

NHDES WATERSHED BUREAU

QUALITY ASSURANCE, QUALITY CONTROL, AND WORKLOAD REPORT

2014

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EXECUTIVE SUMMARY

In 2014, the NHDES Watershed Management Bureau operated 16 individual programs to monitor, protect, and restore the state's surface waters including its lakes and ponds, rivers and streams, coast, wetlands, and public bathing facilities. The diverse nature of these programs is exemplified by their activities that range from water quality monitoring, exotic species management, and regular sampling of beaches to funding vessel waste disposal facilities, support of nonpoint source pollution control activities, and inspection of pools and spas. In all cases, these programs are designed to promote the health one of New Hampshire's most valuable natural resources: water.

A key element to the success of each of these programs is the availability of a modern laboratory. The Jody Connor Limnology Center (JCLC) serves as the primary hub of activity in preparation for field surveys, water sampling processing and tracking. In 2014, the JCLC processed nearly 10,000 water quality samples and 400 identifications of biological organisms. The laboratory's capabilities range from simple tests of pH in water to the determination of mercury content in fish tissue. In addition, Colby Sawyer College maintains a satellite laboratory that provides a water analyses in cases where samples cannot be transported to Concord. Collectively, these laboratories are critical to the support of two valuable volunteer surface water quality monitoring programs that successfully monitored over 170 lakes and ponds and 2,900 river miles in 2014.

In 2014, over 100,000 data records were collected from the state's surface waters by the Watershed Management Bureau. With such a high volume of data, maintaining and managing data quality is critical. Data quality is ensured through program specific Quality Assurance Project Plans (QAPP) or detailed standard operating procedure (SOPs). In both cases, these documents spell out specific procedures to confirm the acceptance of only high quality data.

Data meeting the quality assurance standards are stored in NHDES' environmental monitoring database (EMD). To date, the EMD houses millions of unique data points from over 27,000 monitoring stations and 668 individual projects. Data generated by the Watershed Management Bureau are entered through automated lab imports, batch uploads and manual entry. Applicable data are flowed directly to EPA's STORET/WQX using a node-to-node transfer. The EMD serves as a vital component in meeting the bureau's data management needs and responsibilities. In 2014, the overall department generated 17,630 sampling activities in the EMD.

The following report describes the various program activities within the Watershed Management Bureau that collected data or utilized the facilities of the JCLC in 2014. The report is organized into two primary sections; the first section provides individual program summaries in a standardized template for quick reference; the second section includes a more detailed account of the specific accomplishments of each program and, where applicable, data quality assessments.

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I. WATERSHED AMBIENT MONITORING PROGRAM SUMMARIES

1.1 Jody Connor Limnology Center (JCLC)

Purpose: Provide support to the Watershed Management Bureau's (WMB) statewide surface water monitoring activities through the completion of benchtop chemical and biological analysis. The lab serves as a preparatory space for field meter calibration, sample bottle organization and field sample login for all WMB field activities. The JCLC also is the primary hub for processing samples submitted by the Volunteer Lake Assessment Program (VLAP) and Volunteer River Assessment Program (VRAP).

Data usage: Data processed through the JCLC is used to complete surface water quality assessments, for issuance of public health advisories, completion of waterbody-specific reports, compliance with regulatory activities and general investigations of surface water quality.

Monitoring approach: The JCLC provides equipment, analytical services and sampling services to support probability based, targeted and trend monitoring activities.

Parameters measured: The JCLC and the Colby Sawyer College satellite laboratory provide analysis for approximately 25 chemical and physical parameters as well as more than a half dozen biological parameters.

Method of data collection: Discrete samples are analyzed by the JCLC.

Number of records generated: In 2014 the JCLC and the Colby Sawyer College satellite laboratory created 11,792 chemical or physical data records. The JCLC analyzed 386 biological samples and made 443 species specific identifications.

Quality Assurance Measures: The JCLC and its satellite laboratory each maintain a laboratory manual detailing quality assurance measures and procedures for each specific analysis. In-lab quality assurance measures include blanks, duplicate analyses, continuing calibration verification (CCV) samples and spikes where appropriate. All quality assurance measures are documented by parameter in individual bench logs as well as the JCLC database; last year 1,396 quality assurance measures were performed.

Planned activities for 2015: The JCLC is implementing a new automated alkalinity titrator which will save countless man hours on a time consuming test as well as automate calculations and data entry for this parameter. All monitoring programs should be in operation this summer and workload is expected to be consistent with last year.

1.2 Volunteer Lake Assessment Program (VLAP)

Purpose: VLAP was initiated in 1985 in response to an expressed desire of lake associations to be involved in lake protection and watershed management. Over 500 volunteers monitor water quality from May through September at lakes and ponds throughout the state. This data allows NHDES to analyze water quality trends, identify potential problems and fix them before they cause degradation in water quality. VLAP plays an essential role in monitoring water quality trends in New Hampshire's lakes.

Data usage: Data generated through VLAP are utilized annually to create seven regional water quality reports and approximately 180 individual lake reports. VLAP is a primary source of lake and pond data utilized to complete surface water quality assessments for the federally required section 305(b) / 303(d) water quality report. VLAP data are also utilized by NHDES to complete Total Maximum Daily Loads (TMDLs), watershed management plans, and by lake associations and organizations to apply for grant funds.

Monitoring approach: Trend Monitoring - Repetitive visits to set of established sampling locations annually or on an established schedule for the purpose of tracking water quality parameters over time.

Parameters measured: VLAP measures a total of 12 chemical and biological parameters including: pH, conductivity, turbidity, chloride, total phosphorus, alkalinity, *E. coli*, dissolved oxygen, temperature, transparency, chlorophyll-*a* and phytoplankton (including cyanobacteria).

Method of data collection: VLAP collects discrete samples at multiple in-lake and tributary stations.

Number of records generated: In 2014, VLAP, and its associated satellite laboratory Colby Sawyer College, accomplished the following:

- 423 individual sampling events conducted by volunteers and VLAP biologists.
- 175 lake deep spots and 500 river/stream stations monitored.
- 13,709 individual chemical and biological sample results generated.
- Approximately 3,500 hours collecting water quality samples.
- Approximately \$80,000 value of volunteer time collecting water quality samples.

Quality Assurance Measures: VLAP operates under an EPA approved Quality Assurance Project Plan (QAPP), dated June 26, 2014. VLAP is required to update the plan once every five years and submit to EPA for approval. VLAP is also required to complete an annual program audit detailing any deviations from the methods and data criteria stated in the QAPP and resolutions to those deviations.

1.3 Volunteer River Assessment Program (VRAP)

Purpose: The Volunteer River Assessment Program (VRAP) was initiated in 1998 to promote awareness and education of the importance of maintaining water quality in New Hampshire's rivers and streams. VRAP volunteers monitor water quality from May through October in rivers and streams throughout the state allowing NHDES to analyze water quality trends, identify potential problems and fix them before they cause degradation in water quality.

Data usage: VRAP is primarily a data procurement mechanism to determine whether rivers or streams are impaired or potentially impaired, based on legislative surface water quality standards and designated uses (e.g., swimming, fishing and aquatic life support). Data collected through VRAP are used to develop the federally required section 305(b) / 303(d) water quality report. Almost 40% percent of the surface water quality assessments of riverine assessment units included in the 2014 303(b) report was provided by VRAP. Currently this data contributed to the assessment of 2,900 miles of rivers and streams.

Monitoring approach: VRAP conducts trend monitoring via repetitive visits to established sampling locations on an established schedule. Targeted monitoring is also conducted to investigate suspected sources of pollution or to measure the water quality impacts as they relate to changes in the landscape such as development.

Parameters measured: VRAP measures field parameters including dissolved oxygen, pH, turbidity, specific conductance, water temperature and flow. Laboratory parameters include *E.coli*, nutrients, chloride, chlorophyll-*a*, metals and cations.

Method of data collection: VRAP collects discrete samples at multiple river and riverine impoundment stations.

Number of records generated: In 2014, data generated by VRAP volunteers are summarized as follows:

- 30 VRAP groups supported.
- 312 river/stream stations monitored.
- 6,480 individual chemical and biological sample results generated.
- Approximately 1,500 hours spent by individuals collecting water quality samples.
- Approximately \$30,000 value of volunteer time collecting water quality samples.

Quality Assurance Measures: VRAP operates under an EPA approved QAPP dated April 6, 2011. VRAP is required to update the plan once every five years and submit to EPA for approval. VRAP is also required to complete an annual program audit detailing any deviations from the methods and data criteria stated in the QAPP and the resolutions to those deviations.

1.4 River Trend Monitoring Program (RTMP)

Purpose: The River Trend Monitoring Program began in the early 1970's. From its initiation through 2012 it was known as the Ambient River Monitoring Program (ARMP). In 2013, NH DES updated its surface water monitoring strategy including and revised the ARMP. Since then it has been known as RTMP and includes 40 river and stream stations that are visited 3–5 times per year. The revised monitoring network includes approximately 20 new stations that span a wider range of watershed sizes and levels of development. Data collected since 1990 is maintained in NHDES' Environmental Monitoring Database (EMD). The RTMP is implemented directly by NHDES staff and measures water quality in rivers and streams throughout the state.

Data usage: RTMP is primarily a data procurement mechanism to determine whether river or stream conditions are declining, improving or remaining stable over time. The data is also used to assess if individual river segments are impaired or potentially impaired, based on legislative surface water quality standards and designated uses (e.g., swimming, fishing and aquatic life support). Data collected through RTMP are used to develop the federally required section 305(b) / 303(d) water quality report.

Monitoring approach: The RTMP conducts trend monitoring via repetitive visits to established sampling locations on an established schedule with the purpose of tracking water quality parameters over time. The RTMP also conducts confirmation monitoring to determine if waterbodies can be removed from the 303(d). Targeted monitoring of previously unsampled waterbodies may also be completed to gain additional information about the condition of New Hampshire surface water resources. Targeted sampling is done primarily through a rotating basin design whereby sampling locations are chosen from within eight 10-digit hydrologic drainage units (HUC 10) based on a predetermined schedule.

Parameters measured: The RTMP measures field parameters including dissolved oxygen, pH, turbidity, specific conductance, water temperature and flow. These parameters are collected via instantaneous measurements and deployable multi-parameter dataloggers. Laboratory parameters include *E.coli*, nutrients (nitrogen and phosphorus), chloride, chlorophyll-*a*, metals, cations and other parameters as needed.

Method of data collection: The RTMP collects discrete and continuous samples at multiple river and riverine impoundment stations. In 2014, over 2,500 individual chemical and biological sample results were generated.

Quality Assurance Measures: The RTMP operates under an EPA approved QAPP that is required to be updated every five years and submit to EPA for approval. An updated QAPP received preliminary approval from EPA in 2014 and will be finalized for the 2015 monitoring season. The RTMP is also required to complete an annual program audit detailing any deviations from the methods and data criteria stated in the QAPP and resolutions to those deviations.

1.5 Lake Trophic Survey Program (LTSP)

Purpose: The Lake Trophic Survey Program was initiated in the mid-1970s and continued through 2008 when it was discontinued. The program was reinitiated by the WMB in 2013. The purpose is to determine a trophic rating for the lake or pond as well as gather basic lake data.

Data usage: Beyond the previously mentioned trophic rating, the new monitoring approach attempts to gather enough data to determine if waterbodies meet use criteria as required by sections 305(b) / 303(d) report for the Federal Clean Water Act.

Monitoring approach: Lakes are selected from a schedule of targeted watersheds on a rotational basis (eight 10-digit hydrologic drainage units annually). The selection process is conducted by several biologists in the WMB and takes into consideration the age of available water quality data, public accessibility, and recreational use.

Parameters measured: At the deep site a dissolved oxygen/temperature profile is collected and the degree of stratification is assessed. Secchi depth is measured. A composite water sample from the epilimnion is collected and analyzed for Chlorophyll-*a*, and a plankton haul is collected to mid-metalimnion depth. A discrete sample is collected and analyzed for alkalinity, pH, conductivity, apparent color, chloride, calcium, magnesium, NO₂ and NO₃ nitrogen, TKN nitrogen, total phosphorus, sodium, sulfate and total organic carbon.

Method of data collection: The Lake Trophic Survey Program collects discrete samples.

Number of records generated: In 2014, 21 lakes were visited, a temperature/oxygen profile was collected on each one and a total of 177 chemical records were generated.

Quality Assurance Measures: The Lake Trophic Survey Program has a draft QAPP that was submitted to EPA in 2015 and is undergoing review. All analyses are performed in accordance with the JCLC laboratory manual or the Department of Health and Human Services (DHHS) water lab's NELAC certification.

1.6 Biomonitoring

Purpose: The Biomonitoring Program was established in 1995 to determine the ability of the state's surface waters to support a healthy community of aquatic organisms. Sampling is completed each in summer and fall and serves to satisfy federally water quality reporting requirements under sections 303(d) / 305(b) report for the Clean Water Act. To date, sampling by the biomonitoring program has been primarily focused in rivers and streams.

Data usage: Data produced through the biomonitoring program is used to complete water quality assessments to determine whether rivers or streams are impaired or potentially impaired, based on legislative surface water quality standards and designated uses (e.g., swimming, fishing and aquatic life support). Biological data is used in the development of water quality standards and in making regulatory decisions. The data is also used to track site specific trends in biological condition and characterize the variability associated with macroinvertebrate data.

Monitoring approach: Prior to 2013, biological monitoring was either part of a probability-based or targeted sampling design. Starting in 2013, biological monitoring was expanded to encompass approximately 27 long-term trend stations and 10-15 targeted stations as part of the River Trend Monitoring Program (RTMP). In addition, from 2014 – 2016 an additional 40 station will be sampled as part of a statewide probabilistic assessment of NH rivers and streams.

Parameters measured: Fish, macroinvertebrates, dissolved oxygen, pH, specific conductance, water temperature, flow, physical habitat characters, and various laboratory generated water chemistry parameters.

Method of data collection: Data is collected using discrete and continuous measures of water quality.

Discrete sample points

- Field chemistry measures.
- Laboratory samples.
- Invertebrate identifications.
- Fish identifications.
- Algal observations.
- Habitat measures.
- Stream gradient assessments.
- Pebble counts.

Continuous points

- Water temperature data.

Number of records generated: In 2014, 119 macroinvertebrate samples were collected and taxa identifications are pending selection of a new taxa identification contractor. In addition, 25 fish samples (3,170 discrete identifications), 2,177 habitat measures were completed in 2014.

Quality Assurance Measures: In 2014, the Biomonitoring Program and River Trend Monitoring Program (RTMP) merged quality assurance protocols covering physical, chemical, biological and habitat parameters used for assessing rivers and streams. All data is quality assured via specific measures as specified in the QAPP.

1.7 Fish Mercury Program

Purpose: To collect data on the elemental mercury content in tissue of freshwater fish species within the State of New Hampshire.

Data usage: The data is used to conduct risk assessments for mercury exposure for the game fish consuming public. This risk assessment results in statewide and, if appropriate, waterbody-specific fish consumption advisories for various species of fish. The data is also used to track trends over time in the mercury content in fish tissue.

Monitoring approach: Trend and targeted Monitoring. Most samples are supplied by volunteers who bring in fish from the lake where they live or often fish. Additional fish may be obtained through specific studies related to regulatory changes designed to reduce the deposition of atmospheric mercury. Additionally certain waterbodies have been targeted for long term collection to perform trend monitoring.

Parameters measured: Mercury content in fish tissue expressed as mg of Mercury/kg of fish, weight and length of the fish.

Method of data collection: Discrete.

Number of records generated: At least 100 fish are collected, processed and analyzed annually.

Quality Assurance Measures: Scale used for the weight is inspected and certified annually by a third party (contractor). Blanks, duplicates, continuing calibration verification (CCV) and spikes are performed in accordance with the JCLC laboratory manual protocols.

1.8 Acid Rain Deposition Program

Purpose: To collect data on acid rain deposition and determine its effects on sensitive lakes and ponds.

Data usage: Data is used to conduct trend analysis on the effects of acid rain deposition and the effectiveness of air pollution regulations. Data have been used by the NH Fish & Game Department to make stocking decisions on acid sensitive ponds and lakes. Rain is also collected in Concord, NH and analyzed to verify source inputs to lakes and ponds.

Monitoring approach: Trend Monitoring. Lakes and ponds included in this monitoring program have been monitored consistently in excess of 30 years.

Parameters measured:

- Lakes/Ponds – pH, acid neutralizing capacity, conductivity, color, dissolved aluminum, dissolved calcium, sulfate, nitrate and chloride.
- Rain – pH, nitrate, sulfate and total phosphorus

Method of data collection: Discrete. Rain events are collected and analyzed at NHDES headquarters in Concord.

Number of records generated: 20 lakes and ponds are sampled twice per year, 10 helicopter stocked lakes are sampled once per year during stocking activities, and rain is sampled every time there is a rain event significant enough to yield the volume necessary for testing. In 2014, 51 rain events were sampled and 220 parameters analyzed.

Quality Assurance Measures: All samples per requirements of the JCLC laboratory manual or Health and Human Services (H&HS) water lab protocols. This program is included in the Lake Trophic Survey Program QAPP that was submitted to EPA in 2015 for approval.

1.9 Surface Water Quality Complaints

Purpose: Investigate concerns impacting surface water quality reported to the WMB by staff and the public.

Data usage: Data is used to evaluate if an issue or water quality violation exists. If an issue exists there may be administrative action taken by NHDES or a referral to another agency for action to be taken.

Monitoring approach Targeted Monitoring: If investigator deems monitoring is warranted targeted sampling is completed at strategically located stations.

Parameters measured: Depends on the nature of the complaint.

Method of data collection: Continuous monitoring or discrete samples depending on the nature of the complaint.

Number of records generated: In 2014, 57 complaints were received, and 90 analytes were tested (not including macrophyte identification) during investigations. Most complaints are logged into and tracked through the complaints module of the Environmental Monitoring Database (EMD).

Quality Assurance Measures: Parameter specific based on the JCLC Laboratory Manual or DHHS water lab protocols.

1.10 Public Bathing Facility Program (PBFP)

Purpose: RSA 485A:26 requires NHDES to operate a year round statewide PBFP program to ensure public health and safety when using bathing facilities such as pools and spas. Administrative rules Env-Wq 1100 specify the design, operation and maintenance requirements for public bathing facilities. The PBFP program reviews applications for new public bathing facilities, inspects and tests the water in existing public bathing facilities to ensure that applicable requirements are being met.

Data usage: Data generated through the PBFP program are used to evaluate facility compliance with state and federal public health and safety laws, determine enforcement actions, prioritize seasonal/regional inspections, shape educational outreach efforts and make historical comparison to evaluate program effectiveness. The U.S. Center for Disease Control makes periodic requests for data in studying chlorinated aquatic venues.

Monitoring approach: Targeted monitoring – The PBFP program conducts periodic routine inspections to evaluate public health and safety and responds to illness complaints.

Parameters measured: The PBFP program measures a total of 10 chemical and biological parameters. In-situ analysis includes temperature, pH, free chlorine, total chlorine, combined chlorine, bromine, turbidity, total dissolved solids, cyanuric acid, hardness and alkalinity. Field samples are submitted to the DHHS-PHL for *E. coli* and total coliform analysis.

Method of data collection: The PBFP program collects discrete samples at public bathing facilities statewide.

Number of records generated: In 2014, the PBFP achieved the following:

- 363 facility inspections.
- Collected 637 samples for chemical and microbial analysis.
- Identified 231 water quality violations.
- Found 109 safety/facility violations.
- Issued 4 Letters of Deficiencies.
- Issued 17 full design permits for new construction.

Quality Assurance Measures: Follows and updates the PBFP Field Inspection QA & SOP manual (last updated 11/21/2014). PBFP program staff follow the JCLC quality assurance measures for specific analysis. The PBFP program is also required to complete an annual program audit detailing any deviations from the methods and data criteria stated in the QA manual and resolutions to those deviations.

1.11 Public Beach Inspection Program (PBIP)

Purpose: Public Beach Inspection Program (PBIP) personnel collect water from coastal and freshwater beaches to test for fecal bacteria to protect the public health of swimmers. During the summer swim season, NHDES personnel monitor about 170 freshwater public bathing beaches on a monthly basis and 16 coastal beaches on a weekly or bi-weekly basis. When bacteria counts at designated public beaches are higher than the state criteria, an advisory is issued to notify the public approximately 24 hours after sampling.

Data usage: The main goal of the program is to use the data collected to protect public health and inform the public of potential health risks at public beaches. Over time, data from beach sampling is used to determine impairment for the 303(d) list of impaired waters.

Monitoring approach: Targeted – samples are collected at individual beaches based on a predetermined schedule and used to make daily posting decisions regarding public health and safety. Follow up sampling at beaches with advisories is completed as necessary until fecal bacterial levels fall below state criteria. Trend Monitoring – Repetitive visits to set of established sampling locations annually or on an established schedule with the purpose of tracking water quality parameters over time.

Parameters measured: The main parameters measured are fecal bacteria (*E. coli* – freshwater beaches; enterococci – coastal beaches). Additionally, six other physical parameters are collected during visits to beaches.

Method of data collection: Discrete data points are collected during each beach visit.

Number of records generated: In 2014, 2,282 bacteria samples were collected, 61 advisories issued and 4 cyanobacteria warnings issued.

Quality Assurance Measures: Quality assurance measures for beach sampling are one trip blank and one field duplicate for every ten samples collected during each sampling trip. Quality assurance measures are completed daily for coastal beach inspections and twice a week for freshwater beach inspections. An EPA-approved PBIP QAPP was updated in April 2012.

1.12 Boat Inspection Program (BIP)

Purpose: The program was initiated with the intention to promote proper boating practices and enforce the No Discharge Area designation by conducting inspections of vessels with onboard wastewater containment facilities. Inspections are conducted during weekends of the boating season and are concentrated on waterbodies that accommodate larger vessels with onboard facilities including Lake Winnepesaukee, Lake Winnisquam, and Lake Sunapee.

Data usage: The boat inspections fulfill a regulatory requirement under RSA 487 (Control of Marine Pollution and Aquatic Growth). A database is maintained to track boaters and their onboard wastewater systems. Annual reports are prepared from queries of a database of approvals, violations, and re-inspections with all related details as necessary.

Monitoring approach: Targeted – inspections of boats with onboard “heads” are conducted on weekends over the course of the boating season. Boats are boarded only when occupied or with prior permission. A boarding would be requested if an inspection decal was not visible on the port side forward window or the bow number did not return any information from the database. Re-inspections would be prompted by a change in ownership, modifications to the plumbing system, or a complaint. Inspection locations include areas accommodating vessels with onboard facilities.

Parameters measured: Information for the boat inspection database is collected from individual boat registrations and wastewater systems that include graywater and marine sanitation device (MSD) configurations. Details on location, dates of inspections or re-inspections, and compliance/non-compliance issues are documented.

Method of data collection: Vessel and owner information is entered into the database by the BIP coordinator.

Number of records generated: During the 2014 season, the boat inspections staff traveled to Lake Winnepesaukee on 12 events to inspect recreational boats.

Quality Assurance Measures: Database entries are reviewed by either the program manager or Clean Vessel Act coordinator.

1.13 Clean Vessel Act Program

Purpose: The New Hampshire Clean Vessel Act (CVA) program is administered through NHDES and funded by the U.S. Fish and Wildlife Service Sport Fish Restoration program. The Federal CVA of 1992 authorizes funds to states for the construction, renovation, and the operation and maintenance of stationary and mobile pumpout resources for the recreational boating public. Pumpout options are a key factor in maintaining a No Discharge Area for New Hampshire inland and coastal waters.

Data usage: Locations and availability of pumpout resources are tracked to identify potential projects for CVA funding assistance in areas that would enhance compliance with No Discharge, safety of shellfish harvesting areas, maintenance of water classification status and protection of public health within recreational waters. Seasonal participants and sewage amounts are documented by grantees and contractors to track variations in boater usage from previous years and differing sites.

Monitoring approach: Targeted – information is collected annually from stationary and mobile pumpout resources through grantees, contractors and staff site visits.

Parameters measured: Information collected may include the location of the pumpout resource whether stationary or mobile, marina amenities, pumpout system mechanical information, system availability, usage fee collected (if any), participant contact information, vessel name, vessel type, and sewage gallons pumped.

Method of data collection: Staff site visits employ the use of data sheets while grantees are required to document boat and sewage estimates in logbooks. The mobile pumpout services organize information by a manual receipt per service.

Number of records generated: Three stationary pumpout locations and one mobile pumpout boat are available to the recreational boating public along coastal waters. In 2014, the mobile pumpout boat experienced engine failure several times throughout the season. For this reason, the service was not available as often as in previous years. Plans have been made to replace the engines in 2015. The 2014 mobile pumpout season operated from May through August, documenting 709.5 captain hours (including time that was used as match), 322 serviced boats and approximately 7,860 gallons of sewage pumped from recreational vessels. Since 2002, the service has pumped off a total of approximately 141,000 gallons of boater wastewater.

New Hampshire also has approximately 19 pump/dump facilities with 17 (13 of which are public access) devoted to Lake Winnepesaukee and one to Lake Winnisquam. A dump station is located within Sunapee Harbor on Lake Sunapee. There is no mobile pumpout service for any inland waters at this time. Plans to complete the renovation for another pumpout station on Lake Winnepesaukee were approved in 2014 and are expected to be completed in 2015.

Quality Assurance Measures: Input from data sheets, logbooks, and receipts are verified either by the seasonal intern or program coordinator.

1.14 Exotic Species Program

Purpose: The primary purpose of New Hampshire’s Exotic Aquatic Plant Program is to “prevent the introduction and further dispersal of exotic aquatic weeds and to manage or eradicate exotic aquatic weed infestations in the surface waters of the state” (RSA 487:17, II).

Data usage: Data generated through the Exotic Species Program are used to guide control activities on waterbodies across New Hampshire that are infested with exotic aquatic plants. Data are also used to track concentrations of aquatic herbicides that may be used in various waterbodies, and to determine the presence/absence of invasive aquatic plants in waterbodies.

Monitoring approach: Trend Monitoring – Repetitive visits to infested waterbodies to track infestations (size, density, distribution) over time. Water quality monitoring may also be performed along with invasive plant monitoring to determine impacts of the invasive species on the waterbody, or to determine impacts of the control practice on a waterbody.

Parameters measured: The exotic species program monitors for the location, density and percent cover related to exotic plants. Water depth, clarity, dissolved oxygen concentrations, herbicide concentrations, nutrient concentrations, temperature and turbidity may also be monitored as part of this program, depending on any special studies that may be on-going related to specific management projects.

Method of data collection: Discrete samples at multiple stations in lakes and ponds, as needed based on the requirements of special studies that may be conducted.

Number of records generated: In 2014, the Exotic Species Program collected the following data:

- Plant identifications: >600
- Herbicide residue samples: >30
- Field inspections (GPS): >90
- Pet store Inspections (for invasive species sales): 47

Quality Assurance Measures: Activities performed by the Exotic Species Program are described in the Quality Assurance Project Plan for the program, which was approved in 2014 by EPA.

1.15 Interstate 93 (I-93) Chloride TMDL

Purpose: Implementation monitoring for the Total Maximum Daily Loads (TMDL) for chloride for water bodies in the vicinity of the I-93 corridor from Massachusetts to Manchester, NH.

Data usage: The data is used to determine compliance with the TMDL.

Monitoring approach:

- Continuous datasonde monitoring at four stations within the I-93 Corridor.
- Handheld measurements every six weeks.
- Chloride grab samples every six weeks.
- Data sonde checks in known standards twice every fiscal year.

Parameters measured: Temperature, specific conductance, and chloride.

Method of data collection: Continuous.

Number of records generated: 34,000-35,000 data points per station every state fiscal year.

Quality Assurance Measures: Data sonde deployments are checked for quality control with handheld measurements taken prior to and after each deployment. Handheld measurement devices are checked with known standards before field visits. Data sondes are checked for quality control twice per fiscal year by submerging each data sonde in known standards. If these quality control checks fail to meet data quality objectives, the data from the whole deployment are invalidated unless there is sufficient evidence to support retaining the data. A full description of all the data quality control measures are contained in a 2006 EPA-approved QAPP.

1.16 NHDES Shellfish Program

Purpose: The mission of the NHDES Shellfish Program is to examine the sanitary quality of the state's tidal waters, in order to ensure that the molluscan shellfish in those waters meet standards for human consumption. To this end, the NHDES Shellfish Program: 1) evaluates the sanitary quality of all coastal shellfish growing waters in the state; 2) identifies and monitors pollution sources and other factors that render the state's shellfish resources unfit for human consumption; 3) works with partners and the public to eliminate pollution sources; and 4) coordinates with shellfish farmers and other agencies to site new aquaculture operations, plan harvesting activities, and prevent illness outbreaks.

Data usage: Data generated by the Shellfish Program are used to prepare and update Sanitary Survey reports for the eight major shellfish growing areas in the state's jurisdiction. Data generated by the program are also used to make daily and weekly management decisions regarding which harvesting areas are open/closed based on current information on public health threats such as red tide levels, recent rainfall, boating and mooring surveys, and others. These decisions are communicated to through a hotline message and internet-based tools.

Monitoring approach: The Ambient Monitoring program implements a systematic random sampling program to maintain updated bacteria data on 75 monitoring stations in the state's tidal waters. Data from event-based seawater and shellfish tissue testing after pollution events such as heavy rainfall events are used to supplement the ambient program and to support management decisions. Additional monitoring programs include, Red Tide monitoring, Shoreline Survey program, communication with operators of potential pollution sources, and a new monitoring program focused on *Vibrio* bacteria risk assessment and on viral indicators.

Parameters measured: Seawater and shellfish tissue sampling programs document fecal coliform bacteria, water temperature, salinity, and other observations; Paralytic Shellfish Poison (PSP) toxin in blue mussels and other shellfish species; water temperatures near commercial oyster farms and *Vibrio* bacteria levels in oysters; and Male Specific Coliphage levels in oysters and blue mussels.

Number of records generated: In 2014, the Shellfish Program accomplished the following:

- 65 rounds of sampling on tidal waters
- 969 seawater samples collected
- 18 rounds of sampling in response to rainfall events
- 64 red tide samples collected
- 341 commercial harvesting decisions generated
- 93 wastewater treatment facility calls evaluated
- 66 harvesting hotline updates implemented
- 1,376 properties surveyed and tracked
- 59 marina/mooring field surveys performed
- 875 pollution sources tracked

Quality Assurance Measures: The Shellfish Program operates under three EPA-approved Quality Assurance Project Plans (QAPPs), dated May 2014, addressing Ambient Monitoring, Red Tide Monitoring, and Shoreline Survey Monitoring. The Shellfish Program is also required to complete a program audit every other year detailing any deviations from the methods and data criteria stated in the QAPPs and resolutions to those deviations. Information is managed in the state EMD and in GIS format, and is used to support management decisions outlined in the sanitary surveys.

1.17 Special Studies

Purpose: Short-term monitoring to collect data for the purposes of evaluating the environmental impact of a temporary event such as construction, answer a specific scientific question, evaluate a data collection method, or solve a specific problem within a waterbody or watershed.

Data usage: The primary use of data will fulfill the goal of the study. Any ambient monitoring data will be available via the EMD for other programs to use.

Monitoring approach: Targeted Monitoring approach

Parameters measured: Determined by study design.

Method of data collection: Determined by study design.

Number of records generated: In 2013, 264 analyses were conducted for the Pawtuckaway Lake instream flow pilot and 296 analyses were conducted for the Low Impact Hydropower Certification program.

Quality Assurance Measures: Determined by study design.

1.17 Surface Water Quality Assessments (305(b)/303(d))

Purpose: The water quality status of New Hampshire's surface waters are reported in accordance with Section 305(b) and 303(d) of the Clean Water Act (CWA), and New Hampshire Statutes Chapter 485-A:4.XIV. Per the Clean Water Act assessments are to be completed biennially on even numbered years.

Data usage: Assessments are viewed and used by the general public, local, state, and federal agencies, as well as non-governmental organizations. Assessment results are formally sent to EPA for transmittal to Congress. All assessment results are made available to the public via the program website and a web based data mapper.

Assessments determine if a waterbody meets its designated uses. Waters that do not meet one or more designated use are considered impaired. In cases where a waterbody meets one or more of its designated uses, protection measures may be an appropriate management action. The Surface Water Quality Assessment Program does not itself take any actions based upon the attainment determinations, but rather provides that information to other programs. Impaired waters become eligible for 319 restoration funds. Impairment status may influence certain permitting actions.

Method of data collection: The primary source of data for the assessments is the department's Environmental Monitoring Database (EMD). Every two years, as part of the assessment process, a snapshot of 'recent' samples is imported to the Supplemental Assessment Database (SADB) for processing and tracking.

Number of records generated: For 2014, the Surface Water Quality Assessment Program integrated the following into designated use support decisions:

- 120 different project sources of data.
- 5,230 monitored stations.
- 195,794 individual sampling events.
- 133,051 day/parameter combinations from datalogger record sets.
- 929,565 individual chemical and biological grab sample results.
- 1,961,356 individual water quality standard comparisons were made.

Quality Assurance Measures: In addition to the quality assurance methods of each of the data sources, the assessment is guided by set of standard procedures called the Consolidated Assessment and Listing Methodology (CALM) More information is available in the CALM under "Publications" at <http://des.nh.gov/organization/divisions/water/wmb/swqa/index.htm>

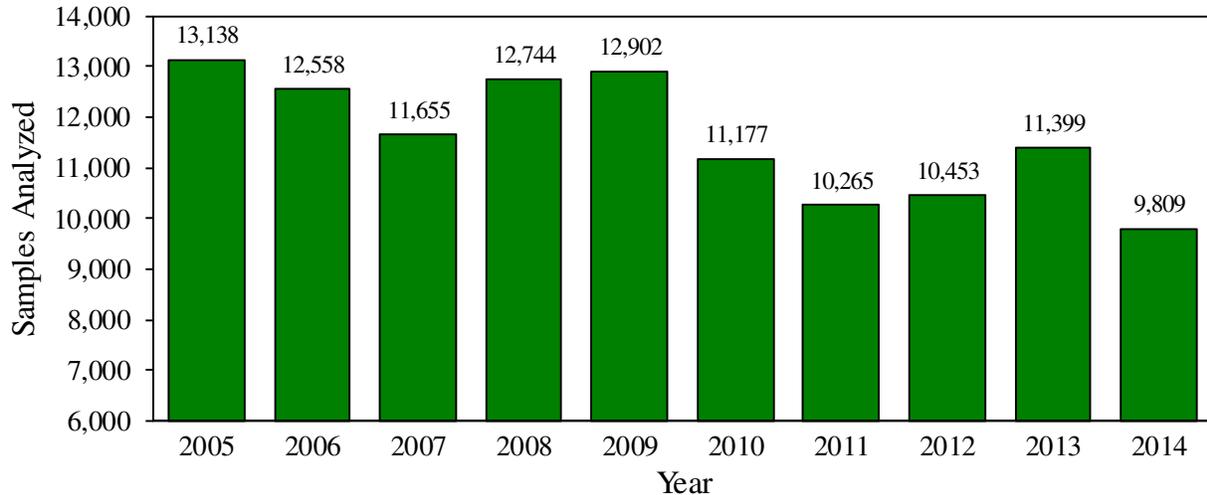
Assessments are conducted in a step wise fashion. First, the SADB manages all imported sample data and performs the initial sample level water quality standard comparisons. Next, each waterbody/parameter combination is summarized in bulk and those bulk assessments are quality assured by a second individual. Third, the detailed lists of waterbodies with significant changes and/or borderline assessments are subjected to detailed review using a tool that allows all samples to be paired up with weather and flow data. Finally, all new impairments and deimpairments are vetted through professional staff to confirm that the data is sufficient to support those decisions

II. NHDES JODY CONNOR LIMNOLOGY CENTER AND SATELLITE LAB

2.1 Overall Workload

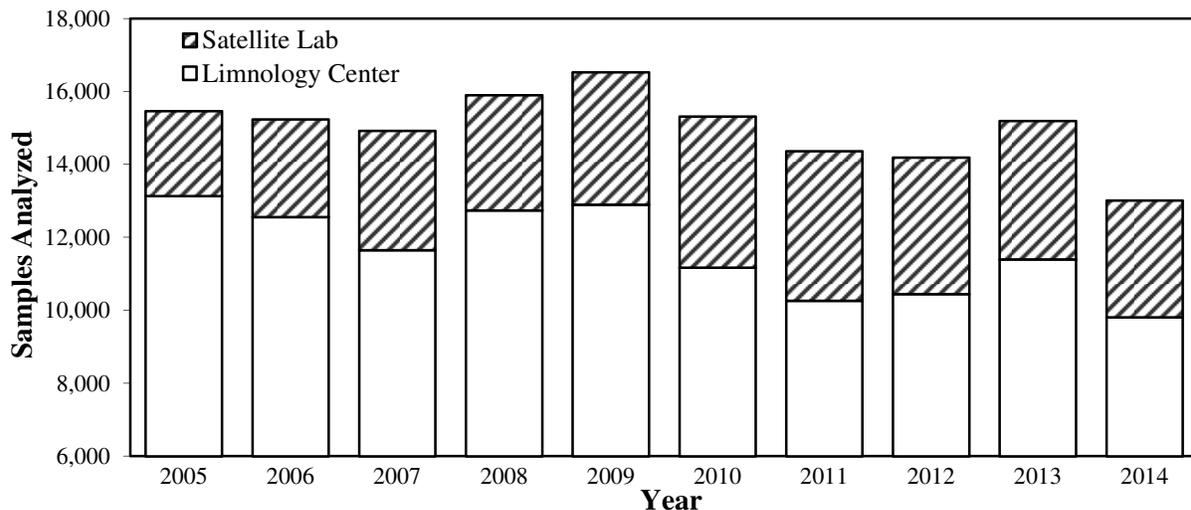
The NHDES Jody Connor Limnology Center (JCLC) staff processed 9,809 chemical analyses in 2014 (Figure 1), a decrease of over 2,500 analyses from 2013. The leading contributor to this was the VLAP program which accounted for 20 percent fewer analyses, details of this reduction are covered in the VLAP annual summary (see below). The Pool Program also began analyzing TDS in the field which lowered the JCLC numbers. Approximately 4,100 of the samples from 2014 were collected by JCLC programs but analyzed by the DHHS-PHL.

Figure 1: Chemical analyses processed by NHDES JCLC, all programs combined.



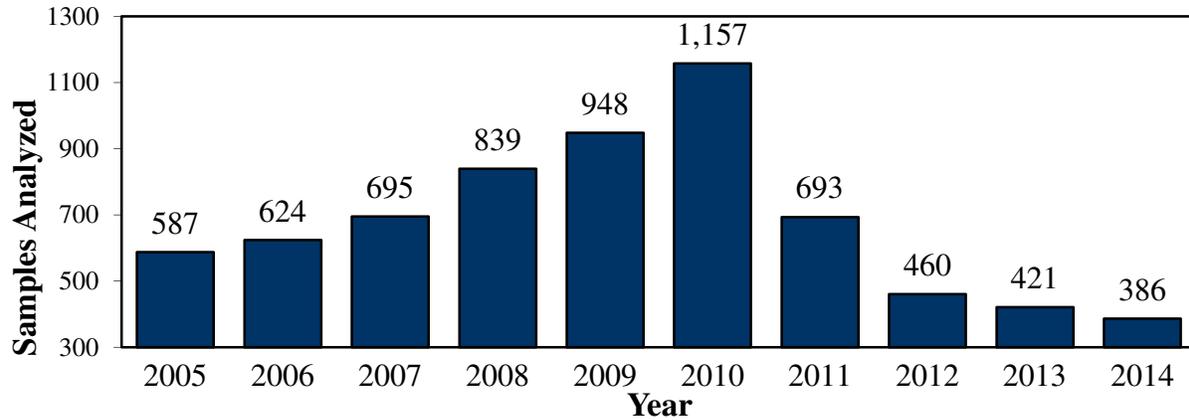
The JCLC strives to provide volunteer monitors better service by establishing and operating satellite laboratories. Unfortunately in 2014 the Plymouth State University (PSU) Center for the Environment satellite laboratory closed due to budget constraints. The laboratory at Colby Sawyer College (CSC) has operated for about two decades and is still an asset to the JCLC's volunteer programs. The JCLC's share of samples for VLAP and VRAP analyzed has steadily declined from 85 percent in 2005 to 75 percent in 2013, but as a result of the closure at PSU rose to 77 percent in 2014 (Figure 2).

Figure 2: Satellite vs JCLC Analysis 2005-2014



Quality control (QC) is an important component in assuring the production of high quality data. At both the JCLC and its satellite lab QC samples are processed regularly. About 1,500 QC sample analyses were conducted by the two laboratories in 2014.

Figure 3: NHDES JCLC Total Annual Biological Analyses

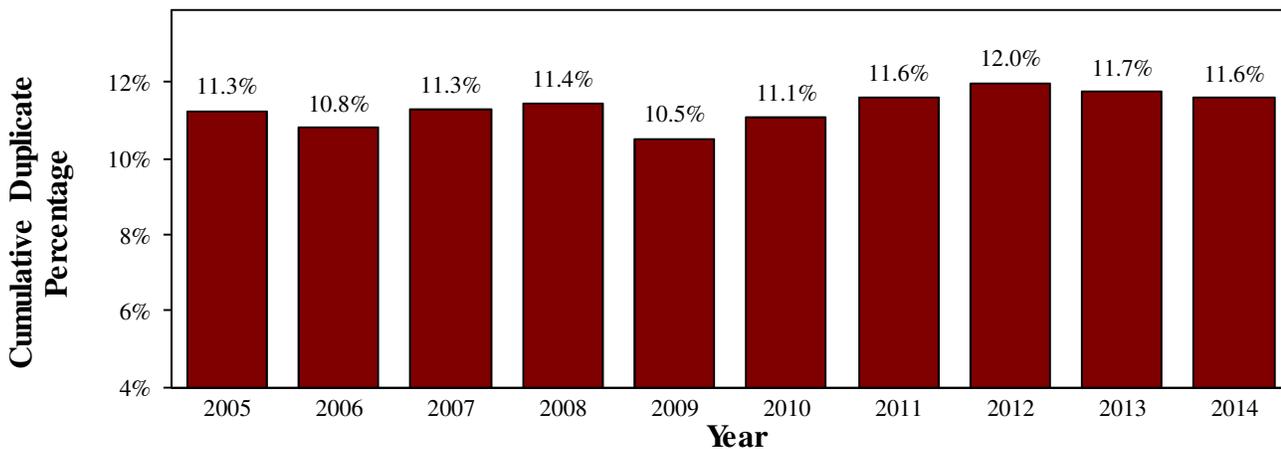


The JCLC also analyses biological samples covering microscopic, phytoplankton, cyanobacteria and macrophyte identifications. The number of annual biological analyses performed rose steadily until 2010 (Figure 3), but has been steadily dropping since. A ten year low of 386 biological samples was analyzed in 2014. These analyses are time consuming and most often performed through microscopic examinations by trained staff. Reductions in biological analysis for 2014 were mostly from the microscopic identification and macrophyte identification categories. Microscopic identifications result from complaints which were reduced in 2014. Macrophyte ID samples come from either weed watchers or from the Lake Host program.

2.2 Data Quality Objectives

The JCLC and its satellite laboratory met their data quality objective (DQO) requirement of conducting replicate analyses on 10 percent of the processed samples (Figure 4). Since establishing the DQO objective in 1999, the cumulative laboratory replicate percentage has surpassed the 10 percent requirement each year. All three laboratories also continued to follow both Continuing Calibration Verification (CCV) and Critical Range (CR) criteria. The CCV and CR processes verify that the laboratory equipment, standard operating procedures and personnel are all meeting established standards and confirming that high quality, reliable data are being produced.

Figure 4: NHDES JCLC and Colby-Sawyer satellite lab cumulative replicate percentage



2.2.1 JCLC Laboratory

As a result of requirements set forth in the NHDES Quality Management Plan (QMP), the JCLC began to track trained staff in 2003. Tracking staff training is a critical component to verify competency on equipment use, DQO procedures, CR and CCV procedures. At the start of each sampling season, in addition to routine training, interns and new permanent staff are required to complete a training checklist prior to conducting analyses. This checklist serves to standardize training for new analysts and to document the proficiency of laboratory staff.

The JCLC replicate split mean ranges (SMR) also show consistency in data quality.. The split mean range is the value difference between two aliquots (sub-samples) from the same sample. The JCLC generates split mean ranges as a non-statistical method to review that replicate ranges are consistent with historical SMRs. In 2014, all parameters exhibited split mean ranges within their historic levels (Table 1).

Table 1: 2014 calendar year JCLC chemical analyses quality assurance summary.

Parameter	Replicate Analyses	Sample Analyses	Replicate Percent	Average Split Mean					
				2009	2010	2011	2012	2013	2014
Alkalinity (ANC) mg/L	49	429	11.42	0.22	0.30	0.18	0.26	0.47	0.51
Apparent Color (Visual) cpu	8	70	11.43	0.56	1.90	0.67	0.2	0.63	0.63
Chloride mg/L	167	1462	11.42	0.86	0.78	0.53	2.29	1.02	0.55
Chlorophyll-a mg/L	59	487	12.11	0.42	0.44	0.22	0.35	0.35	0.29
Conductivity μ mhos/cm	239	2145	11.14	0.26	1.32	1.28	1.27	0.74	1.41
Mercury mg/L	5	54	9.26	0.03	0.03	0.03	0.04	0.03	0.04
pH units	245	2185	11.21	0.07	0.08	0.06	0.05	0.06	0.07
TDS mg/L	1	10	10.00	3.84	5.69	0.9	0.97	1.49	0.90
Turbidity NTU	237	2087	11.36	0.27	0.17	0.15	0.12	0.09	0.16

2.2.2 Satellite Laboratory

The Colby-Sawyer Satellite Laboratory, located at Colby-Sawyer College (CSC) in New London, continued to use a Microsoft Access™ based sample tracking system which allowed for standard and efficient data management and quality control routines.

The CSC facility continues to be well operated and serves as a model satellite laboratory for producing high quality data in support of NHDES' volunteer water quality monitoring programs. CSC has consistently met or exceeded the replicate DQO for all VLAP parameters since 2008. In addition, the 2014 split mean remained consistent with previous years (Table 3). Lastly, CSC laboratory replicates met established critical range criteria for all parameters.

Table 2: 2014 calendar year CSC Laboratory chemical analyses quality assurance summary

Parameter	Replicate Analyses	Sample Analyses	Replicate Percent	Average Split Mean					
				2009	2010	2011	2012	2013	2014
Alkalinity (ANC) mg/L	10	79	12.66	0.36	0.27	0.47	0.52	0.29	0.42
Chlorophyll-a mg/L	12	90	13.33	0.20	0.28	0.27	0.17	0.27	0.42
Conductivity μ mhos/cm	78	698	11.17	0.37	0.94	0.26	0.39	0.80	0.56
pH units	78	698	11.17	0.07	0.06	0.06	0.10	0.06	0.03
Turbidity NTU	78	698	11.17	0.16	0.24	0.23	0.21	0.18	0.18
<i>E. coli</i> counts/100ml	9	76	11.84	0.13	0.17	0.14	0.00	0.00	0.33
Total Phosphorus mg/L	91	693	13.13	0.001	0.001	0.001	0.001	0.0006	0.001

III. ANNUAL PROGRAM REPORTS

3.1 Assessment Based Programs

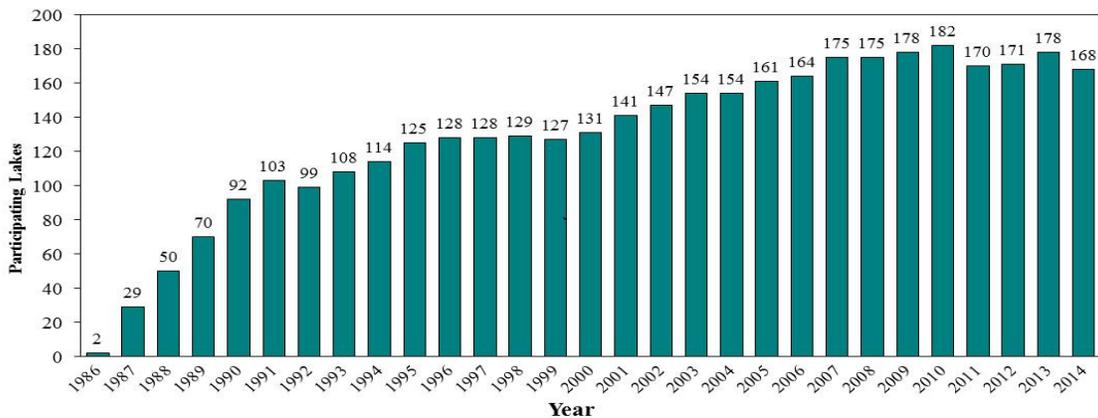
3.1.1 JCLC support summary

JCLC provided analytical services for over a dozen programs in the Watershed Management Bureau in 2014. In addition, JCLC provides bench space where field equipment can be maintained, calibrated and prepared for use. Equipment from JCLC is also loaned to volunteers and other state agencies for the purpose of surface water quality monitoring. The following sections summarize the activities of the programs supported by and operating within JCLC.

3.1.2 Volunteer Lake Assessment Program (VLAP)

VLAP was established in 1985 and volunteers collect monthly in-lake and tributary water quality samples during the summer. In 2014, 168 lakes were sampled through the program (Figure 5). Since its inception, VLAP has consistently enrolled additional lakes into the program on an annual basis. However, due to budget cuts in 2011, VLAP did not accept any new lakes into the program despite the request of multiple groups. In 2013, VLAP began accepting new lakes into the program and expects future growth. The continued dedication of volunteers from nearly 200 lakes statewide clearly demonstrates the program’s popularity and reflects the public’s devotion to watershed management, water quality improvement and lake protection for future generations.

Figure 5: Total Annual Number of VLAP Lakes Monitored from 1986-2014



The VLAP coordinator provides the necessary level of service (training, field inspections, equipment loans and maintenance) to volunteers in order to produce quality data under the auspices of an EPA approved QAPP. Sample collection and data quality control is extremely important as the data are used to prepare the state's Section 305(b) water quality report and list of impaired waters [303(d) list]. In addition, VLAP data are utilized to complete Total Maximum Daily Load (TMDL) studies, water quality criteria development and watershed planning efforts.

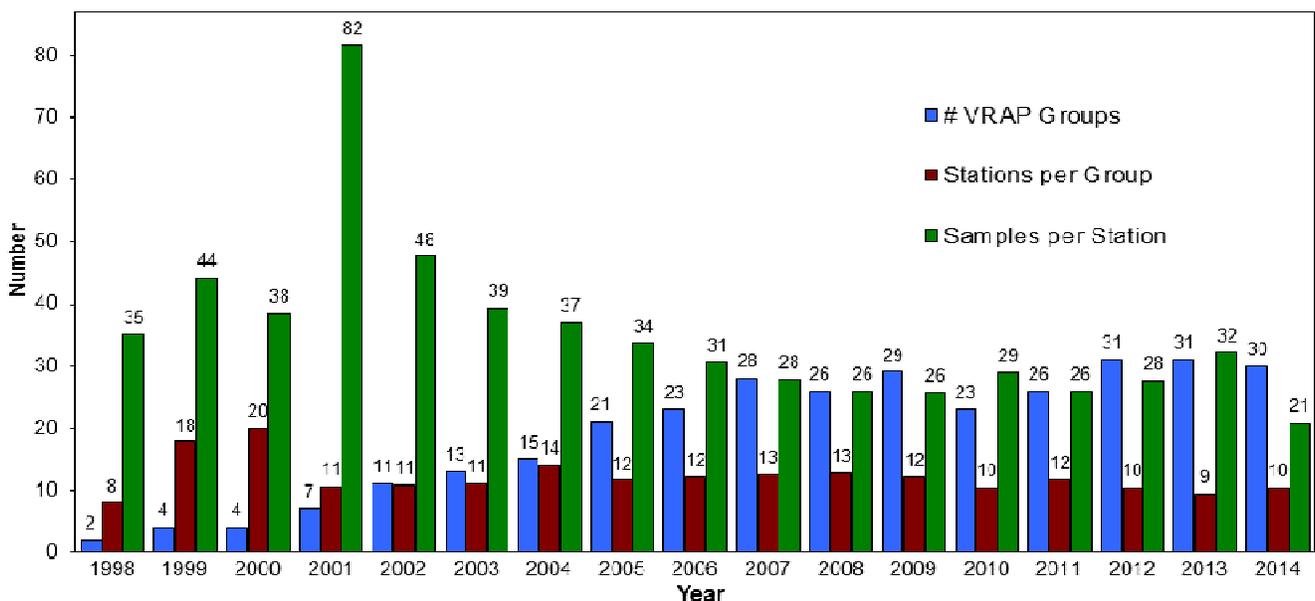
Lake associations are educated on the importance of practicing quality control measures during sampling events and sample preservation during the delivery of samples to the JCLC. In addition, volunteer monitor sample techniques are audited by collecting field duplicate samples during biennial NHDES staff visits to each participating lake and pond. If data are suspect, the VLAP coordinator assesses sample collection techniques and if necessary, provides quality control recommendations to the on-site volunteer monitors.

3.1.3 Volunteer River Assessment Program (VRAP)

In 1998, NHDES established VRAP to promote awareness and education of the importance of maintaining water quality in New Hampshire's rivers and streams. VRAP aims to educate people about river and stream water quality and ecology, and to improve water quality monitoring coverage for the protection of water resources. Today, VRAP loans water quality monitoring equipment, provides technical support, and facilitates educational programs. In 2014, VRAP supported 32 volunteer groups (Figure 6) on numerous rivers and watersheds throughout the state.

VRAP is a cooperative program between NHDES, river groups, local river advisory committees, watershed associations and individuals working to protect New Hampshire's rivers and streams. VRAP volunteers are trained by NHDES staff in the use of water quality monitoring equipment at an annual training workshop. NHDES staff work with VRAP groups to establish monitoring stations and develop a sampling plan. During each sampling season, NHDES receives water quality data from trained volunteers. The data are reviewed for quality assurance, and are entered into the EMD. During the off-season, NHDES staff interprets the data and compiles the results into an annual report for each river. VRAP volunteers can use the data as a means of understanding the details of water quality, as well as to guide future sampling efforts.

Figure 6: VRAP Group, Station, and Sample Count from 1998-2014



Data collected through VRAP is used to develop the 305(b) / 303(d) report, from which impaired or potentially impaired waters are targeted for additional, detailed study. Over 40 percent of the surface water quality assessments of riverine assessment units included in the 2014 Section 305(b) report were provided by VRAP. In 2014, this data contributed to the assessment of 2,900 miles of rivers and streams.

3.1.4 Lake Trophic Survey Program (LTSP)

In 2013 WMB reinitiated the lake trophic survey program (LTSP) as part of the bureau’s comprehensive surface water monitoring strategy. For 2014, a total of 20 lakes were sampled (11 from the 2014 selection; 9 from the 2013 selection) (Table 4).

Table 3: Three year sampling plan for the lake trophic survey program

Sampling Month		June	July	August	Maximum Lakes Sampled
Sampling Year	2013	x	x	2013 selections	10
	2014	x	2013 selections	2014 selections	20
	2015	2013 selections	2014 selections	2015 selections	30
	2016	2014 selections	2015 selections	2016 selections	30
	2017	2015 selections	2016 selections	2017 selections	30
Each year of selection represents up to 10 lakes					

3.1.5 Biomonitoring Program

The NHDES biomonitoring program was established in the mid-1990's in response to an EPA directive for states to develop the capacity to characterize the condition of its aquatic communities. Since that time, the program has focused on the development and implementation of biological condition indices for rivers and streams. The program also collects chemical and habitat data which is used in conjunction with biological data to complete comprehensive water quality assessments of river and stream segments.

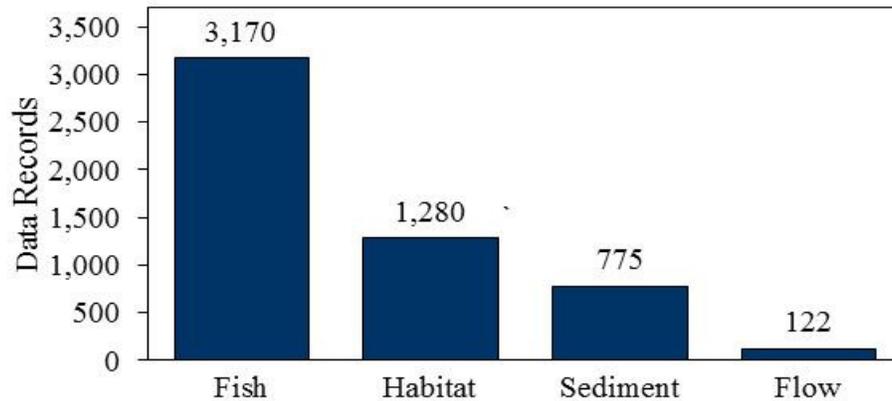
In 2014, the biomonitoring program assisted other WMB staff to complete water quality monitoring at 42 trend monitoring sites and 20 synoptic monitoring sites one to two times per month from June through September. At 40 of these locations (28 trend, 9 synoptic) biomonitoring staff were primarily responsible for the coordination and collection of macroinvertebrate data and fish data at 11 of these locations (2 trend, 9 synoptic). 2014 marked the first year of a partnership between NHDES and NH Fish and Game for the collection of fish data for several sites according to NHDES protocols, allowing aquatic life use assessments. This effort was successful in 2014 and NHDES and NH F&G anticipate this will continue in 2015.

In addition to trend and synoptic monitoring, the biomonitoring program led the probabilistic assessments of the state’s rivers and streams, coordinating crews of 5-8 people. As part of the 2013/2014 National Rivers and Streams Assessment project, data for various water quality, habitat and biological parameters were collected at 12 sites in New Hampshire. Most samples were packaged and later shipped for processing through EPA contract laboratories. NH will be continue implementing many of the same protocols to complete a probabilistic based assessment specific to New Hampshire’s wadeable streams. In order to complete a statewide intensification of the national assessment, an additional 30 sites require monitoring. In 2014, four of the 30 sites were completed. The remaining sites will be monitored in 2015 and 2016.

Biomonitoring data summaries included in this report summarize 2014 fish samples collected as part of the NRSA, Trend and Synoptic monitoring projects. In 2014, 119 macroinvertebrate samples (42 stations) were

collected. Macroinvertebrate samples from 2014 have not been processed. Biological monitoring for fish at 25 stations included 3,170 identifications of 31 unique taxa (Figure 7).

Figure 7: 2014 Biomonitoring data summaries for fish, habitat and sediment.



Fish identification data quality control measures relied on having an expert fish taxonomist on site during sampling. Any unknown species were retained for laboratory analysis and further consultation with other state agencies and partners. Several samples were preserved for laboratory identification in 2014, including spottail shiners and round whitefish.

For 2014, habitat, stream sediment types and flow conditions were also assessed for four state probabilistic monitoring sites, resulting in 2,177 data points collected (Figure 7). With the exception of flow, all quality control for state assessment probabilistic sites will be assessed by comparing collected data for two site visits on different dates. Flow measurements were repeated 10 percent of the time.

3.1.6 Wetlands Monitoring Program

In 2013, EPA awarded NHDES a Wetlands Program Development Grant (WDPG) for several tasks including biomonitoring of wetlands following Maine’s wetland biomonitoring protocols (macroinvertebrates) and protocols previously used by New Hampshire. The two-year grant funds the monitoring and assessment work at 24 wetlands.

The protocols involve:

- Sampling benthic macroinvertebrates using a dip-net from a canoe or by wading (three “replicate” samples).
- Taking instantaneous measurements of field parameters including dissolved oxygen, pH, turbidity, specific conductance, and water temperature.
- Collecting grab samples that are analyzed for nutrients (nitrate – nitrite, total Kjeldahl nitrogen, dissolved orthophosphorus and total phosphorus), chloride, chlorophyll-a, dissolved organic carbon and alkalinity.
- Collecting information on physical habitat parameters (land use, terrain, dominant plant species, and substrate composition),
- Applying Maine’s landscape-based Wetland Human Disturbance Assessment, which evaluates the landscape around a wetland and its watershed.
- Applying the NH NHB- Ecological Integrity Assessment (EIA) which also includes a GIS-based landscape analysis as well as vegetation-based surveys that can support application of Floristic Quality Assessments and further inform the macroinvertebrate assessment results.

Identification to genus level and enumeration of wetland macroinvertebrate samples will be done by a taxonomic contractor that has Society for Freshwater Science genus-level certifications. Biological metrics will be calculated from the taxonomic data, which will be run through Maine’s statistical model to predict the water quality of the wetland. This will improve New Hampshire’s ability to assess the condition of wetlands, and more specifically support of aquatic life.

In 2014, a team of three NHDES staff sampled six wetlands in watersheds consistent with year 2 of NHDES HUC 10 rotational watershed monitoring schedule. The sampling period runs from mid-June through mid-August. The balance of the wetland sampling under this grant will be conducted in 2015.

3.1.7 I-93 Chloride TMDL

In fiscal year 2014 data collection continued for the I-93 TMDL development and implementation. The data quality objective for data completeness is to obtain continuous data for 80 percent of the fiscal year at each station. The 80 percent data completeness criterion was met for the datasonde records for Policy Brook, Beaver Brook and Dinsmore Brook (Table 5). At station I93-NTC-01 valid specific conductance readings were made for 71 percent of the fiscal year which did not meet the data completeness requirement. Low flow (equipment not submerged) and equipment failure accounted for the inability to attain the data completeness requirement at I93-NTC-01.

Table 4: Data completeness for in-situ specific conductance datasonde readings from 7/1/13-6/30/14

Station ID	Valid Specific Conductance Data Points	15 Minute Intervals in Reporting Period	Portion of Reporting Period with Valid Conductance Data
I93-POL-01V	33,804	35,040	97%
10A-BVR	35,018	35,040	100%
I93-DIN-01	30,988	35,040	88%
I93-NTC-01	28,887	35,040	71%

The actual number of handheld meter samples for temperature and specific conductance (49) exceeded the expected number (36) and met the data completeness quality objective of 80 percent (Table 6).

Table 5: Data completeness for grab samples and field meter measurements for 7/1/13-7/1/14

Parameter	Actual Samples or Measurements	Expected Samples or Measurements	Completion Rate
Temperature	49	36	>100%
Specific Conductance	49	36	>100%
Chloride	49	36	>100%
Temperature Duplicates	10	9	>100%
Specific Conductance Duplicates	10	9	>100%
Chloride Duplicates	10	9	>100%

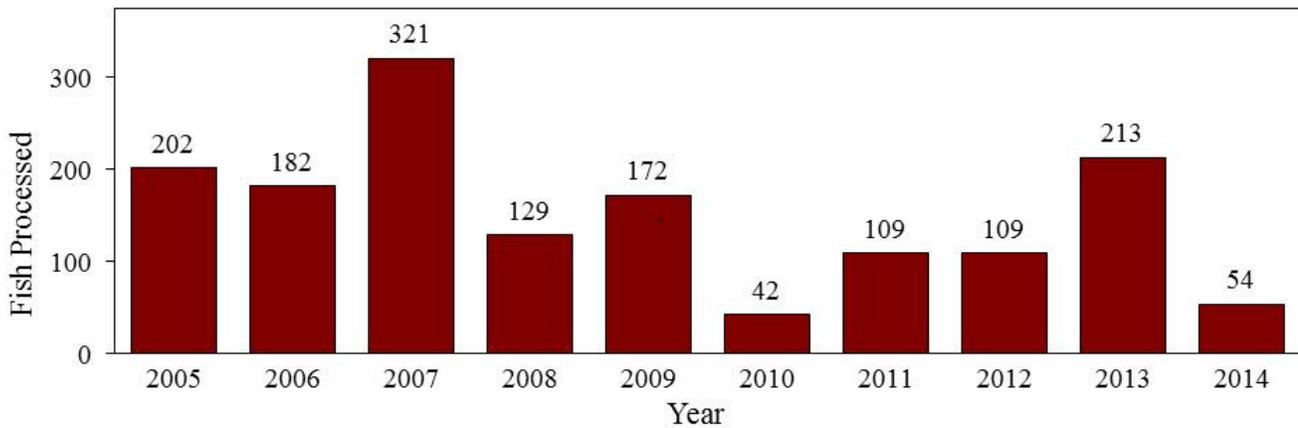
The actual number of chloride grab samples (49) was higher than the expected number (36) (Table 6). This result met the data completeness quality objective of 80 percent of the planned measurements. There were 10 pairs of routine and field duplicate samples for chloride which exceeded the expected number. The RPD

between the routine and duplicate sampled was less than 15 percent, therefore, the quality control samples do not indicate any systematic problems with the chloride samples collected for this study.

3.1.8 Fish Tissue Program

JCLC plays a critical role in the state’s fish tissue study program. NHDES is responsible for organizing the collection of fish specimens for state and national fish tissue studies. Fish are collected by VLAP volunteers using traditional fishing methods, by NHDES and NH Fish and Game staff using fish electroshock boats during the summer months, and at ice fishing tournaments during the winter. The number of fish collected and processed by JCLC over the past several years has ranged from a high of 321 to a low of 42 (Figure 8). The number of fish processed in 2014 was 54, well below the average number of fish processed each year (158); this was mostly due to the fact that US Fish & Wildlife was unable to collect fish for the PSNH outfall study.

Figure 8: Number of Fish Processed for Mercury Analyses

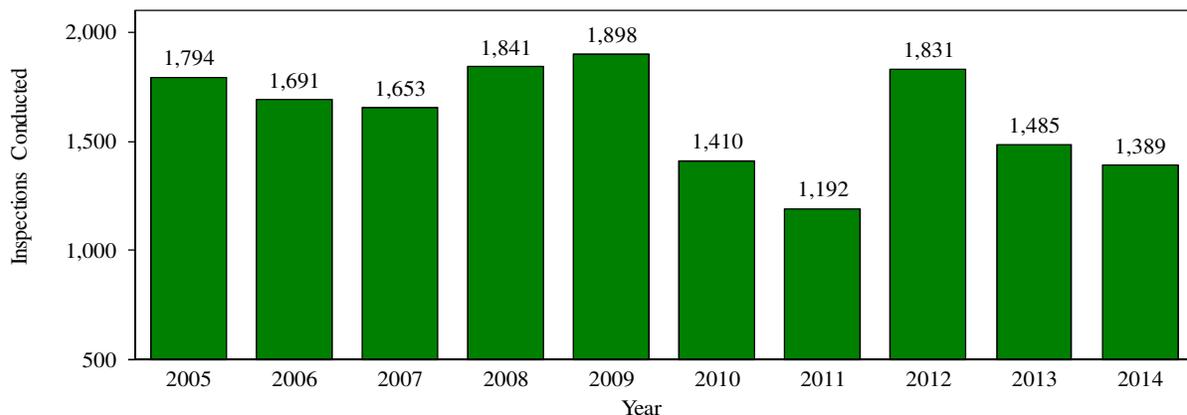


3.2 Inspection Based Programs

3.2.1 JCLC Support Summary

Several programs are responsible for conducting field inspections. These programs include public bathing facility, coastal and freshwater public beach, boat discharge, and exotic plant inspections conducted at pet supply stores and plant supply stores (Figure 10). Program inspections may be either routine, a result of complaints or inquiries. In addition, suspect exotic aquatic plant samples are regularly submitted by the public to JCLC for identification. These programs protect public health and welfare and require a significant investment of JCLC staff time and resources.

Figure 9: Inspections Conducted by NHDES JCLC for All Programs



3.2.2 Complaints

Sixty eight new complaints were added to the EMD during the 2014 calendar year. Biology section staff conducted site visits for 39 (Figure 10), or 57 percent, of the complaints.

The JCLC continues to track all complaints in the EMD. The complaints module of the EMD has been valuable for communicating complaint information and details within the WMB and NHDES. The main complaints reported to WMB were cyanobacteria/algae blooms (28 percent), water quality concerns (18 percent), and public health/bacteria (17 percent) (Figure 11). The “other” category came in a 31 percent and is an aggregate of many diverse suspect activities or observations such as snow dumping, salt piles, and fish kills, etcetera.

Figure 10: NHDES biology section complaint summary.

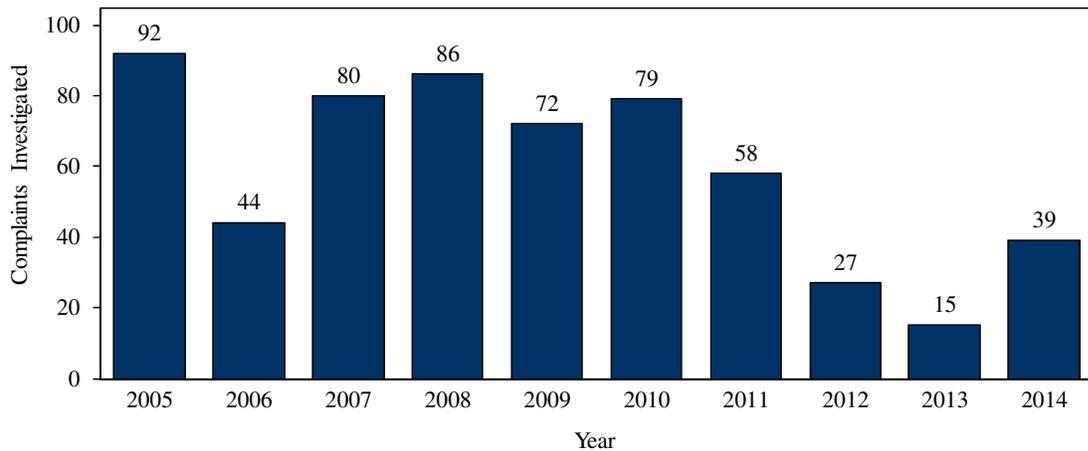
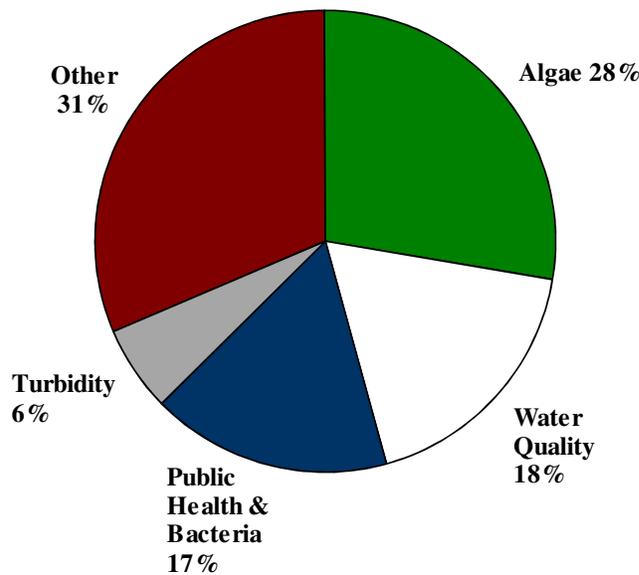


Figure 11: Number of complaint investigations conducted by the NHDES biology section



3.2.3 Public Bathing Facility Inspection Program

The Public Pool and Spa Program oversee more than 1,300 active facilities. In 2014, 363 facility inspections were conducted including 338 routine/follow-up inspections, 11 complaint inspections, and 13 pre-opening inspections (Figure 13). This is a small increase over 2013 when 334 inspections were administered. The

inspection rate varies from year to year depending on funding levels, and the amount of time spent on additional program activities other than field work. Currently inspections are carried out by the program coordinator and one dedicated summer intern. Historically the pool program received significant inspection assistance from the sub-surface bureau, specifically in the North Country from Rich Treiss. That additional support began to significantly decrease in 2005 and ended completely in 2009. The loss of that assistance made the goal of inspecting all indoor facilities no longer possible. In recent years a significant amount of staff time has been spent on generating and posting web content, program database upgrades and a full revision of the programs administrative codes.

Over the last 10 years of inspection activity, water quality violations, as a percentage of inspections conducted, have averaged 67 percent. Sixty-three percent of all inspections in 2014 had one or more deficiency. Bacterial violations decreased in number from 32 in 2013 to 24 in 2014. This represents a 2 percent drop, from 9 percent to 7 percent, of all inspections conducted. The number of water quality violations varies from year to year with several factors contributing. Those factors include, but are not limited to weather, inadequate or improper water testing, equipment failure, higher than typical bather loads, insufficient owner/operator education and poor construction.

Safety violations often involved direct potential hazards to bathers such as missing break float safety lines or broken, loose or missing drain covers. In comparison to 2013, the number of safety violations remained steady (30 percent) as a percentage of the total inspections conducted. Of the 109 safety/facility violations identified in 2014, the majority were issues with record keeping/testing and up-to-date signage. No problems were found with unapproved main drain covers since stringent state and federal anti-entrapment laws were recently codified. It is anticipated that 2015 and 2016 will see an increase in this violation category as a result of a recent rule revision that includes additional safety considerations.

Seventeen permit applications were submitted and issued in 2014. This is a slight increase over 2013 (15 permits). Over the last 10 years, 2006 witnessed the highest number of permits issued in one year at 44. The economic downturn of 2008 resulted in a rapid decrease in construction activity with the fewest number of submitted applications (10) in 2010. Pool construction this year came from a broader spectrum of categories including hotels, condos, campgrounds, health clubs, assisted living facilities, and a municipal pool.

Enforcement activity in 2014 resulted in 4 Letters of Deficiency (LOD) and 106 Notices of Deficiency (NOD) being issued, with one or more deficiency category cited. Nineteen facilities were closed on site due to significant water quality or safety violations. The responses to closures are rapid with many operators taking action during the inspections to correct deficiencies

Figure 12: Public bathing facility inspections

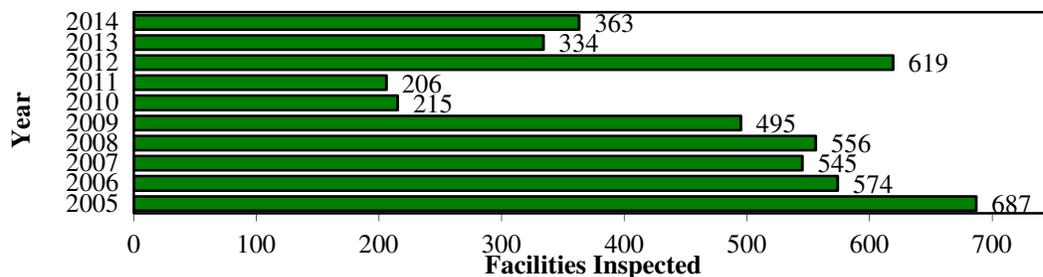
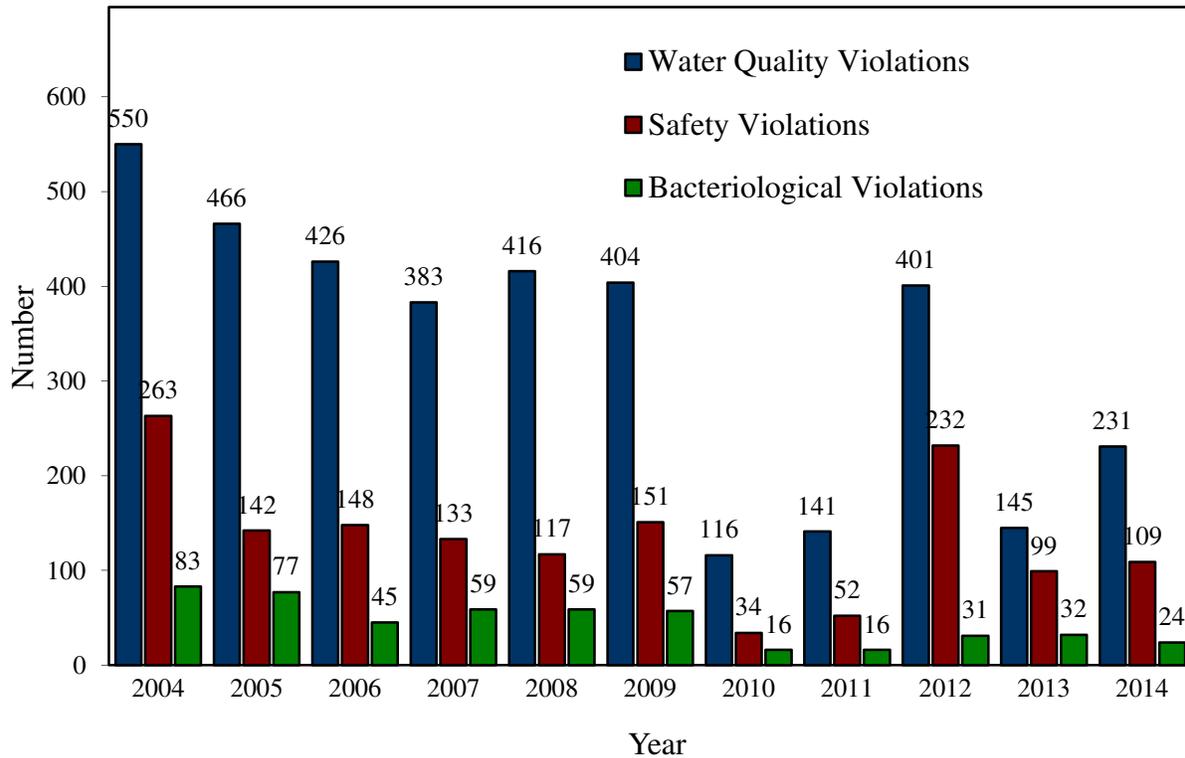


Figure 13: New Hampshire public bathing facility violations, 2014.



3.2.4 Freshwater Beach Program

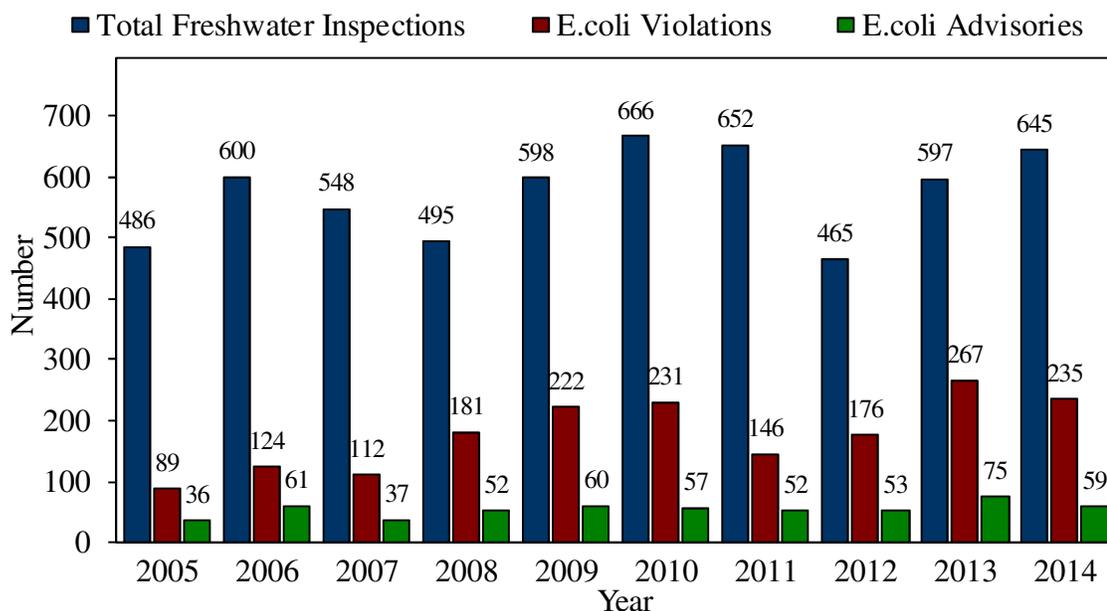
In 2014, freshwater beaches were inspected by the Public Bathing Beach Inspection Program from June 16 to August 21. The goal of the freshwater beach program is to inspect each beach in the program three times over between Memorial Day and Labor Day. In 2014, NHDES personnel performed 626 beach inspections at 169 freshwater beaches in 11 weeks. In addition, Drinking Water & Groundwater Bureau personnel conducted 36 routine inspections at juvenile camp beaches. The 626 inspections conducted yielded a total of 1,356 *E. coli* samples analyzed by the state laboratory, including field duplicates. Towns and federal agencies that sample water at New Hampshire beaches also collected 452 samples looking for bacteria at beaches. In 2014, 235 *E. coli* samples exceeded the state standards, resulting in the issuance of 59 freshwater beach advisories, a reduction of 20 percent from the summer of 2013 which had the highest number of bacteria advisories issued in one summer. Rainfall was just slightly above average in June and August of 2014 while twice as much rain fell in July 2014 than in previous years. The 59 freshwater beaches advisories issued in 2014 is 4 more than the 10-year average of 55.

Of the 43 beaches with elevated bacteria levels leading to advisories, 24 also had advisories in 2013. Twelve additional beach advisories were issued for cyanobacteria, four more than issued in 2013. However, not all cyanobacteria blooms occur on a beach. Since 2008, NHDES has issued cyanobacteria lake warnings if an algae bloom occurs far away from a beach or on a lake without a public beach. Cyanobacteria warnings were issued for Long Pond, Henniker; Otternic Pond, Hudson; Showell Pond, Sandown and Hunkins Pond, Sanbornton. Four warnings were issued, as twice as many as in 2013 and four times lower than in 2008.

Eleven preemptive fecal bacteria advisories were issued at Ahern State Park, Laconia, four fewer than in 2013. Preemptive advisories are issued when >0.25 inches of rain falls in a 6 hour period at the state park. The decrease was due to the decreased rainfall over the summer. Additional sampling was not conducted in the

summer of 2014 to determine if the efforts to reduce the goose population by letting the grass grow tall have been successful. Future sampling will be conducted after heavy rainfall at Ahern State Park in 2015 to determine if this pre-emptive advisory system can be eliminated. Not all freshwater beaches sampled by the NHDES program are accessible to the general public. Of the 145 town and private beaches that are sampled by the NHDES inspection staff, 102 limit entry to residents and guests only. Seven of the beaches charge entry fees to everyone. Only 36 of 145 private and town beaches allow unrestricted access to the swimming areas.

Figure 14: Water quality violations and advisories at freshwater beaches



3.2.5 Coastal Beach Program

The BEACH Program is a federally funded program that provides resources for coastal beach research and monitoring. NHDES inspected 16 coastal public swimming beaches in 2014. During the swim season, Memorial Day through Labor Day, eight beaches were inspected twice weekly and six were inspected weekly according to their tiered monitoring assessment. Sampling at the final three beaches, Hampton Harbor, Sun Valley and Northside Park (a.k.a. Plaice Cove), occurred every other week in 2014. Sampling frequency was reduced at Sun Valley Beach because, since 2004, the beach has never had any sample exceed state standard (n=318).

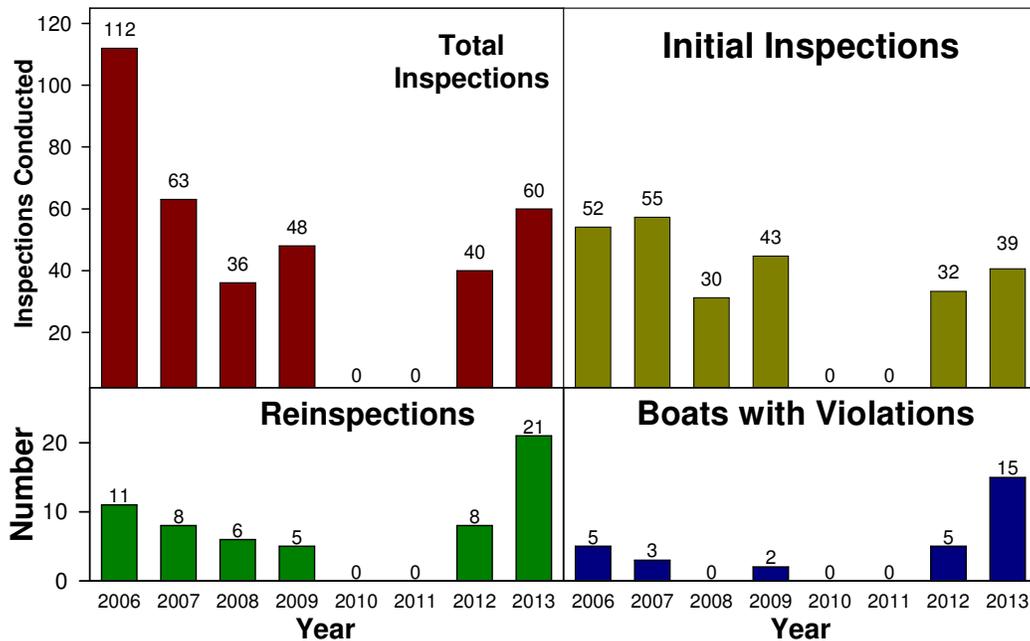
Staff members conducted 272 inspections and collected 951 samples for Enterococci analysis during the swim season. No off-season sampling was conducted in 2014. During the swim season, 15 Enterococci samples exceeded the state standard, resulting in five coastal beach advisories. Two of the five advisories were at North Hampton State Beach and in effect for a total of 8 days. The advisory issued for Wallis Sands Beach at Wallis Road in was based on elevated results in a sample collected in a tide pool. The swimming water samples collected from the beach were never above the state standard. The swim season in New Hampshire was 98 days long in 2014 which translates into 1,568 beach days for all 16 beaches. With only 15 advisory days during the entire summer at coastal beaches, the chance of a beach being under a swimming advisory was only 1% in 2014.

3.2.6 Boat Inspection Program

Promotion of proper boating practices and enforcement of the No Discharge Area designation was continued in 2014 by conducting inspections of vessels with onboard marine sanitation devices (MSD) that operate on inland waters. No marine toilet, sink or shower on any boat operated upon fresh waters of the state shall be so constructed or operated as to discharge graywater or sewage (whether it's treated or not) per RSA 487:2-3.

The 2014 season boat inspections were done on Lake Winnepesaukee on 12 separate events. Final numbers of total inspections, re-inspections, and approvals have not yet been calculated. The inspection summary (Figure 16) has not been updated yet with the totals for 2014.

Figure 15: NHDES biology section boat inspection summary, 2006-2013.



3.2.7 Clean Vessel Act Program

The New Hampshire Clean Vessel Act (CVA) program is a result of a cooperative effort between the NHDES and the U.S. Fish and Wildlife Service. The Federal Clean Vessel Act of 1992 was established to support adequate facilities for recreational boaters to dispose of waste from marine sanitation devices. Through grants from the U.S. Fish and Wildlife Service Sport Fish Restoration program, the CVA program has funding available to construct, operate, maintain, and repair stationary pumpout facilities and mobile pumpout services. These federal funds can be used to account for 75 percent of all approved projects with a minimum of 25 percent supplemented by the applicant including state and local government, and private businesses or associations.

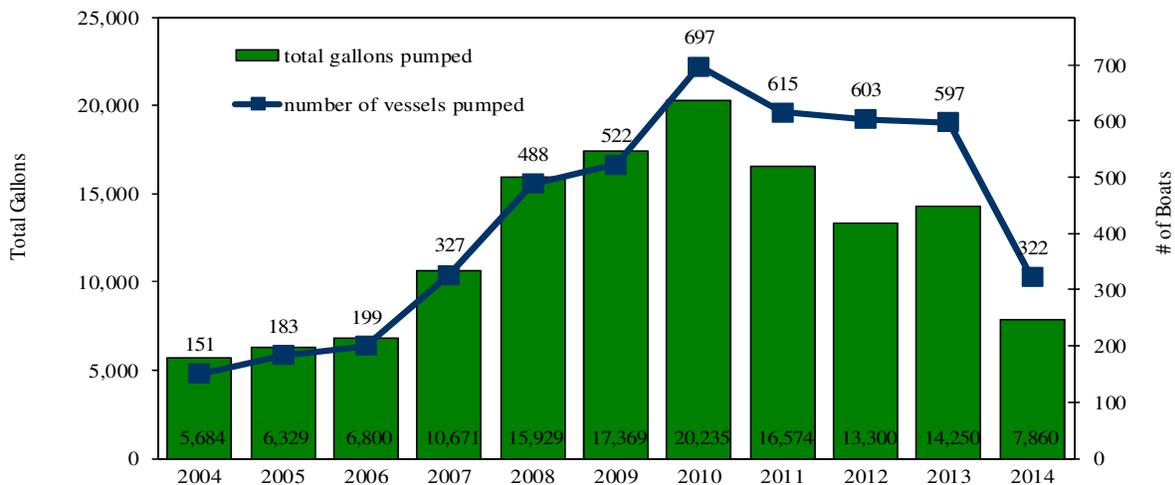
New Hampshire funding has been applied to the operation of a mobile pumpout service along the coast since 2002 and within inland waters 2010-2012. Beginning in 2006, these grants were also used to implement an Operation and Maintenance Funding program that continues to assist marinas in seasonal upkeep costs to ensure existing pumpout resources remain in proper working condition. Eligible state activities include general program administration and educational outreach to marina owners, boat dealers, and the boating fraternity.

Pumpout options are a key factor in maintaining No Discharge Areas (NDA) throughout New Hampshire waters. All waters within three miles of the New Hampshire shoreline and the Isles of Shoals are part of the coastal NDA where treated or untreated boat sewage is prohibited. Tidal and estuarine waters, including all bays and rivers to the tidal dams, are also incorporated into the coastal NDA. Important goals of the CVA program continue to include educating the boating fraternity of their environmental responsibilities and encouraging public awareness of sources of pollution and pumpout resources.

Coastal Waters – Four stationary pumpout locations and one mobile pumpout boat are available to the recreational boating public along New Hampshire’s coast. All four stationary facilities have taken part in CVA funds at one point either for initial installation or seasonal repairs. Two of the four marina locations were awarded 2014 CVA operation and maintenance funding for their stationary pumpout units. Under this grant, Wentworth Marina in New Castle, and Great Bay Marine in Newington continued routine operation and maintenance. Wentworth Marina also continued to support the mobile pumpout boat service by serving as the pumpout facility where all the collected sewage was discharged.

The mobile pumpout service receives CVA funding annually through a multi-year contract. Since 2002, approximately 141,000 gallons of sewage have been removed from recreational boats through the use of the mobile pumpout service. During 2014, the mobile pumpout season operated from May through August and the program documented 709.5 captain hours, 322 serviced boats, and the disposal of approximately 7,860 gallons of sewage. The popularity and effectiveness of the mobile resource has been evident in the consistency in boater user numbers and sewage pumped since program implementation (Figure 17). The mobile pumpout boat experienced engine failure in 2014 and therefore the time of service was significantly reduced. Boating community members who normally use the service were forced to find other viable options for sewage disposal. Seasonal activity within the recreational boating community varies from year to year depending on economic and weather conditions.

Figure 16: NHDES Clean Vessel Act Pumpout Boat Service



Inland Waters – New Hampshire has approximately nineteen pump/dump facilities with seventeen (13 of which are public access) devoted to Lake Winnepesaukee and one to Lake Winnisquam. A dump station is also located within Sunapee Harbor on Lake Sunapee. Approximately 50 percent of the available pump/dump facilities have taken part in CVA funding at one point or another either for initial installation or seasonal repairs. Three marinas on Lake Winnepesaukee were awarded 2014 CVA operation and maintenance funding for their stationary pumpout units.

The CVA program anticipates funding construction, renovation, and maintenance of systems as necessary in 2015. Project review for a mobile pumpout service dedicated to Hampton Harbor is currently underway. This service is expected to begin in 2015 for a pilot period of two years. Education and outreach to marinas, pumpout/dump stations, and the boater fraternity in general will continue both for inland waterbodies and coastal waters.

3.2.8 Exotic Species Program

The primary purpose of the exotic aquatic species program is to “prevent the introduction and further dispersal of exotic aquatic weeds and to manage or eradicate exotic aquatic weed infestations in the surface waters of the state” (RSA 487:17, II). The program has five focal areas: 1) Prevention of new infestations; 2) Early detection of new infestations; 3) Control of established infestations; 4) Research towards new control methods with the goal of reducing or eliminating infested areas; and 5) Regional and national cooperation.

There were two new infestations of exotic aquatic plants in New Hampshire in 2014, both were found as early detections and by the end of the 2014 growing season. Variable milfoil was found in both Baboosic Lake in Amherst and in Beaver Lake in Derry. The populations were deemed to be eradicated thanks to repeated diving operations during the growing season. At this time, neither waterbody was added to the list of infested waters, so the total number of infested waterbodies remains at 79. We plan to continue to monitor both sites to determine if the infestations persist.

The exotic species program inspected 90 waterbodies in 2014 for exotic species infestations (Figure 18). The exotics species program anticipates conducting at least 50 lake inspections in 2015 that have a high potential for exotic species infestations. The total number of management actions for exotic plant control in 2014 is shown in Figure 19.

Figure 17: Exotics species program lake inspections

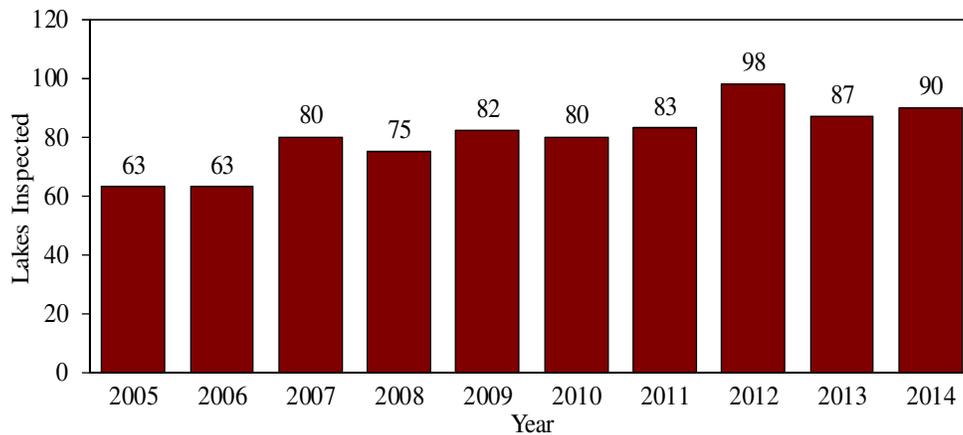
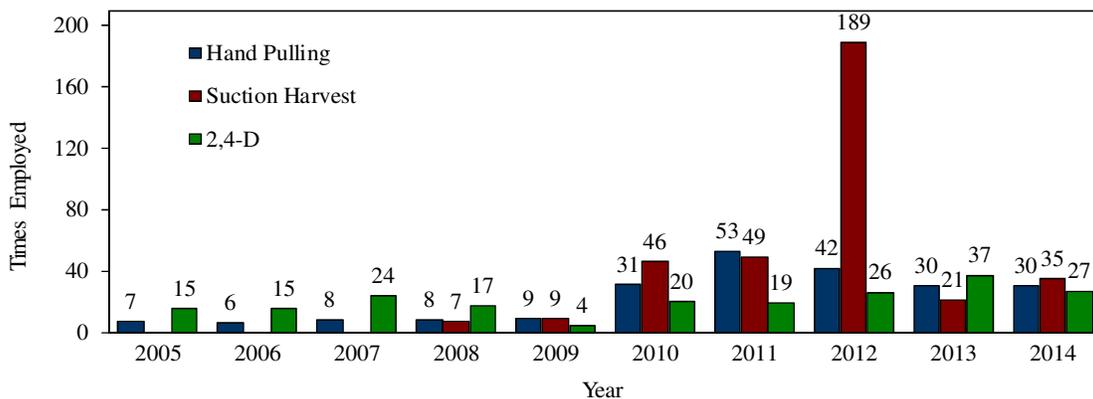


Figure 18: Exotics Species Program Control Practices



4. Summary

In summary, the NHDES WMB operated 16 programs dedicated to monitoring and protecting surface waters. Collectively, these programs provide critical information regarding the status and trends of the condition of our lakes, ponds, rivers, streams, estuaries, and oceans. Many of these programs also supply valuable data used to estimate public health risks. The JCLC serves as a vital component in the operation of each of these programs not only through the facilities and equipment it supplies, but also the consistency maintained in data quality control and data management. In 2014, nearly 10,000 data points were processed in the JCLC. The data quality control measures for all the data were adequately maintained. In total, surface water quality programs operating within the JCLC are covered under seven EPA QAPPs that have been approved or are pending approval. Programs without a formal QAPP have a dedicated SOP included in the JCLC laboratory manual which is updated annually. Changes in 2014 included the loss of the Plymouth State University satellite laboratory and the development of dedicated QAPP for the LTSP. Overall, the JCLC continues to serve a hub of NHDES surface water monitoring activities and a necessary resource to collecting high quality data on the state's natural resources.