***much less 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 was ***greater than*** the non-viewscope transparency on the **September** sampling event. The transparency was ***not*** measured with the viewscope on the **May** through **August** sampling events. 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 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 shows that the non-viewscope transparency has ***significantly decreased*** (meaning ***worsened***) on average by ***approximately 0.027 percent*** per year during the sampling period **1988** to **2007**. Please refer to Appendix E for the statistical analysis explanation and data print-out.

SOUTH STATION

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

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

The historical data (the bottom graph) show that the **2007** mean non-viewscope transparency is ***slightly less than*** the state median and is ***much 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 (the bottom graph) shows that the mean annual in-lake non-viewscope transparency has ***not significantly changed*** (either *increased* or *decreased*) since monitoring began. Specifically, the in-lake transparency has remained ***relatively stable, ranging between***

approximately 2.72 and 4.14 meters since **1992**. Please refer to Appendix E for the statistical analysis explanation and data print-out.

- **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 vascular plant and algae growth in New Hampshire's lakes and ponds. Excessive phosphorus in a lake/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.**

  NORTH STATION
  The current year data for the epilimnion (the top inset graph) show that the phosphorus concentration ***increased greatly*** from **May** to **June**, ***decreased greatly*** from **June** through **August**, and then ***remained stable*** from **August** to **September**.

  The historical data show that the **2007** mean epilimnetic phosphorus concentration is ***much greater than*** the state median and 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 ***increased continually*** from **May** through **September**.

  The historical data show that the **2007** mean hypolimnetic phosphorus concentration is ***much greater than*** the state median and is ***much greater 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) at the North Station has ***significantly increased*** (meaning ***worsened***) on average by ***approximately 2.395 percent*** per year during the sampling period **1988** to **2007**. 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

significantly increased (meaning ***worsened***) on average at a rate of approximately **5.416 percent** per year during the sampling period **1988** to **2007**. Please refer to Appendix E for the statistical analysis explanation and data print-out.

SOUTH STATION
The current year data for the epilimnion (the top inset graph) show that the phosphorus concentration ***decreased*** from **May** to **June**, ***remained stable*** from **June** through **August**, and then ***increased*** from **August** to **September**.

The historical data show that the **2007** mean epilimnetic phosphorus concentration is ***approximately equal to*** the state median and ***slightly greater than*** 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 ***remained stable*** from **May** through **July, *increased*** from **July** to **August**, and then ***decreased slightly*** from **August** to **September**.

The historical data show that the **2007** mean hypolimnetic phosphorus concentration is ***much greater than*** the state median and 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) and the hypolimnion (lower layer) has ***not significantly changed*** since monitoring began. Specifically, the epilimnetic phosphorus concentration has ***fluctuated between approximately 7.6 and 28.8 ug/L,*** and the hypolimnetic phosphorus concentration has ***fluctuated between approximately 10.8 and 60.6 ug/L*** since **1992**. 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 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.

NORTH STATION
The dominant phytoplankton species observed in the **May** sample were ***Asterionella*** **(Diatoms),** ***Tabellaria*** **(Diatoms),** and ***Anabaena*** **(Cyanobacteria).**

The dominant phytoplankton species observed in the **June** sample were ***Mallomonas*** **(Golden-Browns),** ***Asterionella*** **(Diatoms),** and ***Uroglenopsis*** **(Golden-Browns)**.

The dominant phytoplankton species observed in the **July** sample were ***Chrysosphaerella*** **(Golden-Browns),** ***Asterionella*** **(Diatoms),** and ***Ceratium*** **(Dinoflagellates)**.

The dominant phytoplankton species observed in the **August** sample were ***Tabellaria*** **(Diatoms),** ***Peridinium*** **(Dinoflagellates),** and ***Synedra*** **(Diatoms)**.

The dominant phytoplankton species observed in the **September** sample were ***Tabellaria*** **(Diatoms),** ***Dinobryon*** **(Golden-Browns),** and ***Rhizosolenia*** **(Diatoms)**.

SOUTH STATION
The dominant phytoplankton species observed in the **May** sample were ***Asterionella*** **(Diatoms),** ***Tabellaria*** **(Diatoms),** and ***Mallomonas*** **(Golden-Browns)**.

The dominant phytoplankton species observed in the **June** sample were ***Mallomonas*** **(Golden-Browns),** ***Uroglenopsis*** **(Golden-Browns),** ***Asterionella*** **(Diatoms),** and ***Sphaerocystis*** **(Greens)**.

The dominant phytoplankton species observed in the **July** sample were ***Chrysosphaerella*** **(Golden-Browns),** ***Asterionella*** **(Diatoms),** and ***Ceratium*** **(Dinoflagellates)**.

The dominant phytoplankton species observed in the **August** sample were ***Peridinium*** **(Dinoflagellates),** ***Chrysosphaerolla*** **(Golden-Browns)** and ***Dinobryon*** **(Golden-Browns)**.

The dominant phytoplankton species observed in the **September** sample were ***Tabellaria*** **(Diatoms),** ***Rhizosolenia*** **(Diatoms),** and ***Mallomonas*** **(Golden-Browns)**.

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 throughout the summer. ***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 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 North Station deep spot this year ranged from **5.88** in the hypolimnion to **6.35** in the epilimnion. The mean pH at the South Station deep spot this year ranged from **5.95** in the hypolimnion to **6.53** in the epilimnion. This 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 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 state's abundance of granite bedrock in the state and acid deposition received from snowmelt, rainfall, and atmospheric particulates, there is little 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 **4.8 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 **3.5 mg/L** at the North Station and **4.3 mg/L** at the South Station, which are both ***slightly less 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 **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 North Station was **33.80 uMhos/cm**. The mean annual epilimnetic conductivity at the South Station was **33.69 uMhos/cm**. Both values are ***slightly less than*** the state median.

The **2007** conductivity results for the deep spots and tributaries were ***lower than*** has been measured **during the past few years**. It is likely that the lack of rainfall during the **2007** season reduced watershed runoff to the lake. Typically, rain events and snowmelt cause potentially pollutant laden watershed runoff to reach tributaries and ultimately the lake leading to elevated conductivity levels.

The in-lake conductivity has ***decreased*** (meaning ***improved***) in the lake since monitoring began. Increases in conductivity typically indicate the influence of human activities on surface water quality. Septic system leachate, agricultural runoff, iron deposits, and road runoff which typically contains road salt during the spring snow melt, can each influence conductivity readings. This ***decreasing*** conductivity trend suggests the reduction of pollutants and erosion in the watershed. We hope that this improving trend continues!

- **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 mean total phosphorus concentration was ***elevated*** (**442.5ug/L and 1900 ug/L**) in **Fernalds A** and **Fernalds Upstream** this year. These stations have a history of ***elevated*** and ***fluctuating*** phosphorus concentrations. We recommend that your monitoring group conduct a stream survey and rain event sampling along this tributary so that we can determine what may be causing the elevated concentrations.

  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 **2007**. 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.

During this year, and many past sampling years, the lake has experienced a lower dissolved oxygen concentration and a higher total phosphorus concentration in the hypolimnion (lower layer) than in the epilimnion (upper layer). These data suggest that the process of ***internal phosphorus loading*** is occurring in the lake. When the hypolimnetic dissolved 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 with metals in the sediment may be re-released into the water column. 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.

Low hypolimnetic oxygen levels are a sign of the lake's ***aging*** and ***declining*** health. This year the DES biologist conducted the dissolved oxygen profile in **August**. We recommend that the annual biologist visit for the **2008** sampling year be scheduled during **June** so that we can determine if oxygen is depleted in the hypolimnion ***earlier*** 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.

Most of the tributary and deep spot turbidity was ***relatively low*** this year, which is good news.

However, we recommend that your group sample the pond and any surface water runoff areas during significant rain events to determine if stormwater runoff contributes turbidity and phosphorus to the pond.

The turbidity in the **Fernalds Upstream** sample was ***moderately elevated*** (**10.49 NTUs**) on the **July** and **August** sampling events, which suggests that the stream bottom may have been disturbed while sampling or that erosion is occurring in this area of the watershed. When the stream bottom is disturbed, sediment, which typically contains attached phosphorus, is released into the water column. When collecting samples in the tributaries, 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.

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.

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 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 this year. 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 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 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:

- **Sample "cooling":** Please remember to bring a cooler with ice when you sample. Samples should be put directly into the cooler and kept on ice until they are dropped off at the laboratory. This will ensure that samples do not degrade before they are analyzed. If you plan to sample on the weekend, please sample on Sunday, preferably in the afternoon, and return samples to the laboratory first thing on Monday morning to ensure that samples can be analyzed within 24 hours. **And, please remember that *E.coli* samples that are more than 24 hours old will not be accepted by the laboratory for analysis.**

- **Sample bottle volume:** Please fill each sample bottle up to the neck of the bottle where the bottle curves in. This will ensure that the laboratory staff will have enough sample water to conduct all of the necessary tests.

  Please be careful to not overflow the small brown bottle used for phosphorus sampling since this bottle contains acid. If you do accidentally overflow the small brown bottle, please rinse your hands and the outside of the sample bottle and make a note of this on your field sampling sheet. The laboratory staff will put additional acid in the bottle in the laboratory to preserve the sample.

- **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.

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.

IPM: An Alternative to Pesticides, DES fact sheet WD-SP-3, (603) 271-2975 or www.des.nh.gov/factsheets/sp/sp-3.htm.

Iron Bacteria in Surface Water, DES fact sheet WD-BB-18, (603) 271-2975 or www.des.nh.gov/factsheets/bb/bb-18.htm.

Lake Foam, DES fact sheet WD-BB-4, (603) 271-2975 or www.des.nh.gov/factsheets/bb/bb-5.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.

Swimmers Itch, DES fact sheet WD-BB-2, (603) 271-2975 or www.des.nh.gov/factsheets/bb/bb-2.htm.

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