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2004 Student Estuarine Research Project

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2004 STUDENT ESTUARINE RESEARCH PROJECT
A PUBLIC SCHOOL-BASED BIRD MONITORING PROGRAM

A Final Report to

The New Hampshire Estuaries Project

Submitted by

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Table of Contents

	Page
Executive Summary.....	3
List of Figures.....	4
Introduction.....	5
Project Goals and Objectives.....	6
Methods.....	6
Results and Discussion.....	8
Conclusions.....	12
Recommendations.....	12
Acknowledgments.....	12
Literature Cited.....	13
Appendices.....	14
Appendix A - Curriculum guidelines; Field Data Sheet	
Appendix B - Ecology Homework Assignments	
Appendix C - Ecology Vocabulary Glossary	
Appendix D - Field Notebook	
Appendix E - Raw data on bird observations	
Appendix F - Press coverage of the project	
Appendix G - Names of volunteers	
Appendix H - Names of sixth grade students	
Appendix I - Sample student writings and photos	

Executive Summary

This report describes the results of the second education and bird-monitoring program conducted by sixth grade students, teachers, and volunteers at Portsmouth Middle School. The program combined classroom lessons with field trips to monitor bird populations in South Mill Pond, a tidal pond-like estuary in front of the school. The Pond has suffered over the years from a variety of environmental problems as the City of Portsmouth developed, including major watershed changes, combined sewer overflows, runoff from city streets and parking lots, and fill projects. Several years ago, the City initiated a long-term project to re-direct sewage away from the Pond to the City's wastewater treatment plant. In 2001, scientists from the University of New Hampshire joined with the City, eighth grade students and teachers from Portsmouth Middle School, and local volunteers to construct experimental shellfish reefs and salt marsh habitat in the Pond.

Our project was designed to allow sixth grade students to participate in the overall community-wide program of restoring South Mill Pond. It had the dual goal of education and monitoring an ongoing habitat restoration project, and it involved approximately 175 students during Spring 2004 and 162 students during Fall 2004.

The education component consisted of teaching lessons on the ecology of coastal waters, how scientists study nature, and several biology topics, including identification and ecology of birds. The bird-monitoring component of the project involved observing, identifying and recording data on birds in and around the Pond. Each observation team consisted of four to six students and one or two adult volunteers, who in most cases were parents of students in the classes.

The data collected in 2004 were compared to the 2003 (year of the first bird monitoring project) data, and represented the beginning of what is anticipated as a long-term monitoring project for South Mill Pond. Similar numbers of birds and major bird types were observed in Spring 2004 compared to Spring 2003. However, during Fall 2004 many more ducks were observed compared to the Spring monitoring periods, perhaps reflecting waterfowl migratory patterns in general. This suggests that South Mill Pond may be an important feeding area for migratory ducks. The observation site that included restored shellfish reefs had the highest numbers of birds during Fall 2004. Otherwise, similar numbers and types of birds were observed in all four observation sites of the Pond both years. Future bird monitoring efforts will be able to use these data to assess long-term recovery of South Mill Pond.

Both goals of the project were accomplished in substantial ways. Sixth grade students participated in an extraordinary, hands-on science project and were given the opportunity to work with professionals. The unique curriculum and lesson plans included a student handbook on the ecology of the Pond. For nearly all of the science topics covered – including photosynthesis, food webs, pollution, habitats, and others – the focus was on how they related to South Mill Pond. This made all of the lessons much more interesting and relevant.

List of Figures

Fig. 1. South Mill Pond study area, showing four bird observation sites, residential and commercial development around the Pond, and the location of Portsmouth Middle School.

Fig. 2. Average numbers of birds observed per 10-minute observation period at each of the four study sites for 2003 and 2004.

Fig. 3. Average numbers of birds observed per 10-minute observation period by date with all four study sites combined for 2003 and 2004.

Fig. 4. Average numbers of the major bird types observed per 10-minute observation period each of the four major bird types with all study sites and dates combined for 2003 and 2004.

Introduction

During 2003, sixth graders at Portsmouth Middle School conducted the first bird-monitoring program for South Mill Pond (Grizzle 2003). The present project involved two additional groups of sixth graders, one during Spring 2004 and another during Fall 2004. These projects combined classroom education and field-based monitoring in a program that included students, teachers, scientists, and community volunteers. The overall aim was to involve students in a monitoring program designed to provide data for scientists to assess the long-term restoration and recovery of South Mill Pond.

South Mill Pond is a small estuary where freshwater mixes with saltwater from the ocean. It is part of the Piscataqua River watershed of Portsmouth, New Hampshire. Early maps and observations suggest South Mill Pond was a combined salt marsh-mudflat ecosystem (likely with shellfish) prior to settlement of Portsmouth in the 1600s. In those days, people swam and canoed in the Pond. But in the late 1800's, inside plumbing came to Portsmouth, and sewage and run-off from new roads were dumped into the Pond.

In addition to changes caused by pollution, the Pond was altered by various kinds of construction projects. The most conspicuous was a filled causeway supporting Junkins Avenue, which split the Pond into two portions, an inner pond and an outer pond. Currently, two large open culverts connect the two ponds and a tide gate on the eastern end connects the entire system to tidal waters leading to the Piscataqua River. Development around South Mill Pond, probably built on salt marsh in many areas, has been extensive: a city park, homes and city hall, including the police station, surround the outer portion. A city park, parking lots, recreation areas with tennis courts and ballparks, and Portsmouth Middle School, border the inner portion.

Centuries ago, South Mill Pond was a healthy estuary providing habitat for a diverse array of life - from the tiniest phytoplankton and zooplankton, to shellfish, fish, and birds. Today, however, most of the "freshwater" that feeds South Mill Pond is runoff from parking lots and streets, sometimes mixed with sewage. These changes have produced a Pond with problems, one of which is a build up of organic matter on the bottom and foul odors that sometimes come from the Pond. The City of Portsmouth has initiated a long-term re-sewering project that will eventually route sewage wastes from the area to the City's treatment plant.

In 2001, the University of New Hampshire joined with the City, Team Piscataqua (eighth grade students and teachers at Portsmouth Middle School), and local community volunteers to initiate a 1.5-year ecological restoration project that was jointly funded by the National Oceanic and Atmospheric Administration's Community-Based Habitat Restoration Program, the Gulf of Maine Council for the Marine Environment, the Greater Piscataqua Community Foundation, and the Wal-Mart Foundation (Burdick et al. 2002). This project resulted in construction of several experimental shellfish (mussels and oysters) reefs and salt marsh habitat, and enhanced tidal flushing of South Mill Pond.

Noticeable improvements in the Pond were documented by the UNH-coordinated project. During this project, it was also noted that citizens familiar with bird use of the area reported that bird numbers in and around the Pond seem to have been increasing over the past several years. However, no data existed on bird use of the area. Our project was designed to provide such data and to involve sixth grade students in the process.

Project Goals and Objectives

Overall, our project was directed at "Outreach Action Plan, EDU-5: Support for volunteer organizations active in water quality, habitat or other estuarine watershed natural resource issues" in the New Hampshire Estuaries Project Management Plan. One of the expected benefits of such activities mentioned in the Management Plan (NHEP 2000, p. 8-22) is "Volunteers engaged in environmental conservation, monitoring, and educational work make substantial contributions to raising public awareness and protecting and improving environmental quality."

Our project had the dual goal of education and monitoring an ongoing habitat restoration project. It consisted of seven major work tasks: develop curricula and lesson plans, conduct lessons, purchase supplies, conduct bird monitoring, data synthesis, project partner coordination, and media outreach.

Methods

Education Activities

Curricula (Appendix A) and lesson plans were developed based on the current sixth grade NH science standards and relevant to the bird monitoring activities of the project (see below): the scientific method; birds and their basic life processes; ecology and identification of phytoplankton; consumers; and photosynthesis and its ecological importance. Homework assignments (Appendix B) were given to provide students with an in-depth ecological research study (see pp. 21-22 in Appendix C Glossary).

The ecology of estuaries in general and South Mill Pond in particular was a central theme for most of the lessons. An ecology student handbook (Grizzle 2003) was developed as a primary text. All students were also given in-class instruction in field protocol techniques involved in the bird monitoring trips (see pp. 24-25 in the Field Notebook Appendix D). The project also had a language arts component where students completed a written research paper that involved various aspects of the writing process. Details on how the educational activities were conducted are given in the Results and Discussion section below.

Bird Monitoring Activities

The bird-monitoring component of the project was designed to provide UNH with quantitative data on overall bird use of South Mill Pond, and to test the hypothesis that the same number of birds would visit the inner pond (sites 1 and 2 on Fig. 1) when compared to the outer pond (sites 3 and 4). The overall study design was used to demonstrate to the students how scientists study nature.

To accomplish both objectives, the Pond was divided into four areas (referred to as sites) of approximately equal size and establishing a permanent observation site in each area (Fig. 1). One group of four to six students with one or two adult volunteers visited each of the four observation sites at the same time (between 12:30 pm and 1:45 pm) for an average of two days per week from March 25 to June 11 and from October 4 to November 29, 2004.

Students were trained to identify birds as belonging to one of six major types: duck-like, gulls, crows, perching, wading, or other. This represented a change from 2003 when identification to species level was attempted, but not successfully

accomplished much of the time. Hence, for 2004 the goal was correct identification of the major types of birds. Each student carried a field notebook (Appendix D), illustrated bird identification field guide and a bird monitoring data sheet (Appendix A) into the field. Upon arrival at the observation site, data were recorded on environmental conditions relevant to bird activities. Each team then observed, identified, and counted all the birds in their area for a 10-minute period, recording all data on the data sheet. During the next 10-minute period students would spread out and find a comfortable spot to record personal observations and drawings in their field notebooks. Students were assigned one of five jobs (Data Recorder, Marine Plant Ecologist, Behavioral Ecologist, Geographic Specialist, or Ornithologist, pp. 25 Appendix D) for each field day. Jobs were rotated on field days to provide students the opportunity to encounter different responsibilities for their observations. This general protocol was based on Dionne et al. (1999) and Brant monitoring guidelines (2003) web-published by the Qualicum School District in British Columbia (www.sd69.bc.ca/~brant/Curriculum/Ch8.html).

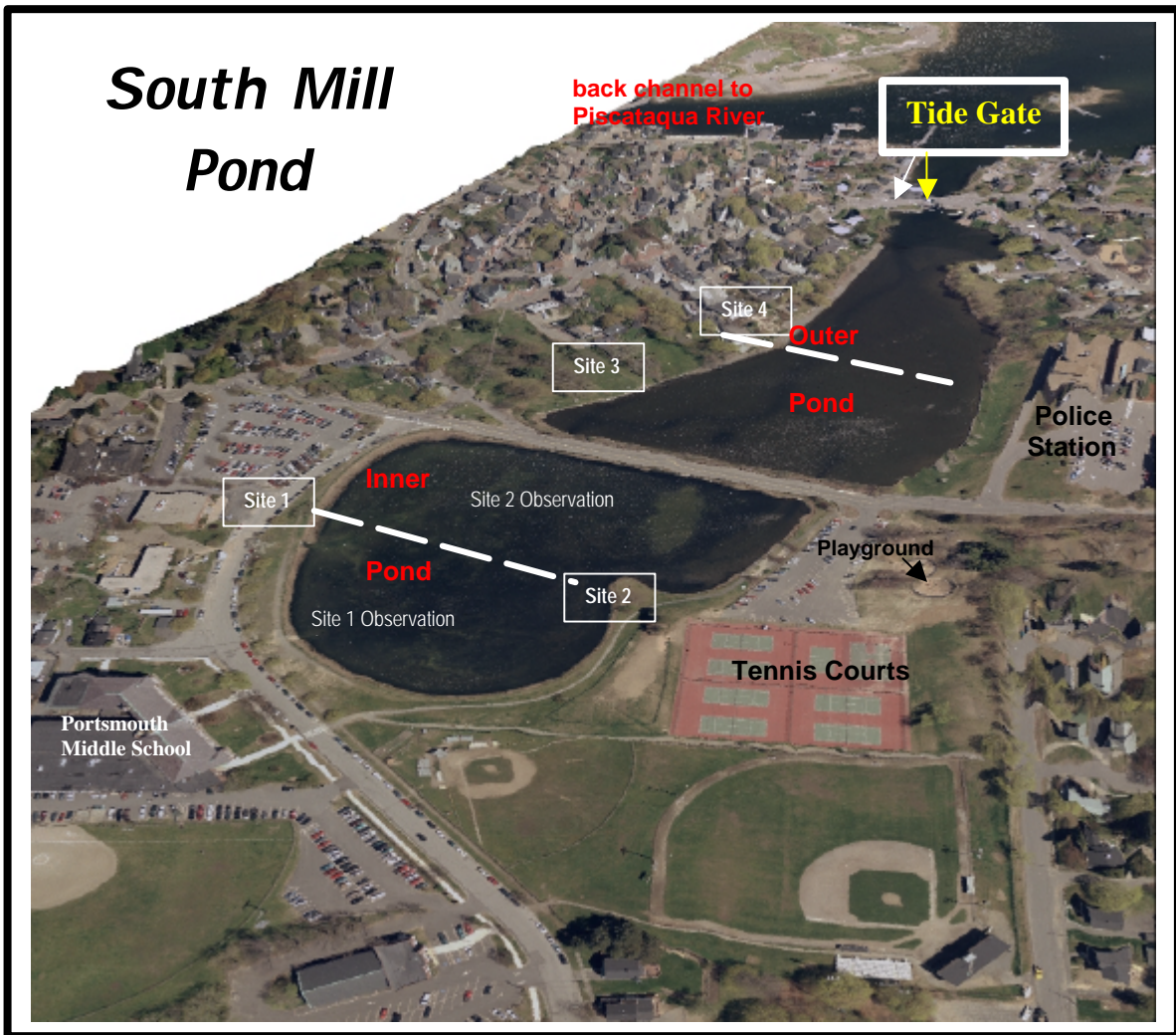


Fig. 1. South Mill Pond study area, showing four bird observation sites, residential and commercial development around the Pond, and the location of Portsmouth Middle School.

Results and Discussion

Education

Mrs. Sherry Weston, sixth grade science and math teacher at Portsmouth Middle School, taught classroom lessons and supervised field days. Mrs. Weston revised the student handbooks and field notebooks (Appendix D) from 2003 for the 2004 program, which involved approximately 337 students. Six guest speakers also prepared and conducted class sessions during 2004.

Three of the guest speakers had also participated in 2003. Ms. Candace Dolan, education specialist with the New Hampshire Great Bay Coast Watch Program, presented lessons on phytoplankton in estuaries, including identification and ecology. She brought in field microscopes and taught students how to identify phytoplankton. Ms. Dolan and her volunteers visited the school eight times and presented sixteen lessons. Ms. Karen Acerno, biologist with the New Hampshire Audubon Society, taught eight lessons during the Spring on bird ecology and identification, with an emphasis on those species occurring in coastal New Hampshire. Dr. Ray Grizzle, zoologist at the University of New Hampshire, presented lessons (eight visits to the school for a total of sixteen sessions) on the history and ecology of South Mill Pond. He also discussed his work as a marine biologist; the hypothesis that would be tested in 2004; how UNH researchers use the bird data; and the importance of the tide gate as the key to restoring the Pond, including how the city regulates opening and closing of the gate.

Three new guest speakers joined the program in Fall 2004. The first, Henry Burke, a bird expert from the Seacoast Science Center, discussed topics concerned with bird characteristics, the importance of color patterns, and how birds eat, including various types of beaks. Mr. Burke also taught about migration, and showed slides of ducks, gulls, herons, and shore birds that students should be able to identify.

Also new to the Fall lectures were Mr. Bruce Montville and Mr. Dick Dube from the Future Water Guardians of NH who introduced lessons on groundwater and watersheds. They introduced themselves as "guardians to protect surface waters from groundwater pollution." Mr. Dube demonstrated with a model how water draining from high ground to low ground runs into streams, rivers, estuaries, and finally the ocean. Mr. Montville demonstrated how surface water can become polluted by groundwater, and he explained the water cycle, showing how surface waters evaporate and cycle back to groundwater after falling as precipitation.

As during 2003, we found that students developed a sense of ownership of the Pond and the restoration process. Students at this age are excited about making a real difference in their community, and the more knowledge they gained on the pollution problems of the Pond the more passionate they became to "fix" it. Of particular interest to the students (and adults), was learning that there is a tide gate and how it affects the health of the Pond. Over the past decade or so, using the tide gate to maintain high tide in the Pond and control odors for several days probably has made conditions worse. If the gate is closed long enough, oxygen in the water is used up, killing fish and invertebrates in the Pond. Invertebrates such as worms, crustaceans, and mollusks that live in bottom sediments constantly mix and aerate them, contributing in the long-term removal of organic matter from the sediments. If these creatures are killed, then the entire food chain is altered and more foul odors are produced. UNH scientists

contend that the long-term solution to the odor problem—and the overall restoration of South Mill Pond—must include better management of the tide gate.

The unique curriculum developed using South Mill Pond to illustrate major lesson topics was invaluable for classroom discussions. Although requiring a lot of extra time to initially develop, the Ecology Student Handbook (Grizzle 2003) was very important to the success of the course. One of the unique features of the Handbook was a Glossary (Appendix C) with terms taken from our new *Environmental Science* textbook and then adapted to illustrate their importance to South Mill Pond. UNH scientists provided us with the information needed to specifically adapt the terminology to our needs.

Bird Monitoring

The average number of birds observed per 10-minute period at each of the four sites was very similar during Spring 2003 (last year's data) and Spring 2004 (Fig. 2). For both years, the smallest number of birds was observed at Site 1 in the inner pond, with similar numbers at the other three sites. Hence, for both years the hypothesis that the same number of birds would visit the inner pond (sites 1 and 2) when compared to the outer pond (sites 3 and 4) was not supported. However, during Fall 2004 more birds were observed at the two inner pond sites compared to Sites 3 and 4 in the outer Pond, the opposite of the trend during Spring. These data suggest that there may be substantial differences between Spring and Fall in bird use of South Mill Pond.

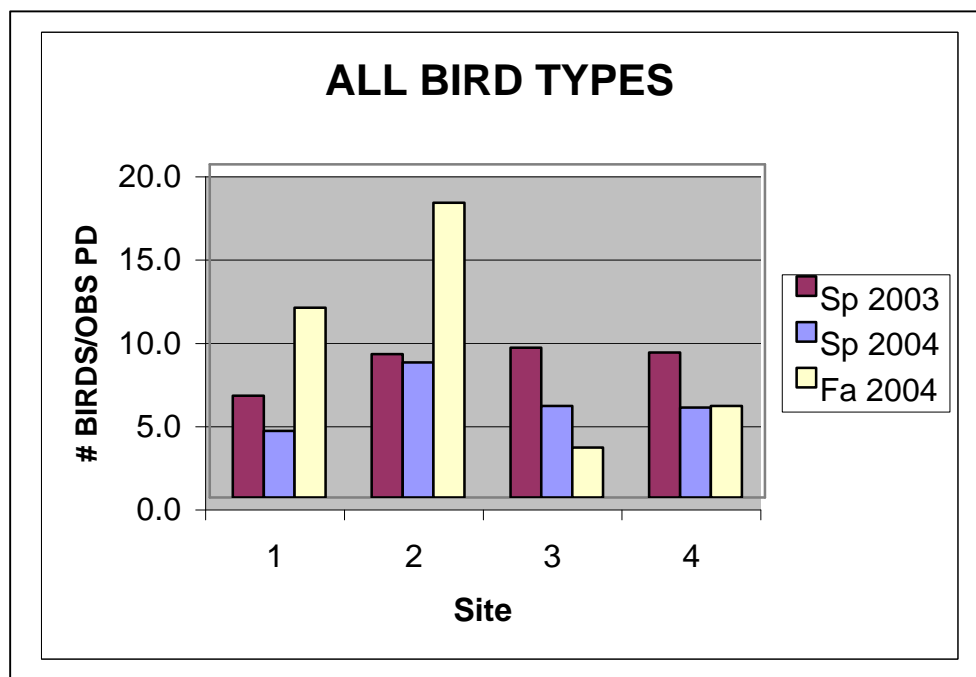


Fig. 2. Average numbers of birds observed per 10-minute observation period at each of the four study sites for 2003 and 2004.

Bird use of the Pond would be expected to vary by season, reflecting migration patterns and other movements of the dominant species. Comparison of the data by date indicated similar trends for Spring 2003 and 2004 with maximum bird numbers both years (Fig. 3). Both years generally also had the least numbers of birds during May. However, the rise in bird use in June for 2003 was not observed in 2004. In contrast, during Fall 2004 there were similar numbers of birds observed throughout the period.

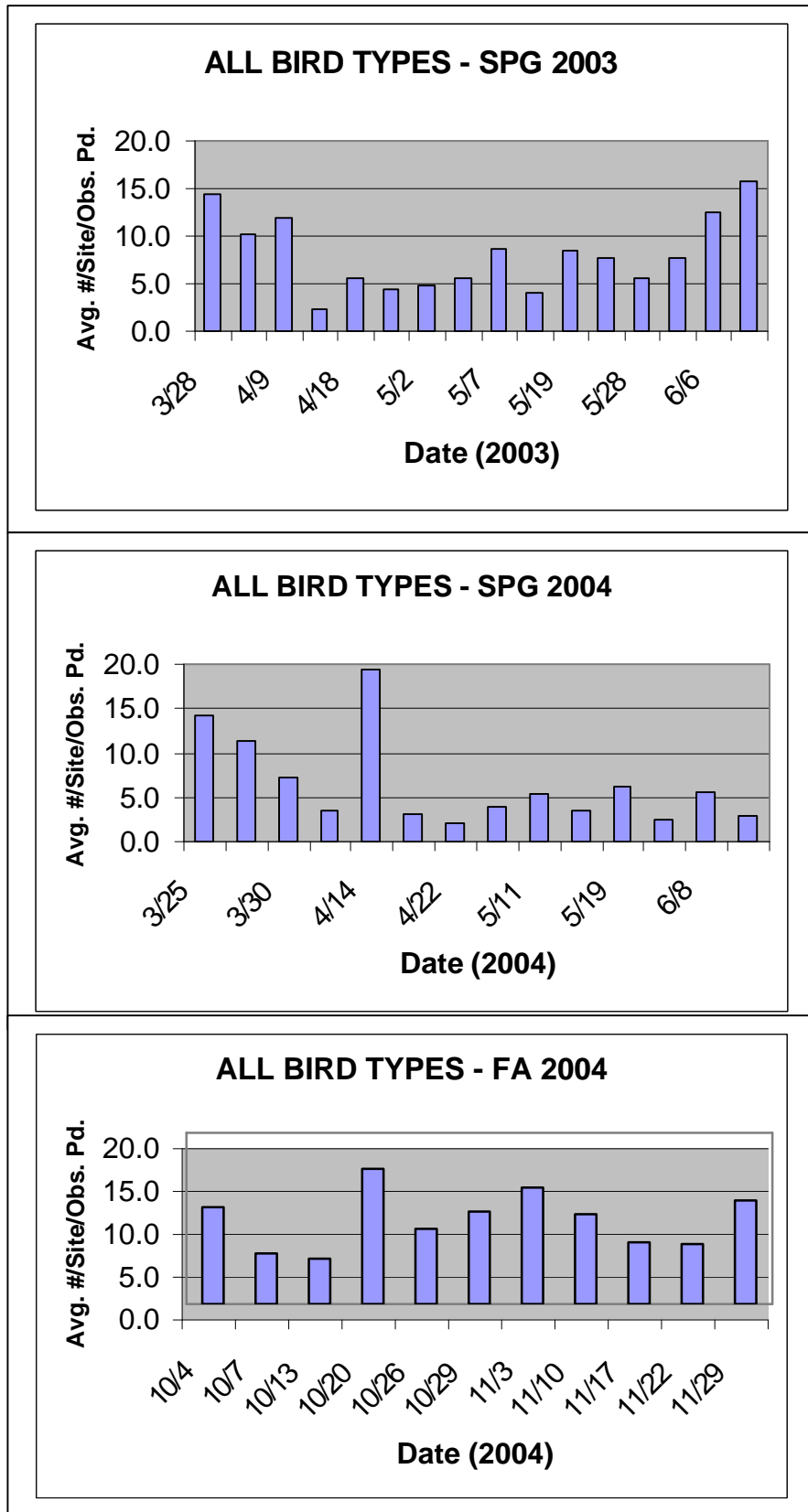


Fig. 3. Average numbers of birds observed per 10-minute observation period by date for 2003 and 2004 with all four study sites combined.

During Spring 2003 and Spring 2004, gulls were by far the most common bird type occurring in South Mill Pond when data from all sites and dates were combined, followed by crows, ducks and perching birds (Fig. 4). However, during Fall 2004 ducks far outnumbered the other types of birds. This probably reflected the migrations of ducks through New Hampshire as they flew south for the winter. These data suggest that South Mill Pond may be an important feeding area for ducks as they begin their migrations.

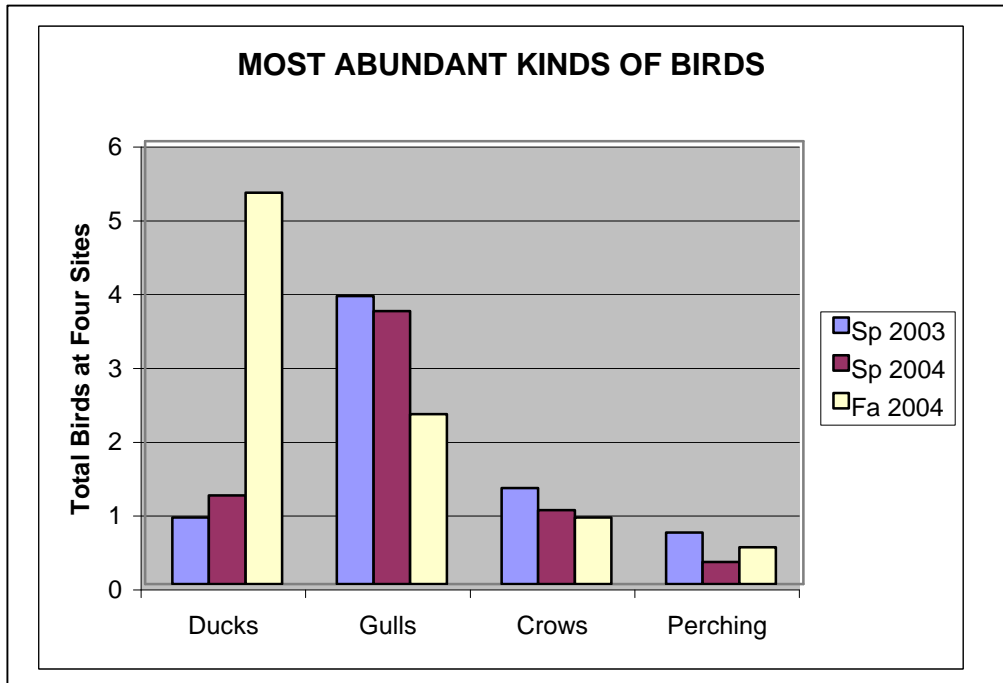


Fig. 4. Average numbers of the major bird types observed per 10-minute observation period each of the four major bird types with all study sites and dates combined for 2003 and 2004.

Project Partner Coordination

As project manager, Teri Grizzle worked with Sherry Weston in the revision of the student handbooks and field notebooks, providing approximately 700 copies of student materials. Mrs. Grizzle also was responsible for administrative duties including report preparation and budget management. Mr. Dave Cohen, Portsmouth's Community Service and Learning Program, provided a color printer and storage cabinet for the project. Scientists from UNH described the project in conference presentations in New Hampshire and Canada. The project was also discussed at the National Shellfisheries Association/World Aquaculture Society conference in Hawaii in March 2004.

Conclusions

We feel that both educational and monitoring goals were achieved in substantial ways. Approximately 337 sixth grade students at Portsmouth Middle School were taught lessons and received "hands-on" experiences in a real science project in collaboration with scientists from the University of New Hampshire and the New Hampshire Audubon Society. The major modification to the bird-monitoring component of the program for 2004 compared to 2003 was aiming for identification only to major bird type, instead of species-level. The data seemed much more consistent from group to group during 2004. However, some type of quality assurance program will need to be developed to better assess the quality of the data. Our data for 2003 and 2004 represent the first such surveys of bird use of South Mill Pond, and will serve as a baseline for future monitoring programs as the Pond continues to be restored.

Recommendations

Projects of this kind require a substantial amount of time and energy on the part of teachers and volunteers. This should be recognized and planned for early on. It required much more time than originally planned. Strong volunteer interest and involvement were critical to the project, but coordination of the volunteers consumed a considerable amount of time. Teachers typically do not have the time required to do these kinds of activities, so preliminary planning and allocation of work tasks is essential. At Portsmouth Middle School our sixth grade science classes are taught on three-week rotations. If other schools choose to model a similar program we suggest scheduling sessions longer than a 3-week period to provide the students with a more in-depth experience.

Because of the success of this project, it is recommended that a long-term comprehensive program be established at Portsmouth Middle School that involves as many students and teachers as appropriate in the ongoing restoration of South Mill Pond. Such an undertaking would require the continued guidance of principal John Stokel and Superintendent of Schools Dr. Robert Lister.

Finally, the response of parents and other citizens to involving middle school students with the restoration project was encouraging. To build on this interest in the future, a parent involvement program could be organized through the school.

Acknowledgments

This project was the result of the hard work of many individuals. Portsmouth Middle School staff involved in the project included Sherry Weston, sixth grade science teacher, and Teri Grizzle, the project coordinator. Karen Acerno (NH Audubon Society), Candace Dolan (Great Bay Coast Watch), Henry Burke (Seacoast Science Center), Bruce Montville and Dick Dube (Future Water Guardians of NH) and Ray Grizzle (UNH) donated their time to prepare lesson plans and provide much needed information for curriculum development. They also visited our classroom many times throughout the six months to conduct lessons. Ray Grizzle also gave valuable time to help prepare the final report. Superintendent Robert Lister has approved and helped with the administration of our NHEP grant. From the beginning, we had support from our principal, John Stokel.

We thank the many parent and community volunteers (Appendix G) for their participation in thirty field days. Their participation and enthusiasm was essential to the project.

Major funding (\$9950.00) was provided by the Local Grants program of the New Hampshire Estuaries Project. We thank Jennifer Hunter and Dave Kellam of NHEP for their encouragement and support. Supplemental funds (\$1200.00) were supplied by Portsmouth School System's Community Service and Learning Program. We thank Dave Cohen for his continued support from the project's inception.

Finally, we acknowledge all 337 sixth grade students (Appendix H) involved in the project. Their enthusiasm and observations while collecting data far surpassed expectations. A staff of 13 sixth-grade student volunteers donated their own time during school, after school, and at home, to compile written South Mill Pond pieces. They served as typists, editors, and artists who were involved in major decisions concerning final drafts. (Appendix I student samples)

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Appendix A

Curriculum Objectives: To include NH “Curriculum Standards and Student Proficiencies in Science, For Grade 6” – including process and content standards.

Students explored nature through binoculars. They worked in small teams to investigate the problems of South Mill Pond, but were encouraged to form their own predictions. Why were there only 2 birds at our site yesterday and today there are 18 birds? Are there more birds at site 2 or site 4? Are there more birds around the mussel reefs? Why did the newly planted salt marsh grass not survive? Students learned to accurately record interesting data for an ongoing community restoration project.

- **Scientific Method**

There is no fixed procedure called “the scientific method,” but that investigators involve systematic observations, carefully collected, relevant evidence, logical reasoning, and some imagination in developing hypotheses and explanations. And to establish relationships and patterns based on evidence and logical argument.

How can we tell if an ecosystem is changing? Is the water getting cleaner? Are there fewer birds? Unless a system is observed and documented, without the numbers, we can't protect the resource. “Today's students are tomorrow's stewards...caretakers of the planet. We need to get students out of their seats and outdoors... we have to let them fall in love with nature. People care for what they love.” -Michael Novacek, American Museum of Natural History.

Scientific Method for South Mill Pond: Determining the problem to investigate and our role in an ongoing community research program. Use a testable hypothesis.

1. Will we see more birds in the inner pond or the outer pond? (There will be more birds in the outer pond than the inner pond because the outer pond is healthier.)
2. Different species of birds will use the inner and outer ponds because different food is available.
3. Birds will be concentrated around restored habitats (8th grade project); mussel reefs and salt marsh grass.
4. What is the long term hypothesis? Health of the pond is improving over time. Our data is the first to be recorded. Scientists and PMS students will monitor and collect similar data each year. The data two years from now will be compared to data collected for the first time in 2003.

- **South Mill Pond Food Web**

To observe and describe major characteristics of various life forms; including microorganisms, fungi, salt marsh plants, and animals such as mussels and birds.

Disruptions in the food web:

What if you eliminated the largemouth bass (or a large predator of the Pond)? What if you poisoned the lake with pesticides, and a dragonfly ate 100 poisoned mosquitoes, a frog ate 10 dragonflies, a fish ate 5 frogs and 5 dragonflies, and you ate 3 fish? You would eat 16,500 particles of pesticide $(100 \times 10 \times 5) + (100 \times 5) \times 3 = 16,500$. When a water plant is fertilized from run-off water its vigorous growth decreases the sunlight and nutrients available to other plants.

- **Photosynthesis**

Basic process of photosynthesis and its importance to all life forms and how photosynthesis affects the Pond.

- **Pollution of local Watershed**

South Mill Pond's odor problems are from sewage being dumped into it throughout the years. Sediments are high organic, decomposed sewage over the years, leading to odor. The Pond needs more oxygen. If Portsmouth leaves the tide gate open the tide will move in and out and help to clean the sediment. Currently they close the tide gate on weekends so there will be fewer odors and no low tide.

- **Solving Ecological Issues**

Students shared data with all sixth graders and the University of New Hampshire from data collected and written essays.

The tide gate at South Mill Pond is the problem. Closing the tide gate removes the oxygen and is not a permanent solution. Students are given the opportunity to discuss their arguments with UNH scientists.

1. Development viewpoint – money, jobs, and food are most important. Close the tide gate and stop the smell. Our businesses are most important. Neighborhoods should have parties without the “odors” bothering guests. Tourists to Portsmouth deserve a nice place to visit.
2. Preservation viewpoint – humans take care of the earth, enjoy its beauty, birds should not be disturbed for human benefit. Remove the tide gate. Remove the road and redirect it or build a freestanding bridge that will open the pond back up and keep it flushing “naturally”.
3. Conservation viewpoint – okay to eat fish but not destroy the species. What is your solution for the tide gate?

Educating people about South Mill Pond might be the most helpful long-term plan. Townspeople and families that live near the pond might not realize what the problems are. All they know is that they don't like it to stink!

Salt marsh sprigs are continually being planted. When the pond loses its oxygen the plants can't survive. We can't keep planting grass, putting out mussels.

- **Ecology Vocabulary related to South Mill Pond Glossary** (Appendix C)

- **Bird Monitoring Data Sheet**

A data recorder from each team is responsible for data entries. The data sheet was created to reach the goals of UNH scientists and data important to Mrs. Weston. Students observed, described, and recorded weather conditions such as clouds, temperature, wind, and rain. By observing these variables, pollution, and tide measurements they were able to make predictions concerning bird habitat in South Mill Pond.

Bird Monitoring Data Sheet

(Data Recorder fills data sheet out at site.)

Observer (first and last) **names:** _____

Date _____ **We are at Observation site:** 1 2 3 4

Time started _____ **Time stopped** _____ **Total observation time** _____ **minutes**

Is the tide stage: low mid high

Weather conditions: mist/light rain rain snow no wind breeze windy

Cloud cover: clear partly cloudy cloudy heavy wind

Has it rained in the last 24 hours? yes no

Site 1 Air temperature: _____ degrees **Site 4 is tide gate:** open closed

Types of Birds	Number of Birds by Type	Names of birds that you can identify and how many. (i.e. 4 herring gulls; 2 mallard drakes; ...)	Notes: Is the bird feeding ...bothered by noises or people ... details to help identify the bird... anything exciting happening...
Duck – like			
Gulls			
Crows (perching)			
Perching			
Wading			
Other			
Total Birds:			

Appendix B

South Mill Pond Synopsis 2004

Day 1 Mrs. Weston: Introduction, student handbooks and textbooks (begin p. 1-9)

Homework: Prep for Dr. Grizzle

- Go over science contract with your parents (p.1-2)
- Vocabulary List 1 (Assignment on page 5 in this handbook.)
- If time, begin reading Day 2 homework

Due _____

Day 2 Mrs. Weston: Continue protocol, field jobs, data sheets (p. 1-9 in handbook; field notebooks)

Homework: Prep for Dr. Grizzle: In *Environmental Science* read:

- p. 20-21; "Communities" and "What Is Ecology?"
- p. 44-48; "Energy Flow in Ecosystems..."
- p. 200; "Think Like a Scientist: Observing, Inferring, Predicting"
- p. 204 "Conducting a Scientific Investigation: Posing Questions, Develop Hypothesis"
- Study definitions to Vocabulary 2 (p. 6 in this handbook)

Due _____

Day 3 Dr. Grizzle: History/Pollution/Remove-Restore/6th graders Spring 2003

Homework: Follow-up for Dr. Grizzle

- With a parent, read 4 newspaper articles: (p. 13-18 in this handbook)
 - o "It's a bird, it's a ... bird" ("Keeping Count")
 - o "Sweet-smelling makeover in cards for pond"
 - o "Fourth-graders aid Mill Pond recovery"
 - o "Students tackle pond stench"

Due _____

Day 4 *Field Day 1:* Record data 1st day

Homework: Prep for Karen Acerno, Audubon Society

- "How Can We Tell One Bird From Another?" (p. 19)
- Study Bird Shapes with pictures (p.20-28 this handbook)

Due _____

Day 5 Karen Acerno: (Audubon Society) "How to Identify Birds"

Homework: In *Environmental Science* read:

- p. 149-153; "The Water Supply"
- p.155-158 "Finding Pollution Solutions"

Due _____

- Day 6 *Field Day 2:* Collect data for 1st time.
Homework: In *Environmental Science* read:
 p. 52-53; "The Water Cycle" & "The Carbon and Oxygen Cycles"
 p. 175 "Tidal Energy"
Due _____
- Day 7 Mrs. Weston (or guest): Watershed; water cycle
Homework: In *Environmental Science* read:
 p. 18-19 "Abiotic Factors"
Due _____
- Day 8 Mrs. Weston: Laptops = Language Arts activity (varies w/each rotation)
Homework: In *Environmental Science* read:
 p. 23-28 "Studying Populations"
Due _____
- Day 9 Mrs. Weston: Laptops = Language Arts activity (varies w/each rotation)
Homework: In *Environmental Science* read:
 p.100-103 "Extinction of Species, Causes of Extinction..."
 p.104-105 "Protecting Biodiversity"
Due _____
- Day 10 Candace Dolan: (UNH: Great Bay Coast Watch) Phytoplankton Expert
 Field microscopes / power point
- Day 11 Mrs. Weston: Laptops = Language Arts activity (varies w/each rotation)
Homework: Continue work on project - final draft
Final Draft Due _____
- Day 12 *Field Day 4:* collect data; record observations
Homework: Continue work on final draft project
- Day 13 Mrs. Weston: Laptops = Language Arts activity (varies w/each rotation)
 (Last day in-class computers)
- Day 14 Mrs. Weston: Wrap-up and reflections
 Last recording in field notebooks: reflect on previous entries and observations.
 Discuss "patterns" at sites; predictions... data analysis

Vocabulary List 1

Assignment:

- Using the Glossary in this handbook study the definitions for the six vocabulary words listed below.
- Be prepared to participate in a game using these words. Your team will score lots of points if you not only know their meaning but their relationship to South Mill Pond as well.

1. water pollution -
2. estuary -
3. habitat -
4. restoration (restore) -
5. watershed -
6. biodiversity -

Vocabulary List 2

Assignment:

- In ***Environmental Science*** read: pgs. 20-21; 44-48; 200; 204
- ***After*** reading, use the glossary in this handbook to write definitions for Vocabulary List and include their relationship to South Mill Pond.

1. community (20) -
2. ecology (20) -
3. photosynthesis (45) -
4. decomposer (47) -
5. food chain (47) -
6. food web (47) -
7. observing (200) -
8. inferring (200) -

Appendix C

Glossary

(Page numbers refer to *The Science Explorer Environmental Science*, Prentice-Hall, 2002.)

- air pollution – A change to the atmosphere that has harmful effects to the health of living things. (p.140-142) Smog is formed when gases are burned from cars and trucks. Power plants and factories that burn coal and oil cause acid rain. When acid rain falls on South Mill Pond many fish, and their eggs, cannot survive.
- biodiversity – The number of different species in an area. (p.97-99) All species in an area are connected to one another. A change that affects one species will surely affect the balance of all the others. If the mussels in South Mill Pond cannot survive it would affect the quality of the water and be a loss of food for birds.
- competition – The struggle between organisms for the limited resources in a habitat. (p.33) There is a limited amount of food, water, and shelter. Some birds are active during the day, others at night, and some birds wade in certain areas of South Mill Pond, others swim, dive. The birds use different parts of the Pond in order to lessen competition with one another.
- consumer – An organism that obtains energy by feeding on other organisms. (p.46) Birds do not make their own food so they must eat other organisms such as plants and animals. Animals are consumers.
- decomposer – An organism that breaks down wastes and dead organisms. (p.47) Bacteria in the pond decompose sewage wastes that enter the pond.
- development – The construction of buildings, roads, dams, and other structures. (p.115) As more people settle in Portsmouth more houses and roads are built. This can lead to more pollution unless development occurs properly.
- development viewpoint – The belief that humans should be able to freely use and benefit from all of Earth's resources. (p.88-89) Economics: business, money and jobs.
- ecology – The study of how living things interact with each other and their environment. (p.20). Ecologists study how living things interact with their surroundings. In South Mill Pond, ecologists are interested in water quality, microorganisms, plants, fish, and birds. They study such things as food webs and the distribution of plants and animals in the Pond.
- ecosystem – All the living and nonliving things that interact in an area. (p.16) South Mill Pond can be considered a small ecosystem.
- endangered species – A species in danger of becoming extinct in the near future. (p.100). Birds that are endangered and occur in New Hampshire include the Bald Eagle ...environmental science - (p.87) is the study of the natural processes that occur in the environment (your surroundings) and how humans can affect them. How humans interact with their surroundings is what environmental scientists study and provide information for decisions to be made on environmental issues. UNH environmental scientists are collecting data from South Mill Pond that will provide the community with information on how to protect the Pond from pollution in the present and future.
- estuary – Where the fresh water of a river meets and mixes with the salt water of the ocean. (p.71) An estuary produces a unique and fertile environment that supports a diversity of plant and animal life. Fresh water in South Mill Pond comes from rainfall runoff from the surrounding neighborhoods and groundwater. The Pond empties into the Piscataqua River, which flows into the Atlantic Ocean.
- extinction – The disappearance of all members of a species from Earth. (p.100) Passenger pigeons were hunted for sport and food, and hundreds of thousands were killed. At some point, there were not enough birds to reproduce and increase their population. Only after the birds disappeared did people realize that they had killed too many for the species to survive.
- fertilizer – A chemical that provides nutrients to help crops grow better. (p.151)

Rain washes fertilizers into ponds, where they cause algae to grow quickly. Algae covers the pond and blocks the light from other plants in the pond.

food chain – A *series of events* in which one organism eats another (p.47). Food chains always begin with a producer such a phytoplankton or seaweeds in South Mill Pond. Small fish that are consumed by larger fish or birds eats the plants. Large birds such as the Great Blue Heron are at the top of the food chain.

food web – The *pattern* of overlapping food chains in an ecosystem. (p.47)

groundwater – Water stored in underground layers of soil and rock. (p.149)
South Mill Pond receives groundwater as it seeps into the Pond from the surrounding land.

habitat – The place where an organism lives and that provides the things it needs.
(p.17) South Mill Pond is a suitable habitat (place) for many species of plants and animals. Birds need water and food from the Pond to survive.

habitat destruction – The loss of a natural habitat. (p.101) Destroyed.
South Mill Pond's destruction is primarily caused by sewage overflowing into the Pond. Odors result from the decomposition of sewage and other organic material in the mud in the pond.

habitat restoration - An effort to restore (bring back) habitats (places where plants and animals live) that have been destroyed. The University of New Hampshire has a long-term goal of restoring healthy water to the Pond by constructing new habitats where more plants and animals can live. The City of Portsmouth has a long-term goal of removing all the sewage from the Pond.

hazardous waste - A material that can be harmful (to humans or the environment) if it is not properly disposed of. (p.131) Examples: window cleaner, radio batteries, nail polish remover, and toxic chemicals from industries. (see p.130)

hypothesis – A possible explanation for a set of observations or answer to a scientific question; must be testable. (p.204) Hypothesis for South Mill Pond: There is no difference in the number of birds that live in the outer pond compared to the inner pond. (This hypothesis can be tested by the information/data that you keep during your bird observations.)

inferring - (p.200) To interpret an observation using facts, your own experiences and knowledge to reach a logical conclusion. An inference is not a fact; it is only one of many interpretations. An inference may turn out to be wrong. For example, you and I are both reading the same crime mystery. As you read, you will pick-up on different clues and suspects than I would. We would both "infer," or come to a logical conclusion to who we think committed the crime. By the end of the book, the author could have shocked us both...and our conclusions could both be wrong!

pesticide – A chemical that kills crop-destroying organisms (beetles, worms). (p.151)
Planes spray crops with pesticides. Pesticides also harm birds that feed in sprayed fields. Even low levels of chemicals in South Mill Pond causes water pollution and can be harmful as it moves through the food chain.
Water → microorganism → plants → fish → birds

photosynthesis – The process in which organisms use water along with sunlight and carbon dioxide to make food. (p.18) All living things require water to carry out their life processes. Plants and algae use water, along with sunlight and carbon dioxide to make food. Other living things eat the plants and algae to obtain energy. In South Mill Pond, when the sun is shining phytoplankton take in carbon dioxide from the water and produce oxygen. The animals in the Pond use up the oxygen and give off carbon dioxide as a waste product.

pollution – A change to the environment that has a negative effect on living things.
(p.85) Adding chemicals to a natural habitat. Sewage has a negative effect on South Mill Pond because it smothers organisms living on the bottom of the pond and it can cause a loss of oxygen as bacteria decompose the sewage.

preservation viewpoint – The belief that all parts of the environment are equally important, no matter how useful they are to humans. (p.88) Humans are the caretakers of nature. Earth is a source of beauty, comfort, and recreation. Living things and ecosystems should not be disturbed for the benefit of people.

producer – An organism that can make its own food. (p.45) Any plant. restoration - To restore, to bring back. South Mill Pond needs to bring back (restore) phytoplankton, seaweed, and mussels to be a healthy pond.

sediments – Particles of rock and sand.(p.152) As rainwater runs off streets in Portsmouth sediments from cars, building sites, can be washed into South Mill Pond. These particles cover up food sources, nesting sites, and eggs of organisms. By blocking sunlight in the water, the sediments prevent algae and plants from growing. This affects other organisms that need algae and plants for food.

sewage – The water and human wastes that are washed down sinks and toilets. (p.151) Sewage is why South Mill Pond is polluted. Bacteria living in the sewage multiply and use up the oxygen in the water. Other organisms that need the oxygen, such as phytoplankton, fish and mussels, cannot survive.

species – A group of organisms that are similar and reproduce to produce fertile offspring. (p.19) A few bird species in South Mill Pond: ducks, gulls, crows.

threatened species – A species that could become endangered in the near future. (p.100) Threatened birds in New Hampshire:

variable – Any factor that can change in an experiment. (p.205) A variable in South Mill Pond will be the number of birds counted each day because the numbers will always be changing.

water cycle – The continuous process by which water moves from Earth's surface to the atmosphere and back. (p.52) Water from the surface of South Mill Pond evaporates into the air.

water pollution – Any change to water that has a harmful effect on people or any living thing. (p.150-151) Most pollution is the result of human activity. South Mill Pond could be affected by fertilizers from yards, pesticides from spraying lawns and crops, insecticides/spraying for mosquitoes, local industry around the port, runoff from construction sites, oil and gasoline from streets or underground storage tanks...these all produce toxins that can end up in the Pond.

watershed - a network of streams (throughout New Hampshire) that send water to a particular body of water (the ocean). Streams in New Hampshire send storm water to the Piscataqua River, including South Mill Pond, and the storm water finally empties into the Gulf of Maine. South Mill Pond (The Piscataqua River Watershed) is an urban watershed (stage 5). During heavy rains, this underground water includes runoff from the streets, gutters, drains, pipes and sewer lines. To see a map of our watershed, The Piscataqua River Estuary at Portsmouth Drainage area, visit this website: www.mywatershed.com/pis/graphic/pis92.gif

Further References for Students and Parents

- www.enature.com birds (excellent bird photos)
- www.enchantedlearning.com (birds, animals)
- www.npwrc.usgs.gov/resource/tools/duckdist/sizes.htm
- www.audubon.org/bird/watch/kids
- www.ecokidsonline.com
- www.pbs.org/lifeof/birds/ (bird brains, interesting bird stories)
- www.livingwithwildlife.org (conflicts with animals, cruelty to animals)
- www.endangered.fws.gov/kids/heyteach
- www.adopt-a-watershed.org Check links for birds
- www.mywatershed.com/pis/graphic/pis92.gif
- www.epa.gov (ecosystems and pollution)
- www.amnh.org/learn/biodiversity *** American Museum of Natural History classroom today?
- www.writesite.org NY Times Lesson Plans Excellent ideas for essays, animal rights (parrot); active voice (verbal and nonverbal communication) Good conversation starters with parents. May the Force Be WithYou
- www.mywatershed.com/pis/graphic/pis92.gif
- www.epa.gov (ecosystems and pollution)
- www.planetpals.com
- www.learner.org/exhibits/garbage
- www.niehs.nih.gov/external
- www.dnr.state.wi.us/org/caer/ce/eeek ***
- www.eelink.net environmental education

Appendix D

Field Notebook

Portsmouth Middle School Grade 6

2004 Student Estuarine Research Project
Portsmouth, New Hampshire

This book belongs to _____

Date _____

March - June 2004
September - November 2004

South Mill Pond project in collaboration with the University of New Hampshire, Great Bay Coast Watch, NH Audubon Society, and community volunteers. Funding provided by New Hampshire Estuaries Project (NHEP) and the Community Higher Education and School Partnership (CHESP) Service and Learning Program.



Protocol for Bird Monitoring/Field Work

University of New Hampshire

Equipment

___Field Notebooks ___Data Sheets ___Maps ___Clipboards ___Pencils ___Bird field guides ___Binoculars
___Stopwatches ___Outdoor Thermometer (Site 1) ___Walkie Talkies

General Protocol

1. In classroom: students sit at designated team desks and put on binoculars. Binocular straps must be worn at all times. Place lens caps inside binocular cases and leave on desk. Put on nametags. Prepare clipboards and field notebooks.
2. After assigning sites and jobs, Mrs. Weston will dismiss teams to leave for the field. There will be no talking in hallways OR stairwells where voices echo and are extremely loud.
3. Walk to assigned observation site. Students must walk quietly, no running, or behavior that will scare away the birds. Do not throw rocks into the pond. The exact four locations will be visited on each observation period, one site per team. Teams will observe approximately one half of each pond (see map). **Never look directly at the sun through binoculars.**
4. At site: once all team members are in position record the time and begin your stopwatch for a 10-minute count. Birds should only be counted if they are in the pond, diving into the water, in a tree that surrounds the pond, or on the bank of the pond. ***Birds spotted flying overhead of the Pond should not be counted.***
5. During the 10-minute count data recorders will record the team's observations. All members of the team will participate in the 10-minute count.
 - a. Begin bird observations and give information to the team data recorder who will record names and numbers of birds on lower list of data sheet.
 - b. Use binoculars to identify and count all birds on or near the water. Begin observation and recording of birds closest to you.
 - c. Students will first identify birds as: ducks, gulls, crows, shorebirds, perching birds, other
 - d. What are the birds eating? Are birds near a culvert or open drainage area?
 - e. Make notes on general environmental conditions such as loud noises, numbers of people present, or other conditions that you think might have affected the birds.
 - f. After each bird recording, note the bird's general location paying particular attention to birds over shellfish reefs and planted salt marsh.
6. After 10 minutes, record time and stop observations.
7. Work with the data recorder if s/he needs information to complete note. As a team, decide on tide stage, tide gate (site 4), air temperature (site 1), and tide measurement (sites 2, 3).
8. For the next 10 minutes teams will spread out (at least an arm's length away from teammates) and begin recording their individual "job" responsibilities in field notebooks. Don't forget to date your field notebook page. During this quiet time discussion of ideas with team members is not allowed. Your comments will all be different according to individual observations and knowledge. This information is **extremely important to the study, please take your job seriously!** Refer to field guides. If you have questions ask your adult leader. (All field notebooks will be given to UNH for data collection.)
9. Prepare to return to school. Check site for equipment, jackets, and that you have left no litter behind.
10. Return to school quickly, you cannot be late for your next class or miss the bus.
11. **Back in the classroom period 6:** pack binoculars neatly in cases with lens caps on and place them on desk. You should remove your field notebook from the clipboard and your name badge and place them inside the zip bag with your core teacher's name on it. The zip bag stays out on the desks once packed. Data recorder writes bird count on wall chart and all team members can write comments in the "notes" section of the chart. Again, many people are looking at this data. Take serious notes and write some of what happened on the wall chart for everyone to read. It is the data recorder's responsibility to give completed data sheets to adult volunteers.
12. **Back in the classroom period 7:** same as above. Then (1) pack binoculars neatly in a row in the field bag; (2) pack clipboards neatly along the sides; (3) both zip bags of field notebooks and nametags on top. Field bags should be packed neatly, never throw clipboards and binoculars quickly into the bag. Adult leaders are not here to serve you. You are responsible for field equipment and packing field bags at the end of the day. Please take time to thank the adult leader that volunteered so that you could go outside.

Much of this field trip protocol was adapted from The Brant Monitoring Program

"In order to figure out how many species are present in a certain place, you need to count them... therefore we're faced with two major problems. Problem number one is that birds have a bad habit of moving. Occasionally they even fly. Counting all the birds in an area is very difficult unless you make them all keep still. The historical solution to this problem was to shoot birds and count their carcasses, but we don't think we need to explain why this isn't a particularly good idea from a conservation standpoint."

-Bird Diversity Field Manual, The Watershed Institute, Chestnut Hill, MA, 2001.

Observations should be written in field notebooks. Every entry must include the date and weather.

Each team of students will be responsible for the following jobs:

1. **Behavioral Ecologists I and II:** Students will make careful observations about the area surrounding the bird(s) and the relationships of the environment to the bird(s). You will be investigating how birds interact with their living and non-living environments or how they behave under certain conditions. Learning about bird behavior is information that can support bird population in this area if ever there were any threats to its population.
 - What kinds of sounds do you hear? Where are the sounds coming from? How do you think the sounds affect the birds? Are birds singing?
 - What types of human activity do you see around you? Do these things seem to help or hurt the survival of birds?
 - Take time and watch one bird with your binoculars. Record your observations. Describe its behavior and what might be causing that behavior. (On ground hopping or jumping, flying, swimming.)
 - Make note of any air, water or noise pollution.
 - How do the actions and behavior of the birds relate to their surroundings, the disturbances, and your class being there?
2. **Geographic Specialists:** Students will create a map with representations of objects and landforms that are in the vicinity of the bird(s). In your field notebook draw a map of the location of birds you see. Include landforms of the pond area such as trees, land points, concrete walls, salt marsh, and also mussel reefs.... Are the birds in the water? Along the shore? Flying above? **Most importantly, we want to know where the birds are feeding.** Include those areas on your map.
3. **Marine Plant Ecologists:** Students will conduct a basic survey of the major plant life in the area near the bird, including their favored foods: eelgrass and sea lettuce. Is there evidence of plants living in the water? Describe what you see. Do you think these plants are affected by the tide? How might the tide affect the plants and bird populations in the Pond? Notice the landscape around the Pond. Are birds using these plants? How would the plant life in this area change if there were an oil spill?
4. **Data Recorder:** Responsible to record all information on data sheets. (Names, date, site, times, tides, weather...) As team members work with partners to count and id birds you will help in the decision-making and will determine what information is recorded.
5. **Ornithologist:** Using field guides these students are responsible for making final decisions on all bird identifications.

Data Recorder

Field Day # _____ Site # _____

Name _____ Date _____ Time _____
(First and last names)

General weather conditions _____

Task #1

Together with your group, begin bird observations. For exactly 10 minutes, count and record the number of birds and their names (if known) on your data sheet. For these 10 minutes, your team will be giving you information on birds that they see. **Most importantly, we want to know where the birds are feeding and what they are eating.** Make quick notes for identification of birds, you will have time following the first 10 minutes to sit and completely fill it out. At the end of the 10 minutes your team must agree as to how many birds you all counted. If there is a dispute, after debating, you will make the final decision as to the count and id of birds. Follow the protocol in this field notebook so that your data will be accurate.

Task #2

The Data Recorder is responsible for accurately *completing* the page titled "Bird Monitoring Data Sheet". A data sheet should be stapled inside this notebook, if you do not have one ask the adult volunteer for an extra copy. It is your job to be sure all data is entered with accuracy and details. At the end of today, your data sheet will be collected for UNH scientists. When completed give the data sheet to your adult volunteer.

Task #3

On the back of this page, list 3 other observations that you find interesting. Give any details that will help us to understand what you saw and what you are thinking.

Marine Plant Ecologist

Field Day # _____ Site # _____

Name _____ Date _____ Time _____
(First and last names)

General weather conditions _____

Task #1

Together with your group, begin bird observations. For exactly 10 minutes, count the number of birds and their names (if known). As you are counting, give the information to your Field Manager to record on your team's data sheet. **Most importantly, we want to know where the birds are feeding and what they are eating.** Follow the protocol in this field notebook so that your data will be accurate.

Task #2

In the space provided, answer the following questions:

1. Describe any odors (both pleasant and unpleasant that you smell. What do you think is creating the odor?

2. What effect, if any, is today's tide having on the birds? Explain your reasoning.

South Mill Pond Salt Marsh Plants



To help us understand why marshes along the Pond are deteriorating, 8th graders planted two experimental plots of cordgrass.



Sea Lettuce on mudflats indicates pollution.



Healthy cordgrass in the fall. Mud flat is covered with sea lettuce.



Flowering cordgrass

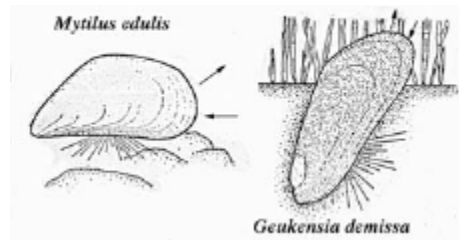


Glass Wort is only about 5 cm high.



Guided by UNH scientists, 8th graders built nine mussel reefs in SMP.

Ribbed Marsh Mussels



Behavioral Ecologist 1

Field Day # _____ Site # _____

Name _____ Date _____ Time _____
(First and last names)

General weather conditions _____

Task #1

Together with your group, begin bird observations. For exactly 10 minutes, count the number of birds and their names (if known). As you are counting, give the information to your Data Recorder to record on your team's data sheet. **Most importantly, we want to know where the birds are feeding and what they are eating.** Follow the protocol in this field notebook so that your data will be accurate. If you can't identify the bird, what color is it? Any reason why the birds might be scared? Are they diving into the water? Are they fighting over food (competition)?

Task #2

The behavioral ecologist will make careful observations of the relationship of the environment to the birds. Through this investigation you will observe how the birds interact with living and non-living things in their environment. In order to further clarify your observations answer the following questions:

- What kinds of sounds do you hear?
- Where are the sounds coming from?
- What effect do the sounds have on the birds?

- Choose three things within your site that you think are affecting the birds. Describe what they are and what effect they are having on birds.

1.

2.

3.

- Identify all types of human activity around you. Does this human activity have a positive or negative effect on the birds?

Task #3

On the back of this page, list 3 other observations *of any kind* that you find interesting. Give any details that will help us to understand what you see and what you are thinking.

Behavioral Ecologist 2

Field Day # _____ Site # _____

Name _____ Date _____ Time _____
(First and last names)

General weather conditions _____

Task #1

Together with your group, begin bird observations. For exactly 10 minutes, count the number of birds and their names (if known). As you are counting, give the information to your Data Recorder to record on your team's data sheet. **Most importantly, we want to know where the birds are feeding and what they are eating.** Follow the protocol in this field notebook so that your data will be accurate.

Task #2

Your responsibility is to observe and describe bird behaviors. Refer to the "Bird Behavior Bingo" sheet on the next page to help you answer the following questions. Please check off any of the following bird behaviors that you observe:

Below, describe in detail how many birds and which species were exhibiting which behaviors:

- flocking -

- flying -

Below, describe in detail how many birds and which species were exhibiting which behaviors:

- feeding -
- bathing -
- preening -
- freezing -
- singing -
- giving an alarm call -
- hiding -

If you were unable to observe any of the above behaviors please make three possible conjectures as to why this happened.

- 1.
- 2.
- 3.

Task #3

On the back of this page, list 3 other observations *of any kind* that you find interesting. Give any details that will help us to understand what you see and what you are thinking.

Geographic Specialist

Field Day # _____ Site # _____

Name _____ Date _____ Time _____
(First and last names)

General weather conditions _____

Task #1

Together with your group, begin bird observations. For exactly 10 minutes, count the number of birds and their names (if known). As you are counting, give the information to your Data Recorder to record on your team's data sheet. **Most importantly, we want to know where the birds are feeding and what they are eating.** Follow the protocol in this field notebook so that your data will be accurate.

Task #2

On the following page create a map with representations of objects and landforms that are in the vicinity of your site.

Task #3

On the back of this page, list 3 other observations that you find *of any kind* interesting. Give any details that will help us to understand what you see and what you are thinking.

This geographic map must include the following information: ?sewers and culverts ?location of birds ?mussel reefs ?marsh grass
?roads ?trees ?bushes ?plants ?banking ?concrete walls ?tide markers (sites 2,3) ?tide gate (site 4)

Extra Notes, Drawings and Questions

Don't forget to date these observations:

Bird Counts From South Mill Pond by Date and Time - Spring 2004

<i>Date/Time:</i>	3-25-04 12:30-12:40	3-25-04 12:35-12:45	3-25-04 12:40-12:50	3-25-04 12:35-12:45	3-25-04 1:20-1:30	3-25-04 1:18-1:28	3-25-04 1:20-1:30	3-25-04 1:23-1:33		
<i>Site:</i>	1	2	3	4	1	2	3	4		
<i>Weather:</i>	cldy, breeze	cldy, breeze	ptly cldy	cldy, windy	cldy, breeze	cldy, windy	ptly cldy, wndy	cldy, windy		
<i>Tide Stage:</i>	low	low	mid	mid	low	low	low	low		
Bird Type	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	TOTALS	avg/day/site
Duck-like	0	3	5	2	0	2	9	9	30	3.8
Gulls	0	25	9	1	2	34	6	3	80	10.0
Crows	0	0	0	0	0	1	1	0	2	0.3
Perching	0	0	0	0	0	0	0	1	1	0.1
Wading	0	0	0	0	0	0	1	0	1	0.1
Other	0	0	0	0	0	0	0	0	0	0.0
TOTALS:	0	28	14	3	2	37	17	13	114	14.3
<i>Date/Time:</i>	3-26-04 12:39-12:49	3-26-04 12:35-12:45	3-26-04 12:37-12:48	3-26-04 12:39-12:49	3-26-04 1:24-1:34	3-26-04 1:25-1:35	3-26-04 1:23-1:33	3-26-04 1:25-1:35		
<i>Site:</i>	1	2	3	4	1	2	3	4		
<i>Weather:</i>	ptly cldy, breeze	ptly cldy, breeze	ptly cldy, breeze	breeze	clear, breeze	windy, clear	breeze, clear	breeze, clear		
<i>Tide Stage:</i>	low	low	low	low	low	low	mid	low		
Bird Type	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	TOTALS	avg/day/site
Duck-like	0	5	6	2	0	7	6	2	28	3.5
Gulls	4	24	2	2	1	19	1	6	59	7.4
Crows	0	0	2	0	0	0	0	0	2	0.3
Perching	0	0	0	0	0	0	0	0	0	0.0
Wading	0	0	0	0	0	0	0	0	0	0.0
Other	0	0	0	0	0	0	0	1	1	0.1
TOTALS:	4	29	10	4	1	26	7	9	90	11.3
<i>Date/Time:</i>	3-30-04 12:30-12:40	3-30-04 12:30-12:40	3-30-04 12:35-12:45	3-30-04 12:30-12:40	3-30-04 1:11-1:21	3-30-04 1:15-1:25	3-30-04 1:17-1:27	3-30-04 1:20-1:30		
<i>Site:</i>	1	2	3	4	1	2	3	4		
<i>Weather:</i>	snow, breeze	snow, breeze	ptly cldy, breeze	cldy, breeze	snow, breeze	snow, breeze	snow, breeze	windy		
<i>Tide Stage:</i>	low	mid	low	low	low	low	low	low		
Bird Type	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	TOTALS	avg/day/site
Duck-like	0	3	2	0	0	5	2	0	12	1.5
Gulls	4	7	5	3	3	9	5	4	40	5.0
Crows	0	0	2	0	0	0	1	0	3	0.4
Perching	0	0	0	0	0	0	0	0	0	0.0
Wading	2	0	0	0	0	0	0	0	2	0.3
Other	0	0	0	0	0	0	0	1	1	0.1
TOTALS:	6	10	9	3	3	14	8	5	58	7.3

<i>Date/Time:</i>	4-12-04 12:37-12:47	4-12-04 12:30-12:40	4-12-04 12:36-12:46	4-12-04 12:40-12:50	4-12-04 1:14-1:24	4-12-04 1:29-1:29	4-12-04 1:22-1:32	4-12-04 1:20-1:30		
<i>Site:</i>	1	2	3	4	1	2	3	4		
<i>Weather:</i>	prtly cldy, windy	prtly cldy, breeze	prtly cldy, breeze	heavy wind	prtly cloudy, windy	prtly cloudy, windy	prtly cloudy, breeze	prtly cloudy, windy		
<i>Tide Stage:</i>	low	mid	low	low	low	low	low	low		
Bird Type	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	TOTALS	avg/day/site
Duck-like	3	2	4	1	0	0	0	2	12	1.5
Gulls	1	2	3	2	0	4	0	2	14	1.8
Crows	0	0	0	0	0	0	0	0	0	0.0
Perching	0	0	0	0	0	0	0	0	0	0.0
Wading	0	0	0	0	0	0	0	0	0	0.0
Other	0	0	0	0	0	0	0	2	2	0.3
TOTALS:	4	4	7	3	0	4	0	6	28	3.5
<i>Date/Time:</i>	4-14-04 12:36-12:46	4-14-04 12:46-12:56	4-14-04 12:40-12:50	4-14-04 12:40-12:50						
<i>Site:</i>	1	2	3	4						
<i>Weather:</i>	prtly cloudy, breeze	prtly cloudy, breeze	prtly cloudy	partly cloudy, breeze						
<i>Tide Stage:</i>	mid	mid	mid	low						
Bird Type	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	TOTALS	avg/day/site
Duck-like	9	4	0	0	**no observations	no observations	no observations	no observations	13	3.3
Gulls	42	9	5	5	no observations	no observations	no observations	no observations	61	15.3
Crows	0	0	2	0	no observations	no observations	no observations	no observations	2	0.5
Perching	0	0	1	0	no observations	no observations	no observations	no observations	1	0.3
Wading	0	0	0	0	no observations	no observations	no observations	no observations	0	0.0
Other	0	0	0	0	no observations	no observations	no observations	no observations	0	0.0
** TOTALS:	51	13	8	5	0	0	0	0	77	19.3
<i>Date/Time:</i>	4-19-04 12:31-12:41	4-19-04 12:30-12:40	4-19-04 12:34-12:44	4-19-04 12:34-12:44	4-19-04 1:27-1:37	4-19-04 1:22-1:33	4-19-04 1:20-1:30	4-19-04 1:20-1:30		
<i>Site:</i>	1	2	3	4	1	2	3	4		
<i>Weather:</i>	prtly cloudy, breeze	prtly cloudy, breeze	prtly cloudy	partly cloudy, breeze	partly cloudy, breeze	partly cloudy, breeze	partly cloudy, breeze	partly cloudy, breeze		
<i>Tide Stage:</i>	high	high	high	high	high	high	high	high		
Bird Type	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	TOTALS	avg/day/site
Duck-like	0	2	0	0	0	0	0	1	3	0.4
Gulls	1	2	2	1	0	4	1	2	13	1.6
Crows	0	0	0	4	0	0	3	0	7	0.9
Perching	2	0	0	0	0	0	0	0	2	0.3
Wading	0	0	0	0	0	0	0	0	0	0.0
Other	0	0	0	0	0	0	0	0	0	0.0
TOTALS:	3	4	2	5	0	4	4	3	25	3.1

<i>Date/Time:</i>	4-22-04 12:35-12:45	4-22-04 12:33-12:43	4-22-04 12:35-12:45	4-22-04 12:30-12:40	4-22-04 1:19-1:29	4-22-04 1:17-1:27	4-22-04 1:19-1:29	4-22-04 1:20-1:30		
<i>Site:</i>	1	2	3	4	1	2	3	4		
<i>Weather:</i>	partly cloudy	partly cloudy	clear	partly cloudy	partly cloudy, breeze	partly cloudy, breeze	breeze	partly cloudy, breeze		
<i>Tide Stage:</i>	low	low	high	mid	mid	mid	?	?		
Bird Type	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	TOTALS	avg/day/site
Duck-like	0	2	2	0	2	0	0	0	6	0.8
Gulls	0	3	0	2	0	0	2	2	9	1.1
Crows	0	0	0	0	0	0	2	0	2	0.3
Perching	0	0	0	0	0	0	0	0	0	0.0
Wading	0	0	0	0	0	0	0	0	0	0.0
Other	0	0	0	0	0	0	0	0	0	0.0
TOTALS:	0	5	2	2	2	0	4	2	17	2.1
<i>Date/Time:</i>	5-7-04 12:35-12:45	5-7-04 12:35-12:45	5-7-04 12:36-12:46	5-7-04 12:36-12:40	5-7-04 1:15-1:25	5-7-04 1:20-1:30	5-7-04 1:20-1:30	5-7-04 1:20-1:30		
<i>Site:</i>	1	2	3	4	1	2	3	4		
<i>Weather:</i>	clear, breeze	clear, heavy wind	clear, breeze	partly cloudy, breeze	clear, breeze	clear, windy	clear, breeze	clear, breeze		
<i>Tide Stage:</i>	low-mid	mid	mid	low	mid	mid	?	?		
Bird Type	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	TOTALS	avg/day/site
Duck-like	0	0	1	1	1	2	1	2	8	1.0
Gulls	2	1	0	1	1	1	1	2	9	1.1
Crows	0	0	0	6	0	0	2	3	11	1.4
Perching	0	0	0	0	0	0	0	0	0	0.0
Wading	1	1	0	0	1	0	0	0	3	0.4
Other	0	0	0	0	0	1	0	0	1	0.1
TOTALS:	3	2	1	8	3	4	4	7	32	4.0
NOTES: ** On 4-14-04 Due to inclement weather there were no observations at the 1:10-1:20 period. At 12:30 all students went onto field together. Each site had two separate teams of 4 students per team.										
<i>Date/Time:</i>	5-11-04 12:34-12:44	5-11-04 12:30-12:40	5-11-04 12:35-12:45	5-11-04 12:38-12:48	5-11-04 1:19-1:29	5-11-04 1:17-1:27	5-11-04 1:18-1:28	5-11-04 1:20-1:30		
<i>Site:</i>	1	2	3	4	1	2	3	4		
<i>Weather:</i>	clear, breeze	clear, windy	partly cloudy, breeze	partly cloudy, breeze	partly cloudy, breeze	partly cloudy, breeze	partly cloudy, breeze	partly cloudy		
<i>Tide Stage:</i>	mid	mid	mid	low	low	?	low	low		
Bird Type	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	TOTALS	avg/day/site
Duck-like	0	0	0	0	0	0	0	0	0	0.0
Gulls	0	1	2	5	2	3	2	8	23	2.9
Crows	3	0	0	3	0	3	4	0	13	1.6
Perching	0	0	0	0	0	0	0	0	0	0.0
Wading	0	1	0	0	0	2	0	0	3	0.4
Other	0	0	0	1	1	0	0	2	4	0.5
TOTALS:	3	2	2	9	3	8	6	10	43	5.4

<i>Date/Time:</i>	5-14-04 12:30-12:40	5-14-04 12:30-12:40	5-14-04 12:33-12:44	5-14-04 12:36-12:46	5-14-04 1:16-1:26	5-14-04 1:16-1:26	5-14-04 1:20-1:30	5-14-04 1:20-1:30		
<i>Site:</i>	1	2	3	4	1	2	3	4		
<i>Weather:</i>	cloudy, breeze	breeze	partly cloudy, breeze	cloudy, breeze	cloudy, breeze	windy	partly cloudy, breeze	partly cloudy, breeze		
<i>Tide Stage:</i>	high	high	high	high	high	?	?	mid		
Bird Type	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	TOTALS	avg/day/site
Duck-like	0	0	0	0	0	0	0	0	0	0.0
Gulls	1	1	1	1	0	1	3	2	10	1.3
Crows	0	0	0	1	0	2	2	5	10	1.3
Perching	0	0	0	0	0	1	0	0	1	0.1
Wading	0	0	0	1	0	0	0	0	1	0.1
Other	0	3	2	0	0	0	0	1	6	0.8
TOTALS:	1	4	3	3	0	4	5	8	28	3.5
<i>Date/Time:</i>	5-19-04 12:32-12:43	5-19-04 12:32-12:42	5-19-04 12:35-12:45	5-19-04 12:35-12:45	5-19-04 1:10-1:20	5-19-04 1:17-1:27	5-19-04 1:20-1:30	5-19-04 1:17-1:27		
<i>Site:</i>	1	2	3	4	1	2	3	4		
<i>Weather:</i>	partly cloudy, breeze	cloudy, breeze	partly cloudy, breeze	partly cloudy	partly cloudy, no wind	cloudy, breeze	cloudy, breeze	partly cloudy, breeze		
<i>Tide Stage:</i>	high	high	mid	mid	mid	mid	high	high		
Bird Type	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	TOTALS	avg/day/site
Duck-like	0	0	0	0	2	0	5	0	7	0.9
Gulls	0	0	3	1	2	0	1	0	7	0.9
Crows	0	0	5	1	4	4	6	1	21	2.6
Perching	0	0	0	4	0	0	0	2	6	0.8
Wading	0	0	0	0	0	0	0	0	0	0.0
Other	0	0	0	1	0	0	7	0	8	1.0
TOTALS:	0	0	8	7	8	4	19	3	49	6.1
<i>Date/Time:</i>	6-3-04 12:33-12:44	6-3-04 12:40-12:50	6-3-04 12:35-12:45	6-3-04 12:40-12:50						
<i>Site:</i>	1	2	3	4	1	2	3	4		
<i>Weather:</i>	clear, breeze	partly cloudy, breeze	partly cloudy, breeze	partly cloudy						
<i>Tide Stage:</i>	high	high	high	high						
Bird Type	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	TOTALS	avg/day/site
Duck-like	0	0	0	0	?	?	?	?	0	0.0
Gulls	1	0	0	3	?	?	?	?	4	1.0
Crows	0	0	0	2	?	?	?	?	2	0.5
Perching	0	0	1	2	?	?	?	?	3	0.8
Wading	0	0	1	0	?	?	?	?	1	0.3
Other	0	0	0	0	?	?	?	?	0	0.0
TOTALS:	1	0	2	7	?	?	?	?	10	2.5

<i>Date/Time:</i>	6-8-04 12:35-12:45	6-8-04 12:30-12:40	6-8-04 12:35-12:45	6-8-04 12:30-12:40	6-8-04 1:19-1:29	6/8/2004 1:24-1:34	6-8-04 1:20-1:30	6-8-04 1:25-1:35		
<i>Site:</i>	1	2	3	4	1	2	3	4		
<i>Weather:</i>	partly cloudy, breeze	clear, breeze	clear, no wind	clear, breeze	clear, breeze	clear, breeze	clear, breeze	clear, windy		
<i>Tide Stage:</i>	low	low	low	mid	low	low	low	low		
Bird Type	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	TOTALS	avg/day/site
Duck-like	0	2	0	0	0	1	0	0	3	0.4
Gulls	3	2	1	1	3	6	2	4	22	2.8
Crows	0	3	1	0	3	0	4	6	17	2.1
Perching	0	0	0	2	0	0	0	0	2	0.3
Wading	0	0	0	0	0	0	0	0	0	0.0
Other	1	0	0	0	0	0	0	0	1	0.1
TOTALS:	4	7	2	3	6	7	6	10	45	5.6
<i>Date/Time:</i>					6-11-04 1:20-1:30	6-11-04 1:25-1:35	6-11-04 1:21-1:31	6-11-04 1:20-1:30		
<i>Site:</i>	1	2	3	4	1	2	3	4		
<i>Weather:</i>					clear	clear, breeze	clear, breeze	partly cloudy, breeze		
<i>Tide Stage:</i>					?	high	high	mid		
Bird Type	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	TOTALS	avg/day/site
Duck-like	?	?	?	?	0	0	0	1	1	0.1
Gulls	?	?	?	?	0	0	0	0	0	0.0
Crows	?	?	?	?	0	0	3	6	9	1.1
Perching	?	?	?	?	3	0	3	3	9	1.1
Wading	?	?	?	?	0	0	0	0	0	0.0
Other	?	?	?	?	0	0	3	0	3	0.4
TOTALS:	?	?	?	?	3	0	9	10	22	2.8

Bird Counts From South Mill Pond by Date and Time - Fall 2004

<i>Date/Time:</i>	10-4-04 12:36-12:46	10-4-04 12:36-12:46	10-4-04 12:41-12:51	10-4-04 12:40-12:50	10-4-04 1:24-1:34	10-4-04 1:21-1:31	10-4-04 1:26-1:36	10-4-04 1:22-1:32		
<i>Site:</i>	1	2	3	4	1	2	3	4		
<i>Weather:</i>	clear, windy	clear, heavy wind	partly cloudy, windy		clear, breeze	partly cloudy, breeze	clear, breeze	clear		
<i>Tide Stage:</i>	low	?	low		low	low	mid	mid		
Bird Type	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	TOTALS	avg/day/site
Duck-like	0	16	3	?	0	12	7	0	38	4.8
Gulls	1	7	2	?	0	2	6	13	31	3.9
Crows	0	0	0	?	0	0	2	0	2	0.3
Perching	0	0	0	?	0	4	0	0	4	0.5
Wading	0	4	2	?	0	0	0	5	11	1.4
Other	0	0	0	?	0	4	0	0	4	0.5
TOTALS:	1	27	7	?	0	22	15	18	90	11.3
<i>Date/Time:</i>	10-7-04 12:34-12:44	10-7-04 12:35-12:45	10-7-04 12:37-12:47	10-7-04 12:40-12:50	10-7-04 1:20-1:30	10/7/2004	10-7-04 1:20-1:30	10/7/2004		
<i>Site:</i>	1	2	3	4	1	2	3	4		
<i>Weather:</i>	clear, breeze	clear, breeze	clear, breeze	clear, breeze	clear	?	clear, no wind	clear, breeze		
<i>Tide Stage:</i>	?	mid	low	low	low	?	low	low		
Bird Type	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	TOTALS	avg/day/site
Duck-like	0	14	1	3	0	0	0	0	18	2.3
Gulls	0	1	0	4	0	1	3	8	17	2.1
Crows	1	0	0	2	0	0	3	0	6	0.8
Perching	0	0	0	0	0	0	0	0	0	0.0
Wading	0	0	0	0	0	0	0	4	4	0.5
Other	0	0	0	1	0	0	1	0	2	0.3
TOTALS:	1	15	1	10	0	1	7	12	47	5.9
<i>Date/Time:</i>	10-13-04 12:38-12:48	10-13-04 12:30-12:40	10-13-04 12:38-12:48	10-13-04 12:45-12:55	10-13-04 1:20-1:30	10-13-04 1:20-1:30	10-13-04 1:20-1:30	10-13-04 1:22-1:32		
<i>Site:</i>	1	2	3	4	1	2	3	4		
<i>Weather:</i>	clear, breeze	clear, breeze	clear, breeze	?	?	clear, breeze	clear, breeze	clear, breeze		
<i>Tide Stage:</i>	high	high	high	high	?	high	mid	high		
Bird Type	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	TOTALS	avg/day/site
Duck-like	14	13	0	5	?	7	0	0	39	4.9
Gulls	0	0	1	0	?	0	0	0	1	0.1
Crows	0	0	0	0	?	0	0	0	0	0.0
Perching	0	0	0	0	?	0	0	0	0	0.0
Wading	1	1	0	0	?	0	0	0	2	0.3
Other	0	0	0	0	?	0	0	0	0	0.0
TOTALS:	15	14	1	5	?	7	0	0	42	5.3

<i>Date/Time:</i>	10-20-04 12:41-12:51	10-20-04 12:42-12:52	10-20-04 12:40-12:50	10-20-04 12:40-12:50	10-20-04 1:20-1:30	10-20-04 1:25-1:35	10-20-04 1:22-1:32	10/20/2004		
<i>Site:</i>	1	2	3	4	1	2	3	4		
<i>Weather:</i>	clear, breeze	clear, breeze	clear, breeze	partly cloudy, windy	breeze	clear, windy	clear, breeze	?		
<i>Tide Stage:</i>	low	mid	low	low	low	low	low	?		
Bird Type	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	TOTALS	avg/day/site
Duck-like	0	20	3	0	20	20	0	?	63	7.9
Gulls	0	4	3	3	2	2	3	?	17	2.1
Crows	0	0	3	0	1	0	0	?	4	0.5
Perching	1	0	0	0	0	0	0	?	1	0.1
Wading	0	7	4	8	11	5	5	?	40	5.0
Other	0	1	0	0	0	0	0	?	1	0.1
TOTALS:	1	32	13	11	34	27	8	?	126	15.8
<i>Date/Time:</i>	10-26-04 12:37-12:47	10-26-04 12:40-12:50	10-26-04 12:40-12:50	10-26-04 12:37-12:47	10-26-04 1:20-1:30	10-26-04 1:21-1:31	10-26-04 1:20-1:30	10-26-04 1:23-1:33		
<i>Site:</i>	1	2	3	4	1	2	3	4		
<i>Weather:</i>	partly cloudy, breeze	partly cloudy, breeze	clear, breeze	partly cloudy, windy	partly cloudy, breeze	partly cloudy, breeze	partly cloudy, breeze	partly cloudy, breeze		
<i>Tide Stage:</i>	high	high	high	high	high	high	mid	high		
Bird Type	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	TOTALS	avg/day/site
Duck-like	10	21	2	0	5	18	0	0	56	7.0
Gulls	1	0	0	0	0	0	0	0	1	0.1
Crows	4	2	0	0	0	1	1	0	8	1.0
Perching	0	1	2	0	0	1	0	0	4	0.5
Wading	0	0	0	0	0	1	0	0	1	0.1
Other	0	0	0	0	0	0	0	0	0	0.0
TOTALS:	15	24	4	0	5	21	1	0	70	8.8
<i>Date/Time:</i>	10-29-04 12:30-12:40	10-29-04 12:37-12:47	10-29-04 12:40-12:50	10-29-04 12:35-12:45	10-29-04 1:17-1:27	10-29-04 1:22-1:32	10-29-04 1:25-1:35	10-29-04 1:25-1:35		
<i>Site:</i>	1	2	3	4	1	2	3	4		
<i>Weather:</i>	clear, breeze	clear, breeze	clear, no wind	clear, breeze	clear, breeze	clear, breeze	clear, breeze	clear, breeze		
<i>Tide Stage:</i>	high	high	high	high	high	high	high	high		
Bird Type	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	TOTALS	avg/day/site
Duck-like	18	14	0	2	11	9	0	0	54	6.8
Gulls	0	0	6	0	2	2	1	3	14	1.8
Crows	0	0	14	0	0	0	2	0	16	2.0
Perching	0	0	0	0	0	0	2	0	2	0.3
Wading	0	0	0	0	0	0	0	0	0	0.0
Other	0	0	0	0	0	0	0	0	0	0.0
TOTALS:	18	14	20	2	13	11	5	3	86	10.8

<i>Date/Time:</i>	11-3-04 12:35-12:45	11-3-04 12:36-12:46	11-3-04 12:36-12:46	11-3-04 12:40-12:50	11-3-04 1:20-1:30	11-3-04 1:22-1:32	11-3-04 1:22-1:32	11-3-04 1:20-1:30		
<i>Site:</i>	1	2	3	4	1	2	3	4		
<i>Weather:</i>	clear, heavy wind	clear, heavy wind	clear, windy	clear, heavy wind	clear, heavy wind	heavy wind	clear, heavy wind	clear, heavy wind		
<i>Tide Stage:</i>	low	low	mid	mid	low	mid	high	?		
Bird Type	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	TOTALS	avg/day/site
Duck-like	0	24	0	0	5	20	0	0	49	6.1
Gulls	5	8	7	2	2	12	2	1	39	4.9
Crows	5	0	0	0	0	0	0	0	5	0.6
Perching	0	0	0	0	1	0	0	0	1	0.1
Wading	2	3	4	0	1	2	0	2	14	1.8
Other	0	0	0	0	1	0	0	0	1	0.1
TOTALS:	12	35	11	2	10	34	2	3	109	13.6
<i>Date/Time:</i>	11-10-04 12:39-12:49	11-10-04 12:39-12:49	11-10-04 12:40-12:50	11-10-04 12:40-12:50	11/10/2004 1:20-1:30	11-10-04 1:20-1:30	11-10-04 1:20-1:30	11-10-04 1:17-1:27		
<i>Site:</i>	1	2	3	4	1	2	3	4		
<i>Weather:</i>	clear, breeze	partly cloudy, breeze	partly cloudy, breeze	clear, breeze	cloudy, breze	cloudy, breeze	cloudy, breeze	prtly cloudy, breeze		
<i>Tide Stage:</i>	mid	high	mid	mid	mid	mid	mid	mid		
Bird Type	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	TOTALS	avg/day/site
Duck-like	6	5	1	0	4	0	0	0	16	2.0
Gulls	5	5	1	5	0	5	1	5	27	3.4
Crows	0	2	3	2	4	7	1	0	19	2.4
Perching	0	0	0	0	0	0	14	8	22	2.8
Wading	0	0	0	0	0	0	0	0	0	0.0
Other	0	0	0	0	0	0	0	0	0	0.0
TOTALS:	11	12	5	7	8	12	16	13	84	10.5
<i>Date/Time:</i>	11-17-04 12:34-12:44	11-17-04 12:35-12:45	11-17-04 12:35-12:45	11-17-04 12:38-12:48	11-17-04 1:19-1:29	11-17-04 1:20-1:30	11-17-04 1:20-1:30	11-17-04 1:20-1:30		
<i>Site:</i>	1	2	3	4	1	2	3	4		
<i>Weather:</i>	clear, breeze	prtly cloudy, no wind	?	prtly cloudy, no wind	prtly cloudy, breeze	prtly cloudy, breeze	?	prtly cloudy, breeze		
<i>Tide Stage:</i>	low	mid	?	mid	mid	mid	?	high		
Bird Type	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	TOTALS	avg/day/site
Duck-like	0	10	?	2	8	0	?	2	22	3.7
Gulls	0	6	?	0	2	3	?	2	13	2.2
Crows	2	0	?	0	0	0	?	1	3	0.5
Perching	0	0	?	0	0	0	?	1	1	0.2
Wading	0	1	?	0	0	0	?	0	1	0.2
Other	0	0	?	0	0	3	?	0	3	0.5
TOTALS:	2	17	?	2	10	6	?	6	43	7.2

<i>Date/Time:</i>	11-22-04 12:35-12:45	11-22-04 12:38-12:48	11-22-04 12:34-12:44	11-22-04 12:40-12:50	11-22-04 1:20-1:30	11-22-04 1:17-1:27	11-22-04 1:20-1:30	11-22-04 1:22-1:32		
<i>Site:</i>	1	2	3	4	1	2	3	4		
<i>Weather:</i>	prtly cloudy, breeze	cloudy, breeze	prtly cloudy, breeze	prtly cloudy, breeze	prtly cloudy, breeze	prtly cloudy, breeze	prtly cloudy, windy	clear		
<i>Tide Stage:</i>	mid	mid	?	mid	mid	mid	low	low		
Bird Type	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	TOTALS	avg/day/site
Duck-like	12	0	2	1	13	2	0	0	30	3.8
Gulls	1	2	2	4	3	1	2	3	18	2.3
Crows	0	1	0	0	0	0	0	1	2	0.3
Perching	0	3	0	0	0	0	0	0	3	0.4
Wading	0	0	0	0	0	0	0	0	0	0.0
Other	3	0	0	0	0	0	0	0	3	0.4
TOTALS:	16	6	4	5	16	3	2	4	56	7.0
<i>Date/Time:</i>	11-29-04 12:35-12:45	11-29-04 12:34-12:44	11-29-04 12:44-12:55	11-29-04 12:37-12:47	11-29-04 1:18-1:28	11-29-04 1:17-1:27	11-29-04 1:20-1:30	11-29-04 1:20-1:30		
<i>Site:</i>	1	2	3	4	1	2	3	4		
<i>Weather:</i>	clear, no wind	clear, breeze	clear, breeze	clear, breeze	clear, breeze	clear, breeze	clear	clear, breeze		
<i>Tide Stage:</i>	high	high	high	?	high	high	high	high		
Bird Type	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	# of Birds	TOTALS	avg/day/site
Duck-like	20	11	0	0	18	21	0	0	70	8.8
Gulls	5	1	0	2	1	2	0	4	15	1.9
Crows	0	0	1	1	0	0	0	8	10	1.3
Perching	0	0	0	1	0	0	0	0	1	0.1
Wading	0	0	0	0	0	0	0	0	0	0.0
Other	1	0	0	0	0	0	0	0	1	0.1
TOTALS:	26	12	1	4	19	23	0	12	97	12.1



Bruce Montville demonstrates groundwater quality testing at the Portsmouth Middle School on Tuesday.
Gigi Giambanco photo

Guarding the groundwater

By Genevieve Giambanco

ggiambanco@seacoastonline.com

PORTSMOUTH - Portsmouth Middle School's sixth-graders are learning that their drinking water comes from groundwater, which must be kept safe from pollutants.

Bruce Montville and Dick Dube of LifeWise Community Partners presented "Future Water Guardians of N.H." to Sherry Weston's sixth-grade science class Wednesday afternoon.

The classroom demonstration was part of the students' South Mill Pond project, said Weston.

The students are studying bird activity as part of a University of New Hampshire project, which Weston said is based on this premise: "The healthier the South Mill Pond, the higher the bird counts."

Montville and Dube explained to the students how groundwater is created through the water cycle and how they can prevent underground water sources from becoming polluted. The school itself receives water from the Bellamy Reservoir and wells in Greenland, which are all groundwater sources, Montville explained.

He used a glass-encapsulated groundwater model to show how pollutants, like antifreeze and gasoline, can move from a well, pond or landfill into water-saturated ground.

"We don't want to get it into our groundwater," Montville told the students. "You wouldn't put this stuff into your cereal, would you?"

Dube used an EnviroScape watershed model to show the students how pollutants can move through a watershed, an area of land that slopes downward.

The students crowded around Dube as he used colored particles and a spray bottle to replicate a rainfall washing contaminants from animal waste, fertilizers, industrial plant waste and other everyday types of "non-point-source pollution" into a river.

"Only the water guardians can stop non-point-source pollution," Dube said.

Montville told the students that he and Dube had come "to help you guys become water guardians."

He urged the students to safely secure, cover up or put away any pollutant or contaminant they come across, because it could potentially enter the groundwater. If the pollution is too large or dangerous, said Montville, leave it alone and tell a parent about it.

Montville, who is the chief executive of LifeWise, said his nonprofit company does many educational presentations of this nature.

Students are given a pretest before the presentation and are tested again afterward.

"We usually see a wonderful learning curve," he said.

"I learned that antifreeze is really dangerous, and water pollution is really bad," said sixth-grader Joe Zammit.

Appendix G

Volunteers

Dee Pafford
Gary Adams, Sr.
Jaqueline Keeffe
Karin Scott
Jacky Burr
Martha Stack
Mary Swerd
Julie Pearson
Anne Barton
Pam Hathaway
Clif Harrigan
Linda Coe
Cyn Beattie
Donna Quinn
Darcie Vaillancourt
Susan Riffert
Lori Smith
Julie McDevitt
Drew Nulph
Eileen Greeley
Maureen Callahan
Diane Berky
Nancy Sell
Glenda Stewart
Amy Rigazio
Roxanne Wilton
Norm Dugas
Shirley Jones
Nancy McMast

Student Literary Magazine Staff:

Spencer Schwartzmiller
Kyle Jones
Kayla Pafford
Julia Vaillancourt
Katie Achilles
Mary Lucas
C C Coder
Mulong Li
Katrina Miamis
J.T. Pearson
Alyssa Rigazo
Colleen O'Leary
Brit Hitchings

Cathy Scala
Judy Stadtman
Mary Brazeau
Karen Zukowski
Nikki Nachampassak
Dirk Slone
Eileen Banester
Jeannette MacDonald
Gena Barrett
Holly Adamy
Jann MacDougall
Tina Montgomery
Sugji Shinnishi
Sheila Mullaly
Lisa Hanson
Lori Lavigne
Cindy Hebert
Barbara Gibney
Jane Connor
Joni Hill
Donna Schefer
Debi Chag
Alison Conner
Elmira Cancelade
Darcy Davidson
Emma Asley
Pat Nichols
Dee Dee Stillman
Tim Lefebine
Paul Nivens
Suzanne Foley
Jill Ballentyne
Nancy Tulois
Charlie Nichols
Valerie Fagin
Tom Giovsmith
Robin Najar
Linda Fleckenstein
Bruce Montville
Dick Dube
Jennifer Greene
Ray Grizzle

Portsmouth Middle School Sixth Grade Students Spring 2004

Mr. Bolko

Achilles, Katie
 Anderson, Andi
 Bush, Patrick
 Castricone, Dylan
 Cronin, Leigh
 Dugas, Adele
 Fernandez, Eddie
 Guthrie, Cody
 Hazard, Natalie
 Henen, Basant
 Hitchings, Britany
 Krueger, Kasey
 Li, Mulong
 Long, Sammy
 Miller, Jarett
 Nelson, Naji
 Perl, Cameron
 Semprini, Danielle
 Smith, Teagan
 Stone, Hannah
 Vinciguerra, Christopher
 West, Natasha
 White, Ashlie

Mrs. Hamilton

Barton, Michael
 Berky, Will
 Clements, Scott
 Formichelli, Jordan
 Harris, Lee
 Hart, Joshua
 Heiman, Josh
 Leach, Hannah
 LeClair, Amber
 Maio, Alecia
 Montgomery, Harrison
 Nulph, Casey
 O'Malley, Katie
 Quinn, Josh
 Redd, Sammy
 Regan, Terry
 Riffert, Max
 Smith, Lizzy
 Sterling, Veronica
 Thomas, L.A.
 Turner, Brian
 Vaillancourt, Julia

Mr. Conti

Allen, Christopher
 Anania, Brittany
 Barker, Tim
 Bhanot, Nitin
 Chandler, Martina
 Coder, CC
 Doyle, Adam
 Hagan, Andrew
 Jones, Kyle
 Kellenbeck, Erin
 Kelloway, Chris
 Legault, Crystal
 Lucas, Mary
 McMaster, Kathleen
 Miamis, Katrina
 Moloney, Liam
 Osborn, Patrick
 Pantelakos, Stephen
 Payne, Joseph
 Rigazio, Alyssa
 Stewart, Amy
 Williams, Qvon

Mr. Hubbard

Adams, Gary
 Allen, Anthony
 Berky, Tim
 Burr, Miles
 Fraser, Ashley
 Hathaway, Lauren
 Keefe, David
 Kelly, Zachary
 Lampert, Jordan
 Haley, Marchewka
 Mignault, Eric
 Morrison, Jessica
 Regan, Chris
 Rose, Garrett
 Scott, Devin
 Shrimpton, Haylee
 Siverts, Katie
 Snider, Jonathan
 Wade, Lindsey
 Wong, Carissa

Mrs. Garland

Barlow, Dan
 Booth, Nathan
 Cassidy, Colton
 Donaldson, Krista
 Eldon, Stephanie
 Fisk, Austin
 Gagnon, Thomas
 Gonsalves, Jack
 Halderman, Matt
 Hardtke, Paige
 Harvey, Andrew
 Hosser, Ridgely
 Kobets, Mariya
 Love, Jonathan
 McGreevy, Ryan
 Miller, William
 Montville, Michael
 Ricci, Lexi
 Tilton, Jesse
 Welch, Robert
 Wilder, Jayquon

Mr. Rafferty

Barstow, Christy
 Brewster, Jimmy
 Callahan, Danny
 Coren, Noah
 Dorow, Justin
 Elder, Shaundraya
 Fahey, Ben
 Gaddy, Brandon
 Gannon, Tanner
 Greeley, Rosa
 Heiman, Jason
 Imhoff, Max
 Jenkins, Eric
 Kaye, Linnea
 Martinese, Chelsea
 McDevitt, Lisa
 McEachern, Jack
 Miller, Dawn
 Rosa, Julia
 Simon, Molly
 Smith, Samantha
 Sutherland, Jacob

Mrs. Weston

Benard, Trevor
 Boynton, Michael
 Capote, Justin
 Ferrari, Steven
 Harvey, Elizabeth
 Hayes, Erin
 Heller, Rachel
 Herron, Ta'nia
 Johnson, Natasha
 Lachapelle, Mary
 Leishear, Nicholas
 Logue, Max
 Love, Alexander
 Pagan, Melony
 Parsons, Chris
 Pelletier, Deanna
 Peyser, Darcy
 Provost, Robby
 Rodriguez, S Diego
 Scott, Brian
 Succi, John
 Zamarchi, Danielle

Mrs. Rafferty

Berounsky, Willy
 Feintuch, Hannah
 Fwu, Kevin
 Harmer, Ian
 Judson, Chris
 Kirkham, Eli
 Lafond, Andrew
 McNeal, Nathan
 McShane, Kia
 Menjivar, Evan
 Moore, Kevin
 Noyes, Britney
 O'Leary, Colleen
 Pafford, Kayla
 Pearson, J.T.
 Sarni, Diana
 Schwartzmiller, Spenser
 Sutherland, Kyle
 Turner, Laura
 Wright, Katie

Portsmouth Middle School Sixth Grade Students Fall 2004

Mr. Bolko

Baca, Cassie
Boyer, Kelvin .
Bunch,Joey
Chase, Ciara
Clark, Bryana
Erwin, Sean
Fontenot, Symonne
Fonteyne, Sean
Graper, Elizabeth .
Hagarty, Quinn
Holt, Victoria
MacDougal, Merriah
McQuade, Catarina
Montgomery, Samantha
Ness, Katherine Katie
Salisbury, Elizabeth(Elise)
Shouse, Sarah
Snover, Dylan .
Standish, Nathaniel
Tobin, Brandon .
Witmer, Michael .

Mr. Conti

Adamy, Sarah
Caillot, Philicia
Camfferman, Chelsea .
Cottonham, Trey
Curry, Cam
Edgecomb, Anthony
Guilbert, Raphael
Hanson, Anna
Harding, Robin
Ignaciuk, Ryan
Kamakas, Kristina
Lavigne, Marissa
Mahoney, Nik .
Mullaly, Samantha
O'Brien, Sean
Pedelose, Mason .
Powers, John
Putra, Lucky
Shinnishi, Junka .
Wong, Adam

Mrs. Garland

Aspen, Derek
Banester, Michael
Barrett, Justin
Blanco, Maleeka
Croteau, Joshua
Deshon, Jacquelyn
Deters, Dakota
Edgar, Hayley
Harnden, Nathan
Haynes, Sabine
Hebert, Frances
Parker, Niven .
Perron, Sydney
Peterson, Stephanie
Phommavongsay,Jesse
Powers, Felicia
Richards, Christopher
Robinson, Brandon .
Smith, Travis

Mrs. Weston

Blanco Mariah
Brazeau Christine
Davenport Brooke .
Donnermeyer Brett
Driscoll Timothy
Foye Edward
Harnden Nicholas
Hudson Derek
Kintz Derek
Lamoureux Bridget
Luu Michelle
Mac Donald Angus
Martel Janet
McCarthy Riley
Reddy Sunny
Scala Julian
Simpson Jordan
Slone Ahlia
Strong Hannah
Tucker Riley
Zukowski Kelsey

Mrs. Hamilton

Bachelor, Samantha
Butler, Annabelle
Camilli, Stephen
DePaoli, Hannah
Duffy-Hall, Marline
Kendall, Kayla
Kouskoutis, Nikki
Levenson, Eric
Main, Matthew
Onosko, Emerson
Porch, Steve
Pratt, William
Reno, Valerie
Roy, Eric
Schefer, Kate
Smith, Jered
Swain, Crystal
Warren, Joey
Young, Conner
Zammit, Joseph

Mr. Hubbard

Beaulieu, Joel
Bourbeau, Chelsea
Cabral, David
Casperson, Bradley
Cole, Billy
Emery, Ben
Harrington, Casey
Hughes, Sean
Jones, Nicole
Konopka, Adam
Kwessell, Emily
Lafrenier, Robin
LaPage, Wyatt
Lefebvre, Tyler
Morash, Nicole
Mulkern, Catherine
Nevin, Lauren
Nevins, Travis
Nichols, Gabrielle
Stillman, Mark

Mr. Rafferty

Ashby, Jordan
Blazquez, Cam
Cancelada, Emma
Chag, Ollie
Conner, Robert
Defelize, Taylor
Demers, Daniel
Hebert, Carolyn
Hill, Katy
Johnson, Brittany
Kramer, Selena
Leone, Savannah
Mayeux, Zachary
McFarland, Mitch
Nagada, Sachi
Polakow, Turin
Robertson, Matthew
Trout, Jaime
Turcotte, Megan
VanWert, Katherine
Wiechert, Robert

Mrs. Rafferty

Ballentyne, Patrick
Clarkson, Will
Delvalle, Alec
Fagin, Tessa
Foley, Eilee
Garcia, Jennifer
Giovanniello, Catherine
Linscott, Molly
Martin, Nowlle
McGlone, Josh
Najar, Hannah
Redd, Derek
Renhart, Alia
Rivais, Brittany
Roy, Matt
Saxe, Will
Smith, Cody
Tulois-Kozak, Maria
Wager, Emma
Walker, Zak

Appendix I

Sample Sixth Grade Students' Writing Pieces

It is important that we help the South Mill Pond

By Lee Harris

In the beginning of this class I was confused. I didn't even know what the South Mill Pond was because I just moved to Portsmouth this year. But I thought it would be fun. Then we got all the booklets. It had a lot of papers about South Mill Pond (SMP). Then I thought the class was going to be hard.

We started to read over the field notebooks. That really confused me. The jobs for field day were really hard to understand. The SMP student handbook was more interesting than the field notebook. Mrs. Weston explained about South Mill Pond and the jobs, the tide gate and why it should be open. She is glad that it is open because when it is closed the pond doesn't get the nourishment and oxygen it needs to keep the environment alive.

Dr. Grizzle came to speak about the pond. He gave us a lot of information. He explained that scientists from UNH were studying the pond. **He explained about the mussel beds and why they are there.** The mussels keep the pond clean. The grass they planted for the salt marsh make the pond look livelier.

Our first field day was very busy. I did not know which way to go. We had chaperones help us out. I discovered that we had only ten minutes to look for birds and other sea life and plants. We learned that it was important to chart our data correctly. There were no birds on our first visit. It was hard to observe this. We had two more field days where we saw more birds like seagulls and mallards.

The second speaker was a lady that talked about birds. She had us split into partners to draw birds; we had to explain details about the bird but not tell the name. This was helpful so we know how to identify the birds. The hard thing was that if you are not a good drawer it was hard.

Two ladies came to talk about plankton and other inhabitants that live in the pond. We used microscopes to look at water samples. Some looked like the pictures in our field notebooks. Some of the things we looked at had a bad smell.

I found learning about the South Mill Pond was interesting. It was not boring. It is important that we help the South Mill Pond and make it a better place to see. It is important to keep the tide gate open so the pond will be flushed out and keep the habitat healthy for many years.

Facts About Mussels

By Jordan Formichelli

The mussel is a freshwater mollusk. They are able to move slowly using their "muscular foot". It has a soft body and a hard shell. Their shells (that open and close) consist of two-part valves that connect the shells like hinges. The dictionary definition of mussel is: an aquatic bivalve mollusk.

Mussels feed and breathe by filtering water through these tubes called siphons. The large mussels can filter up to 10 gallons of water a day. Mussels eat tiny organisms called plankton. These mussels help clean South Mill Pond when they filter and clean the water. They attach themselves to almost any hard surface near shores and estuarine systems. They attach themselves to each other and make huge reefs.

The blue mussel is the most common sea mussel that is found on most shorelines. It is also the one that is found at our shores and found at the mussel reefs the eighth graders made at our South Mill Pond. This mussel has a bluish and blackish shell on the outside and a shiny pearly blue inside. They can grow up to 3 inches long. And the blue mussels are one of the many kinds of mussels that people eat!

Mussels are very interesting creatures and I think its great that they're in our South Mill Pond!

SOUTH MILL POND PROBLEMS

By Andrew Lafond

South Mill Pond is an estuary that has a mix of fresh water and salt water from the ocean. It is located in the Great Bay watershed in Portsmouth, New Hampshire. The biggest problem that this pond has faced has to do with sewer overflows and the bad odors coming from them.

Back in the 1600s this was not a problem. Back then people actually swam and canoed in this area. As Portsmouth began to develop, and inside plumbing was created in the 1800s, things began to change. Sewer overflows, runoff from the city streets, watershed changes, pollution, and construction projects have all affected this pond.

The city tried to reduce the odor from the pond by keeping the tide gate closed. Unfortunately using this gate has caused an unstable system with very few living organisms in the sediment in the pond. If the gate is closed too long,

the oxygen in the water disappears and that kills the plants, salt marsh, fish, worms, crustaceans, and mollusks. These creatures are needed to remove the organic matter from the bottom and that will eventually get rid of the odor.

The pond has also been altered by the construction of the road that splits the pond into two sections. Other developments that have affected the pond are the runoff from the park and parking lots.

Luckily, many people are trying to return the South Mill Pond to what it once was. Although it may never be what it was in the 1600s, hopefully it will get better.

How Can We Save the Pond?

By Danielle Semprini

I think one of the best ways to save the Pond is to clean out any pollution because that leads to animals dying. There are so many different animals that live in the pond. For them to survive they need clean water that will help the plants in the pond grow along with the mussels we plant.

Sometimes people throw their wrappers, bottles and all kinds of trash into the water that the animals could mistake for food and then eat it and die. Making sure that gasoline and oil doesn't flow into the water because if it does it can also harm the animals.

Making the people in our community aware of this problem by having the local papers write about it is a good way to make people aware and hopefully involved. The best way to save the water is by what the teachers are doing; teaching us kids about the problems and how to solve them.

Incredible Improvements of My South Mill Pond

Dear Portsmouth City Council,

I have been looking at the South Mill Pond and I have noticed that it needs some cleaning up.

The current condition of the South Mill Pond is not good because there seems to be a horrendous smell. I think that the smell is coming from the tons of sewage that is imbedded in the mud of the pond. Then there is also a problem with one of the two mussel beds. It seems to be dying, or from what I've heard, dead. I have a feeling that the tide gate being closed is causing this failure.

I have some ideas on what needs to be cleaned up and what should be changed.

First, I would clean out the sewage that is sitting in the mud. It is making a bad smell that I think will be gone if you clean it out.

Next, I would leave the tide gate open because when it is closed it deprives the plants and living animals of oxygen, which could hurt the whole pond ecosystem.

I also think that if the water was clean enough for people to swim in they could use the inner pond but not the outer. Using the inner pond for swimming might cause the bird population to move to the outer pond and that's why the outer pond I left untouched. This untouched outer pond area could also be used by any other living creatures that were scared out of their normal place. This idea is just a thought, it could dangerously hurt the ecosystem.

If the pond was clean enough to be able to swim in and the rules I stated in the last paragraph were in action, I think it would be best if there were extensive checks on the water and on the animals in the inner pond. This idea is to make sure that the creatures and plants are ok and doing well.

Also, I think that there should be a sign that shows information that a tourist would be interested in. These educational signs could teach tourists to appreciate and protect things of beauty, as well as the living inhabitants of the pond.

These are the things I would improve upon or change. I hope these ideas will help you and will help the South Mill Pond.

- Noah Coren

Picture Perfect

By Hannah Feintuch

South Mill Pond should be a place of beauty and environmental health. Currently, the pond is an unhealthy, unattractive place. I would make changes that would benefit the plants, the organisms and the community. The changes would impact the water as well as the surrounding land.

South Mill Pond is a tidal body of water that accepts ocean water along with overflowing sewer water. When the tide is low, the pond shows off its tennis balls and soft drink containers along the muddy bottom. I would transform this into a glistening pool of healthy salt water.

First of all I would dredge the bottom to make the pond deeper to clean out all of the pollutants. With a clean bottom, there would be a wide variety of underwater sea life, plants and animals. This natural balance would keep the water clean. Instead of the water being a murky dark blue, it would be a clear light blue. Certainly when the tide goes out there will be no unpleasant smell even in warm weather. The clean water will attract birds that love salt water such as cormorants, swans, gulls, ducks and many different species of birds. The birds will be attracted to the pond by the healthy plants, bugs and fish.

While this wouldn't be a place for people to swim, there could be some activity involving water. Small remote controlled sail boats could race along the water. It might be possible to have a few pedal boats in a restricted area. All of this depends on the impact of the organisms.

Birds would be a major part of the ideal pond. Birds would nest in the trees and bathe in the water. Proper planting of trees and grasses would make the perfect bird habitat. Bird watchers would enjoy spotting a large variety of birds. Not only would birds be an important part of the environment, but also other animals and plants would add to a healthy ecosystem. A mixture of plants, trees, shrubs, grasses, and flowers would balance the food chain. As a result humming birds, bees and bugs would be a part of the scene.

The area around the pond would be like a park. There would be benches facing the water, picnic tables with trash barrels, walkways around the pond, and a low stonewall entrance to the pond. A variety of fragrant flowering trees would surround the pond. It would be a quiet area for people to enjoy during all seasons.

Fortunately people have taken an interest in pond. The possibility of a clean and healthy South Mill Pond is getting closer to reality.

12 Years Later.....

By Linnea Kaye

Oh my gosh! I can't believe I've been gone for 4 years! I always loved this city, the climate, the ocean, the wildlife, but there was always that stinky mill pond! I was always involved with the pond, bird watching and writing letters to the city council. I even wrote them how I wished the pond would look, totally crystal clear, unpolluted with people swimming! In the last letter I got from my parents they said that I better look at the pond before I came to see them. So here I am, I'm almost there- Oh my gosh! The pond, it's BLUE! And there's green around it, trees! Then I heard something I had never heard there before, a kid from across the lake shouted, "Cannonball!" and jumped in. I was about to scream at him to get out, but then I thought. Crystal clear blue water plus green trees must equal no pollution!

At home my parents told me that the city council read my letters and decided to make it happen. They had scientists come take a look at the pond. They decided that to make it work they would pump out the sewage with special machines. The machines got a percentage of how much sewage was in the water. When they finished that they went around and picked up all the trash. They put huge high-tech filters in the culverts so the bad stuff wouldn't come in, they also took out the sewage pipes. The filters purified the water so that kids would be able to swim in it. Then, to get the wildlife restored, they planted mussel beds along the inner ponds western side. As an experiment the scientists took fish from both salt water and freshwater and put them together in the same place. Most of the fish survived, but others died because of lack of food. But, as the year went by, the insects came and the fish had enough food. Next, they planted cord grass and other plants along the outside in order to try and get some more wildlife back to the pond. They planted more trees around the edges to make the pond look more private and to help try and get the birds back who had been scared away by the construction. The fish in the pond brought back the "birds of prey" like eagles and hawks and ospreys, and the ducks came back on there own. Then, finally, it was done.

Those are all of the changes that happened now I'm going to go take a swim.

A Restored South Mill Pond

By: James Brewster

Accidents, leaks in sewage pipes, people littering and a general lack of caring have resulted in a polluted pond. The South Mill Pond is a small part of a larger watershed on the coast of New Hampshire and is at risk of losing all wildlife because of this pollution. The pollution threatens human health as well as environmental health and could get in the way of the economic growth and life of our community.

If I had the money, I would propose to purchase the pond and surrounding property and place it in a land trust. This would protect it from future development projects such as condominiums. After the trust is set up, I would hire experts in the field of environmental studies to constantly monitor the health of the pond. I would also set up something like an "environmental police" to make sure no polluting is taking place. Once the pond is physically protected, I would create an educational plan to help the public better understand the importance of our South Mill Pond and the larger watershed of New Hampshire.

To clean up the South Mill Pond, I would remove any or all sewer pipes, dredge it to remove waste and take out the tide gate. This would get rid of years of chemical sludge and allow the tide to naturally clean the pond. I would also add a bigger mussel bed to naturally help keep the water clean. To create the ecosystem, plankton from different places will be placed in the pond. I would keep the road in the middle of the South Mill Pond, but would reconstruct it. The bridge would be higher allowing more water to flow underneath it and cause less of an environmental impact.

After the clean up, some rules would have to be put in place to help protect the South Mill Pond. I would not allow septic tanks in the area and no chemicals of any kind can come near it. That would mean no more fireworks shot off over the pond. I would keep the ballpark and the Portsmouth Middle School, but with strict limitations.

Through these efforts the South Mill Pond will no longer smell bad and will be able to support the wildlife that lives there naturally.

S smells at low tide.

Old and naturally formed.

Used to be clean.

The counterpart of the North Mill Pond.

Has been a big community for certain organisms.

My school is next to here.

Is a resting and feeding place for many birds.

Large amounts of Cord Grass.

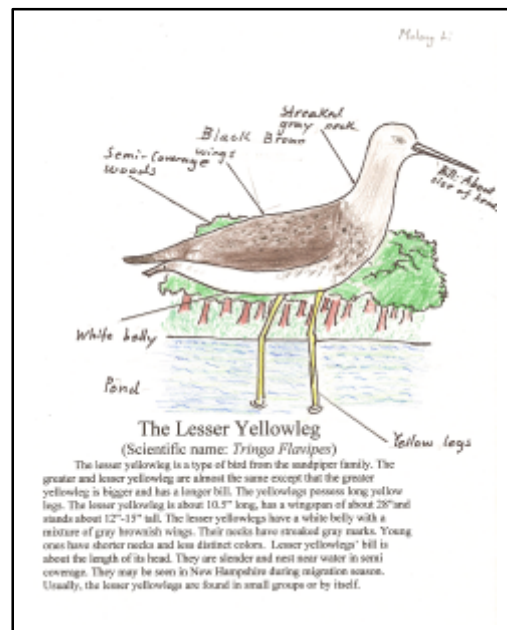
Living creatures surround the area.

Polluted but not as bad as before.

Originally the forces of the tides were used to power the mill.

Not the ideal place to take a swim.

Do you think the pond needs to be fixed?



-Jack McEachern

The Fantastic Future of SMP

By Will Berky

When I came home from college I went to see the South Mill Pond. Parking at the middle school parking lot, I gasped in surprise. The entire pond had completely changed from eighth grade (the last time I saw the pond). First of all, it was low tide. There was no more dirty polluted mud, just clean mud. There must have been at least 40 crabs, 80 mussels, and 100 birds at the pond all trying to protect themselves or eat each other at the same time. I was experiencing the ecosystem of the pond. I went to the edge of the pond and took a whiff, just the nice smell of a cool, fresh, summer cross-breeze.

The next day, I went back and saw high tide in action. It was unbelievable to me how clear the water was. I went and stood over a culvert and saw about 239 fish swimming freely. It would have been 240 but at that precise moment a bald eagle swooped down and grabbed a fish like it was the easiest thing in the world to do. The water was as crystal clear as the beautiful waters of Bermuda. Its inhabitants also agreed because about 1000 organisms must have been there at the same time that I was. It felt great to see something as mucky and yucky as the old South Mill Pond turn into something so beautiful and natural in just eight years.

I am sure that it took a great deal of extremely hard labor to transform the pond. There were at least ten bird watchers talking and arguing about which of the hundreds of birds was what kind of bird. The SMP set a world record yesterday on how many different species of birds came to visit the pond each day. Today that world record was broken again. The record was 673 species yesterday and today the world record stands at 691 different species of birds. I am proud of my town for cleaning South Mill Pond and taking responsibility for its welfare.

The New South Mill Pond in 2014

by Garrett Rose

The year is 2014 and I just graduated from University of Maryland. When I arrive in town, I decide to visit the South Mill Pond. I take a good look at the pond and I am surprised. This pond that sits in front of me, that was so dreary and disgusting that nobody would ever set foot in, and people tried to just ignore, has turned into a haven for human and animal to enjoy. The mud which was once mostly brown and black, now is a clean healthy gray, mixed in amid sand and rocks. The edges of the pond are covered in bright green cord grass, and because the tide is going out, I can see thousands of mussels and barnacles cover the numerous rocks that cover the bottom of the pond. The sun makes the water perfectly clear, so I can see hundreds of tiny flashes reflecting off the scales of the minnows. There are also many larger shadows from striped bass that found their way in. Suddenly the fish that were congregating in one area scatter, as the large shadow of a blue heron flies over them. After seeing the fish, the heron lands and starts hunting. Suddenly a bright flash of color streaks in front of me. It quickly dips down, touches the water and then slows down. I recognize it as a kingfisher. I watch as it goes back to its nest. As it lands, I see several heads peep up. I am highly amazed that the city of Portsmouth was able to save the habitat. I am very excited that this happened. (I hope that it really will happen.)

The Future of South Mill Pond

By Kevin Fwu

In the future, South Mill Pond (SMP) will be full of fishes and birds. If someone pollutes the area in and around the pond, there will be a fine of \$100. There will be bins all around the pond for trash and dog scat. Also, there will be benches and tables for people to eat on and allow them to sketch whatever they want.

Everyday people may fish, but they may not bring any food of any sort (other than bait) to the shore. All the fishermen will have a small amount of space according to their stalls. There will be 50 stalls around the pond. They must pay \$5.00 per hour. There is no minimum but the maximum will be 6 hours. They must pay in hours or it will not work. For example, you cannot pay \$2.50 for 30 minutes.

The Perfect Pond

Sami Mizusawa

A polluted pond stands in front of the Portsmouth Middle School. It looks dirty and dangerous. If you touch the water, the sewage in the pond will infect you right away. Imagine if the pond was perfect, with trees and water clean and safe enough to swim in for hours. What would it look like?

You wake up and you are heading to the Portsmouth Middle School. You see a crowd surrounding the South Mill Pond. You are thinking, *why would they want to see the pond? It's just an old mud blob.* Then you hear voices saying, "Let's go swimming!" You squeeze through the crowd and look. The pond is absolutely beautiful!

The water is crystal blue, and you can see right through it. You can see all the fish and their interesting designs on their bodies. Some fish are macaroni and cheese orange and forest green, some fish are a robins egg blue and baby pink and while other fish are jet-black and a red that looks like the color of leaves on the trees in the middle of fall. The designs are all different shapes and sizes. The fish have zigzags, circles, squares, spiral formations that look like slinkies, and rings around their eyes that look like a raccoon's mask when he is desperate for food on a cold winter day.

There are trees surrounding the pond with bright green leaves on their mahogany brown branches. All of their roots are digging into the ground and will never let go. It looks as if all the trees are watching over the pond just to make sure it is always crystal clear and nothing is wrong with it.

Surrounding the pond, there are too many plants to count. There is emerald green cord grass towering over the pond to make sure the animals around the pond have enough to eat. There are big, dark brown mussel reefs just on the edge of the pond getting rid of any bacteria that crosses into the pond. Forest green Grass Wort grows to about five centimeters to help protect the pond and so much more.

It is the Perfect Pond!

My Return to South Mill Pond

By
Jack McEachern

The year is 2014. I just graduated from college and I have come back home to visit with my family and see how the town has changed. I'm walking down town to get something to eat when I remembered trying to improve South Mill Pond in Mrs. Westin's sixth grade class.

So I strolled onto Parrot Avenue to take a look at the inner pond. I walked over to the edge and what I saw completely took me by surprise. At the time I thought this must be a dream. I remembered walking along side the giant green puddle people thought was suitable for organisms to call their home. At that moment my thoughts completely changed as I gazed into the sparkling blue water. As I looked more carefully I saw a plentiful amount of fish and other wildlife like crabs and periwinkles.

As I trotted along the pier to the island with a sign that said *Viewing Area* on it I observed more birds than I had ever seen in my life. They were flying around a big group of trees and bushes labeled *Bird Habitat*. I also saw two Great Blue Herron wading in a more shallow part of water while a cormorant dive-bombed into the water in search of a tasty treat for its five o' clock dinner. I was amazed by this because when I lived here I remember seeing an occasional Herring Gull swoop down for a quick bite to eat. But I never imagined seeing more than ten different types of birds using all the wonderful resources of a brilliantly restored estuary.

After being blown away by the inner pond I walked across the new bridge to the outer pond. The first thing that caught my eye was the huge mussel reef on the edge of the mudflat. I think that the mussels along with the reduced sewage and new drains really cleaned up the feel and look of the pond.

As I walked further down the dirt trail I saw something that I never thought would happen. The tide gate was gone! I saw ocean water streaming in producing a fluffy white foam. Another thing I noticed were the crows still hanging out on the grass looking for a juicy worm to diminish its hunger.

That day at South Mill Pond I realized that all the hard work and effort really did make a difference in the world. I was really happy to know that I was part of it.

An Interview with Portsmouth Oldies

By Samantha Smith

My father and my father's parents were born in Portsmouth and have lived here all their lives. My mom moved to Portsmouth at the age of seven years with her family and as young children my dad and mom played around the South Mill Pond.

When I started asking questions about South Mill Pond, I wish I didn't because the first thing my dad asked my mom was if she remembered when you could see 'birds' floating in the pond? How gross! What was even worse was when my parents talked about swimming in the water. They explained that they went swimming on the other side of the tide gate by the Blue Finn Fish Market, which is now owned by the Sanders family and is called the Old Mill Fish Market. The water was fine until the tide gate was opened!

My mom said, " I remember going across the pond on our sleds when it froze in the winter."

My dad said, " I remember putting bread into an eel trap to catch the little minnows in the South Mill Pond. We used these to catch the bigger fish like smelts and striper. I also remember walking across the pond when it was frozen in the winter an getting in trouble for it by Mr. Rose, our assistant principal at the middle school then because students were not supposed to walk on the pond when frozen because it may not have been safe."

My grandfather remembers the South Mill Pond always being there. Sewer was pumped into the pond for many years. In the 1950's the pumping station was built on Pierce Island, but in order to build this station, people's houses on the island were bought and families forced to move, the houses then torn down to make room for the building of the pumping station. One of the families forced out were our cousins, the Muchmore family. My dad said, " The foundation of the house is still there in the wooded area."

When my parents were kids in the 1960's and 1970's, there was a wooden slat manually lifted up and down to let the water in and out of the South Mill Pond. Later on, the wooden slat was replaced with an electronic gate.

My dad feels that the Portsmouth City is the biggest polluter by the city plows in the wintertime. The plows clear the streets and dump the snow removed, next to the pond. When this snow melts, it runs into the pond carrying salt and chemicals used to melt the snow on the roads.

Years ago, carnivals would set up each summer next to the South Mill Pond. Even now, after years of people putting up with the strong smell of the South Mill Pond, and in recent years people studying and working at trying to restore the pond, the South Mill Pond still smells!

The problem comes from algae in the pond. Algae take over the pond, robbing its oxygen. Pipes carrying rainwater from the streets bring pollutants that are left on the roadways. When it rains hard, an overflow of sewage mixes with the rainwater runoff and dumps into the pond. The old sewer lines and storm drains are still connected. This runoff combination makes a very high pollution level.

My parents believe that the city needs to work harder looking at all angles of what the city does "around" the South Mill Pond and how it may affect the pond, negatively or positively. We would like to think that with all the knowledge and technology mankind has experienced and developed through the years of history, that the ongoing restoration project is one that is going to be successful.

Interview with a "Puddle Docker"

By Danielle Semprini

I interviewed my dad who was born and raised here in Portsmouth just a few blocks from the South Mill Pond. People that grew up in his neighborhood were called puddle dockers because they lived on or near the water.

My dad attended Portsmouth Middle School and he lived on New Castle Avenue. He was a walker So he had to walk past the pond twice every day. He said that he remembers walking past the pond and on some days when it was really hot and there was no wind blowing he'd have to hold his breath and run because it smelled so bad. The smell he said was from the raw sewage that flowed into South Mill Pond. When it was low tide the smell was so bad that you could smell it all the way up to the hospital (which is now the police station) and all the way down to the middle school!

Dad said that people in the community finally complained to the city about the smell and wanted to know what the cause was. They realized that the pipes ran into the pond carrying raw sewage! Once they realized that between the city and the community they have been working on ways to prevent this from taking place. Several years ago there was talk of dredging (digging up the bottom of the pond) so there would be water in the pond year round. Hopefully this will take place in the near future.

My dad now works up the old hospital hill at the police station. He parks his car out back that is right next to the pond and says that even though it still smells on a hot day he notices that it is not half as bad as it was years before. He believes that between the teachers, students, city officials, University of New Hampshire, and the community we are on the right track and will have a clean pond in the near future.

Interview with my Grandfather

By Tanner Gannon

I interviewed my grandfather and he said when he was back in the middle school he hated Spring and Summer because of the awful smell. They use to have to close all the school windows, which would make it so hot in school. My mom says the same thing, she hated the smell too.

My grandfather use to take my mom when she was little to the fireworks and always hoped it didn't stink that day. It use to be so neat he said to see the firework's reflection off of the pond. He also remembers all the kids from school use to throw trash in the pond along with their school books, and sometimes kid's got thrown in to the pond as well. He also likes to watch the ball games down there. He has noticed just recently they are trying to clean up the trash and trying to get the smell under control. He is just not sure what else they can do with it other then making the surroundings of the pond look nicer.

My grandfather says that the City should concentrate on fixing the tax issue in Portsmouth and then worry about the pond that has been the same for years. My mom agrees with that too. They need to concentrate on issues that are more important than the pond. Not saying that the pond is not important, it's just there is a lot of problems in the town of Portsmouth and we have to deal with those issues before we put all the money into the pond.

Grandfather says, "I am glad that it is being done to the pond, it has been a mess since I was a child and when my children were young and now my grandchildren."

Sample Field Notebook Observations:

Site 1: 3/30/04

... "Construction – loud noises are affecting the birds. Pollution damaging the surroundings of South Mill Pond. They are trying to improve it but the birds don't know that they're helping. Loud noises from cars makes the birds fly away because it probably is really loud for them.

... I saw four birds, they were seagulls. The weather makes the birds not want to come to the Pond. (Cold, snowy) Also there is probably less food because there is less water during low tide."

-Evan Menjivar, Behavioral Ecologist

Site 1: 3/30/04

... "There weren't any birds outside to look at. We saw a bird or two flying around looking for prey."

-Kevin Moore, Geographic Specialist

Site 2: 3/25/04

... "Seagulls were walking up to us. Ducks diving completely underwater. ... All species found in pond rarely fight."

-Kayla Pafford, Geographic Specialist

Site 2: 3/30/04

... "When the black backed gull goes under the water for food they spread their wings and dive their heads. The herring gull only puts its head in really fast and doesn't spread its wings."

-Kia McShane, Geographic Specialist

Site 2: 5/11/04

When the wind blows I can smell an unpleasant odor. I think it comes from the sewage in the pond. The tide is a little higher today than the other day. We saw more ducks today. I think that is because there are more ducks during high tide. There is more water for them to swim in.

I think I see cordgrass. It is long and weedy looking. I found it interesting when we saw clams or muscles (I'm not sure which one) spitting up water from the mud. We also saw a Yellowlegs chasing a fish. I think it got the fish, it was running all over our site. I am not sure if it was a greater or lesser yellowlegs. Last time we went out it was low tide. Today it is about mid-tide. I was surprised at the difference in tides in just a couple of days. I thought it would still be closer to low tide than it is.

-Alyssa Rigarzio, Marine Plant Ecologist

Discovery of Lesser Yellowleg

Mulong Li

We spotted a lesser yellowleg at the South Mill Pond on Site 1 that is closest to the school. Amazingly, this bird had never been spotted this year! This bird was a new discovery! The lesser yellowleg was perching motionless on a small rock, alert and watching. It was as still as a person frozen by snow yet watching like a falcon hunting for its prey. We watched for a long time but it never flew away or moved, it seemed to be cemented onto the stone. Only his head was moving from side to side. My team was really excited for several minutes as we continued to search for birds. The lesser yellowleg was an exciting new discovery for my team.

Site 3: 3/25/04

...“A herring gull had his head underwater along with four other birds. I’m not sure what kind of birds they were. They did not find anything. ...A black crow was hiding under a tree near the police station.”

-J.T. Pearson, *Behavioral Ecologist*

Site 3: 3/25/04

... “Along the embankment there are bushes, grass, and trees. There is also some salt marsh hay. I know that plants were planted on the shoreline of the pond but they didn’t successfully grow. I noticed that there was pollution on the bottom, floating, and around the pond. The garbage ranged from soda bottles to car parts. ... Most of the birds I saw were swimming instead of feeding. I noticed that there were not many different species of birds. Most of the birds were ducks or gulls.”

- Hannah Feintuch, Marine Plant Ecologist

Site 3: 3/26/04

... “I was listening closer and the birds were starting to sound like chickens (a scared sound). I saw the ducks going in the same direction as if they were playing follow the leader. I also noticed the ducks go near the tunnel (culvert) when loud noises can be heard. Maybe they get scared and hide.”

-Laura Turner, Behavioral Ecologist

Site 3: 3/26/04

... “A gull was preening. I heard the gull singing. I wonder...Why people can’t eat the mussels... Why the seagulls were walking on the water... Why do seagulls have buoyancy?”

-Eli Kirkham, Behavioral Ecologist

Site 4: 3/19/04

... “Three interesting facts: The birds seem to like being looked at in the binoculars. The birds usually come at the end of the 10-minute count. There is a lot of mussel shells, but no mussels near the side of the shore.”

- Sami Mizusawa, Behavioral Ecologist

Site 4: 3/26/04

... “I find it interesting that there were no birds in the trees or walking on the grass. The only birds were ones in the water. I noticed that two birds that were swimming forced another to swim in a different area by making loud noises.”

Hannah Feintuch, Behavioral Ecologist

Henry the Herring Gull

By Kyle Jones

Hi, my name is Henry and I am a Herring Gull. One morning in October I was flying when some Ring-Billed Gulls came flying over and started calling me longneck and other insulting things like that so I flew away.

I like to eat garbage and food I can steal from other birds and people. It is so easy to steal food from people because they don't watch their food so it is an easy target. Mussels are always an easy target too but it takes more energy bringing them to the road. This morning I tried to steal a hotdog when a great idea came to me. I would hide the hotdog and go get some mussels. Then I will drop the hotdog on the pavement and when the other gulls got there and started fighting for it (that is their nature) my friend Harry and I will drop the mussels on their head over the parking lot. The mussels would crack open so we will be able to eat them. And it worked! Ha, ha, ha.

I live a normal life for a gull. I get up, fly around, eat, hang out with my friends, and go to bed. One day that all changed. It was the day of the big oil spill of New England. It was a normal day until all the humans started complaining about the water saying it was all thick and gritty. The coast guard checked it out and it turned out to be an oil spill. I was swimming in South Mill Pond unaware of the oil when some men came in and picked us up with a big net. Harry and I stayed close for comfort and protection. They took us to some smelly place with other gulls and animals. They spent hours cleaning us and weirdly moving our wings. We must have been in cages for thirty hours before we could go in the big fenced in area to fly around. But overall they were nice people because they never missed a mealtime or to give us water to drink.

Four weeks later they let us go. I couldn't find Harry. Maybe he was left at another beach but we had color-coded necklaces and me and Harry had the same color. So, where was he? My first and only thought was that those Ring Billed Gulls that were harrassing me had something to do with Harry. I went over to the Ring Bills with a few of Harry's other friends to back me up. We talked.

The disappearance of Harry B. Wellington, our dear herring gull friend, remains unsolved. Was Harry not able to survive the oil spill? Or, was Harry not able to survive the gang of Ring-Billed Gulls?

Herring Gull

By Ashlie White



I'm a Herring Gull
I live at South Mill Pond.
I eat
Crabs, Fish, and bacteria.

From a high branch
I warn my flock of danger
With a warning sound.
I fly around and scare gulls and crows

Some times I eat mussels.
I take to ducks; they are friendly.
South Mill Pond is my favorite
Habitat and place to rest.



5/19/04

Field day 4

Site 3

Time is 1:33

The weather is cloudy with no wind. We saw 19 birds in our site but they were all flying away. Tons of vehicles were passing on the bridge causing an annoying *zooming* noise. I believe the birds are being scared away by the noise and are flying away from the pond. A nearby police or fire truck siren, the cars on the causeway and the lack of food were driving the birds away. The lack of food is probably a constant effect that's bad for most birds. Vehicles are a human activity that is scaring the birds away but we aren't. We are helping them by observing them and trying to make the pond better.

The high tide is making the shore seem like it's starting to get flooded because there is a narrow shore. Seven birds, probably some birds of prey are circling high in the air. I thought they may have been hawks but they usually soar in pairs. An amazing rainbow ring has formed around the sun.

What Am I?

Flying, Honking
Squeaking, Squawking
Get out of my way
I'm elegant, I'm long, I'm thin
I'm wading in the water
Big feather, Long neck
Different colors
Crest on forehead,
Neck stretched high
Spread my wings and try to fly
In the air
I'm soaring, swiftly
Flying, Flying
Through the wind
Tall, Beautiful
Stretch myself
Rushing towards another flock
HONK
This is my turf
You better watch out
Small, short
White and brown
Birds of a feather
Flocking together
But, of course, I'm all alone
Individual
I don't need a flock
What am I?
I'm a Great Blue Heron, of course

By Kasey Krueger



Ornithologist Notes

By Cameron Perl

Date 5/11/04

Time: 1:32

Field Day 2; Site #3

Low tide, sunny, hot

Our group went down to SMP to collect data. For exactly 10 minutes we counted the number of birds and recorded their names. We also noted what they were doing, such as eating or perching.

The following are the birds I observed in Site 3 today. Bird #1 is white with black-tipped gray wings and webbed feet. This was determined to be a Herring Gull as described in the book *Water Birds* on pages 19 and 23. Below is a drawing of this bird.



Bird #2 is black all over with clawed feet. This was determined to be an American Crow as described in *Eastern Coastal Birds* under the title "perching". Below is a drawing of this bird.

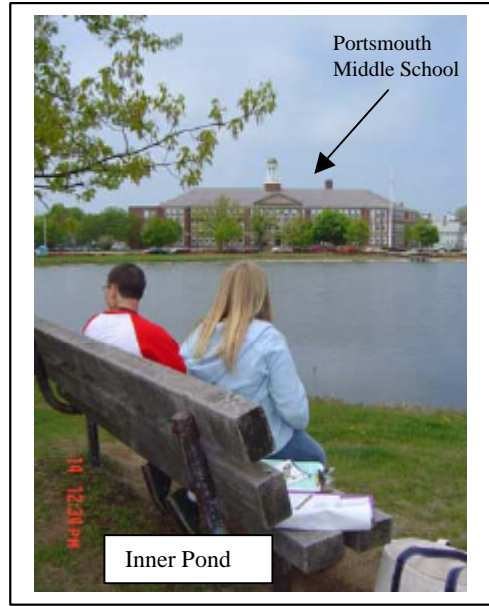


There were three observations of these birds that I found interesting.

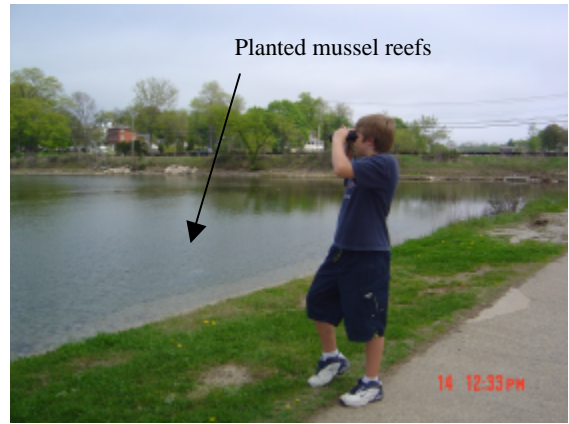
1. Gulls like to sit in the water and almost lounge.
2. Crows like to stay in groups.
3. Low tide brings a lot of birds scavenging to South Mill Pond.



Site 1



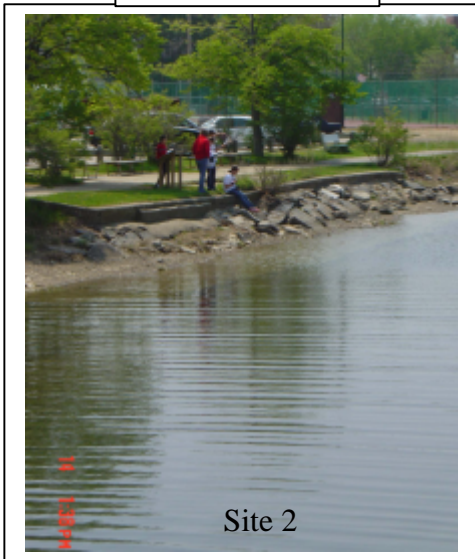
Site 2



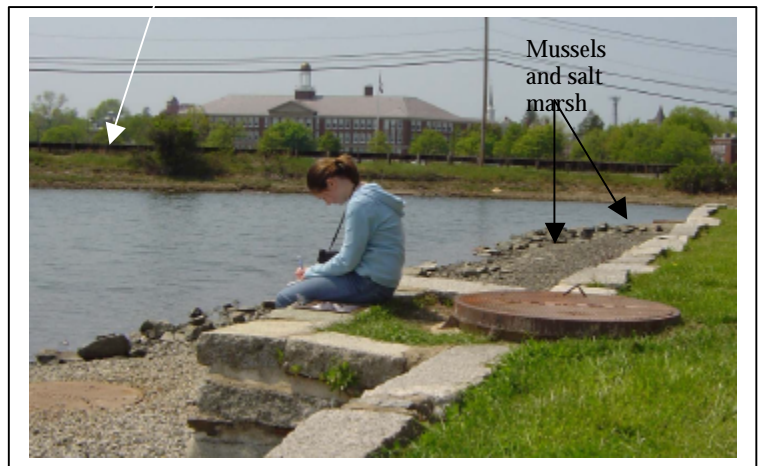
Junkins Road now divides inner and outer ponds.



Inner Pond Sites 1 and 2



Site 2

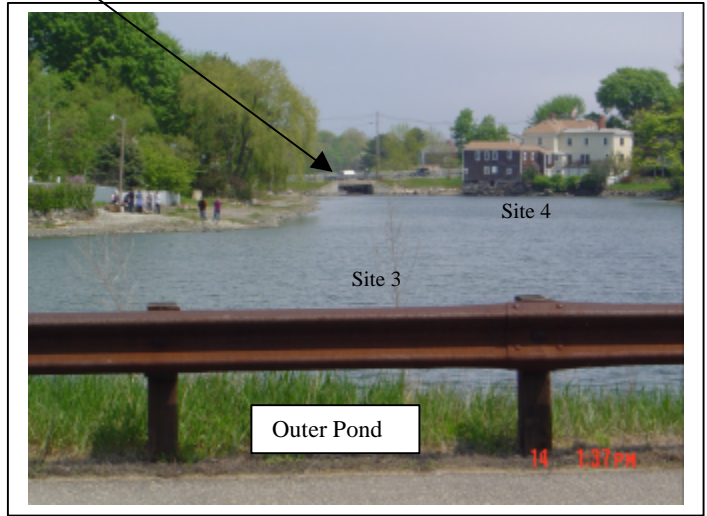


Outer Pond Site 3

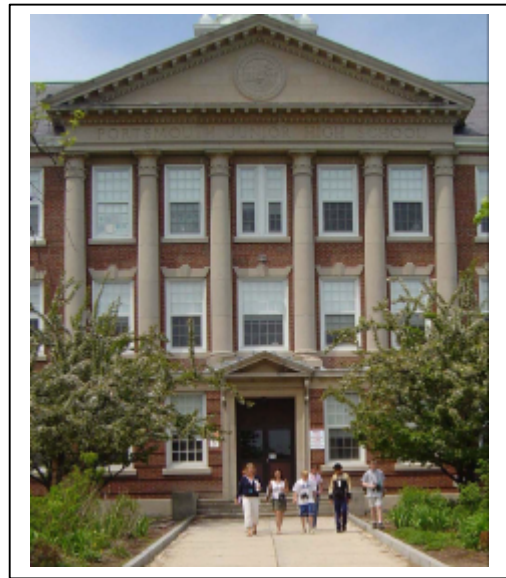
Life Gate



Site 4



Recording data onto classroom chart.



Sign provided by eighth grade classes describing restoration efforts for SMP.