New Hampshire Comprehensive Lake Inventory

New Hampshire Department of Environmental Services

October 2008
3rd Edition

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

WD-07-31

New Hampshire Comprehensive Lake Inventory

Prepared By:

Lakes Management and Protection Program
and the
NH Lakes Management and Advisory Committee

State of New Hampshire
Department of Environmental Services
29 Hazen Drive, PO Box 95
Concord, NH 03302-0095
(603) 271-2959
http://des.nh.gov/organization/divisions/water/wmb/lakes/index.htm

Thomas S. Burack
Commissioner

Michael J. Walls
Assistant Commissioner

Harry T. Stewart
Water Division Director

October 2008
3rd Edition

Acknowledgements

The easy-to-use layout and format of the Comprehensive Lake Inventory (CLI) were based on a design used in the *Method for the Comparative Valuation of Nontidal Wetlands in New Hampshire* document produced by New Hampshire Audubon, the USDA Soil Conservation Service, and the New Hampshire Department of Environmental Services (DES). Members of the Squam Lakes Association (SLA) were kind enough to conduct a trial analysis of the CLI to test the questions, the scoring system and the appendices.

The NH Lakes Management and Protection Program would like to thank several DES employees, past and present, for all of their time and effort which went into the development and production of the CLI: Jacquie Colburn, Laura Weit, Dave Neils, Beth Krumrine, Stacy Herbold, Karen McCartney, Donna Desautels, and Jared Teutsch. The work of these individuals is truly appreciated; this document would not exist without their energy and skills.

It has taken many years and iterations to get this document in the shape that it is. Thank you to the students and faculty of the Lakes Management class at the University of New Hampshire and the Community-Based Research Project class at Colby-Sawyer College for their input and recommendations to improve the document.

Special thanks and gratitude is also extended to the NH Lakes Management and Advisory Committee for their review, comments and contributions to the document.

Your additions, comments and recommendations are always welcome.

Table of Contents

Introduction 1

Lake Value Descriptions 3

Where and/or How to Find the Information 4

Materials and Information Needed 7

Attributes

Attribute 1. Geographic, Spatial, and Demographic Information 12

Question:

A. Waterbody location in the state
B. Waterbody elevation
C. Proximity to major transportation corridors
D. Total year round resident population w/in 30-mile radius

Attribute 2. Physical Waterbody Characteristics 14

Question:

A. Surface water area
B. Maximum water depth
C. Mean water depth
D. Percent shoal area/littoral zone
E. Shoreline configuration
F. Island presence/absence
G. Shoreline wetlands
H. Watershed area
I. Watershed area / Lake area ratio
J. Hydraulic flushing rate
K. Basin morphometry (bottom configuration)
L. Waterbody origin
M. Stratification characteristics
N. Flood storage ability
O. Average water level alteration
P. Water control structure
Q. Inlets (tributaries)
R. Outlets

Attribute 3. Water Quality Characteristics 22
Question:
A. Waterbody trophic status
B. Alkalinity or Acid Neutralizing Capacity (ANC)
C. Calcium concentration
D. pH
E. Total phosphorus concentration
F. Secchi disc transparency
G. Hazardous material spill events
H. Other water quality concerns
I. Historic point source discharges
J. Listed in the 305(b) or 303(d) Surface Water Quality Reports

Attribute 4. Biological / Ecological Characteristics 28
Question:
A. Algal abundance (chlorophyll a level)
B. Phytoplankton community composition
C. Fish species diversity
D. Avian species diversity
E. Mammal species diversity
F. Reptile and amphibian species diversity
G. Aquatic macroinvertebrate community composition in the waterbody
H. Specialized habitats, breeding or rearing areas in the watershed
I. Exotic aquatic plant species
J. Exotic aquatic animal species
K. Threatened and endangered plant and animal species and exemplary natural communities
L. NH Natural Heritage State Rank and Global Rank

Attribute 5. Recreational Characteristics..... 38
Question:
A. Type of watercraft
B. Average watercraft density
C. Private marine service/docking facilities
D. Other water dependent activities
E. Recreational fishing
F. Occurrence of fishing tournaments/derbies
G. Angler usage
H. Ice dependent activities
I. Non-water dependent activities
J. Commercial seasonal camps
K. Boat launches and access sites
L. Other recreation and support facilities
M. Time of recreational use/activities

Attribute 6. Restrictions or Prohibited Uses..... 46
Question:
A. Public swimming facility postings imposed because of threats to human health
B. Fish consumption limits due to threats to human health
C. Recreational fishing restrictions
D. Waterbody is designated as a drinking water supply
E. Power boat restrictions
F. Ski craft restrictions
G. Lake surface areas with restrictions/limitations
H. Restricted activity times

Attribute 7. Unique Characteristics..... 52
Question:
A. Public drinking water supply
B. Historic features in or around the waterbody
C. Educational facilities or sites
D. Research or scientific study
E. Participant in VLAP, LLMP, or an alternative volunteer monitoring program

Attribute 8. Shoreland Characteristics..... 56
Question:
A. Shoreland development and land use
B. Shoreland ownership
C. Protected land or land not available for development within the shoreland
D. Percent of impervious surface within the shoreland
E. Permanent or seasonal water dependent structures
F. Shoreland topography (slope)
G. Shoreland geology and soils
H. Local land use regulatory measures within the shoreland
I. Rate of shoreland development
J. Rate of conversation, additions, improvements, etc.

Attribute 9. Watershed Characteristics..... 64
Question:
A. Watershed development and land use
B. Watershed land ownership
C. Protected land or land not available for development within the watershed
D. Percent of impervious surface within the watershed
E. Land use adjacent to perennial streams
F. Watershed topography (slope)
G. Watershed geology and soils
H. Local land use regulatory measures within the watershed
I. Drainage network
J. Rate of watershed development

Attribute 10. Visual/Aesthetic Characteristics..... 70
Question:
A. Scenic or natural features of interest visible from the waterbody
B. Scenic viewing opportunities of the waterbody
C. Noise level at scenic viewing areas
D. Dominant land use visible from waterbody
E. Odors present on waterbody or at viewing areas

Additional Comments/Ideas..... 74

Appendix A. Summary of Inventory Results ……. A-1
- Recreational Value …….. ..... A-3
- Unique or Outstanding Value …….…….…..... A-5
- Susceptibility to Impairment …….. ..... A-7

Appendix B. Biological Checklists ……..... B-1
- Avian Community Checklist B-3
- Mammal Checklist ……..... B-5
- Reptile & Amphibian Checklist B-7

Appendix C. Recreation and Shoreline Surveys …… C-1
- Type of Watercraft/Average Watercraft Density Survey Instructions . C-3
- Type of Watercraft Survey …… C-5
- Average Watercraft Density Survey ……. C-7
- Angler Survey Instructions ……..... C-9
- Angler Survey Data Sheet …… C-11
- Shoreline Structure Survey Instructions …… C-13
- Shoreline Structure Survey..... C-15

Appendix D. Contact Information D-1

Introduction

Purpose of an Inventory

The first step in the lake and watershed management planning process is to establish a "baseline" of information that objectively characterizes the watershed. The development of the *NH Comprehensive Lake Inventory* was designed to guide, in a standardized manner, the collection of information necessary to assess the status of a specific lake or pond and its surrounding watershed. By documenting the results and sources of information for each of the questions included in the Inventory, a foundation can be established that facilitates a common understanding of the watershed's characteristics among governmental agencies, local municipalities, private business, and interested stakeholders.

Although the Inventory is based on collecting scientific and other information from a broad range of disciplines, it is designed to be easy-to-use and understandable for people with limited knowledge of the technical aspects of watershed management. The purpose of the Inventory is to primarily serve as a planning and educational tool, and is not a sufficient substitute for a detailed assessment of the impacts to lakes or ponds. The Inventory should be used to gather basic information about a specific watershed with the understanding that it will be utilized when developing a lake management plan. Ultimately, this data will be used to develop state and local management techniques that will be implemented to protect or restore the natural characteristics (physical, chemical, and biological) of a lake or pond while accommodating the important economic, social, and recreational values and uses. This document is to be used in conjunction with its companion document *The Guidelines for Coordinated Lake Management and Shoreland Protection Plans*, also written by the NH Lakes Management and Protection Program, which includes the Lakes Management Advisory Committee. Conducting a lake inventory is just one of the many steps toward developing a successful, comprehensive lake management plan.

Inventory Organization and Application

The Inventory is organized into ten primary attributes. Each attribute is designed to address a specific characteristic commonly evaluated when developing a lake management plan. Within each attribute there is a series of questions and a listing of multiple-choice answers for each question. The third edition of the Inventory contains a total of 95 questions; questions may be added or removed as lake issues change. While it would be ideal to answer every question in the document, this may not always be possible. With so many questions, a means of conducting a limited assessment of a waterbody has been included in the document. If a group or organization has limited time and/or resources and is only interested in one or more of the following values – *recreational*, *uniqueness*, or *susceptibility to impairment* – just answer the questions pertaining to those values. The questions pertaining to *recreation* can be found under the heading abbreviated "Rec" and are highlighted in blue, the questions pertaining to *unique or outstanding value* can be found under the heading abbreviated "Out" and are highlighted in pink, and the questions pertaining to *susceptibility to impairment* can be found under the heading abbreviated "Sus" and are highlighted in green. A score has been assigned to particular questions to ascertain each of these values as follows:

1) Recreational Value, ranked from 1 – 5, with 1 being the lowest level of recreational value and 5 being the highest level of recreational value.
2) Unique or Outstanding Value, ranked from 1 – 5, with 1 being few unique features or outstanding value and 5 being many unique features or most outstanding value.
3) Susceptibility to Impairment, ranked from 1 – 5, with 1 being the lowest level of susceptibility and 5 being the highest level of susceptibility.

The total score for each of the three values is determined by adding the scores of the applicable questions for each value. The score can then be compared to the total number of points available (100) for that particular value. Once all of the colored questions have been answered, the information should be recorded in Appendix A. It should be noted that even though a lake may rate low for *susceptibility to impairment*, this does not mean it will remain so in the near future. All efforts to protect and preserve healthy ecosystems should continue and be improved upon.

The scoring system developed for the Inventory was designed to provide an understandable evaluation technique that reduces the amount of technical knowledge required to assess the results. To simplify the process, each category has 20 questions with point values. The maximum number of points per scored questions is five, bringing the total to 100 points possible per value. It is difficult, however to eliminate the subjective nature of any scoring system. Ultimately, while the scoring system may be useful in identifying specific issues or areas of immediate concern, the information collected in completing the Inventory is more important in creating a long-term vision for developing a management plan for the watershed and the respective waterways within it. To this end, efforts in completing the Inventory should be concentrated on collecting the most accurate and recent information available, rather than focusing on actual scores. Time spent completing an accurate Inventory will be beneficial in the long run as it will serve to form a common understanding among all interested parties.

The Inventory was developed to be utilized by municipalities within the lake watershed, state and federal agencies, lake associations, and organized groups with an interest in how a lake or pond is managed. Ideally, the Inventory will be completed as a cooperative effort. Although the Inventory, in most cases, will be undertaken by a group of individuals representing local interests, it must be realized that in New Hampshire all lakes or ponds ten acres or greater in size are public (RSA 271:20). Therefore, when assessing the results of the Inventory it is critically important that the interests of the public at large are incorporated into a watershed management plan.

INVENTORY TIPS:

1. Review the entire document before answering any questions.
2. Make note of any additional information, even if it is not required by the question.
3. If you are stuck on a particular question, contact Jacquie Colburn, Lakes Coordinator with the NH Department of Environmental Services (NHDES), Lakes Management and Protection Program at (603) 271-2959 or jacquie.colburn@des.nh.gov for assistance.
4. Be sure to record the source of the information, including the name of the person you spoke with and the date.

Lake Value Descriptions

CATEGORY 1: Recreational Value

Recreational Value is ranked from 1 – 5, with 1 being the lowest level of recreational value and 5 being the highest level of recreational value.

A lake with a high level of recreational value is one that provides and/or supports a variety of passive and active recreational activities. Recreational activities on these lakes can range from swimming and canoeing to powerboat racing. Given the lake's characteristics, number and type of craft and/or activity, the degree of development in the watershed, and the water quality of the lake, the management plan should include appropriate guidelines to ensure that the lake is not impaired by excessive or inappropriate on-water activities.

Some of the characteristics of a lake with a high recreation value include, but are not limited to:

- Unusual shoreline or interesting islands
- Located within a 30-mile radius of a large population
- Clear water – good Secchi disk transparency
- Private marine and or docking facilities
- None, or limited, boating restrictions
- Scenic or natural features of interest

CATEGORY 2: Unique or Outstanding Value

Unique or Outstanding Value is ranked from 1 – 5, with 1 being few unique features or outstanding value and 5 being many unique features or outstanding value.

A lake scoring high in this category will have many unique features or outstanding natural or cultural features. Based on these criteria, there are a limited number of such lakes in the state. These lakes will require restrictions on the intensities and types of uses permitted on the lake, on the shoreline, and within the watershed, so as to maintain the integrity of the lake environment and lake experience. These lakes are worthy of special designation.

Some of the characteristics of a lake with a high unique or outstanding value include, but are not limited to:

- Elevation above 2,000 feet
- Secchi disk transparency greater than 12 meters
- Glacial kettle hole basin origin
- Unique, scenic or other natural feature(s)
- Habitat for rare, threatened or endangered plant or animal species
- Primarily open space with very little development on the shoreline and within the watershed

CATEGORY 3: Susceptibility to Impairment

Susceptibility to Impairment is ranked from 1 – 5, with 1 being the lowest level of susceptibility and 5 being the highest level of susceptibility.

A lake with a high susceptibility to impairment is one that is vulnerable to detrimental changes or impacts or is threatened or stressed by one or more factors. Due to these factors, the lake is at or near a threshold of impairment. The threats may be potential, or they may already be present. These lakes warrant attention by the appropriate cooperating lake stewards to correct or mitigate the threats. The development and implementation of a management plan with prescribed actions and remedies must focus on the specific problems which have been identified.

Some of the characteristics of a lake with a high susceptibility to impairment include, but are not limited to:

- Very shallow depth
- Historic water quality problems
- Excessive recreational use/activity
- Located within a 30-mile radius of a large population
- Presence of exotic aquatic species in the lake and/or in a nearby lake
- Regulations of the surrounding communities do not, at a minimum, meet state standards

Where and/or How to Find the Information

In an effort to familiarize the user with the significant amount of information necessary to complete the Inventory all of the questions are listed here for reference and planning purposes. How the information can/should be derived and developed is also indicated. Please keep in mind that information sources listed here will need to be updated periodically as websites and their addresses are subject to change. If a link in this list or in the document does not function, please notify Jacquie Colburn, Lakes Coordinator with the NH Department of Environmental Services Lakes Management and Protection Program at (603) 271-2959 or jacquie.colburn@des.nh.gov.

Attribute and Associated Questions	Information Source
***ATTRIBUTE 1.* GEOGRAPHIC, SPATIAL, & DEMOGRAPHIC INFORMATION**	
A. Waterbody location in the state	www.granit.sr.unh.edu/ topomaps.usgs.gov/ earth.google.com/
B. Waterbody elevation	des.nh.gov/organization/divisions/water/wmb/lakes/lake_water.htm
C. Proximity to major transportation corridors	www.granit.sr.unh.edu/ topomaps.usgs.gov/ earth.google.com/
D. Total population w/in 30 mile radius	www.nh.gov/oep/programs/DataCenter/Population/documents/2007_population_estimates.pdf
***ATTRIBUTE 2.* PHYSICAL WATERBODY CHARACTERISTICS**	
A. Surface water area	des.nh.gov/organization/divisions/water/wmb/lakes/lake_water.htm
B. Maximum water depth	des.nh.gov/organization/divisions/water/wmb/lakes/lake_water.htm
C. Mean water depth	des.nh.gov/organization/divisions/water/wmb/lakes/lake_water.htm
D. Percent shoal area/littoral zone	des.nh.gov/organization/divisions/water/wmb/lakes/lake_water.htm
E. Shoreline configuration	des.nh.gov/organization/divisions/water/wmb/lakes/lake_water.htm
F. Island presence/absence	www.granit.sr.unh.edu/ topomaps.usgs.gov/ earth.google.com/ www.fws.gov/nwi/
G. Shoreline wetlands	http://www.delorme.com/mapstore/default.aspx topomaps.usgs.gov/ www.fws.gov/nwi/
H. Watershed area	des.nh.gov/organization/divisions/water/wmb/lakes/lake_water.htm
I. Watershed area / Lake area ratio	des.nh.gov/organization/divisions/water/wmb/lakes/lake_water.htm
J. Hydraulic flushing rate	des.nh.gov/organization/divisions/water/wmb/lakes/lake_water.htm
K. Basin morphometry (bottom configuration)	topomaps.usgs.gov/ des.nh.gov/organization/divisions/water/wmb/lakes/lake_water.htm
L. Waterbody origin	des.nh.gov/organization/divisions/water/wmb/lakes/lake_water.htm des.nh.gov/organization/commissioner/pip/publications/wd/documents/r-wrd-91-4.pdf
M. Stratification characteristics	des.nh.gov/organization/divisions/water/wmb/lakes/lake_water.htm des.nh.gov/organization/divisions/water/wmb/vlap/2006/index.htm
N. Flood storage ability	www.nh.gov/oep/programs/floodplainmanagement/maps.htm www.nh.gov/safety/divisions/bem/aboutus.html
O. Average water level alteration	des.nh.gov/organization/divisions/water/dam/index.htm
P. Water control structure	des.nh.gov/organization/divisions/water/dam/index.htm
Q. Inlets (tributaries)	www.granit.sr.unh.edu/ topomaps.usgs.gov/ earth.google.com/
R. Outlets	www.granit.sr.unh.edu/ topomaps.usgs.gov/ earth.google.com/
***ATTRIBUTE 3.* WATER QUALITY CHARACTERISTICS**	
A. Waterbody trophic status	des.nh.gov/organization/divisions/water/wmb/lakes/trophic_summary.htm
B. Alkalinity or Acid Neutralizing Capacity (ANC)	des.nh.gov/organization/divisions/water/wmb/lakes/lake_water.htm des.nh.gov/organization/divisions/water/wmb/vlap/2006/index.htm
C. Calcium concentration	des.nh.gov/organization/divisions/water/wmb/lakes/lake_water.htm des.nh.gov/organization/divisions/water/wmb/vlap/2006/index.htm
D. pH	des.nh.gov/organization/divisions/water/wmb/lakes/lake_water.htm des.nh.gov/organization/divisions/water/wmb/vlap/2006/index.htm
E. Total phosphorus concentration	des.nh.gov/organization/divisions/water/wmb/lakes/lake_water.htm des.nh.gov/organization/divisions/water/wmb/vlap/2006/index.htm
F. Secchi disc transparency	des.nh.gov/organization/divisions/water/wmb/lakes/lake_water.htm des.nh.gov/organization/divisions/water/wmb/vlap/2006/index.htm
G. Hazardous material spill events	www2.des.state.nh.us/OneStop/ORCB_Query.aspx
H. Other water quality concerns	des.nh.gov/organization/divisions/water/wmb/lakes/index.htm
I. Historic point source discharges	des.nh.gov/organization/divisions/water/wmb/lakes/index.htm
J. Listed in the 305(b) or 303(d)	des.nh.gov/organization/divisions/water/wmb/swqa/2008/index.htm

Attribute and Associated Questions	Information Source
***ATTRIBUTE 4.* BIOLOGICAL / ECOLOGICAL CHARACTERISTICS**	
A. Algal abundance (chlorophyll a level)	des.nh.gov/organization/divisions/water/wmb/lakes/lake_water.htm des.nh.gov/organization/divisions/water/wmb/vlap/2006/index.htm
B. Phytoplankton community composition	des.nh.gov/organization/divisions/water/wmb/lakes/lake_water.htm
C. Fish species diversity	www.wildlife.state.nh.us/Fishing/Fishing_PDFs/FW_Fishing_Guide.pdf
D. Avian species diversity	Complete the checklist in Appendix B
E. Mammal species diversity	Complete the checklist in Appendix B
F. Reptile and amphibian species diversity	Complete the checklist in Appendix B
G. Aquatic macroinvertebrate community composition in the waterbody	See question for more details
H. Specialized habitats, breeding or rearing areas	des.nh.gov/organization/divisions/water/wmb/lakes/index.htm
I. Exotic aquatic plant species	des.nh.gov/organization/divisions/water/wmb/exoticspecies/documents/milfoil_map_list.pdf www.cfb.unh.edu/
J. Exotic aquatic animal species	www.wildlife.state.nh.us/Inside_FandG/contact_fish_and_game.htm www.cfb.unh.edu/
K. Threatened & endangered species & exemplary natural communities	www.nhdfl.org/library/pdf/web_towns.pdf
L. NH State Rank and Global Rank	www.nhdfl.org/library/pdf/TrackingList-PlantGeneral.pdf
***ATTRIBUTE 5.* RECREATIONAL CHARACTERISTICS**	
A. Type of watercraft	Complete the survey in Appendix C
B. Average watercraft density	Complete the survey in Appendix C
C. Private marine service/docking facilities	Local tax maps and local knowledge
D. Other water dependent activities	Local knowledge
E. Recreational fishing	www.wildlife.state.nh.us/Fishing/Fishing_PDFs/FW_Fishing_Guide.pdf
F. Occurrence of fishing tournaments/derbies	www.wildlife.state.nh.us/Fishing/fish_tournament_table.htm
G. Angler usage	Complete the survey in Appendix C
H. Ice dependent activities	Local knowledge
I. Non-water dependent activities	Local knowledge
J. Commercial seasonal camps	Local tax maps and local knowledge des.nh.gov/organization/divisions/water/dwgb/youthcamps/documents/licensed_youth_recreation_camps.pdf
K. Boat launches and access sites	Local tax maps www.visitnh.gov/what-to-do/lakes-beaches-and-water-fun/public-access-and-put-ins/ www.delorme.com/mapstore/default.aspx www.wildlife.state.nh.us/Outdoor_Recreation/access_sites_table.htm
L. Other recreation and support facilities	Local tax maps and town websites www.nhstateparks.org/state-parks/alphabetical-order/ www.delorme.com/mapstore/default.aspx
M. Timing of recreational use/activities	Complete the Recreational characteristics worksheet on page 45
***ATTRIBUTE 6.* RESTRICTIONS OR PROHIBITED USES**	
A. Public swimming facility postings imposed because of threats to human health	www2.des.state.nh.us/Advisories/Beaches/ des.nh.gov/organization/divisions/water/wmb/swqa/2008/index.htm
B. Fish consumption limits due to threats to human health	des.nh.gov/organization/commissioner/pip/factsheets/ard/documents/ard-ehp-25.pdf
C. Recreational fishing restrictions	www.wildlife.state.nh.us/Fishing/Fishing_PDFs/FW_Fishing_Digest_07.pdf
D. Waterbody is designated as a drinking water supply	des.nh.gov/organization/commissioner/legal/rules/index.htm www2.des.state.nh.us/OneStop/Public_Water_Systems_Query.aspx
E. Power boat restrictions	www.nh.gov/safety/divisions/ss/marinepatrol/restricted.html
F. Ski craft restrictions	www.nh.gov/safety/divisions/ss/marinepatrol/restricted.html
G. Lake surface areas with restrictions/limitations	des.nh.gov/organization/divisions/water/wmb/lakes/index.htm
H. Restricted activity times	www.nh.gov/safety/divisions/ss/marinepatrol/restricted.html

Attribute and Associated Questions	Information Source
***ATTRIBUTE 7.* UNIQUE CHARACTERISTICS**	
A. Public drinking water supply	www2.des.state.nh.us/OneStop/Public_Water_Systems_Query.aspx
B. Historic features in or around waterbody	www.nh.gov/nhdhr/programs/documents/NH_State_Register.doc www.nationalregisterofhistoricplaces.com/NH/state.html
C. Educational facilities or sites	Local knowledge, phone book, and the Internet
D. Research or scientific study	Local knowledge, phone book, and the Internet
E. Participant in VLAP, LLMP, or an alternative volunteer monitoring program(s)	des.nh.gov/organization/divisions/water/wmb/vlap/list_participating.htm www.nhlakes.org/docs/06-LH-Manual-Org-List.doc www.wrrc.unh.edu/index.htm
***ATTRIBUTE 8.* SHORELAND CHARACTERISTICS**	
A. Shoreland development and land use	earth.google.com/ www.granit.sr.unh.edu/ topomaps.usgs.gov/ Local tax maps
B. Shoreland ownership	Local tax maps www.granit.sr.unh.edu/
C. Land not available for development	www.granit.sr.unh.edu/
D. Percent of impervious surface	Use the formula on page 58
E. Water dependent structures	Complete the survey in Appendix C
F. Shoreland topography (slope)	www.nh.nrcs.usda.gov/Soil_Data/availableNHsoilsurveys.html topomaps.usgs.gov/
G. Shoreland geology and soils	www.nh.nrcs.usda.gov/Soil_Data/availableNHsoilsurveys.html des.nh.gov/organization/commissioner/pip/publications/geologic/geologic.htm
H. Local land use regulatory measures	Check Municipal and Town websites for Local Land Use and Development Ordinances
I. Rate of shoreland development	www.nh.gov/oep/programs/DataCenter/Housing/documents/housing_supply_06.pdf
J. Rate of conversions, additions, improvements, etc.	www.nh.gov/oep/programs/DataCenter/Housing/documents/housing_supply_06.pdf
***ATTRIBUTE 9.* WATERSHED CHARACTERISTICS**	
A. Watershed development and land use	earth.google.com/ topomaps.usgs.gov/ www.nh.nrcs.usda.gov/Soil_Data/availableNHsoilsurveys.html Local tax maps
B. Watershed land ownership	Local tax maps www.granit.sr.unh.edu/
C. Land not available for development	www.granit.sr.unh.edu/
D. Percent of impervious surface	Use the formula on page 66
E. Land use adjacent to perennial streams	earth.google.com/ topomaps.usgs.gov/
F. Watershed topography (slope)	www.nh.nrcs.usda.gov/Soil_Data/availableNHsoilsurveys.html topomaps.usgs.gov/
G. Watershed geology and soils	www.nh.nrcs.usda.gov/Soil_Data/availableNHsoilsurveys.html des.nh.gov/organization/commissioner/pip/publications/geologic/geologic.htm
H. Local land use regulatory measures	Check Municipal and Town websites for Local Land Use and Development Ordinances
I. Drainage network	www.granit.sr.unh.edu/ www.fgmorph.com/fg_4_8.php
J. Rate of watershed development	www.nh.gov/oep/programs/DataCenter/Housing/documents/housing_supply_06.pdf
***ATTRIBUTE 10.* VISUAL / AESTHETIC CHARACTERISTICS**	
A. Scenic or natural features of interest visible from the waterbody	Map of the Watershed, Waterbody Tour, Camera/Photographs www.granit.sr.unh.edu/ earth.google.com/
B. Scenic viewing opportunities of waterbody	Camera/Photographs, Map of the Watershed topomaps.usgs.gov/ earth.google.com/
C. Noise level at scenic viewing areas	Site visits
D. Dominant land use visible from waterbody	Map of the Watershed, Watershed/Waterbody Tour, Camera/Photographs
E. Odors on waterbody or at viewing areas	Site visits

Materials and Information Needed

As the group begins to gather data for the inventory, it is important to locate reliable resources. The list below contains many links to available on-line resources however some information is only available in print.

Administrative Rule Env-Ws 386: Protecting the Purity of Regulated Watersheds
NH Department of Environmental Services
des.nh.gov/organization/commissioner/legal/rules/index.htm

Aerial Photographs
Google Earth
earth.google.com/

Classifying Stream Orders – Strahler (1957) modified by Horton (1945) method
COMET, NWS NRFC, and SUNY ESCF
www.fgmorph.com/fg_4_8.php

County Soil Surveys in New Hampshire
US Department of Agriculture - Natural Resources Conservation Service
www.nh.nrcs.usda.gov/Soil_Data/availableNHsoilsurveys.html

Current Estimates and Trends in New Hampshire's Housing Supply
NH Office of Energy and Planning
www.nh.gov/oep/programs/DataCenter/Housing/documents/housing_supply_06.pdf

Dam Bureau
NH Department of Environmental Services
des.nh.gov/organization/divisions/water/dam/index.htm

Exotic Aquatic Plant Sites in New Hampshire Map
NH Department of Environmental Services
des.nh.gov/organization/divisions/water/wmb/exoticspecies/documents/milfoil_map_list.pdf

Fishing Tournaments in New Hampshire
NH Fish and Game Department
www.wildlife.state.nh.us/Fishing/fish_tournament_table.htm

Inland Fisheries Division
NH Fish and Game Department
www.wildlife.state.nh.us/Inside_FandG/contact_fish_and_game.htm

Land Use Development/Zoning Ordinances, and Subdivision/Site Plan Review Regulations
Municipal Planning Departments
Regional Planning Commissions

Lakes Lay Monitoring Program (LLMP) Report – only available in hard copy
University of New Hampshire – New Hampshire Water Resources Research Center
nh.wrrc@unh.edu or (603) 862-2341

Licensed Youth Recreation Camps
NH Department of Environmental Services – Drinking Water and Groundwater Bureau
des.nh.gov/organization/divisions/water/dwgb/youthcamps/documents/licensed_youth_recreation_camps.pdf

National Flood Insurance Program (NFIP) Maps
NH Office of Energy and Planning – NH Floodplain Management Program
www.nh.gov/oep/programs/floodplainmanagement/maps.htm

National Register of Historic Places
National Park Service
www.nationalregisterofhistoricplaces.com/NH/state.html

National Wetland Inventory (NWI) Maps
US Fish and Wildlife Service
www.fws.gov/nwi/

NH Atlas and Gazetteer or similar map outlining recreational facilities
Delorme
www.delorme.com/mapstore/default.aspx

NH Bedrock Geologic Maps
NH Department of Environmental Services
des.nh.gov/organization/commissioner/pip/publications/geologic/geologic.htm

NH Freshwater Fishing Guide
NH Fish and Game Department
www.wildlife.state.nh.us/Fishing/Fishing_PDFs/FW_Fishing_Guide.pdf

NH GRANIT
Complex Systems Research Center, Institute for the Study of Earth, Oceans, and Space, and UNH
www.granit.sr.unh.edu/

NH Homeland Security and Emergency Management - Bureau of Emergency Management
NH Department of Safety
www.nh.gov/safety/divisions/bem/aboutus.html

NH Lakes Management and Protection Program
NH Department of Environmental Services
des.nh.gov/organization/divisions/water/wmb/lakes/index.htm

NH Lake Trophic Reports
NH Department of Environmental Services – Watershed Management Bureau
des.nh.gov/organization/divisions/water/wmb/lakes/lake_water.htm

NH Official List of Public Waters
NH Department of Environmental Services – Dam Bureau
des.nh.gov/organization/commissioner/pip/publications/wd/documents/r-wrd-91-4.pdf

NH Public Access and Put-Ins
NH Department of Resources and Economic Development
www.visitnh.gov/what-to-do/lakes-beaches-and-water-fun/public-access-and-put-ins/

NH Public Beach Inspection Advisories
NH Department of Environmental Services
www2.des.state.nh.us/Advisories/Beaches/

NH State Register of Historic Places
NH Division of Historic Resources
www.nh.gov/nhdhr/programs/documents/NH_State_Register.doc

NH Survey Lake Data Summary
NH Department of Environmental Services – Watershed Management Bureau
des.nh.gov/organization/divisions/water/wmb/lakes/trophic_summary.htm

NH Water Resources Research Center
University of New Hampshire – Lakes Lay Monitoring Program (LLMP)
www.wrrc.unh.edu/index.htm

One Stop Database – Public Water Systems
NH Department of Environmental Services
www2.des.state.nh.us/OneStop/Public_Water_Systems_Query.aspx

One Stop Database – Remediation and Initial Response Spill Site
NH Department of Environmental Services
www2.des.state.nh.us/OneStop/ORCB_Query.aspx

Public Access Boating and Fishing Sites in New Hampshire
NH Fish and Game Department
www.wildlife.state.nh.us/Outdoor_Recreation/access_sites_table.htm

Rare Plant List for New Hampshire
NH Division of Forests and Lands – NH Natural Heritage Bureau
www.nhdfl.org/library/pdf/TrackingList-PlantGeneral.pdf

Rare Plants, Rare Animals, and Exemplary Natural Communities in New Hampshire Towns
NH Division of Forests and Lands - NH Natural Heritage Bureau
www.nhdfl.org/library/pdf/web_towns.pdf

Shoreland and Watershed Land Use Maps
Municipal Planning Departments
Regional Planning Commission

State Parks by Alphabetical Order
NH Division of Parks and Recreation
www.nhstateparks.org/state-parks/alphabetical-order/

Statewide Mercury Fish Consumption Advisory Update
NH Department of Environmental Services
des.nh.gov/organization/commissioner/pip/factsheets/ard/documents/ard-ehp-25.pdf

Tax Maps
Municipal Assessor's Offices

UNH Center for Freshwater Biology
Non-Native Species Investigation
www.cfb.unh.edu/

USGS Topographic Maps
U.S. Geological Survey
topomaps.usgs.gov/

Volunteer Lake Assessment Program (VLAP) – List of Lakes and Ponds
NH Department of Environmental Services
des.nh.gov/organization/divisions/water/wmb/vlap/list_participating.htm

Volunteer Lake Assessment Program (VLAP) – 2006 Annual Lake Report
NH Department of Environmental Services - Volunteer Lake Assessment Program website
des.nh.gov/organization/divisions/water/wmb/vlap/2006/index.htm

2006 Lake Host Program Participants
New Hampshire Lakes Association
www.nhlakes.org/docs/06-LH-Manual-Org-List.doc

2007 List of Restricted Bodies of Water
NH Department of Safety – Marine Patrol Bureau
www.nh.gov/safety/divisions/ss/marinepatrol/restricted.html

2007 New Hampshire Freshwater Fishing Digest
NH Fish and Game Department
www.wildlife.state.nh.us/Fishing/Fishing_PDFs/FW_Fishing_Digest_07.pdf

2007 Population Estimates of New Hampshire Cities and Towns
NH Office of Energy and Planning – Date of Publication: June 2008
www.nh.gov/oep/programs/DataCenter/Population/documents/2007_population_estimates.pdf

2008 New Hampshire 305(b) and 303(d) Surface Water Quality Report
NH Department of Environmental Services - Watershed Management Bureau website
des.nh.gov/organization/divisions/water/wmb/swqa/2008/index.htm

CONVERSION FORMULAS

1 meter = 3.28 feet
1 foot = 0.3048 meters

1 acre = 0.405 hectare
1 hectare = 2.47 acres

→ ***Please answer as many questions as possible; even those questions not scored are important.*** ←

Attribute 1. Geographic, spatial, and demographic information

The geographic, spatial, and demographic characteristics of a lake provide insight into the lake's uniqueness by considering its location within the state, accessibility by major roadways, and proximity to immediate and distant population bases.

This evaluation is designed to identify the potential for overall lake usage and development. Lakes in close proximity to a large population base and major roadways generally receive heavier usage and tend to be more developed than more remote lakes. This information can be used to gain a sense of what types, and the extent of protection that may be appropriate for the lake or pond.

Question A. Waterbody location in the state.

Directions - The information for this question can be obtained by consulting a USGS topographic map, NH GRANIT, Google Earth, or a similar map with detailed information about the lake or pond's location in the state and classification of the surrounding land. Note the scale of the map used.

Rationale - The relative geographic location of the lake or pond forms the foundation necessary to complete a comprehensive inventory.

Question B. Waterbody elevation.

Directions - Consult the NHDES Lake Trophic Reports for information regarding the lake or pond or an alternative reliable source.

Rationale - Elevation is a relative indicator of waterbody uniqueness. There are fewer lakes and ponds located above 2,000 feet than low elevation lakes and ponds in New Hampshire.

Question C. Proximity to major transportation corridors.

Directions - Identify the nearest major transportation corridor to the lake or pond by consulting a USGS topographic map, NH GRANIT, Google Earth, or a similar map. Determine the approximate distance, utilizing the most direct **roadway** route available to the general public, from the identified transportation corridor to the waterbody.

Rationale - The distance to a major transportation corridor provides an indicator of waterbody accessibility. Lakes or ponds in relatively close proximity to a major transportation corridor tend to receive heavier usage than waterbodies that require a higher level of travel effort to reach. In addition, for lakes or ponds that currently have a low level of development, their proximity to major roadways provides an indication of the potential for future development.

Question D. Total year round resident population within 30-mile radius.

Directions - Consult the 2007 Population Estimates of New Hampshire Cities and Towns prepared by the NH Office of Energy and Planning to estimate the total year round resident population within a 30-mile radius* of the waterbody's perimeter. In cases where the city, town, village, etc. does not fall entirely within the 30-mile radius (e.g., the 30-mile boundary splits a town in half), include that municipality's entire population.

* 30 mile radius - The **direct** distance from the waterbody's edge to the edge of the boundary.

Rationale - This question identifies the population base that could reach the waterbody within approximately one-hour of travel. One hour is considered to be a conservative estimate of the amount of time that people are willing to regularly travel to enjoy a lake or pond.

Attribute 1. Geographic, spatial, and demographic information

Waterbody Name: _____

Needed for Evaluation:

- USGS topographic map or NH GRANIT or Google Earth
- 2007 Population Estimates of New Hampshire Cities and Towns
- NHDES Lake Trophic Reports
- Engineer's scale, ruler, or alternative method for determining distances

Evaluation Question	Comments, Actual Values or Computations	Evaluation Criteria	Rec	Out	Sus
A) Waterbody location in state	**Town(s):** **County(ies):** **River basin:** **State(s):** **Scale of Map:**				
B) Waterbody elevation (feet above sea level)	**Source of information:**	**1)** <500 feet **2)** 500 – 1000 feet **3)** 1001 – 1750 feet **4)** 1751 – 2500 feet **5)** >2500 feet		1 2 3 4 5	
C) Proximity to major transportation corridors * Proximity is measured using the most direct roadway route.	**Source of information:**	**1)** >30-miles from interstate highways **2)** W/in 30-miles of interstate highways **3)** W/in 20-miles of interstate highways **4)** W/in 10-miles of interstate highways **5)** W/in 5-miles of I-89, I-91, I-93, I-95, I-293, SR-9 (from I-91 to I-89), SR-101 (from I-93 to I-95), SR-16 (from Dover to Conway), SR-3 (north of the notches), SR-28 (Allenstown to Ossipee), SR-4 (Concord to Durham)	1 2 3 4 5		
D) Total year round resident population w/in 30-mile radius	**Source of information:**	**1)** <100,000 people **2)** 100,000 – 250,000 people **3)** 250,000 – 500,000 people **4)** 500,000 – 1,000,000 people **5)** >1,000,000 people	1 2 3 4 5		1 2 3 4 5

Attribute 2. Physical waterbody characteristics

Knowing the physical characteristics of the waterbody will help determine, in-part, what makes it unique among other New Hampshire lakes and ponds. In addition, determining a few of the more scientific aspects of the waterbody's physical qualities, such as the hydraulic retention time and shoreline configuration, allows some inferences about the retention of nutrients (phosphorus and nitrogen) and the extent of the littoral zone (shallow water). Finally, this section will provide assistance in determining the origin of the waterbody, flood storage ability, and method of water level control.

Question A. Surface water area.

Directions - Consult the NHDES Lake Trophic Reports for information regarding the lake or an alternative reliable source.

Rationale - Surface water area is an important consideration when developing a management plan, as larger lakes or ponds will often require more complex strategies and innovative solutions for long-term protection or restoration of its natural resources. Also, it is important to recognize the waterbody's relative size as compared to other New Hampshire lakes and ponds.

Question B. Maximum water depth.

Directions - Consult the NHDES Lake Trophic Reports or an alternative reliable source to determine the maximum water depth.

Rationale - Knowing the lake or pond's maximum depth will provide an initial sense of its hydrologic cycle (i.e. water budget) and potential capacity to absorb excess nutrients.

Question C. Mean water depth.

Directions - Consult the NHDES Lake Trophic Reports or an alternative reliable source to determine the mean water depth.

Rationale - A corollary to *Question B*. Some lakes or ponds may have a single deep spot, but are relatively shallow otherwise. Other lakes or ponds might be deep throughout the entire waterbody. It is important to recognize the overall depth characteristics of the waterbody, as it is an important attribute of lake productivity, water circulation, and extent of light penetration.

Question D. Percent shoal area or littoral zone.

Directions - Consult the NHDES Lake Trophic Reports or an alternative reliable source to estimate the area of the waterbody that is less than 15 feet in depth, not including islands or wetland areas.

Rationale - A measure of the shallow, nearshore regions of a waterbody, commonly referred to as the littoral zone, is the area where aquatic plant growth is most abundant and where nutrients entering from the surrounding lands are highest. In addition, a waterbody's littoral zone provides important habitat for fish, aquatic invertebrates, and wildlife. In general, lakes or ponds with large littoral zones tend to have excessive plant growth compared to waterbodies that drop off fast and consequently have a small littoral zone.

Attribute 2. Physical waterbody characteristics

Waterbody Name: _____

Needed for Evaluation:

- USGS topographic map, NH Atlas and Gazetteer by Delorme, NH GRANIT, and/or Google Earth
- National Wetlands Inventory (NWI) maps
- NHDES Lake Trophic Reports
- NHDES Dam Bureau
- NHDES 2006 VLAP Annual Lake Reports
- NH Official List of Public Waters
- NH Homeland Security and Emergency Management - Bureau of Emergency Management
- NH Office of Energy and Planning – NH Floodplain Management Program National Flood Insurance Program (NFIP) Maps
- Land Use Maps
- Information pertaining to dams
- Water quality data

Evaluation Question	Comments, Actual Values or Computations	Evaluation Criteria	Rec	Out	Sus
A) Surface water area (acres excluding wetlands)	**Source of information:**	**1)** 10 – 50 acres **2)** 51 – 100 acres **3)** 101 – 250 acres **4)** 251 – 1,000 acres **5)** >1,000 acres	1 2 3 4 5		
B) Maximum water depth (meters)	**Source of information:**	**1)** 0 – 7 meters (0 – 23 feet) **2)** 7.1 – 15 meters (23.1 – 49.2 feet) **3)** 15.1 – 30 meters (49.3 – 98.4 feet) **4)** 30.1 – 45 meters (98.5 – 147.6 feet) **5)** >45 meters (>147.6 feet)		1 2 3 4 5	
C) Mean water depth (meters)	**Source of information:**	**1)** >18 meters **2)** 9.1 – 18 meters **3)** 5.1 – 9 meters **4)** 1 – 5 meters **5)** <1 meter			1 2 3 4 5
D) Percent shoal area / littoral zone (water depth <15 feet)	**Method of computation:** **Source of information:**	**1)** <10% **2)** 10 – 25% **3)** 26 – 50% **4)** 51 – 75% **5)** 76 – 100%			1 2 3 4 5

Attribute 2. Physical waterbody characteristics

Question E. Shoreline configuration.

Directions - Consult the NHDES Lake Trophic Reports or an alternative reliable source to determine shoreline configuration.

Rationale - A ratio of shoreline length compared to waterbody surface area. A value equal to one is a lake or pond that is a perfect circle in shape. As the ratio increases and the waterbody's shape becomes more irregular, there is an increase in the contact between land and water and a greater opportunity for nutrient enrichment. In general, larger shoreline configuration ratios will have a more extensive littoral zone area and frequent embayments.

Question F. Island(s) presence/absence.

Directions - Consult a USGS topographic map, NH GRANIT, Google Earth, land use maps, National Wetlands Inventory (NWI) maps, and any natural resource maps on file in the town(s), or an alternative reliable source to determine the number of islands present. Note the scale of the map used.

Rationale - The presence of islands provides additional habitat for shoreline birds and mammals. However, large islands (>1 acre) are likely to attract residential developments, increasing the potential for nonpoint source pollutants.

Question G. Shoreline wetlands.

Directions - Consult a USGS topographic map, NH Atlas and Gazetteer by Delorme, a National Wetlands Inventory (NWI) map(s), or conduct a trip around the lake to determine the extent of shoreline wetland areas. Examination of your local tax maps may also assist in defining wetland areas. It may also be useful to contact local conservation commissions to see if wetland inventories have been completed. Note the scale of the map used.

Rationale - The presence of wetlands provides additional wildlife habitat, flood storage capacity, and pollutant retention ability. In addition to the total number of wetland areas, you should also consider the size of the waterbody.

Question H. Watershed area.

Directions - Consult the NHDES Lake Trophic Reports to obtain the watershed area. **Only the immediate watershed of the lake should be analyzed.** The immediate watershed includes the land area that drains directly into the waterbody or a tributary flowing to that waterbody. **Do not** include those sections of the watershed that drain into an upland lake or pond prior to flowing into the waterbody being analyzed. Likewise, **do not** include those sections of the watershed below the lake or pond.

Rationale - Waterbodies are highly influenced by their watersheds (all of the land and water areas that drain into a particular waterbody). Features such as size, soil type, slope, geology, and vegetation all affect the conditions of the lake. Additionally, the type and extent of human activity in the watershed can also have an enormous impact on the waterbody.

Question I. Watershed area/lake area ratio.

Directions - Consult the NHDES Lake Trophic Reports or an alternative reliable source to obtain the watershed area and lake area. Use the watershed area/lake area formula to determine the watershed area/lake area ratio.
Ratio = Watershed Area / Lake Area (e.g., 5:1 Ratio = 10 acre Watershed Area / 2 acre Lake Area)

Rationale - This ratio provides an estimate of the extent of the surrounding land area contributing surface water runoff to the waterbody. The size of the watershed is a key factor in determining the amount of nutrients in a waterbody. Typically, water quality decreases with an increase in the watershed area/lake area ratio. This estimate provides an initial indicator of the importance of considering local land uses and their potential contributions of pollutants to the lake or pond. In addition, it provides another piece of information useful in characterizing the waterbody's hydrologic cycle.

Attribute 2. Physical waterbody characteristics

Evaluation Question	Comments, Actual Values or Computations	Evaluation Criteria	Rec	Out	Sus
E) Shoreline configuration	**Source of information:**	**1)** 1.0 – 1.5 (Round or nearly so with few shoreline convolutions) **2)** 1.51 – 2.0 (Variable in shape w/ frequent shoreline convolutions or embayments) **3)** 2.01 – 2.5 (Irregular shape; numerous small embayments; some large embayments; frequent shoreline convolutions) **4)** 2.51 – 3.0 (Variable in shape w/ highly convoluted shoreline) **5)** >3.0 (Highly irregular shape; large and numerous embayments; almost continuous shoreline convolutions)	1 2 3 4 5		
F) Island(s) presence / absence	**Number of islands:** **Number >1 acre:** **Number developed:** **Source of information:** **Scale of map:**	**1)** None **2)** 1 – 3 islands **3)** 4 – 8 islands **4)** 9 – 15 islands **5)** >15 islands	1 2 3 4 5		
G) Shoreline wetlands	**Number of wetlands:** **Source of information:** **Scale of map:**	**1)** Few (0 – 3) adjacent wetland areas **2)** Moderate (4 – 6) adjacent wetland areas **3)** Numerous (>6) adjacent wetland areas			
H) Watershed area	**Source of information:**				
I) Watershed area / lake area ratio	**Source of information:**	**1)** Ratio ≥ 51:1 **2)** Ratio 36:1 – 50:1 **3)** Ratio 26:1 – 35:1 **4)** Ratio 11:1 – 25:1 **5)** Ratio ≤ 10:1			5 4 3 2 1

Attribute 2. Physical waterbody characteristics

Question J. Hydraulic flushing rate.

Directions - Consult the NHDES Lake Trophic Reports or an alternative reliable source to determine the hydraulic flushing rate.

Rationale - This question determines the rate at which a lake or pond flushes (i.e. a volume of water equal to the lake's volume which passes through the lake) per year. Waterbodies with large inflows and outflows relative to the lake volume have rapid flushing rates or flush quickly. Waterbodies with relatively small inflows and outflows relative to the lake volume have slow flushing rates or flush slowly. Flushing rates are important when considering the lag time necessary for protection or restoration efforts to be realized. In comparison, waterbodies with relatively slow flushing rates will generally exhibit a slower response to restoration or protection efforts than lakes or ponds with rapid flushing rates. Flushing rate is also important when considering nutrient sources, as waterbodies with slow flushing rates are generally influenced by internal nutrient cycles, while external nutrient sources are most influential to waterbodies with rapid flushing rates.

Question K. Basin morphometry (bottom configuration).

Directions - Investigate the overall shape and design of the waterbody. Determine if it is generally one continuous open water area (i.e. single basin or "bathtub") or if it can be broken up into distinct sections (multiple basins). This question can best be answered by studying a USGS topographic map, NHDES Lake Trophic Reports, or a similar map of the waterbody. You should attempt to identify where the major inlets and outlets are, note any substantial shoreline constrictions, and utilize your general knowledge of suspected waterflow in the waterbody. If you have difficulty determining the basin morphometry, contact the NHDES Lakes Program.

Rationale - This question is designed to help you recognize if there are one or many distinct basins in the waterbody. Lakes or ponds with multiple basins can behave like many different lakes in one. Ultimately, having a better understanding of this attribute will help focus the development of general and targeted management strategies.

Question L. Waterbody origin.

Directions - Consult the NHDES Lake Trophic Reports, the NH Official List of Public Waters, or an alternative reliable source to determine the waterbody origin.

Rationale - Answering this question should help increase the awareness of how the waterbody was formed. Naturally occurring lakes and ponds are usually less productive, have a smaller watershed, and longer hydraulic residence times than human constructed impoundments. There may be other significant attributes linked directly to the waterbody's origin such as its recreational, economic, or aesthetic values.

Question M. Stratification characteristics.

Directions - Consult the NHDES VLAP Annual Lake Reports, the NHDES Lake Trophic Reports or the most recent data source with a temperature-by-depth profile. Lakes or ponds that demonstrate a $>5^{o}$F change in water temperature over a change of 6 feet or less in depth are considered to be "thermally stratified". Thermal stratification is most distinct in mid-summer; therefore the data should be collected sometime from late June through late August.

Rationale - Summer thermal stratification is common to most New Hampshire lakes and ponds. However, since it creates distinct layers of water that do not mix, it is important to recognize if this phenomenon occurs and the possible consequences. Low dissolved oxygen levels in the hypolimnion (bottom layer) can limit the sections of a waterbody available to fish and lead to the accumulation of nutrients. On the other hand, a well-oxygenated hypolimnion can provide a refuge for cold-water fish species such as trout and salmon, as well as limiting the accumulation of nutrients. However, a well-mixed lake (not stratified) will continuously cycle nutrients from the bottom sediments promoting a higher level of algal growth. Thermal stratification usually breaks down in the spring and fall as water temperatures in the upper (epiliminion) and lower layers converge allowing the water from all depths to mix completely.

Attribute 2. Physical waterbody characteristics

Evaluation Question	Comments, Actual Values or Computations	Evaluation Criteria	Rec	Out	Sus
J) Hydraulic flushing rate **Flushing Rate:** number of times lake flushes (i.e. a volume of water equal to the lake's volume which passes through the lake) per year	**Source of information:**	**1)** Flushes more than 2 times per year **2)** Flushes 1 – 2 times per year **3)** Flushes once every 1 – 2 years **4)** Flushes once every 2 – 3 years **5)** Flushes once every 3 years or more			1 2 3 4 5
K) Basin morphometry (bottom configuration)	**Source of information:**	**1)** 1 basin **2)** 2 – 5 basins **3)** > 5 basins		1 3 5	
L) Waterbody origin	**Source of information:**	**1)** Human constructed impoundment that would exist as either a stream or river otherwise. (AI – Artificial Impoundment) **2)** Naturally occurring waterbody with water level raised or controlled by damming. (RD – Raised by Damming) **3)** Naturally occurring lake or pond without human controlled water levels. (N – Naturally Occurring)		1 3 5	
M) Stratification characteristics	**Source of information:**	**1)** Waterbody never or infrequently stratifies. If stratification occurs it is usually for <1 week. **2)** Waterbody experiences summer thermal stratification. **3)** Waterbody never completely mixes.			

Attribute 2. Physical waterbody characteristics

Question N. Flood storage ability.

Directions - Consult the NH Office of Energy and Planning - NH Floodplain Management Program National Flood Insurance Program (NFIP) Maps to identify the waterbody's flood storage capacity. The Federal Emergency Management Agency (FEMA) has undertaken a massive effort of flood hazard identification and mapping to produce Flood Hazard Boundary Maps (FHBMs), Flood Insurance Rate Maps (FIRMs), and Flood Boundary and Floodway Maps. The waterbody's flood storage capacity should be based on the information contained in these maps. An additional source of information is the NH Department of Safety's NH Homeland Security and Emergency Management - Bureau of Emergency Management.

Rationale - Flood frequency is important to landowners along the waterbody's perimeter and recreational users. Lakes or ponds prone to flooding can significantly damage homes, boathouses, docks, and boats. Frequent flooding can inundate nearby septic systems, limit public access, and impact overall recreational experiences. However, natural flooding may also benefit fish and wildlife. Understanding the lake or pond's flooding tendencies will help prioritize management goals and objectives.

Question O. Average water level alteration.

Directions - Contact the NHDES Dam Bureau to determine the number and ownership of any dams. If a dam is privately owned or owned by another state agency, contact them to inquire about the average seasonal drawdown(s). If the lake or pond does not have a water control structure on it, then consider the average natural level of water fluctuation. It is important to note that beaver activity can also affect water level.

Rationale - The amount a lake or pond's water level is artificially manipulated can affect the amount of habitat available for fish and other types of aquatic organisms, lake accessibility, boating safety, and lakeside property desirability. However, artificial drawdown(s) may also be necessary to reduce flooding frequency and property damage.

Question P. Water control structure.

Directions - Contact the NHDES Dam Bureau to identify the size, type, construction date, classification, owner, and date of last inspection. Additionally, note if flowage rights exist and, if so, the ownership of those rights.

Rationale - A comprehensive management plan should include this as basic information regardless of whether regular flooding is an issue. The plan should be designed to serve both as a guidance document and a catalog of general information. Tracking the water control device inspection schedule for the lake or pond will ensure its safety and document any repairs.

Question Q. Inlets (tributaries).

Directions - Consult a USGS topographic map, NH GRANIT, Google Earth, or a similar map containing the waterbody. Identify and record the names and general locations (i.e. mark them on a topographic map or record their latitude and longitude) of all the perennial and intermittent streams and rivers draining into the lake or pond being considered. It may be necessary to visit each stream and river to verify its width. If there are no inlets (either intermittent or perennial) make note of this on the worksheet.

Rationale - The inlets draining into the lake or pond serve as the primary transport mechanisms of nutrients and pollutants associated with the land uses within the watershed under consideration. Inlets also serve as important corridors for fish and wildlife, and offer additional recreational opportunities.

Question R. Outlets.

Directions - Consult a USGS topographic map, NH GRANIT, Google Earth, or a similar map containing the waterbody. Identify and record the names and general locations (i.e. mark them on a topographic map or record their latitude and longitude) of all the streams and rivers draining out of the lake or pond being considered. If there are no outlets make note of this on the worksheet.

Rationale - The outlets draining the lake or pond serve as important transport mechanisms of available nutrients and pollutants. You should be aware of their general size and location. Outlets also serve as important corridors for fish and wildlife, and offer additional recreational opportunities.

Attribute 2. Physical waterbody characteristics

Evaluation Question	Comments, Actual Values or Computations	Evaluation Criteria	Rec	Out	Sus
N) Flood storage ability	**Source of information:**	**1)** Flash floods **2)** Prone to flooding **3)** Low flood storage **4)** Moderate flood storage **5)** High flood storage			
O) Average water level alteration (feet) * Answer even if water level is not human controlled.	**Source of information:**	**1)** > 8 feet **2)** 6.1 – 8 feet **3)** 4.1 – 6 feet **4)** 2 – 4 feet **5)** < 2 feet			
P) Water control structure	**Size:** **Type:** **Construction Date:** **Classification:** **Owner:** **Date of Last Inspection:** **Flowage Rights: yes/no** **Ownership of Rights:**	**Source of Information:**			
Q) Inlets (tributaries)	**Perennial (year-round):** **Number & width (<10 ft vs. >10 ft)** **Intermittent (seasonal):** **Number & width (<10 ft vs. > 10 ft)** **Other known / documented water sources (i.e. springs):** **Source of information:**				
R) Outlets	**Name(s):** **Source of information:**				

Attribute 3. Water quality characteristics

The water quality of the lake or pond is critical in determining its ability to support aquatic life, which in turn will affect the types and abundance of wildlife attracted to the waterbody. Long-term water quality is an indicator of overall lake productivity and assists in assessing potential point and nonpoint pollutant sources. The area geology, atmospheric pollutants, and land use of the shoreland and the watershed all affect the water quality of the lake or pond. The waterbody's water quality will also indirectly influence lake popularity and use, as clean, clear lakes and ponds are generally more attractive to the public. However, as the lake or pond's popularity increases so will the need to ensure that its water quality is not negatively impacted.

The questions within this section will help to identify the current water quality within the waterbody, in addition to creating baseline data for the future. Furthermore, in working toward the development of a lake management plan, protecting or improving current water quality should be an important component. Numerous active and passive tools have been developed to assist in managing water quality and should be explored to meet the management plan goals and objectives.

Question A. Waterbody trophic status.

Directions - Consult the NHDES Survey Lake Data Summary for information regarding the trophic status of the lake. This document uses a technique that incorporates multiple water quality parameters developed by NHDES and provides an overall classification system. Alternative methods are acceptable, but you should note the parameters used in determining the lake or pond's trophic status.

Rationale - A waterbody's trophic status is essentially a measure of its productivity or the amount of organic matter that it produces. The three basic categories in order of decreasing productivity are eutrophic, mesotrophic, and oligotrophic. The addition of unnaturally high amounts of nutrients, primarily phosphorus or nitrogen, can artificially increase lake or pond productivity. Recognizing and maintaining or restoring the waterbody's natural trophic state is important when developing specific actions for a management plan.

Question B. Alkalinity or Acid Neutralizing Capacity (ANC).

Directions - Consult the NHDES Lake Trophic Reports, NHDES VLAP Annual Lake Reports, UNH Lay Lakes Monitoring Program (LLMP) reports, or an alternative reliable source to determine the alkalinity.

Rationale - Alkalinity (or ANC) is a measure of the ability for water to neutralize acidic inputs. New Hampshire lakes and ponds have historically had low alkaline waters due to the granite bedrock. This makes them particularly susceptible to acid precipitation.

Question C. Calcium concentration.

Directions - Consult the NHDES Lake Trophic Reports, NHDES VLAP Annual Lake Reports, UNH LLMP reports, or an alternative reliable source to determine the calcium concentration.

Rationale - Calcium carbonate, in rock forms such as limestone, readily dissolves in water and is an important compound contributing to a waterbody's alkalinity. Calcium concentration may also be used to gauge a lake's susceptibility to invasion by zebra mussels. Zebra mussels require calcium for shell growth and need levels less than 9 mg/L for colonization.

Attribute 3. Water quality characteristics

Waterbody Name: _____

Needed for Evaluation:

- NHDES Lake Trophic Reports
- NHDES Survey Lake Data Summary
- NHDES VLAP Annual Lake Reports
- NHDES Lakes Management and Protection Program
- NH 305(b) and 303 (d) Surface Water Quality Reports
- NHDES One Stop Database Remediation and Initial Response Spill Sites
- UNH LLMP reports

Evaluation Question	Comments, Actual Values or Computations	Evaluation Criteria	Rec	Out	Sus
A) Waterbody trophic status	**Source of classification:** **Date of classification:**	**1)** Eutrophic **2)** Mesotrophic **3)** Oligotrophic			5 3 1
B) Alkalinity or ANC (**a**cid **n**eutralizing **c**apacity) (mg/L)	**Date of most recent analysis:** **Test results:** **Source of information:**	**1)** <0 (acidified) **2)** 0 – 2 mg/L (extremely vulnerable) **3)** 2.1 – 10 mg/L (moderately vulnerable) **4)** 10.1 – 25.0 mg/L (low vulnerability) **5)** >25.0 mg/L (not vulnerable)			
C) Calcium concentration (mg/L)	**Date of most recent analysis:** **Test results:** **Source of information:**	**1)** < 1.0 mg/L **2)** 1.1 – 4.0 mg/L **3)** 4.1 – 8.0 mg/L **4)** 8.1 – 12.0 mg/L **5)** >12.0 mg/L			

Attribute 3. Water quality characteristics

Question D. pH.

Directions - Consult the NHDES Lake Trophic Reports, NHDES VLAP Annual Lake Reports, UNH LLMP reports, or an alternative reliable source to determine the pH. If the waterbody regularly stratifies be sure the data was collected from the epilimnion (i.e. the upper layer of water extending from the surface to the thermocline).

Rationale - A lake or pond's pH is an important factor affecting the type and amount of aquatic life it can support. Highly acidified (pH<5.0) waterbodies are not suitable for the survival of most fish species, but are not harmful to humans. Documentation of the lake or pond's pH may help in assessing its sensitivity to atmospheric deposition of acidic compounds. However, some waterbodies may have naturally low pH (~6.0) levels due to organic (humic and fulvic) acids that result from the breakdown of plant matter.

Question E. Total phosphorus concentration.

Directions - Consult the NHDES Lake Trophic Reports, NHDES VLAP Annual Lake Reports, UNH LLMP reports, or an alternative reliable source to determine the total phosphorus concentration. If the waterbody regularly stratifies, be sure the data was collected from the epilimnion (i.e. the upper layer of water extending from the surface to the thermocline).

Rationale - Phosphorus limits the growth of algae and rooted aquatic plants in the majority of New Hampshire lakes and ponds. Inputs of unnatural phosphorus loads can significantly impact water quality by stimulating excessive algal growth. Identifying unnatural phosphorus inputs and potential remedies is important in the development of a comprehensive management plan.

Question F. Secchi disc transparency.

Directions - Consult the NHDES Lake Trophic Reports, NHDES VLAP Annual Lake Reports, UNH LLMP reports, or an alternative reliable source to determine the transparency.

Rationale - A secchi disc measurement provides an indication of overall water clarity. Lakes or ponds with heavily stained or muddy waters will generally have low secchi disc measurements. Likewise, waterbodies with high concentrations of suspended algae will also have low secchi disc readings.

Question G. Hazardous material spill event(s).

Directions - Visit the NHDES One Stop Database Remediation and Initial Response Spill Sites list for past records of hazardous material spills into or nearby the waterbody.

Rationale - Many of New Hampshire's roadways that pass near or over portions of lakes, ponds, or streams increase the possibility of accidental spills of hazardous materials from transport vehicles. In addition, for lakes or ponds that have marine service facilities on them or businesses nearby, accidental spillage of hazardous materials into the waterbody is of great concern. In completing this inventory, identify any past spills that have occurred and document if the problem persists.

Attribute 3. Water quality characteristics

Evaluation Question	Comments, Actual Values or Computations	Evaluation Criteria	Rec	Out	Sus
D) pH *If lake stratifies, use sample results within 3 feet of water's surface.	**Date of most recent analysis:** **Test results:** **Source of information:**	**1)** > 6.0 (satisfactory; minimal to no impairment to aquatic organisms) **2)** 5.0 – 6.0 (endangered; toxic to some aquatic organisms) **3)** < 5.0 (critical; toxic to most fish species)			
E) Total phosphorus concentration (mg/L) *If lake stratifies, use sample results within 3 feet of water's surface.	**Date of most recent analysis:** **Test results:** **Type of sample:** Epilimnetic (upper layer) or Hypolimnetic (lower layer) **Source of information:**	**1)** < 0.005 mg/L (ideal) **2)** 0.005 – 0.010 mg/L (low) **3)** 0.011 – 0.020 mg/L (average) **4)** 0.021 – 0.040 mg/L (high) **5)** > 0.040 mg/L (excessive)			1 2 3 4 5
F) Secchi disc transparency (meters)	**Date of most recent analysis:** **Test results:** **Source of information:**	**1)** <1 meter (<3.28 feet) **2)** 1.0 – 4.0 meters (3.28-13.1 feet) **3)** 4.1 – 8.0 meters (13.1-26.2 feet) **4)** 8.1 – 12.0 meters (26.3-39.4 feet) **5)** > 12.0 meters (>39.4 feet)	1 2 3 4 5	1 2 3 4 5	5 4 3 2 1
G) Hazardous material spill event(s)	**Date of occurrence:** **Type of material spilled:** **Responsible party (if known):** **Source of information:**	**1)** Spill with current detectable water quality impacts **2)** Spill with water quality impacts that were detectable < 3 months ago **3)** Spill with water quality impacts that were detectable 3 – 12 months ago **4)** Spill with water quality impacts that were detectable >12 months ago **5)** No known spill events or spill without any detectable water quality impacts			

Attribute 3. Water quality characteristics

Question H. Other water quality concerns.

Directions - Contact the NHDES Lakes Management and Protection Program or an alternative reliable source to determine if the waterbody has any unique pollutants that could be problematic.

Rationale - It is possible that pollutants such as pesticides, herbicides, petroleum byproducts (MtBE), mercury, dioxin, or even excessive siltation could compromise the water quality of the lake or pond. Document these occurrences and monitor their status.

Question I. Historic point source discharges.

Directions - Consult the NHDES Lakes Management and Protection Program or another reliable source to determine if the lake or pond has any historic point source discharges.

Rationale - Although a point source polluter may not presently exist on the lake, a historic point source discharge (i.e. sewage outfall) may have contributed an additional phosphorus load or other notable pollutants to the waterbody in the past. If so, it is possible the pollutants may continue to be bound to the bottom sediment and could continue to play an important role in the internal nutrient cycle of the waterbody. Identification and awareness of these historic human inputs can be important when devising a nonpoint source nutrient reduction strategy.

Question J. Listed in the NH 305(b) or 303(d) Surface Water Quality Reports.

Directions - Consult the most recent NH 305(b) and 303(d) Surface Water Quality Reports submitted by NHDES to the U.S. Environmental Protection Agency (EPA). Note whether the waterbody is listed on these reports and the reason(s) why it was listed. Please note: Since all surface waters in New Hampshire are impaired for fish and shellfish consumption due to elevated levels of mercury in fish/shellfish tissue, this impairment should not be included for this question.

Rationale - Each of these reports are designed to give a broad overview of water quality in New Hampshire. The criterion for listing in each of these reports varies among reports and from year to year. Therefore, while the listing of specific waterbodies on these lists provides some indication of potential water quality impairment, it does not indicate any particular level of severity. In any case take note if the waterbody is listed and why it is listed. In some cases, a listed waterbody is eligible for special funding opportunities to further protect or restore water quality.

Attribute 3. Water quality characteristics

Evaluation Question	Comments, Actual Values or Computations	Evaluation Criteria	Rec	Out	Sus
H) Other water quality concerns (e.g pesticides, herbicides, petroleum byproducts, excessive sediment, swimmer's itch, sunken cars / boats / snowmobiles)	**Problem identification:** **Suspected source of problem:** **Status of problem:** **Source of information:**				
I) Historic point source discharges (e.g., sewage treatment facilities, mills, tanneries etc.)	**Name of historic source:** **Name of pollutants discharged:** **End date of discharges:** **Source of information:**	**1)** None **2)** 1 or more; discharge discontinued at least 20 years ago **3)** 1 or more; discharge discontinued at least 10 years ago **4)** 1 or more; discharge discontinued at least 5 years ago **5)** Discharge presently exists			1 2 3 4 5
J) Listed in the NH 305(b) or 303(d) Surface Water Quality Reports	**Report(s) listed on:** **Reason for listing:**	**1)** Listed on 305(b) or 303(d) reports **2)** Not listed on 305(b) or 303(d) reports			

Attribute 4. Biological/ecological characteristics

The questions included in this attribute will generate a more complete understanding of the types of plants and animals that reside in or around the waterbody. Maintaining and enhancing ecosystem diversity and function requires careful consideration when crafting a management plan. Different types of plants, fish, mammals, and other wildlife often have specific habitat requirements that need to be maintained, but will also benefit from general, common-sense protection measures. Such measures include, but are not limited to, reducing pollutant inputs or restoring the natural characteristics (e.g., water quality, native vegetation and wildlife, land use patterns) of the lake or pond.

The interactions between the various plants and animals within and around the lake or pond are also important in maintaining and promoting ecological stability. The introduction of non-native species (exotics) and the extirpation of native species should be avoided whenever possible. Knowing the general abundance or frequency of occurrence of the types of organisms that inhabit the lake or pond and its surrounding watershed must be considered to promote wise development and conservation. In addition, the location of the lake or pond being inventoried to other waterbodies that contain non-native species should be identified to prevent their introduction.

Question A. Algal abundance (chlorophyll a level).

Directions - Consult the NHDES Lake Trophic Reports, NHDES VLAP Annual Lake Reports, UNH LLMP reports, or an alternative reliable source to determine the algal abundance.

Rationale - The algal abundance in a waterbody is a function of water temperature, the amount of sunlight it receives, and the nutrients it contains. In particular, nutrients (primarily nitrogen and phosphorus) are often critical in controlling algal growth. Lakes or ponds with naturally high quantities of nitrogen and phosphorus will have a much higher quantity of algae than waterbodies with low levels of these nutrients. In many cases, lakes or ponds subjected to unnaturally high quantities of nitrogen or phosphorus through runoff of excess fertilizer or leakage of faulty septic systems will experience nuisance algal growths. Therefore, it is desirable to determine what level of algal growth occurs in the lake or pond, and whether the observed levels are within the expected natural range for similar waterbodies.

Chlorophyll *a* is a photosynthetic pigment found in most algae. The measure of its abundance in a water sample provides an easy surrogate measure of the **amount** (but *not* the type) of algae present in a waterbody at the time of collection.

Question B. Phytoplankton community composition.

Directions - Consult the NHDES Lake Trophic Reports, UNH LLMP reports or an alternative reliable source to determine the phytoplankton community composition. Note the collection method used, since standardized methods do not presently exist.

Rationale - While it is the algal abundance, (see Question A above), that causes the nuisance, the types of phytoplankton present and their relative percent abundance of the total phytoplankton community are important when assessing the condition of the lake or pond as well as developing specific strategies and objectives for the management plan.

While many different species and classes of phytoplankton can form blooms (visible accumulations of phytoplankton), it is the blue-greens, or *Cyanobacteria*, that are of particular importance. This class of plankton is important for two reasons. First, blue-greens are phytoplankton that float to the surface and form paint-like scums, often accumulating along down-wind shores. Secondly, some types of blue-greens contain toxins. These toxins can kill dogs and other animals and if consumed in quantity, can cause gastro-intestinal upsets from minor ingestions and can cause skin and eye, ear and nose irritations from bodily contact.

It is not unusual or unhealthy for blue-greens to be present in minor amounts, but when they become the dominant species present, the likelihood of nuisance blooms developing increases if sufficient nutrients are present. The most commonly observed blue-greens in New Hampshire lakes include: *Anabaena*, *Aphanizomenon*, *Microcycts*, *Coelosphaerium*, *Oscillatoria*, *Lyngybya* and *Gloeotrichia*. All but *Coelosphaerium* and *Gloeotrichia* are known to have toxin-producing forms.

If you observe a paint-like or pea soup-like scum along the lakeshore, keep children and pets out of the water and notify NHDES so that the scum can be tested for the presence of toxins.

Attribute 4. Biological/ecological characteristics

Waterbody Name: _____

Needed for Evaluation:

- NHDES Lake Trophic Reports
- NH Freshwater Fishing Guide
- UNH Center for Freshwater Biology
- Inland Fisheries Division
- NH Division of Forests and Lands NH Natural Heritage Bureau's Rare Plant List for New Hampshire
- Rare Plants, Rare Animals, and Exemplary Natural Communities in New Hampshire Towns
- NHDES Lakes Management and Protection Program
- Exotic Aquatic Plant Sites in New Hampshire Map
- NHDES VLAP Annual Lake Reports
- UNH LLMP Reports
- Information on exotic aquatic plants and animals
- Recent survey of fish, mammal, reptile and amphibian, and bird communities

Evaluation Question	Comments, Actual Values or Computations	Evaluation Criteria	Rec	Out	Sus
A) Algal abundance; chlorophyll *a* level (µg/L)	**Date of most recent analysis:** **Test results:** **Source of information:** **Methodology used:**	**1)** >15.0 µg/L (nuisance amounts) **2)** 10.1 – 15.0 µg/L (more than desirable) **3)** 5.1 – 10.0 µg/L (more than desirable) **4)** 3.0 – 5.0 µg/L (good) **5)** < 3.0 µg/L (good)	1 2 3 4 5		5 4 3 2 1
B) Phyto-plankton community composition	**Date of most recent analysis:** **Test results (% blue-greens of total sample):** **Source of information:** **Methodology used:**	**1)** <10% blue-greens **2)** 10.0 – 30.0% blue-greens **3)** 30.1 – 50.0% blue-greens **4)** 50.1 – 70% blue-greens **5)** >70% blue-greens			

Attribute 4. Biological/ecological characteristics

Question C. Fish species diversity.

Directions - Consult the NH Freshwater Fishing Guide or an alternative reliable source to obtain a complete listing of the fish known to occur in the waterbody.

Rationale - The number of species of fish that inhabit a waterbody is strongly influenced by the variety of habitats that are present. In general, large lakes will have a greater diversity of fish species than small ponds. However, in certain instances a lake or pond may contain an isolated fish species or a wide range of habitat types capable of supporting an uncommonly high number of fish species making the community unique. An assessment of the fish community should include both game (naturally occurring or stocked) and non-game fish species.

Question D. Avian species diversity.

Directions - Consult the "Avian Community Checklist" in Appendix B for a listing of birds in New Hampshire that use lake and/or pond habitat. Using the checklist, identify the avian species sighted in and around the waterbody. Work with the NHDES Lakes Program, the NH Fish and Game Department, local conservation organizations or local birding groups/individuals to determine the best source of information to complete this question.

Rationale - Birds that rely on water in some fashion, either for food or habitat, provide a link to the terrestrial environment. Lakes or ponds with many bird species indicate that there are some potentially unique qualities to the ecosystem of interest. Further, waterbodies with a diverse avian community may be popular bird watching sites for the public.

Question E. Mammal species diversity.

Directions - Consult the "Mammal Checklist" in Appendix B for a listing of all mammals in New Hampshire that use lake and/or pond habitat. Using the checklist, identify the mammal species sighted in and around the waterbody. Work with the NHDES Lakes Program, the NH Fish and Game Department, or local conservation organizations to determine the best source of information to complete this question.

Rationale - Mammals that rely on water in some fashion, either for food or habitat, provide a link to the terrestrial environment. Lakes or ponds with many mammal species indicate that there are some potentially unique qualities to the ecosystem of interest. Further, waterbodies with a diverse mammal community may be popular wildlife viewing sites for the public.

Question F. Reptile and amphibian species diversity.

Directions - Consult the "Reptile and Amphibian Checklist" in Appendix B for a listing of all reptiles and amphibians in New Hampshire that use lake and/or pond habitat. Using the checklist, identify those species sighted in and around the waterbody. Work with the NHDES Lakes Program, the NH Fish and Game Department, or local conservation organizations to obtain the information necessary for this question.

Rationale - Reptiles and amphibians are common to all lakes and ponds of New Hampshire. The various types of animals in this group, with few exceptions, are fairly inconspicuous, being heard but not commonly seen. However, this does not diminish their importance to the ecological community. With some assistance and coordination among interested parties, a general assessment of the reptile and amphibian community is possible if no current information is available. Completion of this question is helpful in compiling a comprehensive catalog of the biological diversity residing in and around the lake or pond.

Attribute 4. Biological/ecological characteristics

Evaluation Question	Comments, Actual Values or Computations	Evaluation Criteria	Rec	Out	Sus
C) Fish species diversity	**Date of assessment:** **Species present:** **Source of information:**	**1)** 0 – 2 species **2)** 3 – 5 species **3)** 6 – 8 species **4)** 9 – 12 species **5)** > 12 species		1 2 3 4 5	
D) Avian species diversity	**Date of assessment:** **Number of species present (use Bird Checklist to identify species):** **Source of information:**	**1)** 0 – 5 species **2)** 6 – 10 species **3)** 11 – 15 species **4)** 16 – 20 species **5)** >20 species		1 2 3 4 5	
E) Mammal species diversity	**Date of assessment:** **Number of species present (use Mammal Checklist to identify species):** **Source of information:**	**1)** 0 – 2 species **2)** 3 – 5 species **3)** 6 – 8 species		1 2 3	
F) Reptile and amphibian species diversity	**Date of assessment:** **Number of species present (use Reptile & Amphibian checklist to identify species):** **Source of information:**	**1)** 0 – 2 species **2)** 3 – 5 species **3)** 6 – 8 species **4)** 9 – 12 species **5)** > 12 species		1 2 3 4 5	

Attribute 4. Biological/ecological characteristics

Question G. Aquatic macroinvertebrate community composition in the waterbody.

Directions - The scientific community is developing an effective methodology for determining the macroinvertebrate community composition. At this time, please disregard this question. Use local knowledge and consult the NHDES Lake Trophic Reports to obtain the information about the aquatic macroinvertebrate community in the waterbody.

Rationale - Aquatic macroinvertebrates are those organisms that primarily inhabit lakes, ponds, and rivers that do not have backbones. Similar to reptiles and amphibians, this group of animals is often overlooked when assessing lakes and ponds. Freshwater mussels are examples of macroinvertebrates, which are sensitive to water quality changes. Mussels filter water and may show signs of bioaccumulation, a higher concentration of toxins in their tissues than in their surrounding environment. Take this opportunity to become familiar with the different types of aquatic macroinvertebrates that inhabit the lake or pond.

Question H. Specialized habitats, breeding or rearing areas in the watershed.

Directions - Identify any specialized habitats such as breeding and rearing areas on the waterbody and within the watershed. Some types of specialized habitats may include beaver lodges, loon nesting areas, heron rookeries. Contact the NHDES Lakes Management and Protection Program to identify the most effective and efficient method to obtain the information necessary to complete this question.

Rationale - Some types of wildlife require specialized structures (e.g., beaver lodges) or breeding and rearing areas in order to be considered permanent residents (rather than transient) of a waterbody. Identification of these types of structures or areas (e.g., heron rookeries) in and around the lake or pond adds to its ecological significance. Also, an awareness of the general locations of these structures or areas is important when considering development or land use options.

Attribute 4. Biological/ecological characteristics

Evaluation Question	Comments, Actual Values or Computations	Evaluation Criteria	Rec	Out	Sus
G) Aquatic macro-invertebrate community composition	**Date of assessment:** **Species present (if known):** **Source of information:**	**Major groups to be considered:** - Mussels / Clams - Freshwater jellyfish - Freshwater shrimp - Crayfish - Freshwater sponges / bryozoans **1)** 0 groups present **2)** 1 group present **3)** 2 groups present **4)** 3 groups present **5)** 4 or more groups present			
H) Specialized habitats, breeding or rearing areas (e.g., osprey nest, beaver lodge)	**Habitat type(s) and species:** **Date(s) of observation:** **General location(s):** **Source of Information:**	**1)** 0/1 unique habitat type, area, or structure **2)** 2 unique habitat types, areas, or structures **3)** 3 unique habitat types, areas, or structures **4)** 4 unique habitat types, areas, or structures **5)** 5 unique habitat types, areas, or structures	1 2 3 4 5	1 2 3 4 5	

Attribute 4. Biological/ecological characteristics

Question I. & J. Exotic aquatic plant (I.) / animal species (J.).

Directions - Consult the Exotic Aquatic Plant Sites in New Hampshire Map from NHDES, the Inland Fisheries Division of the NH Fish and Game Department and the UNH Center for Freshwater Biology to determine the exotic plants and/or animals that occur in the lake or pond as well as its proximity to the nearest waterbody with an exotic species.

Rationale - Exotic aquatic species refers to those plant or animal species that are not native to New Hampshire waterbodies. Currently there are nine invasive aquatic plants known to occur in New Hampshire: variable milfoil, fanwort, water chestnut, Eurasian milfoil, Brazilian elodea, water naiad (*Najas minor*), curly-leaf pondweed, purple loosestrife, and common reed, and Didymo, an invasive freshwater diatom species (microscopic algae). When introduced into a waterbody these plants tend to out-compete native plant species and form dense, unattractive growths. In addition, heavy growths of aquatic plants can contribute an excessive amount of decaying matter to the bottom of the lake, ultimately causing a reduction in the amount of dissolved oxygen.

In regards to exotic aquatic animals, there are numerous fishes, such as the smallmouth bass, that long ago became established in most of New Hampshire's waterways. However, more recent exotic animals known to upset the balance of the ecosystem are of primary concern. Such species include alewife (a type of herring), the Japanese live-bearing snail, and the zebra mussel. Currently, zebra mussels are not known to occur in any New Hampshire waterbodies. However, their planktonic larval stage coupled with heavy boater usage of our lakes and ponds from people throughout the northeast region make their introduction possible. If introduced and allowed to become established, zebra mussels could seriously affect the aquatic food chain, clog industrial and drinking water intakes, and cover submerged structures such as docks.

Attribute 4. Biological/ecological characteristics

Evaluation Question	Comments, Actual Values or Computations	Evaluation Criteria	Rec	Out	Sus
I) Exotic aquatic plant species Known New Hampshire exotic aquatic plant species: - variable milfoil - Eurasian milfoil - fanwort - Brazilian elodea - water naiad (*Najas minor*) - curly leaf pondweed - water chestnut - purple loosestrife - common reed - Didymo	**Species name:** **Location(s) in waterbody:** **Nearest waterbody with an exotic plant species and approximate distance to waterbody of interest:** **Source of information:**	**1)** Waterbody does not currently have an exotic plant, is beyond 10 miles of a waterbody with an exotic plant, and has low recreational use **2)** Waterbody does not currently have an exotic plant, is beyond 10 miles of a waterbody with an exotic plant, and has moderate to high recreational use **3)** Waterbody does not currently have an exotic plant, is within 10 miles of a waterbody with an exotic plant, and has low recreational use **4)** Waterbody does not currently have an exotic plant, is within 10 miles of a waterbody with an exotic plant, and has moderate to high recreational use **5)** Waterbody has an established exotic plant, regardless of the size of the infestation			1 2 3 4 5
J) Exotic aquatic animal species Exotic aquatic animal species of concern: - alewife - Japanese live-bearing snail - zebra mussel	**Species name:** **Location(s) in waterbody:** **Nearest waterbody with an exotic animal species and approximate distance to waterbody of interest:** **Source of information:**	**1)** Waterbody does not currently have an exotic animal, is beyond 10 miles of a waterbody with an exotic animal, and has low recreational use **2)** Waterbody does not currently have an exotic animal, is beyond 10 miles of a waterbody with an exotic animal, and has moderate to high recreational use **3)** Waterbody does not currently have an exotic animal, is within 10 miles of a waterbody with an exotic animal, and has low recreational use **4)** Waterbody does not currently have an exotic animal, is within 10 miles of a waterbody with an exotic animal, and has moderate to high recreational use **5)** Waterbody has an established exotic animal, regardless of the size of the infestation			1 2 3 4 5

Attribute 4. Biological/ecological characteristics

Question K. Threatened and endangered aquatic plant and animal species and "exemplary" natural communities.

Directions - Consult the Rare Plants, Rare Animals, and Exemplary Natural Communities in New Hampshire Towns document to identify the status of any "aquatic" plants or animals* listed either by the state or federal government as threatened or endangered and for any natural "exemplary" communities occurring in or around the waterbody's shoreland area (250 feet from the high water mark) or in and around other open waters such as small ponds, streams and rivers **within the immediate watershed**.

Rationale - Plants or animals listed as endangered or threatened, either by the state or nationally, along with "exemplary" natural communities will require additional efforts to ensure their continued existence. Endangered species are defined as those in danger of being extirpated from their natural range. Threatened species are defined as those plants or animals facing the possibility of becoming endangered. Exemplary natural communities are those occurring that are not common in New Hampshire or that may be common, but have a unique feature such as being an old growth forest. The occurrence of endangered and threatened species as well as "exemplary" natural communities within the watershed indicates that there are special characteristics about that area that permit their existence. A management plan should identify these species or areas and recognize that their protection is critical.

*Only note those species within the immediate lake watershed.

Question L. New Hampshire State Rank and Global Rank.

Directions - Consult the NH Division of Forests and Lands Natural Heritage Bureau (NHB) Rare Plant List for New Hampshire to identify the plant or animal of greatest concern that resides within the watershed of interest. Then determine its "flag" ranking by the NHB. The species chosen can be any animal or habitat of local or global interest. Depending on the species selected, its "flag" ranking will determine the appropriate point value.

Rationale - The "flag" rank by the NHB of the species selected indicates its population status and the uniqueness of the watershed. If the chosen species is endangered worldwide and occurs in or around your watershed ensuring its survival, through protective measures, is critically important. Even if the chosen species is not rare statewide or globally, but is important locally to the public, similar effort should be put forth to ensure its continued existence, but with the realization that its presence does not make that watershed particularly unique biologically.

Attribute 4. Biological/ecological characteristics

Evaluation Question	Comments, Actual Values or Computations	Evaluation Criteria	Rec	Out	Sus
K) Threatened and endangered plant and animal species and "exemplary" natural communities * Include plant and animal species known to occur within the **immediate lake watershed**.	**Threatened:** - **state listed species** - **federally listed species** **Endangered:** - **state listed species** - **federally listed species** **Exemplary natural communities as identified by the NH Natural Heritage Inventory:** **Source of information:**	**1)** None **2)** 1 or more species listed by the state as threatened **3)** 1 or more federally listed threatened species **4)** 1 or more species listed by the state as endangered OR 1 – 2 exemplary natural communities **5)** 1 or more federally listed endangered species OR >2 exemplary natural communities		1 2 3 4 5	
L) NH Natural Heritage State Rank and Global Rank. * Select a species of public concern that resides within the watershed.	**Species selected for assessment:** **Reason for selection:**	**1)** Species not considered to be rare, endemic, disjunctive, threatened, or endangered; No flag ranking by NHB **2)** Species secure globally, but may be rare in parts of its statewide range; single "flag" ranking by NHB **3)** Species moderately rare globally; good evidence of statewide rarity; double "flag" ranking by NHB **4)** Species globally rare (<20 occurrences worldwide); extremely rare statewide vulnerable statewide; triple "flag" ranking by NHB **5)** Species imperiled because of global rarity; globally and extremely rare statewide; quadruple "flag" ranking by NHB			

Attribute 5. Recreational characteristics

The recreational opportunities that a waterbody supports allow users to gain an appreciation for the lake or the pond and its unique features. This section will assist in identifying the type and intensity of recreational activities that occur on and around the waterbody. Once identified, you will become more aware of the specific recreational issues that need to be addressed in developing a management plan. An important part of the management plan should be to ensure that all suitable recreational opportunities are accommodated in a manner that minimizes the impact on water quality and the biological community. Further, as multiple recreational uses will dominate most lakes or ponds, a management plan should reflect this by incorporating the ideas and concerns of user groups, landowners, and the general public. Finally, as the popularity of the lake or pond increases, it is critical that a management plan include strategies capable of tracking its recreational uses.

Question A. Type of watercraft.

Directions - Estimate the average percentage of both petroleum and non-petroleum powered watercraft in use on the lake or pond during four mid-summer days. Watercraft survey instructions are included in Appendix C to assist in the estimate.

Rationale - Lakes and ponds that support or allow watercraft use can become crowded in the summer months. In addition, if the percentages of power and non-power boats are known, the needs and desires of these different types of watercraft users can be considered in future waterbody access plans.

Question B. Average watercraft density.

Directions - Refer to the "Average Watercraft Density Survey" in Appendix C for instructions on determining the average watercraft density on a lake or pond.

Rationale - An estimate of watercraft use provides one component for estimating the waterbody's popularity. Ultimately, estimating watercraft use will be helpful in establishing a carrying capacity or maximum number of watercraft that is desirable on the individual waterbody and/or the need to provide specialized facilities such as boat launches and public restrooms.

Question C. Private marine service/docking facilities.

Directions - By using local tax maps or personal knowledge determine and identify the name(s) and location(s) of all the privately owned marine service or docking facilities that surround the waterbody's perimeter.

Rationale - Knowing the locations of all the service and docking facilities will assist in estimating the number of boats that use the lake or pond. Cataloging the names and locations of these facilities will be useful in creating a shoreline use map. Finally, when obtaining this information, identify those areas that provide refueling areas or waste disposal centers.

Question D. Other water dependent activities.

Directions - Identify all other types of recreational activities that require open water and that occur on the lake or pond.

Rationale - In addition to power boating, there are a great variety of other recreational activities that might occur on a waterbody. Some of these activities could potentially provide unique opportunities and attract a large number of people. Whether or not the activities are unique to a waterbody, they should be considered in the development of a management plan.

Attribute 5. Recreational characteristics

Waterbody Name: _____

Needed for Evaluation:
- NH Freshwater Fishing Guide
- Public Access Boating and Fishing Sites in New Hampshire
- NHDES Licensed Youth Recreation Camps List
- Fishing Tournaments in New Hampshire
- Local tax maps, websites and the NH Atlas and Gazetteer by Delorme
- NH Department of Resources and Economic Development NH Public Access and Put-Ins
- NH Division of Parks and Recreation State Parks by Alphabetical Order
- List of private marine service and docking facilities
- Watercraft survey results
- Angler usage survey results

Evaluation Question	Comments, Actual Values or Computations	Evaluation Criteria	Rec	Out	Sus
A) Type of watercraft (Estimate the average percentage of petroleum and non-petroleum powered watercraft in use on the waterbody during the mid-summer.)	**Method(s) of assessment:** **% power:** **% non-power:** **Date(s) of estimate:**	**Percent per mid summer weekend day** **1)** 76 – 100% power : 0 – 24% non-power **2)** 51 – 75% power : 25 – 49% non-power **3)** 26 – 50% power : 50 – 74% non-power **4)** 1 – 25% power : 75 – 99% non-power **5)** 0% power : 100% non-power	1 2 3 4 5		5 4 3 2 1
B) Average watercraft density on lake or pond *Estimate the average number of active boats on the waterbody during a mid-summer day; include all power, sail, paddle, and jet driven boat types.	**Method(s) of assessment:** **Date of estimate:**	**Average density per mid summer day** **1)** 1 watercraft / < 5 acres **2)** 1 watercraft / 5 – 15 acres **3)** 1 watercraft / 16 – 30 acres **4)** 1 watercraft / 31 – 50 acres **5)** 1 watercraft / >50 acres	1 2 3 4 5		5 4 3 2 1
C) Private marine service / docking facilities	**Name(s) of marina(s):** **Source of information:**	**1)** None **2)** 1 – 3 marinas **3)** 4 – 6 marinas **4)** 7 – 10 marinas **5)** >10 marinas	1 2 3 4 5		
D) Other water dependent activities *Do **not** include power boating!	**List of activities:** **Source of information:**	**Activities for consideration:** - recreational fishing, waterfowl hunting - swimming, snorkeling, SCUBA, canoeing, kayaking, sailing, waterskiing, knee boarding - commercial boat tours, seaplanes, other **1)** 1 – 3 different activities **2)** 4 – 6 different activities **3)** >6 different activities			

Attribute 5. Recreational characteristics

Question E. Recreational fishing.

Directions - Find the waterbody in the NH Freshwater Fishing Guide published by the NH Fish and Game Department. Record the number and type of game fish species that occur in the lake or pond. You may wish to denote whether the species is regularly stocked by the NH Fish and Game Department.

Rationale - Fishing is an important recreational use of many lakes and ponds. In New Hampshire, waterbodies with warmwater game fish species are most common. Lakes or ponds with coldwater game fish species also occur, but are not as common. Identifying the game fish species present is the first step in evaluating the value of the waterbody's recreational fishery.

Question F. Occurrence of fishing tournaments/derbies.

Directions - Consult the NH Fish and Game Department's Fishing Tournaments in New Hampshire listing to identify any fishing tournaments/derbies that have occurred on the lake or pond within the last few years. Also research tournament/derby lists from the past five years to note the year with the maximum number of events.

Rationale - Exceptional populations of game fish (along with lake accessibility, accommodations, and desire for local promotion) attract additional recreational fishing pressure through organized tournaments or derbies. These events usually last one to two days and can significantly increase boat traffic and angling efforts. An awareness of the frequencies and timing of these events will assist with the development of organized plans that accommodate the anglers and their boats in a wise and practical manner.

Question G. Angler usage.

Directions - Using the method outlined in the "Angler Survey Instructions" included in Appendix C, estimate the approximate number of anglers per acre for an **average** day during the summer.

Rationale - Completing this question will provide an estimate of the popularity of the waterbody in regards to its recreational fishing opportunities. An estimate of angler use should be considered in conjunction with lake or pond surface area, as this will ultimately determine the density of recreational anglers. The amount of angler usage that a waterbody receives will help in assessing the need to provide specialized facilities such as boat launching or public shoreline fishing areas.

Question H. Ice dependent activities.

Directions - Identify all types of recreational activities that occur on the lake or pond while it is ice covered.

Rationale - Many of New Hampshire's lakes and ponds host a number of winter activities that occur while they are frozen. Identifying these activities will assist in evaluating the overall recreational value of a waterbody.

Question I. Non-water dependent activities.

Directions - Identify all types of recreational activities that occur around the shoreline of the lake or pond that do not require water.

Rationale - Non-water dependent activities, such as hiking or camping, are also an important component in determining the lake or pond's recreational value. Identifying these activities and their relative popularity should be considered when planning public shoreline recreational facilities.

Attribute 5. Recreational characteristics

Evaluation Question	Comments, Actual Values, or Computations	Evaluation Criteria	Rec	Out	Sus
E) Recreational fishing	**List game fish species:** **Source of information:**	**1)** Single warm water species **2)** Multiple warm water species **3)** Single coldwater species **4)** Multiple coldwater species **5)** Warmwater and coldwater species	1 2 3 4 5		
F) Occurrence of fishing tournaments/ derbies	**List tournament(s), date(s), and number of boats:** **Maximum # events in past 5 years:** **Source of information:**	**1)** None **2)** 1/year **3)** 2 – 3/year **4)** 3 – 5/year **5)** >5/year	1 2 3 4 5		
G) Angler usage *Estimate the average number of anglers per acre during the summer.	**Method(s) of assessment:**	**1)** 1 angler/>10 acres **2)** 1 angler/8.1 – 10 acres **3)** 1 angler/6.1 – 8 acres **4)** 1 angler/4 – 6 acres **5)** 1 angler/<4 acres	1 2 3 4 5		
H) Ice dependent activities	**List of activities:** **Source of information:**	**Activities for consideration:** - ice skating - ice sailing - ice fishing - on-ice racing - snowmobiling - ice strip airports - other **1)** 1 – 3 activities **2)** 4 – 6 activities **3)** >6 activities			
I) Non-water dependent activities	**List of activities and facilities that support them:** **Source of information:**	**Activities for consideration:** - picnicking - walking / hiking - bike / horseback riding - camping - scenic driving - other **1)** 1 – 3 activities **2)** 4 – 6 activities **3)** >6 activities			

Attribute 5. Recreational characteristics

Question J. Commercial seasonal camps.

Directions - By using local tax maps, personal knowledge, and the NHDES Licensed Youth Recreation Camp list determine and identify the name(s) and location(s) of any extended-stay (>1 week) summer youth camps.

Rationale - These facilities are important recreational centers that make the lake or pond unique. Their attendees often gain a deep appreciation of the waterbody and the inherent values that it provides. Depending on its size and location, the camp(s) may require special consideration when developing a management plan.

Question K. Boat launches and access sites.

Directions - By using local tax maps, the NH Atlas and Gazetteer by Delorme, and the NH Department of Resources and Economic Development's NH Public Access and Put-Ins, determine and identify the name(s), location(s), and owner(s) of all public and private boat launching site(s) for the waterbody. Consult the NH Fish and Game Department's Public Access Boating and Fishing Sites in New Hampshire to obtain information regarding public launches. Information on municipal owned and private launches should be collected from each town.

Rationale - The ability to gain access to any lake or pond is likely to be directly related to its water-dependent recreational popularity. These sites can also serve as information stations to educate the public about the condition and concerns that pertain to the waterbody. Since access sites can also concentrate on- and off-water recreational activities they should also be designed and maintained in a manner that protects and matches the natural characteristics of the waterbody.

Question L. Other recreation and support facilities.

Directions - By using local tax maps and websites, the NH Division of Parks and Recreation State Parks by Alphabetical Order, and the NH Atlas and Gazetteer by Delorme determine and identify the name(s), location(s), and owner(s) of any parks, camping, or swimming facilities that occur on a waterbody's shoreline and the activities that are allowed.

Rationale - For the non-boating public, the number of alternative shoreline recreational facilities that are provided will, in part, determine its popularity. Similar to public boat launching sites, these areas can also serve as information stations to educate the public about the condition and concerns that pertain to the waterbody. Since they can also concentrate shoreline and nearshore recreational activities they must also be designed and maintained in a manner that protects and matches the natural characteristics of the waterbody.

Attribute 5. Recreational characteristics

Evaluation Question	Comments, Actual Values, or Computations	Evaluation Criteria	Rec	Out	Sus
J) Commercial seasonal camps (i.e. extended-stay youth recreational facilities)	**Name(s) and location(s) of camp(s):** **Average population of camp(s)** (if available): **Source of information:**	**1)** None **2)** 1 camp **3)** 2 – 4 camps **4)** 4 – 6 camps **5)** > 6 camps			
K) Boat launches and access sites *Consider all publicly and privately owned facilities.	**Name(s), location(s), parking capacity, and owner(s) of boat launches and access sites:** **Source of information:**	**1)** None **2)** 1 – 3 launches &/or access sites **3)** 4 – 6 launches &/or access sites **4)** 7 – 10 launches &/or access sites **5)** >10 launches &/or access sites	1 2 3 4 5		
L) Other recreation and support facilities *Note if sanitary facilities are provided; maintenance requirements; and extent of vandalism, if any.	**Name(s), location(s), parking capacity, owner(s) of access site(s) and activities permitted:** **Source of information:**	**1)** None **2)** 1 facility **3)** 2 – 3 facilities **4)** 4 – 5 facilities **5)** >5 facilities	1 2 3 4 5		

Attribute 5. Recreational characteristics

Question M. Time of recreational use/activities.

Directions - Record the time of year (season), time of week, and time of day that each of the recreational activities take place on or around the waterbody. Consider all types of recreational use/activities that occur on the lake and its shoreline. Be sure to include power boating as well as all of the non-power boating activities listed in questions 5-D, 5-H and 5-I.

Rationale - Documenting the times that a variety of recreational activities occur on the lake or pond will assist in identifying any potential conflicts that may arise among user groups. Also, if completed over a number of years, this information will track the recreational trends on the lake or pond and assist in developing plans to provide adequate facilities.

Attribute 5. Recreational characteristics

Evaluation Question	Comments, Actual Values, or Computations	Evaluation Criteria	Rec	Out	Sus
M) Type and timing of recreational use/activities – Power boating	**Activity** **Time of Year**	**Time of Week** **Time of Day**			
Non-power boating					
Other					
Water-dependent activities					
On-water commercial activities					
Non-water dependent activities					
Ice-dependent activities					
Camp-sponsored activities					
Fishing tournaments					
Others					

Attribute 6. Restrictions or prohibited uses

The number and type of restrictions or prohibited uses on the lake or pond may be reflective of past or present water quality concerns, potential harmful effects of fish consumption, drinking water source protection strategies, or a desire to provide recreational safety. Restrictions can be designed to protect the lake or pond's natural aquatic community or benefit specific user groups by enhancing their recreational experience. It is important to keep in mind that the level of restriction must be balanced with the wide diversity of public interests as most of New Hampshire's surface waters are held in public trust. Therefore, the rules and regulations that apply to a specific waterbody must be appropriate and reasonable for the concerns they are designed to address.

Question A. Public swimming facility postings* imposed because of threats to human health.

Directions - Consult the NH Public Beach Inspection Advisories and the NH 305(b) and 303(d) Surface Water Quality Report.

Rationale - Postings of public swimming facilities are a nuisance and concern to visiting recreational users and beach goers as well as community property owners. Awareness of the frequencies and locations of such closures is useful in prioritizing water quality protection efforts. Please list the locations and reasons for all closures, however for the evaluation, use only public beach closings.

* *A posting occurs when high numbers of toxic cyanobacteria occur or when E. coli or Enterococci bacteria exceed NH state standards (See NHDES environmental fact sheet WD-BB-14). In the cases of E. coli or Enterococci, high bacterial levels persist only for a short time period (i.e. <2 days) and swimmers are advised to swim at their own risk during this time. While the posting is in effect additional water samples are collected to determine if the problem is acute or chronic.*

Question B. Fish consumption limits due to threats to human health.

Directions - Consult the NHDES fact sheet Statewide Mercury Fish Consumption Advisory Update for any fish consumption limits due to threats to human health.

Rationale - If any such restrictions apply to the lake or pond (other than the statewide recommendation in regards to mercury in fish tissue) public awareness is important to ensure compliance with the restrictions. In addition it may be desirable to obtain and keep records of any fish tissue analysis that is completed.

Question C. Recreational fishing restrictions.

Directions - Consult the 2007 NH Freshwater Fishing Digest, published by the NH Fish and Game Department for a list of statewide and waterbody-specific fishing regulations and restrictions.

Rationale - Special fishing restrictions apply to many waterbodies in New Hampshire and can provide unique opportunities for anglers. Often these restrictions are designed specifically to manage populations of naturally reproducing species or are an attempt to equally satisfy anglers fishing for stocked species. In the planning phases of a management plan you may want to consider the public's awareness of any fishing restrictions and their satisfaction with the current fishing opportunities.

Attribute 6. Restrictions or prohibited uses

Waterbody Name: _____

Needed for Evaluation:
- NH Public Beach Inspection Advisories
- 2007 NH Freshwater Fishing Digest
- Administrative Rule Env-Ws 386, Protecting the Purity of Regulated Watersheds
- NH Department of Safety 2007 List of Restricted Bodies of Water
- NH 305(b) and 303(d) Surface Water Quality Reports
- Statewide Mercury Fish Consumption Advisory Update
- NHDES Lakes Management and Protection Program
- NHDES One Stop Public Water Systems

Evaluation Question	Comments, Actual Values, or Computations	Evaluation Criteria	Rec	Out	Sus
A) Public swimming facility postings imposed because of threats to human health *You should note whether the closures occurred at the same location	**List reason(s), restriction(s), location(s), and date(s):** **Source of information:**	**1)** > 6 within past 3 years **2)** 4 – 6 within past 3 years **3)** 2 – 4 within past 3 years **4)** 1 within past 3 years **5)** None within past 3 years			
B) Fish consumption limits due to threats to human health	**List restriction and date issued:** **Source of information:**	**1)** Advisory to limit or avoid fish consumption because of suspected pollutant other than mercury **2)** Avoid consumption of fish recommendation issued for specific waterbody because of suspected mercury contamination **3)** General statewide advisory on fish consumption because of potential exposure to mercury			
C) Recreational fishing restrictions	**List restrictions and information source:** **Source of information:**	**1)** All fishing prohibited **2)** Combination of restrictions **3)** Gear restrictions (e.g., fly-fishing only) **4)** Fishing prohibited in selected areas or certain usage of bait prohibited or restricted **5)** No special restrictions; regulations follow general rules outlined by NH Fish and Game Department			

Attribute 6. Restrictions or prohibited uses

Question D. Waterbody is designated as a drinking water supply.

Directions - Consult Administrative Rule Env-Ws 386, Protecting the Purity of Regulated Watersheds or with the assistance of NHDES, consult the NHDES One Stop Public Water Systems list.

Rationale - Lakes or ponds that serve as a current, emergency, or future drinking water supply have specific watershed restrictions. Enforcement and awareness of these restrictions can vary depending on the size of the waterbody and its proximity to population centers. As part of a management plan, identify the specific restrictions and the perceived level of compliance by the public. Once this is completed, it is important to prioritize protection methods and efforts.

Question E. Power boat restrictions.

Directions - Consult the list of waterbodies with watercraft-specific restrictions in the 2007 List of Restricted Bodies of Water published by the NH Department of Safety – Division of Safety Services.

Rationale - The enactment of power boat restrictions or prohibitions can be effective in protecting surface water quality or sensitive aquatic and nearshore ecological communities. Power boats may also be prohibited or horsepower limited on specific waterbodies to retain its remote or wilderness characteristics and maintain public safety. However, it must be recognized that all types of watercraft must be considered equally when developing recreational use policies.

Question F. Ski craft restrictions.

Directions - Consult the list of waterbodies with ski craft-specific restrictions in the 2007 List of Restricted Bodies of Water published by the NH Department of Safety – Division of Safety Services.

Rationale - Personal ski craft have dramatically increased in popularity within the past decade. As fast, mobile recreational vehicles, personal ski craft can potentially present a safety hazard if operated irresponsibly or in high densities. These concerns must, however, be balanced with the general public's recreational desires in addition to protecting water quality and the ecological community. Any restrictions to recreational surface water uses must reflect reasonable solutions capable of gaining wide public support. In New Hampshire, ski craft are defined as "any motorized watercraft or private boat which is less than thirteen feet in length as manufactured, is capable of exceeding a speed of twenty miles per hour, and has the capacity to carry not more than the operator and one other person while in operation". As defined, this does not pertain to similar ski craft that can carry three or more passengers. Finally, under RSA 270:74, the use of ski craft is prohibited on all public bodies in New Hampshire that are less than 75 acres in size.

Question G. Lake surface areas with restrictions/limitations.

Directions - With assistance from the NHDES Lakes Management and Protection Program list any areas on the lake or pond where specific activities are restricted. In particular, identify any areas where non-native aquatic plants have become established. Developing a reference map showing the locations and restrictions would be beneficial. You should also consider the size of the waterbody when assessing the number of restrictions.

Rationale - These areas are designed to protect against the spread of non-native aquatic plants, promote wildlife inhabitation, and limit specific boating activities.

Attribute 6. Restrictions or prohibited uses

Evaluation Question	Comments, Actual Values, or Computations	Evaluation Criteria	Rec	Out	Sus
D) Waterbody is designated as a drinking water supply * Some New Hampshire lakes and ponds are designated as future or emergency drinking water supplies, but are not currently being utilized as such.	**List restrictions and date of last revision:** * Make a copy of the watershed rules from Env-Ws 386 for the waterbody. Be sure to reference these rules when developing a management plan. **Source of information:**	**1)** Waterbody does not serve as current, emergency, or future drinking water supply. **2)** Waterbody currently serves as a drinking water supply or is designated as an emergency or future drinking water supply and has watershed rules in place.			
E) Power boat restrictions	**List restrictions and date of last revision:** **Source of information:**	**1)** No watercraft permitted **2)** No motorized watercraft allowed (i.e. petroleum or electric); sail or oar / paddle powered only **3)** No petroleum powered watercraft permitted **4)** Power watercraft permitted but with horsepower restrictions **5)** No restrictions	1 2 3 4 5		
F) Ski craft restrictions **Ski craft:** watercraft <13' and carry 1 or 2 people and capable of exceeding 20mph; often jet- powered	**List restriction and date of last revision:** **Source of information:**	**1)** Personal ski craft prohibited on waterbody **2)** Personal ski craft restricted to specific areas of the waterbody **3)** No restrictions	1 3 5		
G) Lake surface areas with restrictions/ limitations	**List area(s) and reason(s) for restriction:** **Source of information:**	**Restrictions for consideration:** - critical wildlife habitat areas - areas where non-native plants are present - specific zones where watercraft speed is limited; no wake zones - specific zones where a particular surface water activity is prohibited (e.g., no rafting zone) - mooring fields **1)** No specialized restrictions (other than statewide regulations outlined in the New Hampshire Boater's Guide) **2)** 1 – 2 restricted areas or activities **3)** 3 – 4 restricted areas or activities **4)** 5 – 6 restricted areas or activities **5)** > 6 restricted areas or activities			

Attribute 6. Restrictions or prohibited uses

Question H. Restricted activity times.

Directions - Consult the list of waterbodies with watercraft restrictions in the 2007 List of Restricted Bodies of Water published by the NH Department of Safety – Division of Safety Services and list any activities on the lake or pond that are restricted **to certain times of the day**.

Rationale - Realizing that there may be high recreational demands placed upon popular lakes and ponds, "time zoning" represents one solution that might minimize conflict between user groups and increase the value of their experience. Further, in cases where wildlife disturbance may be of concern, reducing some surface water activities in specific areas may be beneficial to promoting their continued residence.

Attribute 6. Restrictions or prohibited uses

Evaluation Question	Comments, Actual Values, or Computations	Evaluation Criteria	Rec	Out	Sus
H) Type and timing of restricted activities - Power boating		**Restrictions for considerations:** **1)** No time restrictions **2)** 1 time restriction **3)** 2 or more restrictions			
Non-power boating					
Other					
Water-dependent activities					
On-water commercial activities					
Non-water dependent activities					
Ice-dependent activities					
Camp-sponsored activities					
Fish tournaments					
Others					

Attribute 7. Unique characteristics

A waterbody may contain other types of special characteristics that add to its value as a natural and community resource. By completing this section you will identify these social, cultural, or educational features. Their protection or restoration may also garner widespread community support and should be closely evaluated when developing a management plan. In particular, activities should be planned that increase the appreciation and awareness of any unique features that are identified.

Question A. Public drinking water supply.

Directions - Identify whether the lake serves as a "designated" public water supply, and if so, the approximate population that is served. Consult the NHDES One Stop Public Water Systems list to locate the Public Water Systems in the towns surrounding the waterbody. Note that this **does not** include any waterbodies from which lakeside residents draw water directly from the lake into their home or cottage.

Rationale - Lakes or ponds that serve as a public water supply may need additional protection measures to ensure that it is not contaminated by unnatural activities. In many cases this amounts to a reduction in on-water recreation and close monitoring of shoreline and watershed activities. A management plan should identify areas that are deficient in their protection measures or where the current protection measures are loosely enforced.

Question B. Historic features in or around the waterbody.

Directions - Consult the NH Division of Historic Resources NH State Register of Historic Places and the National Register of Historic Places and/or a local historical association to identify any features that are recognized by a local/state/national historic commission which occur in or around the lake or pond.

Rationale - Registered landmarks or other similar types of attractions that have historical significance along the waterbody's shoreline, or even submerged structures, can attract interest from regular and occasional visitors. Further, they often serve as important gathering places for permanent residents. A management plan should consider their value and protection.

Question C. Educational facilities or sites.

Directions - Record the name(s) and location(s) of any educational facilities or sites that are specifically designed to educate the public about the lake or pond's characteristics.

Rationale - Educational facilities or sites will increase the public's awareness of the natural characteristics for the lake or pond of interest. Public education is arguably the most important long-term component in facilitating wise land use and reducing the potential for negative impacts to water quality.

Attribute 7. Unique characteristics

Waterbody Name: _____

Needed for Evaluation:

- NHDES One Stop Public Water Systems
- National Register of Historic Places
- NHDES VLAP List of Lakes and Ponds
- NH State Register of Historic Places
- NH Water Resources Research Center – Lakes Lay Monitoring Program (LLMP)
- New Hampshire Lakes Association's Lake Host Program
- Knowledge of ongoing or past scientific study or research
- Knowledge of educational facilities
- Knowledge of participation in volunteer monitoring programs

Evaluation Question	Comments, Actual Values, or Computations	Evaluation Criteria	Rec	Out	Sus
A) Public drinking water supply	**Owner/Operator:** **Phone Number:** **Intake Location:** **Source of information:**	**1)** None **2)** 1 – 1000 people served **3)** 1001 – 5000 people served **4)** 5001 – 10,000 people served **5)** >10,000 people served		1 2 3 4 5	
B) Historic features in or around the waterbody	**Name(s), owners(s), location(s):** **Source of information:**	**Features for consideration:** - sunken vessels - stone/earthen dam - mill site - remnant foundation - evidence of Native American activities - other archeological features **1)** None **2)** 1 – 2 features **3)** 3 – 4 features **4)** 5 – 6 features **5)** >6 features		1 2 3 4 5	
C) Educational facilities or sites	**Name and location:** **Source of information:**	**1)** No formal educational facilities or sites **2)** At least one outside trail or waterside area specifically designed to educate the public about the waterbody's natural characteristics **3)** At least one facility with both outside and inside facilities designed to educate the public about the waterbody's natural characteristics		1 3 5	

Attribute 7. Unique characteristics

Question D. Research or scientific study.

Directions - Record the name(s) and affiliation(s) or any institutions or organized groups such as universities, conservation groups or government organizations that conduct periodic or regular scientific investigations in or around the lake or pond. For example, specific types of studies commonly undertaken on lakes or ponds include long-term ecological research (i.e. >5 years of continuous study) or diagnostic feasibility studies (intensive studies of the lake ecosystem that usually last one or two years), periodic monitoring as part of a basin-wide research program. Consider past and ongoing studies. Do not include volunteer monitoring efforts (See Question E).

Rationale - Identifying if any periodic or regular scientific information is collected in or around the lake or pond could help establish a valuable partnership for information sharing and protection efforts.

Question E. Participant in VLAP, LLMP, or an alternative volunteer monitoring program.

Directions - Identify if the lake is a part of a volunteer monitoring program such as the Lakes Lay Monitoring Program (LLMP) by contacting the University of New Hampshire NH Water Resources Research Center or consulting the NHDES Volunteer Lake Assessment Program (VLAP) List of Lakes and Ponds or the New Hampshire Lakes Association's Lake Host Program. Include any type of regular volunteer monitoring efforts.

Rationale - Identifying if the lake undergoes regular volunteer assessment could help establish an information sharing partnership and potential participants for the management plan group. Volunteer monitoring assessment groups have become a valuable tool to simultaneously gather basic information about various lake characteristics and to raise the awareness of a waterbody as a community resource.

Attribute 7. Unique characteristics

Evaluation Question	Comments, Actual Values, or Computations	Evaluation Criteria	Rec	Out	Sus
D) Research or scientific study (excluding volunteer monitoring)	**List affiliation, studies, dates, authors:**				
E) Participant in VLAP, LLMP, or an alternative volunteer monitoring program	**List affiliation and start date:**	**1)** Not a participant in a volunteer monitoring program **2)** Volunteer monitoring program participant for <1 year **3)** Volunteer monitoring program participant for at least 1 year **4)** Volunteer monitoring program participant for at least 5 years **5)** Volunteer monitoring program participant for at least 10 years		1 2 3 4 5	

Attribute 8. Shoreland characteristics

The types and intensity of land use within the immediate shoreland area (250 feet from the high water mark) is a critical factor that influences water quality in the lake or pond under consideration. In particular, nonpoint source pollutants, or those that originate from unspecified and unregulated sites or locations, are the most problematic. Examples of nonpoint source pollutants include shoreline erosion, septic seepage from faulty residential and commercial treatment systems, and fertilizer and stormwater runoff. In many instances, the quantity of pollutants would be of little concern on a case-by-case situation, but can seriously degrade water quality when their cumulative impacts are considered.

Efforts to limit the amount of nonpoint source pollution that is received by a waterbody should include sound land use development (e.g., site plan review, zoning ordinances), use of best management practices (e.g., buffer strips), stormwater catchment facilities, protection of forests and open space, and landowner awareness. In addition, shoreland topography, geology and vegetation can influence the types and amount of nonpoint source pollution that a lake or pond receives and the management plan should reflect these natural characteristics. While New Hampshire's Comprehensive Shoreland Protection Act (RSA 483–B) serves to regulate specific shoreland development activities and reduce nonpoint source pollution, the inventory will provide further insight into less apparent sources of pollution.

Question A. Shoreland development and land use.

Directions - Using Google Earth, local tax maps, NH GRANIT, and USGS topographic maps construct a map indicating the location and approximate amount of medium density residential, high density residential, commercial, industrial, institutional, and major roads, within 250 feet of the high water mark around the entire waterbody. Town planning departments, as well as regional planning commissions may be able to offer assistance in generating a map.

Rationale - Identifying the percentage of each land use type within the shoreland area will help in the development of general and targeted nonpoint source pollution prevention strategies. In cases where nonpoint source pollution is of a lesser concern, knowing the types of each of these land uses will assist in efforts to create public awareness of potential pollutant sources.

Question B. Shoreland ownership.

Directions - By using local tax maps and NH GRANIT develop a map showing land ownership (public or private) within 250 feet of the high water mark. Calculate the percentage of each ownership type. Town planning or assessing departments, as well as regional planning commissions may be able to offer assistance in generating a map of the shoreland.

Rationale - Shoreland held in private ownership provides some indication of where residential and commercial development is located. Defining these areas is useful for planning pollution prevention outreach strategies and programs. Identifying publicly held shoreland assists in assessing current and potential future public access points. Shoreland owned by the public can present nonpoint source pollution concerns, particularly in the case of community swimming facilities. In such cases, the pollution prevention strategies will differ from those employed for private landowners.

Attribute 8. Shoreland characteristics

Waterbody Name: _____

Needed for Evaluation:
- NH GRANIT
- Google Earth
- Current Estimates and Trends in New Hampshire's Housing Supply
- NRCS County Soil Surveys in New Hampshire
- NHDES Bedrock Geologic Maps
- USGS topographic map
- Land use map
- Percentage of impervious surface by land use within the shoreland
- Local Land Use and Development Ordinances/Local tax maps
- Shoreline structure survey
- Calculator

Evaluation Question	Comments, Actual Values, or Computations	Evaluation Criteria	Rec	Out	Sus
A) Shoreland development and use *A map of land use within 250' of the highwater mark is necessary.	medium density residential: _____% high density residential: _____% commercial: _____% industrial: _____% institutional: _____% major roads: _____% Total % developed = _____% **Source of information and date of last update:**	**Developed : Undeveloped** **1)** <10% : >90% **2)** 10 – 25% : 75 – 90% **3)** 26 – 50% : 50 – 74% **4)** 51 – 75% : 25 – 49% **5)** >75% : <25%			1 2 3 4 5
B) Shoreland ownership *A map showing public and private lands is necessary.	**Source of information and date of last update:**	**1)** all private; no public land **2)** all public; no private land **3)** mix of public and private land If (3), then what is the approximate percent of public and private land? Public: _____% Private: _____% * Public lands = government owned or maintained; conservation land; power company land			

Attribute 8. Shoreland characteristics

Question C. Protected land or land not available for development within the shoreland.

Directions - Using the information and maps from questions 8-A & 8-B as well as NH GRANIT identify all land that is protected from future development within the shoreland area (area within 250 feet of the high water mark) around the entire waterbody including state owned conservation properties, town owned conservation properties, private conservation organization properties, and conservation easements. An estimate should identify the amount of lake frontage in feet and shoreland area in acres. Note the ownership of the land.

Rationale - Identifying the percentage of land protected from future development will provide guidance for monitoring changes in shoreland use and the associated levels of nonpoint source pollution that a lake or pond receives. By identifying who owns the land you recognize potential partnerships for future lake management.

Question D. Percent of impervious surface within the shoreland.

Directions - Using the information and maps from questions 8-A, 8-B, and 8-C and the land cover 2001 data from NH GRANIT calculate the land use for residential/commercial/industrial, transportation, disturbed land, and other cleared. Do not include any unbuildable areas of land. Multiple each land use category by its impervious cover coefficient: residential/commercial/industrial = 0.106, transportation = 0.722, disturbed land = 0.143, and other cleared = 0.212. Add up the impervious area for each land use. Divide by the subwatershed area and multiply by 100. See example:

Land Use Category	Area (acres)	Land use/Impervious Cover Coefficient	Impervious Cover (acres)
Residential/ Commercial/ Industrial	524	0.106	55.5
Transportation	15	0.722	10.8
Disturbed	53	0.143	7.6
Other cleared	24	0.212	5.1
Total	616		79

Impervious Cover % = 79/616 x 100 = 12.8%

Adapted from the Center for Watershed Protection

* *There are several ways to measure impervious cover; however the scientific community has not yet reached consensus on a standardized technique. Currently, Rockingham and Stafford Counties have the most accurate data. If possible, field visits should be conducted to collect the most accurate measurement of impervious cover.*

Rationale - The amount of impervious area is important in determining stormwater runoff quantity and quality. Shoreland areas that provide little area for stormwater infiltration into the soil (i.e. high percentage of impervious surfaces) will convey high quantities of stormwater runoff into surface waters. Impervious surfaces can also compromise water quality by transferring oils, greases, heavy metals, and excess nutrients from pavement and rooftops to nearby tributaries and drainage ditches. Stormwater retention facilities and vegetated buffer strips can be used to effectively mitigate stormwater quantity and quality. A management plan should identify the percentage of impervious surfaces in need of stormwater control mechanisms within the shoreland boundaries.

Question E. Permanent or seasonal water dependent structures.

Directions - Using the "Shoreline Structure Survey" in Appendix C, estimate the density (number/1,000 feet) of water dependent structures (e.g., docks, boathouses, breakwaters) on the lake or pond. Be sure to exclude marinas and other similar types of commercial docking facilities.

Rationale - The density of water dependent structures is useful for assessing the waterbody's popularity. It may also assist in future use assessments to determine if their prevalence has increased or decreased. Encroachment on or alteration of the natural shoreline may negatively impact the littoral zone biological community. For example, a fully developed shoreline may modify the natural sediment characteristics of the littoral zone in turn interfering with fish spawning habitat.

Attribute 8. Shoreland characteristics

Evaluation Question	Comments, Actual Values, or Computations	Evaluation Criteria	Rec	Out	Sus
C) Protected land or land **not** available for development within the shoreland * A map should show the owners and the protection mechanism (i..e. easement, conservation lands).	**Total lake frontage** (feet)**:** **Total lake frontage protected** (feet)**:** **Number of parcels protected:** **Total area of protected land with frontage** (acres)**:** **Note ownership of individual parcels:** **Source of information and date of last update:**	**As percent of total shoreland frontage:** **1)** 0% **2)** 1 – 10 % **3)** 11 – 25% **4)** 26 – 50% **5)** >50%		1 2 3 4 5	
D) Percent of impervious surface within the shoreland (e.g., roadways, rooftops, drive-ways, parking lots)	medium density residential: _____% high density residential: _____% commercial: _____% industrial: _____% institutional: _____% major roads: _____% Total % developed = _____% **Source of information and date of last update:**	**1)** >25% **2)** 16 – 25% **3)** 5 – 15% **4)** 1 – 5% **5)** no impervious shoreland within 250' of highwater mark			5 4 3 2 1
E) Permanent or seasonal water dependent structures (e.g., docks, boathouses, and break-waters) *Exclude marinas and other similar types of commercial docking facilities.	**Method(s) of assessment:** **Source of information and date of last update:**	**1)** >10 structures/1,000 feet of shoreline **2)** 7 – 9 structures/1,000 feet of shoreline **3)** 4 – 6 structures/1,000 feet of shoreline **4)** 1 – 3 structures/1,000 feet of shoreline **5)** No boathouses, docks, or breakwaters; continuous natural shoreline			

Attribute 8. Shoreland characteristics

Question F. Shoreland topography (slope).

Directions - Using the US Department of Agriculture Natural Resources Conservation Service's (NRCS) County Soil Surveys in New Hampshire determine all shoreland areas (areas within 250 feet of the highwater mark) with a slope >15%. If NRCS County Soil Surveys in New Hampshire are unavailable determine slope by drawing a straight line perpendicular to the contours of a USGS topographic map. For the most accuracy, begin and end the line on a contour, rather than between contours. Measure the length of the line drawn, using a ruler and the scale of the map, and convert that distance to feet. Determine the total elevation change along the drawn line by subtracting the elevation of the lowest contour used from the highest contour used. This is the elevation change. To calculate a percent slope, divide the elevation change by the distance of the drawn line, then multiply by 100. Ex: 100 ft. (highest elevation) – 40 ft. (lowest elevation) = 60 ft. elevation change. 60 ft/100 ft. (distance of drawn line) = 0.6 ft. 0.6 ft. x 100 = 60 percent slope.

Rationale - The topography and especially the slope of the shoreland area is an important natural characteristic that controls the rate and amount of stormwater that enters the lake or pond. A waterbody that has a steeply sloped shoreland will convey stormwater more quickly than a waterbody with relatively level shoreland. As a result, stormwater runoff for lakes and ponds that have a steep shoreland grade will have a lower chance of infiltrating the soil, limiting the potential for natural pollutant retention.

Question G. Shoreland geology and soils.

Directions - Consult the NRCS County Soil Surveys in New Hampshire and the NHDES Bedrock Geologic Maps to identify the percentages of bedrock and hydric soils in the shoreland area (area within 250 feet of the high water mark).

Rationale - The geology and soils of the shoreland area are important characteristics to inventory because they dictate what type and where development can and should occur. For example, if a high percentage of the shoreland area has bedrock present at the surface, it would be difficult or cost prohibitive to excavate a foundation for a home. Along the same lines, if wetland soils are present, then septic system placement should be prohibited.

Question H. Local land use regulatory measures within the shoreland.

Directions - Review the regulatory measures for land use and development for each of the municipalities by visiting their website or their city/town hall within the shoreland area to determine if there are any ordinances designed to protect the natural waterbody characteristics.

Inadequate	*Adequate*	*Exceptional*
• No zoning	• At least 50' setback from stream/wetland	• >50' setback from stream / wetland
• No site plan review regulations required	• Specific erosion control provisions	• Detailed erosion control plans
• Only state or federal regulations apply	• Subsurface sewage regulations	• Buffer strip protection required
	• Minimum lot sizes	• Subsurface sewage regulations (>125' from stream/wetland)
	• Excavation regulations	• Minimum lot sizes by soil type
	• Junkyard regulations	• Wetland regulations
	• Use of best management practices required	• Aquifer regulations
		• Limited impervious surface
		• Innovative land use controls
		• Growth management strategy enacted
		• Hazardous waste and underground storage tank regulations
		• Overlay zones

Rationale - Reviewing town land use and development ordinances will hopefully increase local awareness of, and compliance with, the measures already in place to protect surface water quality. This process will identify certain land use practices or activities that are of particular concern so that the surrounding communities can address them in the future.

Attribute 8. Shoreland characteristics

Evaluation Question	Comments, Actual Values, or Computations	Evaluation Criteria	Rec	Out	Sus
F) Shoreland topography (slope)	% level (0 – 8% slope): % moderate (9 – 15% slope): % steep (16 – 25% slope): % excessive (>25% slope): **Source of information and date of last update:** Map Scale:	**1)** >75% of the shoreland area has a slope of 16% or greater **2)** 51 – 75% of the shoreland area has a slope of 16% or greater **3)** 26 – 50% of the shoreland area has a slope of 16% or greater **4)** 1 – 25% of the shoreland area has a slope of 16% or greater **5)** None of the shoreland area has a slope of 16% or greater			
G) Shoreland geology and soils	Bedrock: _____% Hydric soils: _____% **Source of information and date of last update:** Map Scale:	**% of soils with impediments to development:** **1)** 0%; all shoreland soils are suitable for development **2)** < 10% **3)** 11 – 25% **4)** 26 – 50% **5)** >50%			
H) Local land use regulatory measures within the shoreland	**List any local ordinance(s) designed to protect natural waterbody characteristics and the respective municipality:** **Source of information:**	**1)** No municipality has an ordinance specifically to protect the lake or pond; only state and federal standards apply **2)** At least 1 municipality has 1 ordinance to protect the lake or pond **3)** Two municipalities have at least 1 ordinance to protect the waterbody OR 1 municipality has 2 ordinances to protect the lake or pond **4)** Three or more municipalities have at least 1 ordinance or 1 municipality has 3 or more ordinances **5)** Each of the municipalities has numerous (2 or more) ordinances to protect the lake or pond		1 2 3 4 5	5 4 3 2 1

Attribute 8. Shoreland characteristics

Question I. Rate of shoreland development.

Directions - Consult the NH Office of Energy and Planning's Current Estimates and Trends in New Hampshire's Housing Supply, town planners, town master plans, or regional planning commissions to obtain an estimate of the rate of development over the past ten years of the shoreland area (area within 250 feet of the high water mark). The estimate should be based upon the number of building permits per year. Please note: This question pertains to **new** development, not conversion, additions, improvements, etc. Only include **new** development in the tally.

Rationale - Knowing the rate of shoreland development in the local communities can help prioritize planning goals and objectives. Establishing development guidance priorities is the most efficient use of limited resources and is beneficial in protecting the natural characteristics of the waterbody.

Question J. Rate of conversions, additions, improvements, etc.

Directions - Consult the NH Office of Energy and Planning's Current Estimates and Trends in New Hampshire's Housing Supply, town planners, town master plans, or regional planning commissions to obtain an estimate of the rate of conversions, additions, improvements, etc. over the past ten years of the shoreland area (area within 250 feet of the high water mark). The estimate should be based upon the number of building permits per year.

Rationale - Knowing the rate of shoreland development in the local communities can help prioritize planning goals and objectives. Establishing development guidance priorities is the most efficient use of limited resources and is beneficial in protecting the natural characteristics of the lake or pond.

Attribute 8. Shoreland characteristics

Evaluation Criteria	Comments, Actual Values, or Computations	Evaluation Criteria	Rec	Out	Sus
I) Rate of shoreland development *land conversion within 10 year period	**Building permits/year:** **Source of information:**	**1)** >10 permits/year **2)** 6 – 10 permits/year **3)** 3 – 5 permits/year **4)** 0 – 2 permits/year **5)** None within the past 10 years			
J) Rate of conversions *home conversions, additions, and/or improvements within 10 year period	**Building permits/year:** **Source of information:**	**1)** >10 permits **2)** 6 – 10 permits/year **3)** 3 – 5 permits/year **4)** 0 – 2 permits/year **5)** None within the past 10 years			

Attribute 9. Watershed characteristics

The importance of evaluating land use and activity extends well beyond both the waterbody and the immediate shoreland area. For most lakes and ponds the basic unit used to complete a comprehensive assessment of the factors affecting water quality is the watershed, or the land area draining water into the lake or pond. In general, a waterbody's watershed extends well beyond the shoreland area. Therefore, the land use and activities conducted within the entire watershed are vitally important in determining water quality in the lake or pond. As a result, land use and the human activities conducted in the watershed are important to consider when developing a management plan for the lake or pond. **However, for this analysis concentrate on the immediate watershed draining into the waterbody.**

Similar to the shoreland area, nonpoint sources of pollution are the most difficult to control when protecting or restoring surface water quality within the watershed. Ensuring wise land use and development coupled with creating public awareness of potentially harmful and beneficial activities are important components for maintaining or improving natural watershed characteristics. A management plan should consider nonpoint source pollution control items such as erosion reduction, stormwater treatment, land protection, and utilization of best management practices. Finally, completing this attribute will form the basic foundation for future land use and development planning efforts.

Question A. Watershed development and land use.

Directions - Using the NRCS County Soil Surveys in New Hampshire, Google Earth, local tax maps, and USGS topographic maps construct a map indicating the location and approximate amount of medium density residential, high density residential, commercial, industrial, institutional, and major roads in **the immediate watershed** area. Town planning departments, as well as regional planning commissions may be able to offer assistance in generating a map.

Rationale - Identifying the percent of each land use type within the immediate watershed will help in the development of general and targeted nonpoint source pollution prevention strategies. In addition, knowing the location and distribution of various land use types will assist in identifying those lands available for future development or land use conversion.

Question B. Watershed land ownership.

Directions - By using local tax maps and NH GRANIT develop a map of **the immediate watershed** showing the amount and location of lands held in private and public ownership. Calculate the percentage of each ownership type. Town planning or assessing departments, as well as regional planning commissions may be able to offer assistance generating a watershed map.

Rationale - Strategies for nonpoint source pollution prevention may differ among public and private lands depending on their use. Private lands will consist of residential, commercial, and agricultural uses, while public land may serve primarily as recreational or forestry uses. In addition, tracking the distribution and location of public and private lands over time will help in documenting changes in land use.

Question C. Protected land or land not available for development within the watershed.

Directions - Using the information and maps from questions 9-A & 9-B as well as NH GRANIT identify all land that is protected from future development within **the immediate watershed** including state owned properties, town owned properties, private conservation organization properties, and conservation easements. Note ownership of the land.

Rationale - Identifying the percentage of land protected from future development will provide guidance for monitoring changes in shoreland usage and the associated levels of nonpoint source pollution that a lake or pond receives. By identifying who owns the lands you recognize potential partnerships for future lake management.

Attribute 9. Watershed characteristics

Waterbody Name: _____

Needed for Evaluation:
- Strahler (1957) modified Horton (1945) method
- USGS topographic maps
- NRCS County Soil Surveys in New Hampshire and NHDES Bedrock Geologic Maps
- Google Earth
- NH GRANIT
- Current Estimates and Trends in New Hampshire's Housing Supply
- Percentage of impervious surface by land use within the watershed
- Local Tax Maps and Local Land Use and Development Ordinances

Evaluation Question	Comments, Actual Values, or Computations	Evaluation Criteria	Rec	Out	Sus
A) Watershed development and land use * A map showing watershed boundaries and the land use is necessary.	medium density residential : _____% high density residential: _____% commercial: _____% industrial: _____% institutional: _____% Total % developed = _____% **Source of information and date of last update:**	**% developed : % undeveloped** **1)** >75% : <25% **2)** 51 – 75% : 25 – 49% **3)** 26 – 50% : 50 – 74% **4)** 10 – 25% : 75 – 90% **5)** <10% : >90%	1 2 3 4 5		5 4 3 2 1
B) Watershed land ownership * A map showing public and private lands is necessary.	**Source of information and date of last update:**	**1)** all private; no public land **2)** all public; no private land **3)** mix of public and private land If (3), then what is the approximate percent of public and private land? Public: _____% Private: _____% * Public lands = government owned or maintained; conservation land; power company land; forest company land			
C) Protected land or land **not** available for development within the watershed *A map showing the locations and owners of the protected lands is necessary.	**Total area of protected land** (acres)**:** **Area of protected land as percent of watershed area** (%)**:** **Note ownership of individual parcels:** **Source of information and date of last update:**	**As percent of immediate watershed area:** **1)** 0% **2)** 1 – 10% **3)** 11 – 25% **4)** 26 – 50% **5)** >50%		1 2 3 4 5	5 4 3 2 1

Attribute 9. Watershed characteristics

Question D. Percent of impervious surface within the watershed.

Directions - Using the information and maps from questions 9-A, 9-B, and 9-C and the land cover 2001data from NH GRANIT calculate the land use for residential/commercial/industrial, transportation, disturbed land, and other cleared. Do not include any unbuildable areas of land. Multiple each land use category by its impervious cover coefficient: residential/commercial/industrial = 0.106, transportation = 0.722, disturbed land = 0.143, other cleared = 0.212. Add up the impervious area for each land use. Divide by the subwatershed area and multiply by 100. See example:

Land Use Category	Area (acres)	Land use/Impervious Cover Coefficient	Impervious Cover (acres)
Residential/Commercial/Industrial	524	0.106	55.5
Transportation	15	0.722	10.8
Disturbed Land	53	0.143	7.6
Other Cleared	24	0.212	5.1
Total	616		79

Impervious Cover % = 79/616 x 100 = 12.8%

Source: Center for Watershed Protection

** There are several ways to measure impervious cover; however the scientific community has not yet reached consensus on a standardized technique. Currently, Rockingham and Stafford Counties have the most accurate data. If possible, field visits should be conducted to collect the most accurate measurement of impervious cover.*

Rationale - The amount of impervious surface is important in determining stormwater runoff quantity and quality. Watersheds that are highly developed tend to have a higher percentage of impervious surfaces. Impervious surfaces reduce natural stormwater soil infiltration and convey high quantities of runoff directly to the nearest tributary. Impervious surfaces can also compromise water quality by transferring oils, greases, heavy metals, pathogens, and excess nutrients to tributaries and drainage ditches. The installation of stormwater retention facilities can assist in mitigating some of the negative impacts. A management plan should identify the percentage of impervious surfaces and areas in need of stormwater control within the shoreland boundaries.

Question E. Land use adjacent to perennial streams.

Directions - Using USGS topographic maps identify perennial streams that drain into the lake. Use an aerial photo to delineate the stream and determine the locations and amounts of forested, wetland, active agricultural, clear/open, and urban land use types within 250 feet on each side of the streams that ***drain into*** the lake or pond. Town planning, as well as regional planning commissions may be able to offer assistance in generating a map.

Rationale - The perennial streams that drain into a waterbody act as conduits for pollutant transport from the land that surrounds them. Different land use types are associated with different pollutant types and quantities and must be considered when developing a nonpoint source pollution investigation or prevention program. In addition, when assessing land use in the areas surrounding the largest tributaries, estimate the pollutant load delivered to the lake or pond of interest.

Question F. Watershed topography (slope).

Directions - Using a NRCS County Soil Surveys in New Hampshire determine all areas within **the immediate watershed** with a slope >15%. If a NRCS County Soil Surveys in New Hampshire is available determine slope by drawing a straight line perpendicular to the contours of a USGS topographic map. For the most accuracy, begin and end the line on a contour, rather than between contours. Measure the length of the line drawn, using a ruler and the scale of the map, and convert that distance to feet. Determine the total elevation change along the drawn line by subtracting the elevation of the lowest contour used from the highest contour used. This is the elevation change. To calculate a percent slope, divide the elevation change by the distance of the drawn line, then multiply by 100.

Rationale - The topography, especially the slope of the immediate shoreland is an important natural characteristic that controls the rate and amount of stormwater that enters the lake or pond. A steeply sloped watershed (slope >15%) will convey stormwater more quickly to nearby tributaries than a watershed with a relatively flat landscape.

Attribute 9. Watershed characteristics

Evaluation Question	Comments, Actual Values, or Computations	Evaluation Criteria	Rec	Out	Sus
D) Percent of impervious surface within the watershed (e.g., roadways, rooftops, driveways, and parking lots)	medium density residential: _____% high density residential: _____% commercial: _____% industrial: _____% institutional: _____% Total % developed = _____% **Source of information and date of last update:**	**1)** >50% **2)** 26 – 50% **3)** 10 – 25% **4)** 1 – 10% **5)** 0%			
E) Land use adjacent to perennial streams * Construct a map showing land use within 250' along each of the most significant tributaries draining into the lake or pond of interest.	medium density residential: _____% high density residential: _____% commercial: _____% industrial: _____% institutional: _____% Total % developed = _____% **Source of information and date of last update:**	**% developed : % undeveloped** **1)** 75 – 100%: < 25% **2)** 50 – 75% : 25 – 50% **3)** 25 – 50% : 50 – 75% **4)** 10 – 25% : 75 – 90% **5)** < 10% : > 90%			
F) Watershed topography (slope)	% level (<8% slope): % moderate (9 – 15% slope): % steep (16 – 25% slope): % excessive (>25% slope): **Source of information and date of last update:**	**1)** >75% of the watershed area has a slope of 16% or greater **2)** 51 – 75% of the watershed area has slope of 16% or greater **3)** 26 – 50% of the watershed area has a slope of 16% or greater **4)** 1 – 25% of the watershed area has a slope of 16% or greater **5)** None of the shoreland area has a slope of 16% or greater			

Attribute 9. Watershed characteristics

Question G. Watershed geology and soils.

Directions - Consult the NRCS County Soil Surveys in New Hampshire and the NHDES Bedrock Geologic Maps to identify the percentages of bedrock and hydric soils within **the immediate watershed**.

Rationale - The geology and soils within the watershed area are important characteristics to inventory because they dictate the location and type of development that should occur. For example, if a high percentage of the watershed area has bedrock present at the surface it would be difficult or cost prohibitive to excavate a foundation for a home.

Question H. Local land use regulatory measures within the watershed.

Directions - Contact each of the municipalities immediately surrounding the watershed by visiting their website or city/town hall or consult with the regional planning commission to determine if the local floodplain, aquifer, wetland, and shoreland ordinances meet or exceed state standards. Listed below are potential protection measures that may be in place for some of the municipalities within the watershed. Complete the list for each municipality within the watershed in order to assess the adequacy of the surface water protection measures.

Inadequate	*Adequate*	*Exceptional*
• No zoning	• At least 50' setback from stream/wetland	• >50' setback from stream / wetland
• No site plan review regulations required	• Specific erosion control provisions	• Detailed erosion control plans
• Only state or federal regulations apply	• Subsurface sewage regulations	• Buffer strip protection required
	• Minimum lot sizes	• Subsurface sewage regulations (>125' from stream/wetland)
	• Excavation regulations	• Minimum lot sizes by soil type
	• Junkyard regulations	• Wetland regulations
	• Use of best management practices required	• Aquifer regulations
		• Limited impervious surface
		• Innovative land use controls
		• Growth management strategy enacted
		• Hazardous waste and underground storage tank regulations
		• Overlay zones

Rationale - A comparison of local and state protection measures that apply to the lake or pond will provide an indication of the regulatory measures currently in place to ensure sound watershed development and use. Also, reviewing town land use and development ordinances will hopefully increase local awareness of, and compliance with, the measures to protect surface water quality. It may be important to identify certain land use practices or activities that are of particular concern so that the surrounding communities can address them in the future.

Question I. Drainage network.

Directions - Use the Strahler (1957) modified Horton (1945) method and the NH GRANIT to classify each stream segment within **the immediate watershed**. A stream with no tributaries is a first order stream. A stream segment downstream of the confluence of two first order streams is a second order stream. Thus, a next order stream **only** forms at the confluence of two streams of the same order.

Rationale - This question will provide a better understanding of the lake or pond's relative position (order) in transferring water to its ultimate destination. Answering this question will increase awareness of the waterways that supply and receive water to and from the waterbody, respectively.

Question J. Rate of watershed development.

Directions - Consult the NH Office of Energy and Planning's Current Estimates and Trends in New Hampshire's Housing Supply to obtain an estimate of the rate of development over the past ten years within **the immediate watershed area** (area within 250 feet of the high water mark). The estimate should be based upon the number of building permits per year. This question pertains to **new** development, not conversion, additions, improvements, etc. Only include **new** development in the tally.

Rationale - Knowing the rate of development within the watershed can help prioritize planning goals and objectives. Establishing development guidance priorities is the most efficient use of limited resources and is beneficial in protecting the natural characteristics of the waterbody.

Attribute 9. Watershed characteristics

Evaluation Question	Comments, Actual Values, or Computations	Evaluation Criteria	Rec	Out	Sus
G) Watershed geology and soils	Bedrock: _____% Hydric soils: _____% **Source of information and date of last update:** Map Scale:	**% of soils with impediments to development:** **1)** 0%; based on soils **only**, entire watershed is suitable for development **2)** < 10% **3)** 11 – 25% **4)** 26 – 50% **5)** >50%			
H) Local land use regulatory measures	**List any local ordinance(s) designed to protect natural waterbody characteristics and the respective municipalities:** **Source of information:**	**1)** One or more municipalities within the watershed has inadequate local land use regulations (i.e. only state and federal regulations apply) **2)** All municipalities within the watershed have adequate local land use regulations (i.e. town ordinances comply with minimum state standards) **3)** One or more municipalities within the watershed has exceptional land use regulations that exceed state standards		1 3 5	5 3 1
I) Drainage network (stream order classification)	**Stream or river with the highest order ranking draining into the waterbody:** **Name:** **Order:**	**Highest order rank or stream or river:** **1)** 1st **2)** 2nd **3)** 3rd **4)** 4th **5)** 5th or higher			
J) Rate of watershed development *land conversion within 10 year period	**Building permits/year:** **Source of information:**	**1)** > 25 permits/year **2)** 16 – 25 permits/year **3)** 7 – 15 permits/year **4)** 0 – 6 permits/year **5)** None within the past 10 years			

Attribute 10. Visual/aesthetic characteristics

The visual or aesthetic characteristics that are present on and around a waterbody can either add or detract from its desirability to the public. Factors that affect a lake or pond's aesthetic qualities include land use, landscape viewing, level and type of detectable noise, and strength and type of odors sensed. Collectively, these factors can create a sense of natural beauty or a severely altered waterbody that is not attractive for visitation or residence.

The quality of a waterbody's visual or aesthetic characteristics should be evaluated from two vantage points. The first perspective is the overall perception gained while viewing the lake. Are there ample opportunities to view the waterbody? Is the lake or pond inviting, or is the water green and overly crowed with boats? Are there unnatural odors and noises that interfere with the natural setting? The second perspective is the view from the waterbody itself. When viewed from the lake or pond, does the surrounding landscape appear natural or is it greatly altered by human intervention? What level of residential or commercial development is visible? Are lakeshore roadways busy and loud? Evaluate each of these characteristics in an attempt to assess the waterbody's inherent beauty or degree of human influence.

Question A. Scenic or natural features of interest visible from the waterbody.

Directions - Record the name(s) and location(s) and photographs of any significant scenic or natural features of interest that can be viewed from the waterbody by conducting a site visit and using NH GRANIT.

Rationale - The presence of significant scenic or natural features will increase the popularity and natural beauty of the lake or pond.

Question B. Scenic viewing opportunities of the waterbody.

Directions - Using a USGS topographic map of your waterbody, mark the scenic locations from which the lake or pond can be viewed (e.g., roadway pullovers, public parks, access sites, and public beaches) by the general public. Visit each location, take photos, and on the same map shade in the **area of the waterbody** you are able to view from that spot. After visiting each location and shading in the area viewed, use the map to estimate the total percent of the lake viewed (percent of map that is shaded).

Rationale - Viewing areas allow the general public to gain an appreciation for the natural beauty of a lake or pond. Over time, these areas may also permit an evaluation of changes in land use along the visible shoreline.

Question C. Noise level at scenic viewing areas.

Directions - Gauge the levels of natural and unnatural detectable sounds at each of the scenic viewing areas identified above.

Rationale - The level of desirable noise varies from person to person, however noisy viewing areas, such as those next to busy roadways, will be less aesthetically pleasing than areas set in more remote areas.

Attribute 10. Visual/aesthetic characteristics

Waterbody Name: _____

Needed for Evaluation:
- USGS topographic maps
- NH GRANIT
- Map of the Watershed
- Camera
- Colored pencils

Evaluation Question	Comments, Actual Values, or Computations	Evaluation Criteria	Rec	Out	Sus
A) Scenic or natural features of interest visible from waterbody (e.g., visible cliffs > 200' high; mountain peaks > 2,000' high, unusual rock formations)	**Name(s) and location(s):** **Source of information:**	**1)** None **2)** At least 1 **3)** At least 2 **4)** At least 3 **5)** > 3	1 2 3 4 5	1 2 3 4 5	
B) Scenic viewing opportunities of the waterbody * Scenic viewing areas included must be accessible by the general public (i.e. parks, beaches roadside viewing areas).	**Viewing location(s) and estimated total percent of waterbody visible:** **Source of information:**	**1)** No scenic viewing opportunities **2)** Scenic viewing area(s) collectively allow <25% of waterbody to be observed **3)** Scenic viewing area(s) collectively allow 25 – 50% of waterbody to be observed **4)** Scenic viewing area(s) collectively allow 50 – 75% of waterbody to be observed **5)** Scenic viewing area(s) collectively allow >75% of waterbody to be observed			
C) Noise level at scenic viewing areas	**Viewing location and predominant noise level/type:** **Source of information:**	**1)** High; unnatural sounds predominate (i.e. constant traffic, industrial, construction) **2)** Moderate; some unnatural sounds audible (i.e. occasional nearby traffic, diffuse constant traffic noise, distant industrial noise) **3)** Low; natural sounds predominate (i.e. birds, wildlife, winds)			

Attribute 10. Visual/aesthetic characteristics

Question D. Dominant land use visible from waterbody.

Directions - Estimate the percentage of visible undeveloped, agricultural, residential, and commercial land uses within the watershed from the waterbody. If you cannot view the entire watershed from one point, choose a variety of points on the waterbody. Using a map of the entire watershed, including the waterbody, mark your location, and take photos. In different colors shade in the types of land uses you see (undeveloped, agricultural, residential, and commercial). In the end you should have a map of visible land uses within your watershed as seen from the waterbody. Looking at the outline of the total **viewable** area of the watershed and comparing it to the areas of land use types that were shaded in, estimate the percentage for each type of land use viewed.

Rationale - Lakes and ponds that have little visible development tend to be more aesthetically pleasing than waterbodies with a heavily developed visible landscape.

Question E. Odors present on a waterbody or at viewing areas.

Directions - Gauge the type, duration, and intensity of natural and unnatural odors at various locations on the waterbody and at popular land-based viewing locations.

Rationale - The types and levels of detectable odors will affect the aesthetic value of the lake or pond being considered.

Attribute 10. Visual/aesthetic characteristics

Evaluation Question	Comments, Actual Values, or Computations	Evaluation Criteria	Rec	Out	Sus
D) Dominant land use visible from waterbody	**Estimated percent:** % forested: % agricultural: % residential: % commercial: **Source of information:**	**1)** Commercial or urban development dominates visible landscape **2)** Densely clustered residential development and occasional commercial land uses dominates visible landscape **3)** Residential and/or commercial development present and visible, but interspersed with forested or other natural land use types **4)** Low density residential development present without any commercial development, but visible landscape dominated by natural vegetation and undisturbed land **5)** Entire visible landscape dominated by natural vegetation and undisturbed land			
E) Odors present on waterbody or at viewing areas	**Location(s) of detection and odor description:** **Source of information:**	**1)** Unnatural odors distinct and continuously present at more than one location **2)** Unnatural odors distinct and continuously present at only one location **3)** Unnatural odors intermittent dependent on production source(s) and wind direction at more than one location **4)** Unnatural odors intermittent dependent on production source(s) and wind direction at only one location **5)** Only natural odors detectable at all location(s)			

Additional Comments / Ideas:

Appendix A
Summary of Inventory Results

RECREATIONAL VALUE ***Attribute and Associated Questions***	*Recorded Points*	*Possible Points*
***ATTRIBUTE 1.* GEOGRAPHIC, SPACIAL, AND DEMOGRAPHIC INFORMATION**		
C. Proximity to major transportation corridors (miles to nearest major roadway)		5
D. Total year round resident population w/in 30 mile radius (# of people)		5
***ATTRIBUTE 2.* PHYSICAL WATERBODY CHARACTERISTICS**		
A. Surface water area (acres)		5
E. Shoreline configuration (i.e. shape)		5
F. Island presence/absence (# of islands)		5
***ATTRIBUTE 3.* WATER QUALITY CHARACTERISTICS**		
F. Secchi disc transparency (meters)		5
***ATTRIBUTE 4.* BIOLOGICAL/ECOLOGICAL CHARACTERISTICS**		
A. Algal abundance (µg/L of chl *a*)		5
H. Specialized habitats, breeding or rearing areas (# of areas, structures)		5
***ATTRIBUTE 5.* RECREATIONAL CHARACTERISTICS**		
A. Type of watercraft use (% of total watercraft)		5
B. Average watercraft density on lake or pond (all types)		5
C. Private marine service/docking facilities (#)		5
E. Recreational fishing (i.e. types and # of game fish species pursued)		5
F. Occurrence of fishing tournaments / derbies (#/year)		5
G. Angler Usage (# anglers / acre)		5
K. Boat launches and access sites (#)		5
L. Other recreation and support facilities (#)		5
***ATTRIBUTE 6.* RESTRICTIONS OR PROHIBITED USES**		
E. Power boat restrictions		5
F. Ski craft restrictions		5
***ATTRIBUTE 9.* WATERSHED CHARACTERISTICS**		
A. Watershed development and land use (% developed, % undeveloped)		5
***ATTRIBUTE 10.* VISUAL/AESTHETIC CHARACTERISTICS**		
A. Scenic or natural features of interest visible from waterbody (# of features)		5
TOTAL		100

A high score indicates that the waterbody has a high recreational value.

UNIQUE OR OUTSTANDING VALUE ***Attribute and Associated Questions***	*Recorded Points*	*Possible Points*
ATTRIBUTE 1. **GEOGRAPHIC, SPATIAL, AND DEMOGRAPHIC INFORMATION**		
B. Waterbody elevation (feet)		5
ATTRIBUTE 2. **PHYSICAL WATERBODY CHARACTERISTICS**		
B. Maximum water depth (meters)		5
K. Basin morphometry (# basins)		5
L. Waterbody origin (natural / artificial)		5
ATTRIBUTE 3. **WATER QUALITY CHARACTERISTICS**		
F. Secchi disc transparency (meters)		5
ATTRIBUTE 4. **BIOLOGICAL/ECOLOGICAL CHARACTERISTICS**		
C. Fish species diversity (# of species)		5
D. Avian species diversity (# of species)		5
E. Mammal species diversity (# of species)		5
F. Reptile & amphibian species diversity (# of species)		5
H. Specialized habitats, breeding or rearing areas (# of areas, structures)		5
K. Threatened and endangered plant/animal species and exemplary natural communities		5
ATTRIBUTE 7. **UNIQUE CHARACTERISTICS**		
A. Public drinking water supply (# households served)		5
B. Historic features in or around waterbody (#)		5
C. Educational facilities or sites (# and type)		5
E. Participant in VLAP, LLMP, or an alternative volunteer monitoring program		5
ATTRIBUTE 8. **SHORELAND CHARACTERISTICS**		
C. Protected land or land not available for development within the shoreland (% shoreland frontage)		5
H. Local land use regulatory measures within the shoreland		5
ATTRIBUTE 9. **WATERSHED CHARACTERISTICS**		
C. Protected land or land not available for development within the watershed (% of watershed area)		5
H. Local land use regulatory measures		5
ATTRIBUTE 10. **VISUAL/AESTHETIC CHARACTERISTICS**		
A. Scenic or natural features of interest visible from the waterbody (# of features)		5
TOTAL		100

A high score indicates that the waterbody has many unique or outstanding values.

SUSCEPTIBILITY TO IMPAIRMENT ***Attribute and Associated Questions***	*Recorded Points*	*Possible Points*
ATTRIBUTE 1. **GEOGRAPHIC, SPATIAL, AND DEMOGRAPHIC INFORMATION**		
D. Total year round resident population w/in 30 mile radius (# of people)		5
ATTRIBUTE 2. **PHYSICAL WATERBODY CHARACTERISTICS**		
C. Mean water depth (feet)		5
D. Percent shoal area / littoral zone (% of waterbody <15')		5
I. Watershed area / lake area ratio		5
J. Hydraulic flushing rate (time waterbody flushes / years)		5
ATTRIBUTE 3. **WATER QUALITY CHARACTERISTICS**		
A. Waterbody trophic status		5
E. Total phosphorus concentration (mg/L)		5
F. Secchi disc transparency (meters)		5
I. Historic point source discharges		5
ATTRIBUTE 4. **BIOLOGICAL/ECOLOGICAL CHARACTERISTICS**		
A. Algal abundance (µg/L of chl a)		5
I. Exotic aquatic plant species (presence/absence and proximity to waterbody with an exotic)		5
J. Exotic aquatic animal species (presence/absence and proximity to waterbody with an exotic)		5
ATTRIBUTE 5. **RECREATIONAL CHARACTERISTICS**		
A. Type of watercraft use (% of total watercraft)		5
B. Average watercraft density on lake or pond (all types)		5
ATTRIBUTE 8. **SHORELAND CHARACTERISTICS**		
A. Shoreland development and use (% developed, % undeveloped)		5
D. Percent of impervious surface within the shoreland		5
H. Local land use regulatory measures within the shoreland		5
ATTRIBUTE 9. **WATERSHED CHARACTERISTICS**		
A. Watershed development and land use (% developed, % undeveloped)		5
C. Protected land or land not available for development within the watershed (% of watershed area)		5
H. Local land use regulatory measures		5
TOTAL		100

A high score indicates that the waterbody has a high susceptibility to impairment.

Appendix B
Biological Checklists

AVIAN COMMUNITY CHECKLIST

NH Comprehensive Lakes Inventory
Attribute 4, Question D

Name of Waterbody:_____ **Date/Time:** _____

Name of Surveyor(s): _____ **Temperature:** _____

Phone Number: _____ **Most Recent Rain:** _____

E-mail: _____ **Current Weather:** _____

SWIMMERS

- [ ] Mute Swan
- [ ] American Black Duck
- [ ] Wood Duck
- [ ] Ring-necked Duck
- [ ] Mallard
- [ ] Bufflehead
- [ ] Canvasback
- [ ] American Wigeon
- [ ] Common Loon
- [ ] Blue-winged Teal
- [ ] Green-winged Teal
- [ ] Common Merganser
- [ ] Hooded Merganser
- [ ] Red-breasted Merganser
- [ ] Northern Shoveler
- [ ] Pied-billed Grebe
- [ ] Double Crested Cormorant
- [ ] Common Goldeneye
- [ ] Canada Goose
- [ ] American Coot

WADERS

- [ ] Great Blue Heron
- [ ] Black-crowned Night Heron
- [ ] Green Heron
- [ ] Spotted Sandpiper
- [ ] Glossy Ibis
- [ ] American Bittern
- [ ] Least Bittern
- [ ] Common Moorhen
- [ ] Virginia Rail

AERIALISTS

- [ ] Herring Gull
- [ ] Black Tern

BIRDS OF PREY

- [ ] Bald Eagle
- [ ] Osprey
- [ ] Northern Harrier
- [ ] Red-Shouldered Hawk

PASSERINE (PERCHING)

- [ ] Red-winged Blackbird
- [ ] Rusty Blackbird
- [ ] Bobolink
- [ ] Purple Martin
- [ ] Barn Swallow
- [ ] Cliff Swallow
- [ ] Northern Roughwinged Swallow
- [ ] Tree Swallow
- [ ] Bank Swallow
- [ ] Common Grackle
- [ ] Swamp Sparrow
- [ ] Palm Warbler
- [ ] Yellow Warbler
- [ ] Olive-sided Flycatcher
- [ ] Alder Flycatcher
- [ ] Common Yellowthroat
- [ ] Blue-Gray Gnatcatcher

NONPASSERINE (LAND)

- [ ] Belted Kingfisher
- [ ] Northern Waterthrush
- [ ] Sora

(Note: This checklist includes only those birds that rely on water and was developed using *New England Wildlife: Habitat, Natural History, and Distribution*, Richard M. DeGraff and Deborah D. Rudis, USDA, 1983.)

MAMMAL CHECKLIST
NH Comprehensive Lake Inventory
Attribute 4, Question E

Name of Waterbody: _____ **Date/Time:** _____

Name of Surveyor(s): _____ **Temperature:** _____

Phone Number: _____ **Most Recent Rain:** _____

E-mail: _____ **Current Weather:** _____

	Black Bear
	Beaver
	Eastern Pipistrelle
	Little Brown Myotis
	Long-tailed Shrew
	Masked Shrew
	Mink
	Moose
	Muskrat
	Northern Water Shrew
	Silver-haired Bat
	Star-nosed Mole
	Raccoon
	River Otter
	Water Shrew

(Note: This checklist includes only those mammals that rely on water and was developed using *New England Wildlife: Habitat, Natural History, and Distribution*, Richard M. DeGraff and Deborah D. Rudis, USDA, 1983.)

REPTILES AND AMPHIBIANS CHECKLIST

NH Comprehensive Lake Inventory
Attribute 4, Question F

Name of Waterbody: _____ **Date/Time:**_____

Name of Surveyor(s):_____ **Temperature:**_____

Phone Number: _____ **Most Recent Rain:** _____

E-mail:_____ **Current Weather:** _____

- [ ] Blanding's Turtle
- [ ] Common Musk Turtle (Stinkpot)
- [ ] Eastern Painted Turtle
- [ ] Midland Painted Turtle
- [ ] Snapping Turtle
- [ ] Spotted Turtle
- [ ] Wood Turtle
- [ ] Bullfrog
- [ ] Grey Treefrog
- [ ] Green Frog
- [ ] Tree Frog
- [ ] Mink Frog
- [ ] Northern Leopard Frog
- [ ] Pickerel Frog
- [ ] Wood Frog
- [ ] American Toad
- [ ] Fowler's Toad
- [ ] Spring Peeper
- [ ] Blue Spotted Salamander
- [ ] Dusky Salamander
- [ ] Four-toed Salamander
- [ ] Jefferson Salamander
- [ ] Marbled Salamander
- [ ] Northern Spring Salamander
- [ ] Northern Two-lined Salamander
- [ ] Spotted Salamander
- [ ] Eastern Newt
- [ ] Red-spotted Newt
- [ ] Eastern Ribbon Snake
- [ ] Northern Water Snake

(Note: This checklist includes only those reptiles and amphibians that rely on water and was developed using *New England Wildlife: Habitat, Natural History, and Distribution*, Richard M. DeGraff and Deborah D. Rudis, USDA, 1983.)

Appendix C

Recreation & Shoreline Surveys

TYPE OF WATERCRAFT/AVERAGE WATERCRAFT DENSITY SURVEY INSTRUCTIONS

NH Comprehensive Lake Inventory
Attribute 5, Question A & B

Name of Waterbody: _____ **Date/Time:** _____

Name of Surveyor(s): _____ **Temperature:** _____

Phone Number: _____ **Most Recent Rain:** _____

E-mail: _____ **Current Weather:** _____

The local lake association or conservation commission may assist with and/or organize this survey.

Purpose: A watercraft survey may be used as a method to estimate the approximate number of powered and non-powered **active** watercraft present on a waterbody. An estimate of watercraft may be used to determine average watercraft/acre. The average number of watercraft can indicate the lake's popularity and may be helpful in the future in establishing a carrying capacity or maximum number of watercraft that is desirable on the individual waterbody and may also indicate a need to provide specialized facilities such as boat launches and public restrooms.

Materials:

clipboard	watch
pencils	calculator
worksheets	map of lake/pond
binoculars	

Procedure:

1. Select four days to survey active watercraft. If possible, two of these dates should fall on the weekend and the other two should fall during the week. It is important that the count is reflective of active watercraft on good weather days, so it may be wise to select rain dates for the survey.

2. Use your own knowledge of boating activity on the lake to choose a peak usage time to carry out the watercraft survey. Try to use the same time period on the two weekend dates and the same time period for the two weekday dates. The survey may be done on land or from the water, whatever you find to be the most efficient.

3. Determine a specified time during which the watercraft tally will be conducted.

4. If you are surveying a larger lake and/or a lake with many embayments where you can not get a good view of all boats and/or types of boats at the same time, divide the lake up into suitable sections and perform the boat count within each section. It is best to have multiple surveyors stationed at each section of the lake. Each surveyor should begin counting boats at the same time. It may be helpful to indicate landmarks to use as section boundaries so surveyors do not to overlap counts. Make sure all surveyors indicate the section of the lake they are surveying on a map.

5. On the map indicate the section of the lake you are surveying.

6. Begin the boat count by recording the weather conditions, date, and time.

7. Begin tallying the number of active non-powered (sail, canoe, kayak, etc.) and powered (motor, jet skis, etc.) watercraft on the lake and record on your worksheet. Count only boats in active use, including those being used by swimmers, picnickers, or beach-goers, but are not necessarily moving. **Do not count moored or docked boats.**

8. Record any comments you may have on the worksheet including any changes in weather conditions.

9. Once you have counted all active boats on the lake, total each type of active watercraft individually and record on the worksheet. Come up with a grand total of boats on the lake by adding up each type of watercraft on the lake.

10. To estimate the number of watercraft per day:
    A. Average the two weekday counts ((week day one + week day two)/2).
    B. Multiply number from A by 5.
    C. Add the two weekend counts (weekend day one + weekend day two).
    D. Add totals from B and C.
    E. Divide number from D by 7.

Example:

Sampling Date	Watercraft Count
Tuesday, May 9	15
Thursday, July 22	10
Saturday, August 12	40
Sunday, September 23	35

A. 15 + 10 ÷ 2 = 12.5
B. 12.5 x 5 = 62.5
C. 40 + 35 = 75
D. 62.5 + 75 = 137.5
E. 137.5 ÷ 7 = 20 watercraft/day

11. To determine the average watercraft density of the waterbody, divide the total number of watercraft per day (E) by the water surface area of the waterbody.

Example: If the waterbody has an average of 20 watercraft/day and has a water surface area of 12 acres then the watercraft density is:
20 watercraft/day ÷12 acres = 1.67 watercraft/acre

12. Turn in the survey form and map to the person responsible for administering the watercraft survey. Be sure to put your name and contact information on the survey and the map.

Other Suggestions

- If possible, record horsepower of boats. Recording boats as over and under 25hp is sufficient.
- If possible, record the number of 2-stroke (carbureted) vs. 2-stroke fuel injected and 4-stroke engines.

TYPE OF WATERCRAFT SURVEY

NH Comprehensive Lake Inventory
Attribute 5, Question A

Name of Waterbody: _____ **Date/Time:** _____

Name of Surveyor(s): _____ **Temperature:** _____

Phone Number: _____ **Most Recent Rain:** _____

E-mail: _____ **Current Weather:** _____

Area: Entire Lake/Section: _____ **(circle one & identify section if necessary)**

Town: _____

	TALLY	TOTAL
NON-POWER BOATS		
CANOES		
KAYAKS		
ROWBOATS		
SAILBOATS		
ELECTRIC		
	SUBTOTAL	
POWERBOATS		
OUTBOARD		
INBOARD (or I/O)		
PONTOON		
JETSKIS (1 person)		
JETSKIS (multi-person)		
	SUBTOTAL	
	GRAND TOTAL	

OTHER COMMENTS: _____

_____

_____

_____

_____

_____

Survey format courtesy of Squam Lakes Association

AVERAGE WATERCRAFT DENSITY SURVEY

NH Comprehensive Lake Inventory
Attribute 5, Question B

Name of Waterbody: _____ **Date/Time:** _____

Name of Surveyor(s): _____ **Temperature:** _____

Phone Number: _____ **Most Recent Rain:** _____

E-mail: _____ **Current Weather:** _____

Area: Entire Lake/Section: _____ **(circle one & identify section if necessary)**

Town: _____

	TALLY	TOTAL
NON-POWER BOATS		
CANOES		
KAYAKS		
ROWBOATS		
SAILBOATS		
ELECTRIC		
	SUBTOTAL	
POWERBOATS		
OUTBOARD		
INBOARD (or I/O)		
PONTOON		
JETSKIS (1 person)		
JETSKIS (multi-person)		
	SUBTOTAL	
	GRAND TOTAL	

OTHER COMMENTS: _____

_____

_____

_____

_____

_____

Survey format courtesy of Squam Lakes Association

ANGLER SURVEY INSTRUCTIONS
NH Comprehensive Lake Inventory
Attribute 5, Question G

Name of Waterbody: _____ **Date/Time:** _____

Name of Surveyor(s): _____ **Temperature:** _____

Phone Number: _____ **Most Recent Rain:** _____

E-mail: _____ **Current Weather:** _____

Purpose: An angler survey may be used to estimate the approximate number of anglers on a lake or pond. Determining the number of anglers will provide an estimate of the popularity of the waterbody in regards to its recreational fishing opportunities. An estimate of angler use should be considered in conjunction with lake or pond surface area, as this will ultimately determine the density of recreational anglers. The amount of angler use that a waterbody receives will help in assessing the need to provide specialized facilities such as boat launching or public shoreline fishing areas.

Materials: clipboard binoculars calculator map of the waterbody worksheets pencils watch

Procedure:

1. Select at least five dates to survey the number of anglers. Sampling should be conducted at least once a month from May through September. Two of these dates should fall on the weekend and the other three should fall during the week.

2. For each of the selected dates, choose a one-hour time period during which the sampling will occur. Sampling should occur either in the morning (6-9am) or in the evening (6-9pm). Note: The number of sampling dates and times (5 dates, 1 hour each) are only the recommended minimum for this survey. The more sampling that is conducted, the more accurate the survey. Volunteers should be encouraged to sample for more than those time periods mentioned above.

3. On the selected dates and within the designated time period (6-9am or 6-9pm), count the number of anglers fishing on the waterbody. This will result in a total of five separate counts being made. The survey may be conducted on land or from the water, or a combination of both methods. Be sure to count those anglers in boats, as well as those fishing from the shore of the waterbody.

4. If counting is being performed on a large lake, it may be helpful to divide the lake into sections and have multiple volunteers perform the survey. Make note of the sections on the data sheet, as well as a map of the waterbody. On a large lake, sampling may also be conducted at access points into the lake.

5. To estimate the number of anglers fishing per day:
   - A. Average the three weekday counts ((week day one + two + three)/3)
   - B. Multiply number from step A by 5
   - C. Add the two weekend counts (weekend day one + weekend day two)
   - D. Add totals from B and C
   - E. Divide number from D by 7

Example:

Sampling Date	Time Period	Angler Count	
Tuesday, May 9	Morning	15	A. 15+10 + 9÷ 3 = 11.3
Thursday, July 22	Afternoon	10	B. 11.3 x 5 = 56.5
Tuesday, June 3	Morning	9	C. 40 + 35 = 75
Saturday, August 12	Afternoon	40	D. 56.5 + 75 = 131.5
Sunday, September 23	Morning	35	E. 131.5 ÷ 7 = 19 anglers/day

ANGLER SURVEY DATA SHEET

NH Comprehensive Lake Inventory
Attribute 5, Question G

Name of Waterbody: _____ **Date/Time:** _____

Name of Surveyor(s): _____ **Temperature:** _____

Phone Number: _____ **Most Recent Rain:** _____

E-mail: _____ **Current Weather:** _____

Area: Entire Lake/ Section: _____ **(circle one & identify section if necessary)**

WEEKDAY SAMPLING

	DAY 1	DAY 2	DAY 3	TOTAL
DATE:				
TIME:				
WEATHER CONDITIONS:				
NUMBER OF ANGLERS:				

TOTAL / 3 = _____ = AVERAGE FOR WEEKDAY COUNTS

X 5 = _____ = AVERAGE WEEKDAY SAMPLE

WEEKEND SAMPLING

	DAY 1	DAY 2	TOTAL
DATE:			
TIME:			
WEATHER CONDITIONS:			
NUMBER OF ANGLERS:			

AVERAGE WEEKEND SAMPLE + WEEKEND SAMPLING TOTAL = _____ / 7 = _____ AVERAGE ANGLERS PER DAY

OTHER COMMENTS: _____

SHORELINE STRUCTURE SURVEY INSTRUCTIONS

NH Comprehensive Lake Inventory
Attribute 8, Question E

Name of Waterbody: _____ Date/Time: _____

Name of Surveyor(s): _____ Temperature: _____

Phone Number: _____ Most Recent Rain: _____

E-mail: _____ Current Weather: _____

Request assistance from the local lake association or conservation commission to help organize and participate in this survey.

Purpose: A shoreline structure survey may be used to estimate the number and density of water dependent structures on a waterbody. The density of water dependent structures is useful for assessing the waterbody's popularity. It may also assist in future use assessments to determine how rapidly the natural shoreline is being modified. Encroachment on, or alterations of, the natural shoreline characteristics may negatively impact the littoral zone biological community. For example, a fully developed shoreline may have altered natural sediment characteristics of the littoral zone, in turn interfering with fish spawning habitat.

Materials:

clipboard	calculator
pencil	map of lake or pond
worksheet	

Procedure:

1. On the survey sheet tally all of the water dependent structures including moorings, docks, breakwaters, boathouses, retaining walls, floats, and similar structures. **Do not count marinas and other commercial docking facilities in the tally.** If you would like to make note of the marinas on the waterbody, this information can be included in the comment section at the bottom of the worksheet. (Suggestion: On more heavily developed lakes it may be easier to break up the survey by having one person count floating structures such as moorings and floats, while another person counts stationary structures such as docks, boathouses, and retaining walls. It takes a careful eye to spot retaining walls.)

2. When counting docks make sure to record whether they are seasonal or permanent structures. If you are unable to identify which docks are seasonal or permanent, talk to someone who remains on the lake during the winter.

3. If you are surveying a larger lake, divide the lake into suitable sections to perform the count. If the entire lake cannot be surveyed in one day, be sure to indicate on the map what was surveyed, to prevent overlapping while counting.

4. To find the number of shoreline structures per 1,000 feet of shoreline:
   A. Add the total number of shoreline structures (docks, boathouses, breakwaters, and retaining walls).
   B. Divide the number of structures by the shoreline length (in feet). See Trophic Reports.
   C. After determining the number of structures per foot, multiply this number by 1,000.

Example: Shoreline Length = 2,000 ft

Shoreline Structure	Number of Structures
Docks	30
Breakwaters	20
Boathouses	10
Retaining Walls	10

A. 30 + 20 + 10 + 10 = 70 structures
B. 70 structures ÷ 2,000 feet = 0.035 structures/feet
C. 0.035 structures/feet x 1,000 feet = 35 structures/1,000 feet

5. Turn in the survey form and map to the person responsible for administering the shoreline structure survey. Be sure to include your name and contact information on the survey and the map.

Other Suggestions or Ideas:

- Videotape the shoreline so reference points can be used for future data collection.
- Contact homeowners when survey is being carried out. Homeowners are a good source of additional information, such as if a dock is seasonal or permanent.
- Conduct a static boat count (boats moored or docked on shore) on the waterbody.

SHORELINE STRUCTURE SURVEY

NH Comprehensive Lake Inventory
Attribute 8, Question E

Name of Waterbody: _____ **Date/Time:** _____

Name of Surveyor(s): _____ **Temperature:** _____

Phone Number: _____ **Most Recent Rain:** _____

E-mail: _____ **Current Weather:** _____

Shoreline Length: _____ **Town:** _____

Lake Organization: _____

SHORELINE STRUCTURES	TALLY	TOTAL
SEASONAL DOCKS		
PERMANENT DOCKS		
BOATHOUSES		
BREAKWATERS		
RETAINING WALLS/RIP RAP		
OTHER		
NON-SHORELINE STRUCTURES		
FLOATS & SIMILAR STRUCTURES (i.e. trampoline)		
MOORING		
OTHER		
	GRAND TOTAL	

OTHER COMMENTS: _____
_____
_____
_____
_____
_____

Appendix D
Contact Information

Federal Agencies

- United States Department of Agriculture
  1400 Independence Avenue, SW
  Washington, DC 20250
  (202) 720-8732
  www.usda.gov/wps/portal/usdahome

  Natural Resources Conservation Service
  NH State Office
  Federal Building, 2 Madbury Road
  Durham, NH 03824-2043
  (603) 868-7581
  (603) 868-5301 (fax)
  www.nh.nrcs.usda.gov/

- United States Department of the Interior
  1849 C Street, NW
  Washington, DC 20240
  webteam@ios.doi.gov
  www.doi.gov/

  U.S. Fish and Wildlife Service
  Northeast Regional Office
  300 Westgate Center Drive
  Hadley, MA 01035-9589
  (413) 253-8200
  (413) 253-8308 (fax)
  northeast@fws.gov
  www.fws.gov/northeast/

  U.S. Fish and Wildlife Service
  New England Field Office
  70 Commercial Street, Ste. 300
  Concord, 03301-5087
  (603) 223-2541
  (603) 223-0104 (fax)
  FW5ES_NEFO@fws.gov

  National Wetlands Inventory
  Division of Habitat and Resources Conservation
  4401 N. Fairfax Drive, Room 400
  Arlington, VA 22203
  (703) 358-2161
  (703) 358-1869 (fax)
  www.fws.gov/nwi/aboutus.htm

National Wetlands Inventory
Regional Wetlands Coordinator – Region 5 (Northeast)
300 Westgate Center Drive
Hadley, MA 01035
(413) 253-8620
(413) 253-8482 (fax)
www.fws.gov/northeast/Wetlands/

- United States Environmental Protection Agency - Region 1: New England
  1 Congress Street, Suite 1100
  Boston, MA 02114-2023
  (888) 372-7341 (toll free within New England)
  (617) 918-0101 (fax)
  (617) 918-1111 (outside New England)
  www.epa.gov/region1/

  National Summary: 2007 Swimming Season Update
  www.epa.gov/waterscience/beaches/seasons/2007/national.html

State Agencies

- New Hampshire Department of Cultural Resources
  20 Park Street
  Concord, NH 03301
  (603) 271-2392
  (603) 271-6826 (fax)
  www.nh.gov/nhculture/

  New Hampshire Division of Historical Resources
  19 Pillsbury Street
  Concord, NH 03301-3570
  (603) 271-3483 or (603) 271-3558
  (603) 271-3433 (fax)
  www.nh.gov/nhdhr/
  preservation@dcr.nh.gov

- New Hampshire Department of Environmental Services
  29 Hazen Drive
  PO Box 95
  Concord, NH 03302-0095
  (603) 271-3503
  (603) 271-2867 (fax)
  www.des.nh.gov

Administrative Rules -
des.nh.gov/organization/commissioner/legal/rules/index.htm

One Stop Data Retrieval - des.nh.gov/onestop/index.htm

Water Division
(603) 271-3503
(603) 271-2982 (fax)
des.nh.gov/organization/divisions/water/index.htm

Watershed Management Bureau
(603) 271-2457
(603) 271-7894 (fax)
des.nh.gov/organization/divisions/water/wmb/index.htm

Lakes Management and Protection Program
(603) 271-2959
jacquie.colburn@des.nh.gov
des.nh.gov/organization/divisions/water/wmb/lakes/index.htm

Watershed Assistance Section
(603) 271-7889
barbara.mcmillan@des.nh.gov
des.nh.gov/organization/divisions/water/wmb/was/index.htm

Volunteer Lakes Assessment Program (VLAP)
(603) 271-2658
sara.sumner@des.nh.gov
des.nh.gov/organization/divisions/water/wmb/vlap/index.htm

Limnology Center
(603) 271-3414
jody.connor@des.nh.gov

Exotic Species Program
(603) 271-2248
amy.smagula@des.nh.gov
des.nh.gov/organization/divisions/water/wmb/exoticspecies/index.htm

Wetlands Bureau
(603) 271-2147
wetmail@des.nh.gov
des.nh.gov/organization/divisions/water/wetlands/index.htm

Shoreland Protection Program
(603) 271-7109
shoreland@des.nh.gov
des.nh.gov/organization/divisions/water/wetlands/cspa/index.htm

Drinking Water and Groundwater Bureau
(603) 271-2513
dwgbinfo@des.nh.gov
des.nh.gov/organization/divisions/water/dwgb/index.htm

Dam Bureau
(603) 271-3406
(603) 271-7894 (fax)
damsafety@des.nh.gov
des.nh.gov/organization/divisions/water/dam/index.htm

Waste Management Division
(603) 271-2900
(603) 271-2456 (fax)
des.nh.gov/organization/divisions/waste/index.htm

Hazardous Waste Compliance
(603) 271-2942
(603) 271-0869 (fax)
hwcomp@des.nh.gov
des.nh.gov/organization/divisions/waste/hwcb/hwcs/index.htm

- New Hampshire Department of Health and Human Services
  105 Pleasant Street
  Concord, NH 03301
  (603) 271-8140
  (800) 852-3345 (toll free)
  www.dhhs.state.nh.us/DHHS/DHHS_SITE/default.htm

- New Hampshire Department of Resources and Economic Development
  172 Pembroke Road
  PO Box 1856
  Concord, NH 03302-1856
  (603) 271-2411
  (603) 271-2629 (fax)
  www.dred.state.nh.us

NH Division of Forests and Lands
PO Box 1856
172 Pembroke Road
Concord, NH 03302
(603) 271-2214
ccolby@dred.state.nh.us
www.dred.state.nh.us/divisions/forestandlands/index.htm

NH Natural Heritage Bureau
(603) 271-2214
www.dred.state.nh.us/divisions/forestandlands/bureaus/naturalheritage/index.htm

NH Division of Parks and Recreation
(603) 271-3556
nhparks@dred.state.nh.us
www.nhparks.state.nh.us

NH Division of Travel and Tourism Development
(603) 271-2665
travel@dred.state.nh.us
www.visitnh.gov/

- New Hampshire Department of Safety
  33 Hazen Drive
  Concord, NH 03305
  1-800-735-2964
  www.nh.gov/safety/

Homeland Security and Emergency Management
www.nh.gov/safety/divisions/bem/index.html

Bureau of Emergency Management
107 Pleasant Street, #1
Concord, NH 03301
(603) 271-2231
www.nh.gov/safety/divisions/bem/aboutus.html

Division of Safety Services
Bureau of Marine Patrol
31 Dock Road
Gilford, NH 03249
1-877-642-9700 (toll free)
(603) 293-0096 (fax)
marinepatrol@safety.state.nh.us
www.nh.gov/safety/ss/nhmarine.html

- New Hampshire Fish and Game Department
  11 Hazen Drive
  Concord, NH 03301
  (603) 271-3511
  (603) 271-1438 (fax)
  director@wildlife.state.nh.us
  www.wildlife.state.nh.us/

- New Hampshire Office of Energy and Planning
  4 Chenell Drive
  Concord, NH 03301-8501
  (603) 271-2155
  (603) 271-2615 (fax)
  OEPinfo@nh.gov
  www.nh.gov/oep/index.htm

  NH Floodplain Management Program
  (603) 271-2155
  Jennifer.gilbert@nh.gov
  www.nh.gov/oep/programs/floodplainmanagement/index.htm

  New Hampshire Outdoor Recreation Program
  (603) 271-2155
  carol.barleon@nh.gov
  www.nh.gov/oep/programs/recreation/index.htm

  State Data Center
  (603) 271-2155
  tom.duffy@nh.gov
  www.nh.gov/oep/programs/DataCenter/index.htm

Regional Planning Commissions

- Central New Hampshire Regional Planning Commission
  28 Commercial Street
  Concord, NH 03301
  (603)226-6020
  (603) 226-6023 (fax)
  www.cnhrpc.org

- Lakes Region Planning Commission
  103 Main Street, Suite #3
  Meredith, NH 03253
  (603) 279-8171
  (603) 279-0200 (fax)
  www.lakesrpc.org/

- Nashua Regional Planning Commission
  9 Executive Park Drive, Suite 201
  Merrimack, NH 03054
  (603) 424-2240
  (603) 424-2230 (fax)
  www.nashuarpc.org

- North Country Council
  107 Glessner Road
  Bethlehem, NH 03574
  (603) 444-6303
  (603) 444-7588 (fax)
  www.nccouncil.org

- Rockingham Planning Commission
  156 Water Street
  Exeter, NH 03833
  (603) 778-0885
  (603) 778-9183 (fax)
  email@rpc-nh.org
  www.rpc-nh.org/

- Southern New Hampshire Planning Commission
  438 Dubuque Street
  Manchester, NH 03102
  (603) 669-4664
  (603) 669-4350 (fax)
  email@snhpc.org
  www.snhpc.org

- Southwest Region Planning Commission
  20 Central Square, 2nd Floor
  Keene, NH 03431
  (603) 357-0557
  (603) 357-7440 (fax)
  admin@swrpc.org
  www.swrpc.org

- Strafford Regional Planning Commission
  2 Ridge Street, Suite 4
  Dover, NH 03820-2505
  (603) 742-2523
  (603) 742-7986 (fax)
  srpc@strafford.org
  www.strafford.org/

- Upper Valley Lake Sunapee Regional Planning Commission
  30 Bank Street
  Lebanon, NH 03766-1756
  (603) 448-1680
  (603) 448-0170 (fax)
  info@uvlsrpc.org
  www.uvlsrpc.org

County Conservation Districts

- New Hampshire Association of Conservation Districts
  PO Box 2311
  Concord, NH 03302-2311
  (603) 796-2615
  director@nhacd.org
  www.nhacd.org

Universities

- University of New Hampshire
  Durham, NH 03824
  (603) 862-1234
  www.unh.edu/

  Lakes Lay Monitoring Program
  38 College Road
  Spaulding Hall
  Durham, NH 03824-3544
  (603) 862-3848
  (603) 862-2717 (fax)
  Jeff.Schloss@unh.edu
  www.wrrc.unh.edu/current_research/lakeslay.htm

  Center for Freshwater Biology
  102 Rudman Hall
  Durham, NH 03824
  jfhaney@unh.edu
  cfb.unh.edu/

- Plymouth State University
  17 High Street
  Plymouth, NH 03264-1595
  1-800-842-6900
  www.plymouth.edu/

Conservation Organizations

- Loon Preservation Committee
  Lee's Mills Road
  PO Box 604
  Moultonborough, NH 03254
  (603) 476-5666
  www.loon.org

- New Hampshire Audubon
  84 Silk Farm Road
  Concord, New Hampshire 03301
  (603) 224-9909
  (603) 226-0902 (fax)
  asnh@nhaudubon.org
  www.nhaudubon.org

- New Hampshire Lakes Association
  84 Silk Farm Road
  Concord, NH 03301
  (603) 226-0299
  (603) 224-9442 (fax)
  info@nhlakes.org
  www.nhlakes.org

- Society for the Protection of New Hampshire Forests
  54 Portsmouth Street
  Concord, New Hampshire 03301
  (603) 224-9945
  (603) 228-0423 (fax)
  info@forestsociety.org
  www.spnhf.org

Other

- NH GRANIT
  Complex Systems Research Center
  Morse Hall
  University of New Hampshire
  Durham, NH 03824
  (603) 862-1792
  granit@unh.edu
  www.granit.sr.unh.edu/