“I fear that the character of my knowledge is from year to year becoming more distinct and scientific; that, in exchange for views as wide as heaven’s cope, I am being narrowed down to the field of the microscope. I see details, not wholes nor the shadow of the whole” (Thoreau’s *Journals*).

**Our Ponds Unit**

**Abstract:**
In this 4 week unit students move through a process of gathering information about a local pond, evaluating the information to determine the overall health of the pond, and presenting the information in a written technical lab report and a PowerPoint presentation. The presentation is given to classmates, parents, community members and water resource managers from the local cities, Dakota County and the MN Department of Natural Resources. The unit also includes a reflective essay using Thoreau, Gretel Ehrlich, Edmund Wilson and Annie Dillard as models.

It is our second unit of the school year, sandwiched between our introductory unit on place and community, and our third unit on rivers. As you know, Minnesota is the “land of 10,000 lakes” and it is hard to overestimate the part they play in our lives. They dot our landscape, and also exist “up north.” Many students have memories of a family cabin or a youth camp on a lake in our northwoods or of canoeing through the Boundary Waters Canoe Area, but our purpose in this unit is to explore the lakes that are right out our doors here in suburban Minneapolis. Our lakes are an important part of our sense of place.

We have 110-120 students for 3 hours each day. We teach in a 3-person team made up of a social studies teacher, an English teacher and an Environmental Science teacher. For this project we divide our house into 20 teams with 5 or 6 students on each team. We investigate 5 different local lakes—four groups per lake. It is useful to pick lakes with
different current characteristics because they clearly illustrate the differing impacts of human activities and natural characteristics such as surficial geology and size of watershed on the aquatic ecosystem. Our units are focused on one thematic question.

**Objectives:**

*How do humans and other organisms adapt to freshwater ecosystems: ponds, lakes & wetlands?*

**Through this study, students should be able to answer the following key questions:**
- What are the characteristics of lentic freshwater ecosystems, including ponds, lakes, and wetlands?
- What is the psychological and spiritual impact of lentic waters on humans?
- What are the physical and chemical characteristics of water?
- What are the characteristics of water quality?
- What are the principle flora and fauna of lentic freshwater systems and what are their adaptations?
- What are watersheds and what is the human impact on them?
- What is the geologic and human history of a given water body?

**Skills Highlighted in this Investigation:**
- Using field equipment for water testing and surveying ponds, lakes & wetlands
- Recording field data
- Using field guides to identify organisms
- Paraphrasing and summarizing written documents
- Interpreting and creating maps
- Interpreting and writing technical documents
- Researching local history
- Working with a group
- Preparing and delivering a formal presentation of data

**Texts**
- Chapters from *Pond & Brook*
- Chapters from *Bird in the Waterfall*
Understanding Lake Data packet
Selection of essays about ponds & lakes

Duration:
The schedule we use for this unit is quite involved. We spend a week prepping students with readings, lectures, practice using equipment and identifying plants and organisms. The second and third week we run a complex schedule of fieldwork, lab work, seminars and student work time. We conference with each team at least twice to give feedback on their two drafts of the technical report. Additional conferences are needed for some teams. The fourth week is for final revisions of the technical report and preparation for the presentation. During the fourth week we also begin some assignments for the river unit.

Lesson details and chronological outline of this unit:
- Students individually develop a timeline of human activities from Dakota people to the present in Dakota County using primary source documents, including plat maps, census records, and newspaper articles focusing on the impact of these activities on local lakes.
- In preparation for their field work students in their pond groups of 5 or 6 create a poster of the different components of a pond ecosystem using Minnesota’s Natural Heritage by John Tester and Pond and Brook by Michael J. Caduto, including the chemical, physical and a biological components.
- Students choose a specialty area—vegetation, chemical data, or macroinvertebrate/fish and focus their attention on preparing to collect data in that area.
- Students learn to use vegetation field guides to identify ten common plants including upland, shoreline and aquatic plants collected from school grounds.
- Students make a first visit to their pond to create a 10 x 10 meter plot along the shoreline of their pond. Students will identify the vegetation within the plot using field guides and guides from the Wetlands Health Evaluation Program (WHEP). See videos on the creation of plots and guides at www.mnwhep.org/id63.html. Students will identify plants at the pond, and take digital photos
or bring a sample back to school to identify plants with a teacher’s help.

- Students identify 4 common aquatic macroinvertebrates using resources from the Wetlands Health Evaluation Program (WHEP).
- In teams of 2 students learn how to use a dipnet and a seine net to collect aquatic macroinvertebrates and fish.
- Students learn how to collect a water sample and how to use sampling equipment to find concentrations of dissolved oxygen, nitrates, phosphates and pH.
- Students learn how to use a secchi disk to determine the clarity of the water or their lake.
- In teams of six students make a second visit to their pond to collect data including macroinvertebrates and fish using a seine net and dipnet, physical data using the secchi disk, water samples to test for dissolved oxygen, phosphates, nitrates and pH and draw a map of lake including its surroundings.
- Students learn to use technical writing style and complete a first draft of the Methods and Materials and Results sections of the pond profile.
- Students use a Surficial Geology map to identify the underlying geology of their lake.
- Students obtain topographic maps and aerial photos of their lakes using Google maps and topozone.com.
- In their pond teams of 5 or 6 students put together the Introduction section of their report using primary source information from the Dakota County Historical Society, maps and aerial photos.
- Students will revise their first drafts of the Introduction, Methods and Materials, and Results sections of their pond profile incorporating teacher feedback.
- The 4 pond teams of 5 or 6 students who all studied the same lake compile a master list on one rolling whiteboard of their results—organisms found, plants identified, dissolved oxygen, phosphates, nitrates, pH and secchi disk readings, and the timeline of human interactions with the lake.
- Students compare the results from the 5 different lakes studied looking at relative diversity and quantities of families of aquatic
macroinvertebrates, of aquatic, shoreline and upland plants and of the chemical and physical data found in water samples.

- Students create 2 conclusions about the quality of their lake ecosystems citing a source, such as *Pond and Brook, MN Natural Heritage*, or notes from speakers or lectures to back up their conclusions.
- Students create hypotheses to explain the differing data from the 5 lakes.
- Students write an individual Analysis and Discussion section for the pond profile using data collected and citing sources to explain the meaning of their data.
- Teams compile a final copy of their pond profile technical report incorporating teacher feedback and creating one Analysis and Discussion section.
- Students read and discuss 4 pieces of reflective nature writing and identify 4 specific components—sensory details, knowledge of nature, thoughts on a larger topic, and a sincere and authentic voice.
- Students make a third visit to their lakes to collect sensory details, which will be incorporated in a piece of reflective writing using various writers as model.
- Students complete a PowerPoint presentation including tables, photos and conclusions.
- Students present their findings to other students, family and community members and water resource managers from the city, country and state.
- Students evaluate their group process and the pond profile experience.
- Students journal on a Thoreau passage on creating the experience of their day.

**Worksheets and Handouts:**

*Rose House Pond Profile Assessment*
___Task 1: Data Collection Complete by Friday, September 28, 2012

Your team of 5-6 will collect geographic, historical, physical, chemical, and biological data from a selected pond in Eagan. You should record the data in your individual journals as field notes and transfer the data to group data sheets later. You will be making three trips to your pond during class time, with a teacher. You may also return to your pond for further study on your own time.

___Task 2: Data Processing Complete by Tuesday, October 2, 2012

Your team will analyze the data obtained in the field. You will have blocks of class time in the Rose lab to analyze the scientific data; you may also work with your data on your own time. You should record your findings in your individual journals and transfer to group data sheets. You will also be sharing your data with the three other teams who are profiling your pond and analyzing the combined data by Wednesday, October 3.

___Task 3: Technical Report Note the deadlines listed below.

Your team will prepare a technical report that profiles your pond. The report will include a summary of all the data your team collected, as well as an analysis of that data. The report will be assessed as a team effort.

1. Draft of your Introduction, Methods and Materials, and Results sections is due Thursday, October 4
2. Draft of your Analysis & Discussion and Conclusions section from each individual is due Tuesday, October 9. Your team will examine each individual's section and combine them to produce a consolidated section for the team's report.
3. Conference with a teacher to assess progress on drafts will be held during the week of October 8.
4. The first complete draft of your report, including all sections, is due Monday, October 15.
5. Conference with a teacher to review the draft will be held in class on Tuesday, October 16.
6. The “Final” Final draft, ready to share with professionals, is due Monday, October 22.

___Task 4: Fall Mid-Term Reflection on Thursday, October 4

During class today, you will complete a reflection sheet on your goals and expectations for Fall trimester.

___Task 5: Presentation of Report On Wednesday, October 24

Your report will be presented to local water professionals in a formal PowerPoint presentation that summarizes your findings. You should be prepared to answer questions about your work. You will also provide 2 print copies and 1 CD of your report for SES and the cooperating agencies. These are due Tuesday, October 23.

___Task 6: Pond Reflection by Wednesday, October 10

You will submit an essay, in which you describe and reflect upon your pond, similar to what Thoreau did with Walden Pond. Your essay will be based on the field notes and sketches you complete in your individual journal while at your pond.
**Task 7: Individual Journal Entries**
Be prepared to submit your individual journal with pond profile entries for individual grading at any time.

**Task 8: Self-Evaluation of Your Own and Your Group’s Work**
You will evaluate both your team’s work and your own work as an individual during class sometime after the presentation of your report.

---

**Pond ________________________ Team Members______________**

Your Pond Profile Report must contain ALL of the following components to be complete.

- **Title Page:** professional style, with name of pond, name of school, names of team members, date of report
- **Table of Contents:** includes section headings and page numbers
- **Abstract:** a concise, one paragraph summary of the profile (write this at the end after everything else is done)
- **Introduction:** background about your pond and your study
  - **Purpose** of this profile
  - **Geographic Data:** location of the pond, description of surrounding landscape, inlets & outlets, watershed, topography, terrain, human development, GPS coordinates, etc.
  - **Map:** City map showing location of pond (to show directions to your pond)
  - **Map:** Map of the watershed (if available)
  - **Map:** Topographic map of pond and surrounding terrestrial community
  - **Aerial Photo:** of pond and surrounding terrestrial community
  - **Historical Data:** What’s the history of this land and its use? How long has the pond been here? What is the history of the pond such as alterations, treatment, and construction?
  - **Plat Maps:** of pond and surrounding area from the Dakota County Historical Society or other sources
- **Methods & Materials:** description of how you collected the data
  - **Physical Data Collection:** collection techniques & equipment for, depth, clarity, temperature
  - **Chemical Data Collection:** collection techniques & equipment for pH, oxygen, phosphate, nitrate levels
  - **Vegetation Data Collection:** equipment and techniques for sampling of vegetation
  - **Macroinvertebrate & Vertebrate Data Collection:** equipment and techniques for collection of aquatic organisms in the dipnet and seine net
  - **Map:** Aerial view map indicating sampling sites with GPS coordinates
- **Results:** verbal description of the data you collected and tables, graphs and charts
  - **Physical Data:** depth, clarity, temperature, weather (on the days of collection)
  - **Chemical Data:** pH, dissolved oxygen, phosphate, nitrate levels (of both surface and deep water samples)
  - **Vegetation Data:** species found in 3m X 3m plot sampled—rare, common and abundant AND a separate description and table listing the upland vegetation 9/19 visit AND a table of aquatic (littoral) from the seine net
  - **Dipnet Data:** macroinvertebrates and fish found in the dipnet
  - **Seine Net:** macroinvertebrates and fish found in the seine net
Analysis and Discussion: of your results and other data about your pond, as well as data collected by the three other teams who profiled your pond; includes references to the data tables in your results section and to outside sources

- What would you expect to find in a pond like yours? How does yours compare? (with references to sources)
- How do your data compare with what the other teams surveying your pond found?
- How do your data compare with data collected in previous years or by other groups (City of Eagan, DNR, etc.) (if available)
- Analysis of data: What reasons can you give for the data you collected? Use evidence from class readings to support your analysis of your data. You should display a thorough understanding of pond ecology as applied to this pond.

Conclusions and Recommendations: Overall conclusions about the condition and features of this pond. What steps might be taken by the city to maintain or improve the condition of the pond/lake

Works Cited: includes all sources cited in the report, in MLA style

Appendices: your data sheets and any other extra information you wish to submit with your report

Technical Writing Style and Format:
- Consistent and appropriate use of technical vocabulary
- Consistent use of neutral voice
- Appropriate organization and structure, such as a bulleted format with consistency in headings and subheadings
- Language and information appropriate for the audience
- Professional appearance
- Proofread carefully to eliminate all mechanical errors
- Accurate identification of organisms with correct spelling of names
- Word processed in appropriate format with sources correctly formatted (MLA style)

Identifying Aquatic Plants

Figure 1

During our pond investigation you will need to be able to identify a variety of organisms in, on and around your pond. During this activity you will begin to familiarize yourself with common aquatic pond and lake plants and characteristics of those plants.

We will use three guides to gather this information and also identification:
- Through the Looking Glass
- A Guide to Aquatic Plants
**Wetland Plant Identification Guide**

**TASK 1:** Use the guides above to collect some basic information about aquatic plants in your journal.
1. In your journal define the following terms:
   - Submergent plants
   - Emergent plants
   - Floating plants
2. Identify three benefits of aquatic plants.

**TASK 2:** Plant Identification
There are a variety of plants scattered throughout the classroom. In your journal list the plants and characteristics for each as you identify it. You should have 7 to 10 species in your journal when you are finished.
1. Identify three plants for which there are seven or eight specimens. There are enough of these plants so you can carefully study each one as long as you need.
2. Identify each of the other plants available in the lab. There are fewer examples of these plants, so please take only one at a time and return them to the front table when you are finished with it.

---

**Pond 1st Visit: Teacher Directions**

**Before you go:**
Assemble the group (2 pods)
Make sure they have these things:
- Waders (1 pair SES waders/hipboots per team plus any that students brought from home) Hopefully everyone has waterproof shoes!
- Tape measures (hopefully 1 SES tape per team plus any they brought from home)
- Blue Vegetation Field Guide (1 per team)
- Aquatic Plants guide (1 per team)
- 4 stakes per team and some sort of flagging (students should have brought these; if they didn’t, they will have to improvise)
- 1 set of data sheets per team
- 1 clipboard per team (students should have brought)
- Compass is helpful (students should have brought)
- GPS nice if they want to do that (students should have brought)
- Digital camera (students should have brought)
- 1 bucket per team to collect aquatic plants if needed
- Baggies or trash bags to collect plants if absolutely necessary
- Each student should have their own journal & pens/pencils

Go over:
- Who is driving? Who is riding with whom?
- Directions to the pond & where to park

**At the pond:**
1. Take attendance for your 4 groups (2 pods)
2. Survey the area. Talk a little about what everyone sees---surrounding the pond, vegetation in and around the pond, etc.
3. Fill out the Site Information Sheet (1 per team). Be **very thorough** in the map. If there’s something they don’t know, they can look it up later (like GPS coordinates).
4. Decide where to put the sampling plot (releve). It should be a spot that is somewhat representative of the vegetation of the whole pond, but it also needs to be accessible.
5. Students should lay out the plot: 10 m x 10 m unless the water gets deep very quickly, in which case they could do 20 m on shore x 5 m in the water.
6. Mark the corners by placing stakes.
7. 2 students should walk through the plot and identify plants. One student should be the recorder, checking off what they find on the Releve Data Sheet. The other 2 can help identify plants, using field guides. They don’t have to count how many plants, just record presence.
8. If they can’t identify something, they should take a picture to bring back to SES, OR sketch it carefully to bring back OR as a very last resort, bring back a sample. On the Releve Data Sheet, unidentifiables should be recorded as “Unknown Forb #1, Unknown Forb #2, Unknown Grasslike #1, etc.”
9. If they have time, they could estimate the cover class and record that on the data sheet, but don’t worry about it....they probably won’t get to that. The vegetation specialists should come back to that on their second visit.
10. At the end, they should leave the stakes in the plot. They should be able to find the plot on their next visit even if someone removes their stakes...so they should take a photo, take GPS, note landmarks...whatever they’d like to do to remember.

**IMPORTANT:**
Leave with enough time to get back to school safely in time for 3rd block.

**Pond Profile First Visit**

**EACH TEAM**
1. Draw a map of your lake that includes what surrounds your pond; include storm drain inlets and outlets, streets, houses, parks, forested areas, parking lots, docks, beaches, walking paths, boat landings.

2. Locate a good place for your 10X10 foot plot, which you will investigate on your next visit. Your plot should include a variety of plants. One side of the plot should be the lake. Mark it on your map. Check with a teacher to make sure you have chosen a good spot. Don’t make the plot or identify plants in your plot until your next visit.

3. Use field guides to identify as many species of plants as possible from the land that surrounds the lake. Combine your lists with the other teams to make one list of plants identified.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>CommonName of Plant</th>
<th>Scientific Name</th>
<th>What guide did you use?</th>
<th>Rare?Common? OR Abundant?</th>
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</table>

Characteristics | CommonName of Plant | Scientific Name | What guide did you use? | Rare?Common? OR Abundant? |
|-----------------|---------------------|----------------|------------------------|--------------------------|
Plants from other teams (include common, scientific names, and if rare, common, or abundant):
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Pond Profile Action Plan for Chemical Specialists
### Field Responsibilities 1st Visit

**Vegetation Plot** – see handout.

### Field Responsibilities 2nd Visit - Physical & Chemical Data Collection, from the canoe

Collect a deep water sample, from which you will:
- Place water sample in clean bucket for testing
- Record pH (using pH meter)
- Test for Phosphate (PO₄)
- Test for Nitrate (NO₃)

Collect a surface water sample, from which you will:
- Place water sample in clean bucket for testing
- Record pH (using pH meter)
- Test for Phosphate (PO₄)
- Test for Nitrate (NO₃)

Collect a Secchi disc reading

Determine D.O. and temp readings for depth and surface using Dissolved Oxygen Probe. Be sure to agitate probe.

Determine the depth of the pond/lake from 10 selected points (using depth meter, lake map or other method)

Record weather information: air temperature, wind, cloud cover, etc.

Take field notes on what you notice about your pond/lake as you are canoeing

Take notes on your exact methodology in collecting your data

### Materials to bring to Ponds – 1st Visit

As a team you will need:
- Individual Journals, field guides and a clipboard.

### Materials to bring to Ponds – 2nd Visit

- Canoe
- Paddles (1 per canoeist)
- PFDs (1 per canoeist)
- Deep water sampler
- Secchi disc
- pH meter
- Probe for DO & temperature
- Dissolved oxygen, phosphate, nitrate testing cubes & sampling tubes
- Clean bucket for water sampling

### Lab Responsibilities

- Complete any chemical testing not completed in the field
- If needed, complete a D.O. test on your fixed, surface and deep water sample using colorimeter cubes and the colorimeter.
- Once all data is complete, find a computer and make a data chart that includes all of your chemical data
- Share chemical data with the 3 other teams from your pond, make a data chart that includes all groups data – share with all teams.
## Written Report Responsibilities

<table>
<thead>
<tr>
<th>Written Report Responsibilities</th>
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<tbody>
<tr>
<td><strong>EACH PERSON WILL WRITE - Chemical data Methods and Materials:</strong> description of how you collected your data, including collection techniques &amp; equipment for pH, oxygen, phosphate, nitrate levels.</td>
</tr>
<tr>
<td><strong>EACH PERSON WILL WRITE - Physical Data Methods and Materials:</strong> collection techniques &amp; equipment for width, depth, clarity and temperature.</td>
</tr>
<tr>
<td><strong>TOGETHER, YOU WILL WRITE – Chemical &amp; Physical Results:</strong> description of the data you collected, as well as data collected by the three other teams who profiled your pond; includes text and tables and figures (charts, graphs, etc.)</td>
</tr>
<tr>
<td><strong>EACH PERSON WILL WRITE - Abstract:</strong> a concise, one paragraph summary of the profile (written when everything else is done)</td>
</tr>
<tr>
<td><strong>EACH PERSON WILL WRITE - Individual Analysis/Discussion:</strong> of your results and other data about your pond (with references to outside sources).</td>
</tr>
<tr>
<td>- What would you expect to find in a pond like yours? How does yours compare (with references to sources)</td>
</tr>
<tr>
<td>- How does your data compare with what the other teams surveying your pond found? What possible explanations might there be for differences in your data?</td>
</tr>
<tr>
<td>- How does your data compare with data collected in previous years or by other groups (City of Eagan, DNR, etc. if available).</td>
</tr>
<tr>
<td>- Analysis of data: what reasons can you give for the data you collected? Use evidence from class readings to support your analysis of your data. You should display a thorough understanding of pond ecology as applied to this pond.</td>
</tr>
<tr>
<td><strong>TOGETHER, YOU WILL WRITE – Conclusion:</strong> Overall conclusions about the condition and features of this pond.</td>
</tr>
</tbody>
</table>

## Powerpoint Presentation Responsibilities

You will be responsible for discussing the physical and chemical data found in your pond, along with an explanation of your methods & materials, and your analysis of what your data indicates.

### Questions you will be responsible for answering.....

- What factors influence the lake chemistry: D.O, temperature, pH, phosphorous, nitrate etc.
- How do internal lake influences affect lake chemistry? (vegetation, macroinvertebrates, fish)
- How does water chemistry influence vegetation and pond succession?
- How does water chemistry influence animal populations in a pond?
- How do humans impact water chemistry?

## Pond Profile Action Plan for Macroinvertebrate/Fish Group

### Background Research

Pond and Brook – pp. 81-112, 45-48, 125-134
### What is a Lake?

**Sustaining Minnesota’s Lakes**

**Other TBA reading:**

## Field Responsibilities 1st Visit

<table>
<thead>
<tr>
<th>Vegetation Plot</th>
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<tbody>
<tr>
<td>- Record site information on MN WHEP Vegetation Survey Field Sheet</td>
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<tr>
<td>- Complete Site Sketch</td>
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<tr>
<td>- Locate a spot for a representative plot</td>
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<tr>
<td>- Stake out the 10x10 plot (2/3 of your plot should be in your pond/lake, 1/3 along the shoreline)</td>
</tr>
<tr>
<td>- Identify plants within the plot (one member should have waders to ID aquatic and emergent plants)</td>
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<tr>
<td>- Zig-zag back and forth through the plot to identify all species in your plot.</td>
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<tr>
<td>- Have 2 corner people shouting out plants they recognize</td>
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<tr>
<td>- One person walking through plot and identifying</td>
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<tr>
<td>- One recorder</td>
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<tr>
<td>- One collector/picture taker</td>
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<tr>
<td>- Estimate Cover – once all plants have been identified, estimate the abundance of those plants. (See cover class code on Field Sheet).</td>
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</tbody>
</table>

*If you can’t ID plants in the field there are three options: (1) take a digital photo with notes in journal (location found - upland, emergent, submergent, floating leafed, size of plant, leaf arrangement etc). (2) bring back samples of the plant (not just the leaf) (3) detailed sketch with notes of features (same as photo).*

### Field Responsibilities 2nd Visit - Macroinvertebrate Collection, seine and dip net

<table>
<thead>
<tr>
<th>Even pod groups will start with dip net, odd pods will start with seine net.</th>
</tr>
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<tbody>
<tr>
<td>Collect organisms with the dipnet</td>
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<tr>
<td>- Record the locations selected for sampling on a map; mark with GPS if possible.</td>
</tr>
<tr>
<td>- Take at least 3 dipnet samples (for each sample you will make 3 sweeps with the dipnet).</td>
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<tr>
<td>- For each sample, place the vegetation netted on the screen tray and let it sit for 10 minutes. Agitate the vegetation gently to encourage organisms to drop through the screen into the tray. After 10 minutes, toss the vegetation back into the pond/lake. (You will repeat this 3 times.)</td>
</tr>
<tr>
<td>- Combine the 3 samples into 1 bucket to take back to SES. Label your bucket with your pod and group #, dipnet sample and your lake name.</td>
</tr>
<tr>
<td>- If you choose to release any organisms, be sure to photograph/sketch and make notes on them before you release them.</td>
</tr>
<tr>
<td>Record your exact procedure in a journal</td>
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</tbody>
</table>

| Collect organisms with the seine net  |
|   - Record the locations selected for sampling on a map; mark with GPS if possible. |
|   - Make at least 3 hauls |
|   - Combine samples from the 3 hauls into 1 bucket to take back to SES. |
|   - If you choose to release any organisms (you should release fish and frogs), be sure to photograph/sketch and make notes on them before you release them. |
| Record your exact procedure in a journal |

Identify all fish in your seine net at the lake, and release them. Record species, # of individuals.

**Take field notes on what you noticed about your pond/lake as you sampled**

**When you return to the lab, it is your responsibility to pour the contents of your buckets**
into the provided Tupperware shoe boxes and put into the Blue House fridge. Be sure to label your containers appropriately. Wash out your collection buckets and pour out back (not in the the sinks).

### Materials to bring to Ponds – 1st Visit

<table>
<thead>
<tr>
<th>As a team you will need:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual Journals</td>
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<tr>
<td>Poles</td>
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<td>Flagging tape</td>
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<tr>
<td>Tape measures</td>
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<tr>
<td>Field Guides</td>
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<tr>
<td>• Minnesota Trees</td>
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<tr>
<td>• Trees and Shrubs</td>
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<tr>
<td>• Aquatic Plants</td>
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<tr>
<td>• Vegetation Index (PCA)</td>
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</tbody>
</table>

Digital camera  
Sharpe  
Baggies for plant collection  
Waders  
MN WHEP vegetation data sheets  
Clipboard  
Waders

### Materials to bring to Ponds – 2nd Visit

| Journals |
| Team’s Data Sheets on Clipboard |
| Extra pencils |
| SeineNet |
| Dip Net |
| Tray and Screen |
| 2 Buckets with group # labeled (Seine net) (Dip Net) |
| sharpe |
| Masking tape |
| Waders (1 per collector) |
| Fish identification guide |

### Lab Responsibilities

- Pour samples out and set up sample petri dishes with your macroinvertebrates.  
- Use the field guides to identify the organisms in your sample.  
- Record the scientific and common name of each species found in your sample.  
- Estimate # of each species for each of your samples.  
- Be sure to keep your dip net and seine net samples separate in the lab. (The physical/geo/history group will identify samples from the seine net).

### Written Report Responsibilities

**Methods and Materials Dip net protocol:** equipment and techniques for collection of aquatic organisms in the dipnet and seine net.  

**Macroinvertebrate Results section:** description of the data you collected as well as data collected by the three other teams who profiled your pond: includes text and tables/figures (charts, graphs, etc.). Results section should include your individual group data, as well as data from the other groups from your pond.

**Individual abstract:** a concise, one paragraph summary of the profile (written when everything else is done)  

**Individual Analysis/Discussion:** of your results and other data about your pond (with references to outside sources).  
- What would you expect to find in a pond like yours? How does yours compare (with references to sources)  
- How does your data compare with what the other teams surveying your pond found? What possible explanations might there be for differences in your data?
- How does your data compare with data collected in previous years or by other groups (City of Eagan, DNR, etc. if available).
- Analysis of data: what reasons can you give for the data you collected? Use evidence from class readings to support your analysis of your data. You should display a thorough understanding of pond ecology as applied to this pond.

**Individual Conclusion:** Overall conclusions about the condition and features of this pond.

**Powerpoint Presentations**
You will get a checklist later for your responsibilities with the powerpoint presentation.

**Questions you will be responsible for answering....**
- How does vegetation influence animal populations in your pond/lake?
- How does water chemistry affect animal populations in your pond/lake?
- How do human impacts influence animal populations in your pond/lake?
- How do physical factors influence animal populations in your pond/lake?

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### Pond Profile Action Plan for Vegetation Group

#### Background Research
- Pond and Brook: pp. 60-80
- Pond and Brook: pp. 114-125
- Sustaining Minnesota’s Lakes Packet
- What is a Lake?

#### Field Responsibilities 1st Visit
- Vegetation Plot
  - Record site information on MN WHEP Vegetation Survey Field Sheet
  - Complete Site Sketch
  - Locate a spot for a representative plot
  - Stake out the 10x10 plot (6m of your plot should be in your pond/lake, 4m along the shoreline)
  - Identify plants within the plot (one member should have waders to ID aquatic and emergent plants)
  - Zig-zag back and forth through the plot to identify all species in your plot.
    - Have 2 corner people shouting out plants they recognize
    - One person walking through plot and identifying
    - One recorder
    - One collector/picture taker
  - Estimate Cover – once all plants have been identified, estimate the abundance of those plants. (See cover class code on Field Sheet).
- *If you can’t ID plants in the field there are three options: (1) take a digital photo with notes in journal (location found- upland, emergent, submergent, floating leafed, size of plant, leaf arrangement etc). (2) bring back samples of the plant (not just the leaf) (3) detailed sketch with notes of features (same as photo).*

#### Field Responsibilities 2nd Visit – Transect Plant Identification
- Revisit plot, identifying any additional plants.
- Draw a map of your transect: Review data and fill in any holes with % cover etc.
- When you are done, you will help out the macroinvertebrate group

**Materials to bring to Ponds – 1st Visit**
As a team you will need:
- Individual Journals
- Poles
- Flagging tape
- Tape measures
- Field Guides
  - Minnesota Trees
  - Trees and Shrubs
  - Aquatic Plants
  - Vegetation Index (PCA)
- Digital camera
- Sharpe
- Baggies for plant collection
- Waders
- MN WHEP vegetation data sheets
- Clipboard
- Waders

<table>
<thead>
<tr>
<th>Materials to bring to Ponds – 2nd Visit</th>
</tr>
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<tbody>
<tr>
<td>Individual journal</td>
</tr>
<tr>
<td>Digital camera</td>
</tr>
<tr>
<td>MN WHEP Vegetation Survey Field Sheet</td>
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<tr>
<td>Bags for collection</td>
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<thead>
<tr>
<th>Lab Responsibilities</th>
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<tbody>
<tr>
<td>Identify all samples not identified in the field from collected samples, pictures etc. with field guides</td>
</tr>
<tr>
<td>Record common and scientific name for all samples</td>
</tr>
<tr>
<td>Identify the zone each sample was found in – floating, submergent, emergent, shoreline and upland and prepare data for your data chart</td>
</tr>
<tr>
<td>Record % cover for each species in the plot</td>
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<tr>
<th>Written Report Responsibilities</th>
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<tbody>
<tr>
<td>Vegetation Protocol for Methods and Materials: description of how you collected your data.</td>
</tr>
<tr>
<td>Equipment and techniques for construction of releve plot and sampling of vegetation.</td>
</tr>
<tr>
<td>Vegetation Results: description of the data you collected, as well as data collected by the three other teams who profiled your pond; includes text and tables and figures (charts, graphs, etc.) Data chart listing each of the species and % cover from the plot, and chart should separate plants into appropriate zones.</td>
</tr>
<tr>
<td>Individual abstract: a concise, one paragraph summary of the profile (written when everything else is done)</td>
</tr>
<tr>
<td>Individual Analysis/Discussion: of your results and other data about your pond (with references to outside sources).</td>
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  - What would you expect to find in a pond like yours? How does yours compare (with references to sources) |
  - How does your data compare with what the other teams surveying your pond found? What possible explanations might there be for differences in your data? |
  - How does your data compare with data collected in previous years or by other groups (City of Eagan, DNR, etc. if available). |
  - Analysis of data: what reasons can you give for the data you collected? Use evidence from class readings to support your analysis of your data. You should display a thorough understanding of pond ecology as applied to this pond. |
| Individual Conclusion: Overall conclusions about the condition and features of this pond. |

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You will get a checklist later for your responsibilities with the powerpoint presentation.

<table>
<thead>
<tr>
<th>Questions you will be responsible for answering....</th>
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<tbody>
<tr>
<td>How do plants contribute to the overall health of a pond?</td>
</tr>
<tr>
<td>What is the plant animal interaction and how does this contribute to the overall health of your pond/lake?</td>
</tr>
<tr>
<td>How do the plants affect the water chemistry of your pond/lake?</td>
</tr>
<tr>
<td>How do human activities affect vegetation in your lake/pond?</td>
</tr>
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</table>

Pond Ecology Assignment

Remember that by the end of this study, each of you should have a solid answer to each of these questions. Begin by reading the following:

Dennis, Bird in the Waterfall ch. 13, pp. 167-174 and middle of 180-187

Then answer the following questions in your journal, using BITW ch. 13 and other suggested pages in P & B (Caduto)

- What are the characteristics of lentic freshwater ecosystems, including ponds, lakes, and wetlands?
  - What is a pond? (Caduto 54-56)
  - What is a lake? (Caduto 115)
  - What are the major zones of a pond/lake? (Caduto 118-121)
  - What is succession in a pond/lake (think trophic states)? (Caduto 79 and 115-116)

- What are the characteristics of water quality?
  - How does water chemistry affect water quality? (Caduto 21-44 and 134-137)

- What are the principle flora and fauna and other biological organisms of lentic freshwater systems and what are their adaptations?
  - What major animals live in the different zones of a lake? (Caduto 125-134)
  - What major plants live in the different zones of a lake? (Caduto 121-125)
  - What major animals live in ponds? (Caduto 81-105)
  - What are major plants live in ponds? (Caduto 62-79)
  - What are the major decomposers in ponds? (Caduto 61-62)
  - Construct a food web as you would expect to find it in a local lake or pond (include all components such as producers, primary, secondary & tertiary consumers, decomposers)? (Caduto ch. 2, 3, 4)

- What is the geologic and human history of a given water body?
  - How are lakes formed? (Caduto 116-118)
You should have these questions completed in your journal by Monday, Sept. 29.

Research Assignment

Find two additional sources, which could include field guides, Internet sites, etc. to research

1 pond plant (submergent, emergent, grasslike, etc.)
1 pond chemical or physical influence (Nitrate, DO, Phosphate, pH, etc.)
1 pond animal (insect, vertebrate, etc.)
1 human activity that impacts ponds

For each of these 4 components, research to discover its role and influence in the pond ecosystem

Create a Working Portfolio entry that summarizes your research (with correctly cited sources).
Submit it to the Pond Profile Crate by Friday, September 26.

***If you are the Physical/Geography/History Group, you are exempt from this working portfolio. INSTEAD, you will submit the 1st draft of the Introduction section of the report (purpose, geographic data and historical data) as a Working Portfolio by Monday, Sept. 29.

Pond Seminar Assignments

<table>
<thead>
<tr>
<th>Seminar / Tasks</th>
<th>Before this Seminar, you should</th>
<th>What will you will turn in:</th>
<th>Deadline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seminar A: Compiling Data (work on computers in Centrum)</td>
<td>Collect data at your pond &amp; process it in the lab. Bring your data to the seminar.</td>
<td>Draft your Results section of your report for your specialty</td>
<td>Submit to the Pond Profile crate 10:35 the day you have Seminar A</td>
</tr>
<tr>
<td>Seminar B: Searching for Data (research on computers in Centrum)</td>
<td>Some reading on your specialty area; bring notes in your journal to the seminar.</td>
<td>Notes in your journal from your research, with correct source citations</td>
<td>Whenever journals are checked</td>
</tr>
<tr>
<td>Seminar C: Technical Writing: How to Write the</td>
<td></td>
<td>Notes in your journal. A plan for completing the</td>
<td>Whenever journals are checked.</td>
</tr>
<tr>
<td><strong>Report</strong> (go through the checklist; ideas for the Introduction)</td>
<td>research you need.</td>
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</tbody>
</table>
| **Seminar D: Pond Ecology Presentations** *See handout* | Complete the reading & note-taking for your specialty from  
- *Pond & Brook Bird in the Waterfall* “What is a Lake?”  
- “Understanding Lake Data”  
- *MN Natural Heritage*  
Prepare for teaching about your topic | Outline & visual aid of information from your texts | As you present in Seminar D |
| **Seminar E: Technical Writing: Methods & Materials** *See handout* |  | **Working Portfolio:**  
1st Draft of the Methods and Materials for the procedure in your specialty | Submit to the Pond Profile Crate the day after your Seminar E |
|  |  | 2nd Draft with revisions including field procedure changes | Submit to the Pond Profile Crate Mon., Sept. 29 |
| **Seminar F: Reflective Writing**  
*See handout* | Journal responses to “The Ponds” (Thoreau)  
(*AP Comp has an alternate assignment) | Journal responses to “The Ponds” (Oliver) & “On the Pond Again” (Ehrlich) |  |
**Seminar G: Socratic Seminar: Water Memory**  
*See handout*

- Read & respond to “Once More to the Lake,” (White) in your journal (*AP Comp has an alternate assignment)*

**Working Portfolio:**  
**My Water Memory**

- Show your journal during Seminar G  
- Submit WP to the Pond Profile Crate at the end of Seminar G

**Seminar H: Descriptive Writing (Thoreau's Ponds)**  
*see handouts*

- Journal notes on guided reading of “The Ponds” in *Walden* pp. 235-253  
  (see handout)

- Poster on two passages from “The Ponds”

- At the end of Seminar H. Hang the posters in pods.

**Seminar I: Team Building**

- Journal responses to team-building exercise  
- Whenever journals are checked

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**What to Work on During your Individual Worktime and as Homework**

- Preparation for seminars as listed above  
- Background research for your specialty (as listed on your rubric; take detailed notes in journal with correctly cited sources)

**Research Assignment:** See the handout.  
Create a **Working Portfolio** entry that summarizes your research (with correctly cited sources).  
Submit it to the Pond Profile Crate by

****If you are the Physical/Geography/History Group, you are exempt from this working portfolio. INSTEAD, you will submit the 1st draft of the Introduction section of the report (purpose, geographic data and historical data) as a **Working Portfolio**.

- **Pond Ecology Assignment:** See the handout. Complete in your journal.
- Working on drafting the section of the report for your specialty area.

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**Seminar A: Descriptive Writing - Thoreau’s Way of Seeing Walden Pond**
Objective: To analyze the way in which Thoreau “sees” Walden Pond by:
- Noting Thoreau’s descriptions including the content and details.
- Creating an image based on his descriptive writing.
- Reminding ourselves about hard eyes & soft eyes
- Finding sensory language in descriptions

Preparation: Amongst your pod mates, each person should select one of the passages below:
Skim the page for the exact wording below. Typically, the passage begins at the start of a new paragraph. You can plan on the length of the passage lasting until the beginning of the next passage.
A. “The scenery of Walden Pond…” (235)/(140)
B. “The water is so transparent” & “The shore” (237)/142
C. “Yet perchance the first who came…”(238/144) & “The pond rises & fall”(239/144)
D. “Some have been puzzled…”(240/146) & “The pond was my well ready dug”(241/146)
E. “There have been caught in Walden…”(2410147) & “You may see from a boat”(242/147)
F. “The shore is irregular” (243/148) & “A like is…earth’s eyes” (243/148)
G. “In such a day, in September…Walden is a perfect forest mirror”(245/151)
H. “An old man…” (246/151) & “Nevertheless, of all the characters…”(248/152)
I. “The cars never pause to look at it…” (249/155)& “Flints’ or Sandy Pond” (249/155)
K. “Goose Pond…” (251/158) & “Since the woodcutters, and the railroad…”(252/158)

Instructions:
1. READ your passage.
2. Put your name on the white half sheet—lower left.
3. STATE THE MAIN IDEA: Write a complete sentence that states the passage’s main idea on the white paper.
4. FIND EVIDENCE OF HIS DESCRIPTION: Find at least 5 quotes that provide examples of the descriptive details Thoreau uses to explore that main description.
   Specifically:
   - Hard Eyes (literally accurate language; unbiased; objective)
   - Soft Eyes (figuratively accurate language; similes, metaphors, personification; Vivid imagery)
   - Sensory Details (touch, movement, images, sounds)
   Find at least 5 quotes
   Cite them correctly!
5. PICTURE THOREAU’S MAIN IDEA: Create a pictorial representation of the passage’s main idea on recycled printer paper.
6. PLACE QUOTES ON YOUR PICTURE: Place Thoreau’s descriptive details on your pictorial representation.
7. POST YOUR WORK next to your pods mates somewhere OBVIOUS in your pod.

Seminar C : Writing the Introduction
Before the seminar answer these questions in your journal:

1. With your team look over the requirements for the Introduction of the Pond Profile Technical Report—what is required for that section?

2. Make a list of who will be responsible for finding or writing what is required.

3. Look at your pod schedule for the week. When can you do this work? Set a due date for when these portions will be done.

During the seminar answer these questions in your journal:

1. Your “Purpose” should answer the questions, “who will you be presenting this information to and what will they be doing with it?” and “what do we hope to learn by gathering and analyzing this data.” Write good answers to these questions, and practice writing them using third person, “students” instead of “we” or “I.”

2. Look at the examples of History Sections. There are three—one for Nokomis, one for Orchard, and one for Diamond Lake. Make a table, with a column for each History Section. What kinds of information are covered in each of the History Sections? Make a fourth column...how can you find this information? Be specific in your journal.

3. In your journal, answer these questions:
   a. What is a section?
   b. What Township and section is your lake in?
   c. What, specifically, will you ask the librarian at the Dakota County History Center?

4. Finally, read “Walden, The Place” by Wesley Hoag. Notice how he includes information, briefly, about the geology and the human history of Walden. You will take the information you gather and do the same.

During your work time, find and save your maps, and begin to draft your introduction. As a team be ready to show your progress with this section—have a draft ready to check by__________________.

Be ready to show your journal entry by__________________.
Walden Pond, presumably named by early colonists after Saffron Walden, England, is located in Concord, Massachusetts, about eighteen miles northwest of Boston and a mile-and-a-half southeast of Concord center, near the junction of Routes 2 and 126. Encompassing some sixty-one acres, Walden Pond is approximately a half-mile long with a considerably narrower but varying width. A path following the shoreline runs nearly a mile-and-three-quarters along the base and sides of rising, forested banks. Railroad tracks at the pond's western extremity parallel the Walden road (Rt. 126) to the east. Walden Pond is the centerpiece of the approximately 425-acre Walden State Reservation, administered by the Commonwealth of Massachusetts, and is the crown jewel in the much larger Walden Woods ecosystem, identified in the writings of Henry Thoreau and now being incrementally secured and protected by the Walden Woods Project.

Walden Pond occupies the bottom of a kettle hole created by the melting of the Wisconsin glacier about ten to twelve thousand years ago. Its steep sides were built up from sand and gravel deposited by swirling meltwater eroding a diminishing block of ice left in the glacier's wake. From 8,000 to 6,000 B.C., the Walden environment was tundra like, inhabited by creatures including mastodons, musk ox, bison, and caribou. By the time of white settlement in the 1630s, the land surrounding the pond had become densely forested with the chestnut-oak-hickory association that has characterized much of the last three thousand years. By Thoreau's day pine trees, among them the "tall arrowy white pines" that he cut down for cabin timber in March 1845, were a prominent part of the hardwood/conifer mix.

A water-table pond, Walden has no springs or streams running into or out of it, above or below the surface. Water is added to the pond's volume by seepage, rainfall, and snowmelt; it is subtracted through seepage (principal during periods of high water into Well Meadow and the Andromeda Swamp and thence to the Sudbury River at Fairhaven Bay), through evaporation, and through uptake by trees and plants. In 1968 marine technologists confirmed the absence of springs or feeder streams and corroborated Henry Thoreau's 1846 determination of the pond's greatest depth as 102 feet. The same scientists also recorded a September surface temperature of seventy-six degrees and a bottom temperature of forty-one degrees.

Notably, Walden Woods, Concord, and, indeed, all of New England were far less densely forested in the mid-to-late nineteenth century (including during Thoreau's 1845-1847 Walden stay) than they are today. Much previously wooded land was cleared for cultivation or pasturage, while the wood stoves and other requirements of a growing population consumed local woodlots faster than they could be regrown. During the twenty years before Thoreau began his Walden residency, most of the trees on one
Walden hillside owned by Ralph Waldo Emerson were cut down. Ironically enough, Emerson then purchased an additional fourteen acres of Walden woodland, including the land on which he let Thoreau built his cabin and plant his beanfield, in large part to preserve the threatened sylvan setting of the pond that charmed him just as it did his younger friend. Yet not without reason is the sound of woodchopper Alek Therien's ax a persistent refrain in Walden. And not long after Thoreau left the pond, the severe winter of 1851-1852 caused much of Walden Woods to be cut for firewood. Still, the pond and its immediate shoreline remained a woodland retreat, and in 1855 Thoreau joined with Emerson, Bronson Alcott, and William Ellery Channing to form the "Walden Pond Walking Association," a whimsical yet fitting rubric for their saunterings to Walden and other spiritually renewing destinations.

Despite its relative wildness, the Walden Pond that Thoreau knew from his first childhood encounter had long since ceased to be an untouched wilderness lake. Nor does he pretend that it is one. While Walden's essential wildness is as unviolated as the inviolable wildness of nature itself, this is a pond with a long human association. Not just natural history but human history had taken place there for thousands of years before Thoreau's arrival, just as it has continued to occur there for the century-and-a-half since his departure. More than twenty-five-thousand Indian artifacts, dating from approximately six-thousand years ago, have been found around Walden Pond; countless others from the centuries since that distant era. Henry Thoreau was famous for his ability to find arrowheads, including one inadvertently discovered point that he whimsically attributed to Tahattawan, the Indian chief who in 1637 signed over to English newcomers six square miles of Concord land including Walden Pond.

Distanced from Concord's business and residential center and largely uncultivated, the area around Walden Pond was a home to those Concordians who found or placed themselves on the fringes of the community, several of whom are described in Walden: slaves such as Cato Ingraham and the ironically named Brister Freeman, whose "hospitable" wife Fenda told fortunes; Zilpha, another black woman who "spun linen for the townsfolk, making the Walden Woods ring with her shrill singing"; Tommy Wyman, a potter who told tales of an iron chest on the bottom of the pond that was sometimes seen floating toward shore before sinking once again; and John Breed, a barber and drunkard in whose life and death Thoreau found "an extreme instance of the power of appetite for rum" (Journal). The woods were home, too, to families of shanty Irish such as Walden's John Field, many of whom helped build the Fitchburg Railroad whose newly laid tracks carried the first Concord train across the west end of the pond the year before Thoreau began his cabin.

In Thoreau's time Walden Pond served as a nature retreat not just for him but for the town at large. Concord fishermen sought its native pickerel, pout, and perch (since replaced by stocked trout), not letting thick winter ice keep them from their quarry. Hunters and waterfowlers roamed its woods and stationed themselves on its shores. Picnickers, berry pickers, and skaters made Walden a frequent destination, and then as now it was a popular swimming hole. Abolitionists met at Walden and local celebrations
were held there. And during Thoreau's residency, the pond attracted short-lived economic interest as an ice-harvesting site, an activity described in *Walden*.

In the years after Thoreau's death Walden was exploited for recreational use. The railroad put in picnic tables in 1866, a bath house in 1868, and in 1880 began conducting excursions to the pond that continued into the next century. A pavilion, merry-go-round, race track, boat rentals, and concessions were Victorian period embellishments. Notably, as early as 1875 Harper's Magazine urged that Walden be protected from overuse. In 1922 the Emerson family and others deeded more than eighty acres of Walden land to the Commonwealth of Massachusetts to secure the pond for appropriate recreation and to preserve its natural beauty. Although Walden today has been restored to pre-amusement park condition, its management as a heavily used (though restricted) swimming site is controversial, especially to the many Thoreauvian pilgrims who visit the pond, the cabin site, and the cairn begun there in Thoreau's honor by Bronson Alcott and Mary Adams of Iowa in 1872. In 1965 Walden Pond was designated a National Historical and Literary Landmark. About 750,000 people visit it annually.

**Writing the Introduction-Geographic Data**  
**Seminar B**

Your Pond Profile Technical Report will include 4 maps:
- a map which shows your pond’s watershed
- a topographic map of your pond or lake
- an aerial view of your pond or lake drawn by you which includes the location of your shoreline vegetation plot, dominant upland vegetation, measured depths of your pond and other places you took samples
- a modern city map which shows the location of your pond in the city of Eagan

You may also include some historic maps from your research on the history of your pond and lake. Also, important background information is available from surficial geology maps. Those maps are available, too.

Before you begin these activities, find you pond or lake on a city map or a map of northern Dakota County. How did you find it? What streets or landmarks help you locate it?

These activities will help you learn about maps. You may do them in any order.

**Activity 1-topography**

You must include a topographic map of your pond or lake in your Pond Profile. First find your pond or lake on one of the topographic maps lying on the tables.

Answer in your journal
Use the contour lines to determine the elevation of your pond or lake.
What is the topography of the land surrounding your pond?
What man-made structures around your pond does the topo show?
In one or two clear sentences describe the elevation and topography of your pond

USGS topographic maps are available on the Internet at [www.topozone.com](http://www.topozone.com). Go to that site at home or at school if a computer is available. To find your pond, type in the city your pond of lake is located in and
scroll to MN, and then click on Search. When the city comes up click on it and a topographic map of your
city will appear. Use the green arrows around the margin of the map to get your pond or lake in the center.
Choose scale 1:25,000 and large size for the map. Make sure your lake is on the screen, and then print a
copy. You will need to cite the map in the pond profile.

**Activity 2—terrain**

Use the Surficial Geology of Dakota County Map to determine what deposits make up the land below and
around your lake or pond.

Answer in your journal
What is the surficial geology of your pond or lake?
What does that mean?
When you are at your pond or lake make sure someone on your team notes the surrounding terrain and
describes it in their journal, to include in this paragraph

**Activity 3—watershed, inlets and outlets**

If your pond or lake is in Eagan locate your pond on the watershed map. If it is not in Eagan, use the
topographic map to see if you can find this information.

Answer these questions in your journal.
Identify the letter of the watershed that your pond or lake is associated with.
Does your lake or pond have inlets or outlets? How are they indicated? Sketch your pond and show the
inlets and outlets and major features of its watershed. Where does the water from your watershed
eventually flow? Where does the water come from which flows into your pond or lake?
Explain why it is important to know about the location and size of the watershed that your pond or lake is
associated with.
Discuss with your pond team what you might do to obtain a map of your pond’s watershed and, if you have
time, obtain it.
When you are at your pond or lake make sure someone on your team notes if there are any inlets or outlets,
and notes where

**Activity 4—not needed for geographic data section**

In small groups, look at the map of Minnesota from the 1840’s. Get a modern Minnesota road map, too.

Answer the following questions in your journal.
Look for locations you are familiar with on the historic map. What places are there? What places are not?
What places are on the historic maps that are no longer there?
Give examples of where a Native American name is listed alongside the name that is commonly used
today.
What are other differences you notice?
What parts of Minnesota seem well known on the historic map? What parts seem less well known?
Explain your reasoning.

**Activity 5—location**

With your pond team use the present day map of Dakota County that includes sections to identify the
township and section your pond or lake is in. Are you sure? Do you all agree?

In your journal
Write down the section and the township your pond or lake is in
Also write one sentence in which you use technical language that clearly states the location of your pond.

Activity 6-aerial map

When you are at your pond or lake, one person on your team must create an aerial map that includes:

- north
- inlets and outlets
- terrain
- human built structures, such as roads, houses, buildings, etc.
- characteristic upland vegetation surrounding the pond
- aquatic sampling sites
- shoreline plot

Activity 7-writing the geographic data section of your pond profile

With your pond team begin drafting the geographic data section of your introduction. Dispassionately report the geographic data in a few paragraphs. Present your information in an organized fashion. Refer to the map that goes with your data. If it is included in your report write (See Figure 1). If it is not, cite it (Surficial Geology Map of Dakota County).

Seminar D: Pond Ecology I

Ecology can be defined as the relationship between organisms and their environment (abiotic factors). In order to understand the ecological relationships in your pond you will need to know something about the organisms, the naturally occurring chemicals and the vegetation common to ponds in our area. This activity will give you some insight into these relationships by having you conduct research on different aspects of your pond and then tying them together to teach others about your topics.

Task 1: Pick 3

Pick 3 things to research, one from each of the following categories. Each person on your team should pick different items to research.

<table>
<thead>
<tr>
<th>Macroinvertebrate</th>
<th>Vegetation</th>
<th>Chemical/cycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Scorpion</td>
<td>Coon tail</td>
<td>Nitrate</td>
</tr>
<tr>
<td>Damsel fly Larvae</td>
<td>Elodea</td>
<td>Phosphate</td>
</tr>
<tr>
<td>Dragonfly Larvae</td>
<td>Water milfoil</td>
<td>Dissolved Oxygen</td>
</tr>
<tr>
<td>Water boatman</td>
<td>Eurasian milfoil</td>
<td>pH</td>
</tr>
<tr>
<td>Amphipod</td>
<td>Cattail</td>
<td>Nitrate (yes again)</td>
</tr>
</tbody>
</table>
Task 2: Research

Use *Pond and Brook, MN Natural Heritage* the internet, or any other sources you may have (hint try some of the field guides). Research each item in depth. Remember you are trying to understand how the ecology of your pond.

Record information in your journal that will help you understand the organisms in your pond and how they are connected to each other and the abiotic (non living) aspects of your pond. Here are some starter questions to consider but feel free to add more information than this to the information you collect.

**Organisms:**
- What is the common and scientific name of your organism?
- What is it’s habitat? (Where does it live in the pond?)
- What does it eat? Or What eats it?
- How big is it?
- Where does it fit on the food chain?
- How has it adapted to living in a pond?
- Responses to changes in pond chemistry?

**Other**

**Chemicals:**
- What role does this chemical play in a pond or lake?
- What are “normal” levels?
- What problems may be caused by too much or too little?
- How is it cycled/introduced/taken out of the ecosystem?

Task 3: Put It All Together

Now that you have collected this information write a short paragraph connecting all three of the areas you researched to show how they connect and affect the pond ecosystem. Remember our simple definition of ecology... *the relationship between organisms and their environment.*

Task 4: Add Another Layer

**Working Portfolio Entry:**

Once you complete this entry please place in your working portfolio folder.

Now read your paragraph to the other members of your team. Find one or two other people to combine you information with and either write another paragraph further connecting the pieces of your ecosystem or a graphic organizer showing
connections with both words and pictures. Each person should create their own work.

“What is a Lake?” / “Understanding Lake Data”
A Dialectical Journal

What is a dialectical journal?
A dialectical journal is another name for a double-entry journal or a reader-response journal. A dialectical journal is a journal that records a dialogue, or conversation, between the ideas in the text (the words that you are reading) and the ideas of the reader (the person who is doing the reading). This is what you must do in your journal—keep a dialogue with yourself.

In the left column, you take notes from the text (Note Taking).
In the right column, you try to make sense of your notes (Note Making). In this case, we’d like you to make sense of the reading material by seeing how it might apply to the pond/lake you are studying.

<table>
<thead>
<tr>
<th>Note Taking</th>
<th>Note Making</th>
</tr>
</thead>
<tbody>
<tr>
<td>What does the text say?</td>
<td>How might this apply to my pond/lake?</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Some sections of the reading won’t apply to our work with our lakes/ponds. Your teachers will tell you which topics to exclude. Write them here:

Seminar E Reflective Writing I

“Ponds are places of magic and mystery” (Caduto 53)

In addition to the technical profile, each of you will create a more personal reflective essay about your pond/lake. This seminar should help with that essay, to help you “see” the magic & mystery in your pond.
What is Reflective Writing?

"Reflective writing is really thinking on paper---the process of searching for meaning and value in experience" (Sebranek 339). It’s a “self-study” in which the writer learns more about his/her experience in or with a meaningful place, and through the process learns more about himself/herself.

- **Starting Point**: A personal experience in a meaning-full place
- **Purpose**: To describe what you “saw” at the moment of the experience and then to “see” the meaning in that experience.
- **Form**: Many options here...could be highly structured or freeform. You’re both describing and reflecting, so you should include both literal and figurative details.
- **Audience**: *Yourself* as much as your readers (typically people who can relate somehow to your description and experience).
- **Voice**: Speak openly and honestly.
- **Point of View**: *First person* (I, me, my)...it’s your personal exploration and discovery.

Task #1: Looking at Models of Reflective Writing

Work with a partner to **study** the excerpts from two reflective essays: “The Ponds,” by Mary Oliver and “On the Pond Again,” by Gretel Ehrlich.

Read each piece **aloud**.
Go back through the piece together, annotating in the following way:

- Underline any **factual details** the writer gives about the pond/lake. *(literal pictures: think hard eyes)*
- Put brackets [ ] around any **sensory details** (appeals to sight, hearing, taste, touch, smell) that the writer offers? *(images: think sharp eyes)*
- Put parentheses ( ) around any **“artistic” details** (metaphors, similes, personification, etc.) that the writer uses. *(figurative pictures: think soft eyes)*
- Mark with an “R” statements that the writer makes that reveal her feelings about the pond/lake and her experience with it? *(reflection)*
- Somewhere on the piece, jot your ideas about what “thoughts about life” the pond/lake inspired in the writer? *(reflection)*

Put these two annotated pieces in your journal.

Task #2: Study the Requirements for the Reflective Essay

Look over that checklist to begin thinking about what you’ll need to do.
Working Portfolio: Analysis & Discussion

Each of you will write a solid draft of the analysis & discussion section for your team’s technical report, to be turned in on Thursday, October 7th at the end of class. You should bring your analysis on a hard copy (to turn in) and a flash drive (for your team to use).

Your team will examine all of the rough drafts and combine the best pieces from them into one coherent analysis & discussion section to be submitted with the complete draft of your report on Wednesday, October 13.

Remember, in your analysis, you are:
- Limited to the data you have collected (don’t make up data, speculate on what the data might be, etc.)
- Offering only a “snapshot” of your pond, revealing only what you saw at one point in time, and comparing your “snapshot” to the “snapshots” of other students.
- Trying to place your “snapshot” into the “photo album” of the City’s longitudinal data on your pond.
- As you write remember you are discussing two things: what data did you find and what does it mean? (cite source).

Avoid:
- Sweeping generalizations.
- Drawing conclusions that can’t be drawn from the data you have.
- Faulty correlations.
- Stating your opinion without professional, textual support.
- Emotional, persuasive, descriptive language (remain objective, concise, technical, professional).

There are many ways in which to organize your analysis. Here is one way you might choose as a “formula” to follow as you work through your analysis is:

<table>
<thead>
<tr>
<th>Steps in the Analysis</th>
<th>Examples of Questions to Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summarize the data gathered by your team.</td>
<td>What was the pH of your pond?</td>
</tr>
<tr>
<td>Compare your data to the collective data (from other teams, past profiles, City data, etc.)</td>
<td>What have others found the pH to be?</td>
</tr>
<tr>
<td>Summarize what professional sources (texts) say is “normal” or “average” or “expected” data (cite the source in a correctly formatted parenthetical citation)</td>
<td>What did Caduto say is the expected pH of a pond of this type?</td>
</tr>
<tr>
<td>Draw conclusions about how your data compares to other collectors’ and the texts.</td>
<td>How similar is the pH you found to that found by others at your pond? How does the pH level you found compare to what Caduto said is expected?</td>
</tr>
<tr>
<td>---------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Offer possible explanations about the comparison between your team’s data, other collected data and the texts.</td>
<td>How might you explain the difference in the findings of your team and the others at your pond? What variations in your methodology might have impacted your results? How might the weather have affected your data?</td>
</tr>
<tr>
<td>Offer explanations of how this data might impact other aspects of your pond.</td>
<td>How might this pH affect the numbers and kinds of macroinvertebrates in your pond?</td>
</tr>
<tr>
<td>Draw an overall conclusion about this data</td>
<td>Therefore, how might this data affect the state of your pond?</td>
</tr>
</tbody>
</table>

**GRADING CHECKLIST: ANALYSIS & DISCUSSION**

Name_________________

Team________

+ Exceeds expectations √ = Meets expectations - = Needs improvement

<table>
<thead>
<tr>
<th>QUESTIONS TO BE ANSWERED IN YOUR ANALYSIS &amp; DISCUSSION</th>
<th>+</th>
<th>√</th>
<th>-</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Have you discussed these?</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• physical data</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• chemical data</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• vegetation data</td>
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<td></td>
<td></td>
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<tr>
<td>• seine net data</td>
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<td></td>
<td></td>
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<tr>
<td>• dipnet data</td>
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<td></td>
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<tr>
<td><em>How can you describe the physical health of your pond?</em></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Explain with evidence from texts and your own data; thinking about the connections between flora &amp; fauna, water chemistry, historical forces, etc.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• How was your pond formed?</td>
<td></td>
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</tr>
<tr>
<td>• What type of pond / lake is it?</td>
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<tr>
<td>• What can you conclude about the productivity of your pond? (What’s the trophic state of your pond?)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
pond?)
- What’s the current level of stratification (turnover)?
- What predictions can you make about the succession of your pond?

**What has impacted your pond?**
- Topography
- Watershed (current & historical)
- Human impacts (current & historical)

**Compare to textbook “normal” ponds.**
How does your pond compare to what the texts say is a “normal” or “typical” pond for this region? (include references to texts)

**Compare data.**
How does your data compare with others’ data?
- Other teams
- Other groups (if available)
- City of Eagan
- DNR or other agencies

What are some possible explanations for differences in the data?

**WRITING MECHANICS TO CONSIDER**

<table>
<thead>
<tr>
<th>Analysis &amp; discussion are written in technical style</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quotes from texts are effectively integrated in your writing. (Tester, Caduto, Dennis, Shaw)</td>
</tr>
<tr>
<td>Parenthetical citations are included, correctly formatted</td>
</tr>
<tr>
<td>Writing is free of mechanical errors</td>
</tr>
</tbody>
</table>

**Pond Profile Presentation**

Preparation of the Team’s Presentation:
As the final piece of your team’s in-depth study of a local pond, each team will present their findings (and a copy of their reports) to a city water resource manager, and perhaps some other interested listeners. Please feel free to invite residents around your pond you may have talked to or you feel may be interested in your findings. You may also want to invite parents or other family members to share in your hard work.

Presentations will be during the last part of house time on October 28th (from about 9:00-10:35). Each presentation should be about 15 minutes, plus time for questions & answers from the audience.

For a successful presentation you should:

- Introduce the pod members
- Introduce your pond
- Summarize the data collected and your analysis of the data
- Offer comparisons with the findings of the two teams and typical lake data
- Use helpful visual aids (Power Point w/ graphs, tables, maps, pictures, etc.)
- Consider your audience as you plan your presentation
  - Dress professionally, because you are making a professional presentation
  - Refer to “The Learner’s Companion” or Writers Inc. for tips on making an effective presentation.
  - Practice your presentation so that it will be polished and professional.
- Prepare to answer questions about your work during the question & answer session.
- Make sure that each person in the pod plays a significant part in the preparation and/or presentation.
- Each person should create a note card to speak from.
- Carefully revise and edit your report so that it is ready for a professional presentation
- Text should be readable accurate and concise. Do Not simply copy paragraphs from your report

Each team will present one copy of their final report to the city official. Eagan ponds will be presented to Jim Storland (Water Resource Manager), other Eagan staff, or other persons knowledgeable about water resources.

Profile Presentation:
Each team can make their presentation using Power Point on SES computers. A successful presentation should include these aspects:

- Include pictures, graphs, tables and maps from your technical report
- Summary of data analysis comparing your pond or lake to typical lakes and ponds in this area
- Your groups conclusions and recommendations for your pond
- Save a final copy to one members folder on the network
- Use conservative color and design
- Focus on info, not glitzy formatting

Requirements:
+ ✔ -

- [ ] Burn a CD copy of your final Presentation for grading
- [ ] Make sure that each person in the pod plays a significant part in the preparation and/or presentation.
- [ ] Each person should create a note card to speak from.

Final Profile Submission
You will need two copies of your Pond Profile. Each copy should be clean and clearly labeled with the pond name, date and group members first and last names. You will submit the following:

- [ ] A copy of your power Point presentation on CD or saved to them to the Network in the following location: Academic Vol./ House Blue/Assignment Drop/Pond Profile Presentation. You should call the file: Lake Name Team A or B. For example: Fish Lake Team A
- [ ] A copy of your final report plus data sheets in a flat folder to go to the city.
- [ ] A copy of your final report plus data sheets in a flat folder plus the original draft with teacher comments to go to SES for grading. Any individual drafts of sections plus individual conclusions and recommendations should also be included.
- [ ] Team evaluation of the project (each individual will also submit a self-evaluation)
Improving our Ability to Work in Teams

**Directions for the Activity:**
Your team should choose one person to be the recorder of your ideas and turn them in. Your team should discuss the following scenarios and generate a list of suggestions for working to resolve each.

**What could you do to work effectively if you are working with a team and one of the team members...**
- is absent a lot?
- is not a strong writer?
- is a procrastinator?
- has a different learning or working style from the rest of the group?
- is a perfectionist?
- has a complicated life and therefore has difficulty getting work done with the group?
- tries to take total control?
• is always goofing around?

• ends up doing the whole project (or most of it) by him/herself?

• lies to the group?

• doesn’t complete agreed-upon tasks?

• doesn’t complete agreed-upon tasks on time?

• rewrites other people’s work without talking to them?

• is struggling with personal problems?

**What are some ways in which your team might...**

• effectively deal with stress?

• avoid computer problems?

• deal with the varying interest, ability and commitment levels in the group?

• divide and conquer the tasks?

**Can you think of any other ideas for making your next team work more effectively on the next project? Any other problems you had working on the Pond Profile that you’d like to resolve this time?**
Follow-up Activity, to be Completed Individually

For your journal, each of you should write your personal goals for improvement in team work. What will you do differently next time you have to work on a team, that might help you and your team work even more effectively? You should think of at least 3 goals, and write a paragraph discussing your plans for accomplishing each goal.

Journal Assignment

“It is something to be able to paint a particular picture or to carve a statue, and so to make a few objects beautiful, but it is far more glorious to carve and paint the very atmosphere and medium through which we look, which we can actually do. To affect the quality of the day, that is the highest of arts” (WILAWILF)

1. I know that there have been times during this project that have been difficult. Your pre-writing assignment is to experiment with the quality of your day. Over 3-5 days try these things:
   Experiment with kindness. At home think of a few things you could do to be kind to your family. Can you make your mom’s coffee? Can you rake, mow the lawn, empty the dishwasher, fold the laundry or some other task without being asked? Can you do something nice for your little sister? Can you ask your parents about work, and actually tell them about what is going on in your life? With your friends, do the same. Try to think of something that would be kind, and do it. This might actually be to do something fun and simple outside, like sledding or skating, or playing football. Finally, be kind to someone you don’t know that well. Talk to them or walk with them after class. Sit with someone lonely at lunch.
   Experiment with your free time. Make yourself be outdoors part of each of those 3-5 days. Walk or bike to a park and do something. Make yourself avoid media for these 3-5 days and use that time to be outside or to read. Find a book you remember you enjoyed and read it again. Go to the library and find a new book and read it.
   Experiment with your job or homework. Do the best you can on any assigned tasks you have. Really set aside the time you need to do your best work for school. Do the best job possible at your job.
   Experiment with the idea of gratitude. What are you grateful for and who do you hold responsible for the things you are grateful for? Thank them.
Make a list during these 3-5 days of the things you did to “affect the quality of your day” and if they did improve the quality of your day.

2. Journal on the art of “affecting the quality of your day.” Is it possible to make our lives better by consciously choosing acts that people through time have told us are the routes to happiness? What makes you happy? Is the construction of a good day the highest of arts?

**Grading System:**
We have 4 categories in our grade book. Assessments are 55% of a student's trimester grade and should show the cumulative understanding of the unit’s material. This unit has three assessments—the technical report, the PowerPoint, and the Reflective Essay. Our expectation is that students will have a B or better on the final draft of the technical report and on the PowerPoint since they are presented to the public. In 13 years I have never had a group not meet that expectation. Our second category is made up of “Working Portfolios” and they are 20% of the student’s grades. This unit contains 3 portfolios—the first draft of the technical report, a draft on a water memory, and a piece on pond ecology. These are somewhat polished pieces meant to assess student understanding of the material during the unit. They may be the draft of an essay, but are meant to be the building blocks of assessments. Journals are the third category, and count for 20% of their grade. There are probably 20 journal entries for this unit including notes from speakers, lectures, and readings. Finally, 5% of students grade is for on time completion of work.

**Other:**
Minnesota State Social Studies Standards are available through this link [http://education.state.mn.us/MDE/EdExc/StanCurri/K-12AcademicStandards/index.htm](http://education.state.mn.us/MDE/EdExc/StanCurri/K-12AcademicStandards/index.htm).

**Bibliography:**

Caduto, Michael J. *Pond and Brook.* University Press of New England.

