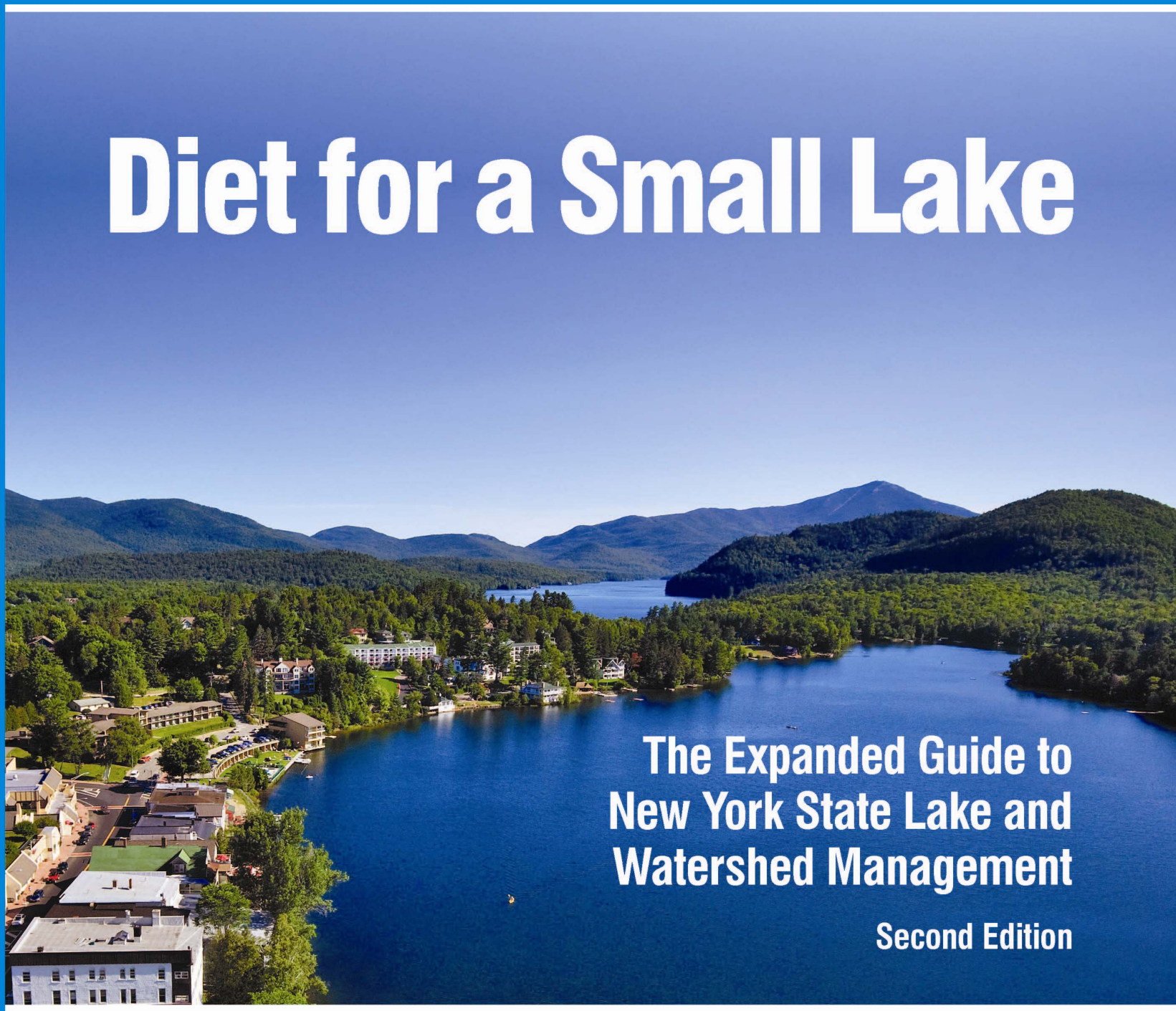
Diet for a Small Lake

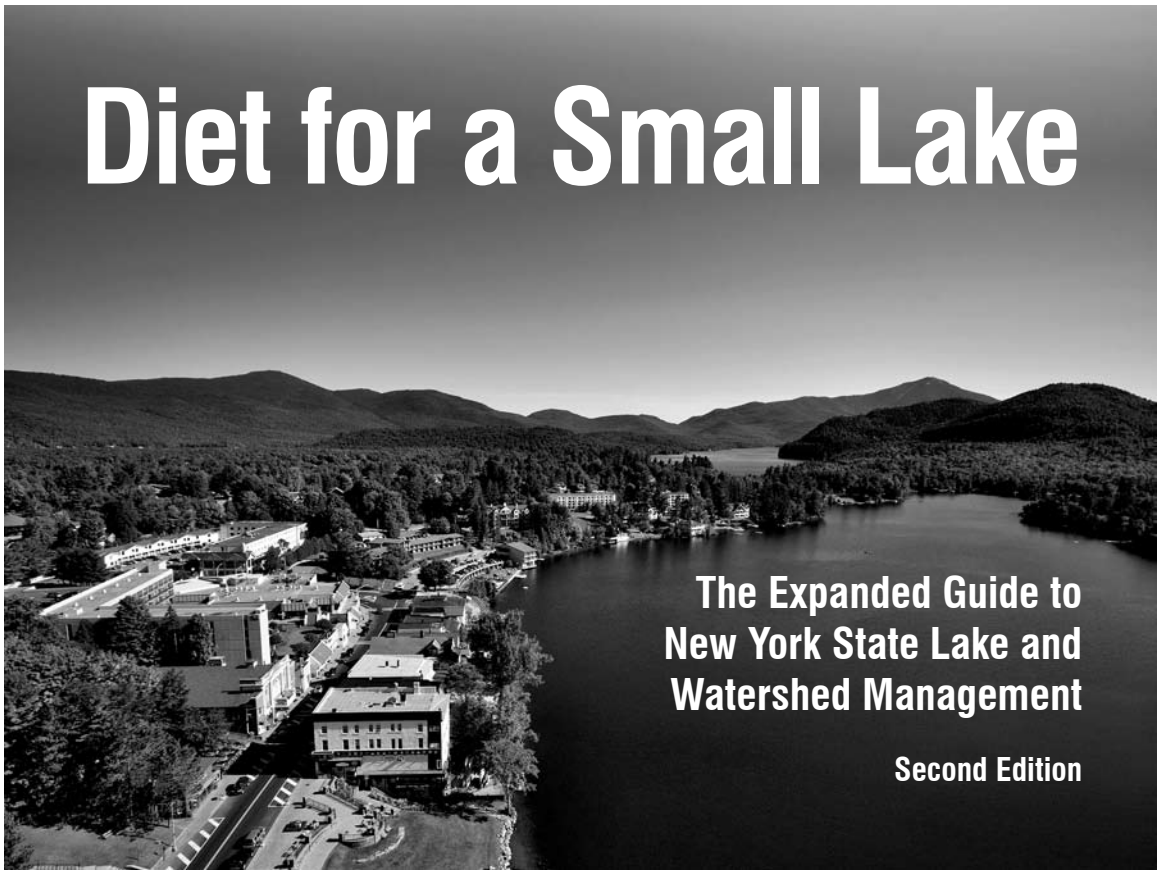


The Expanded Guide to New York State Lake and Watershed Management

Second Edition

Prepared by the New York State Federation of Lake Associations, Inc.
in cooperation with the New York State Department of Environmental Conservation

Diet for a Small Lake



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Photograph by Carl Heilman II / Wild Visions, Inc.

NYSFOLA

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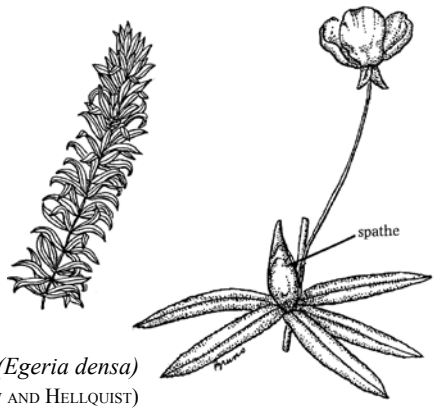

Brazilian elodea (Egeria densa)
(CREDIT: CROW AND HELLQUIST)

Zebra mussels (Dreissena polymorpha)
Top: Single zebra mussel. Bottom: Colony of zebra mussels attached to a hard surface (clam).
(CREDIT: WENDY SKINNER)

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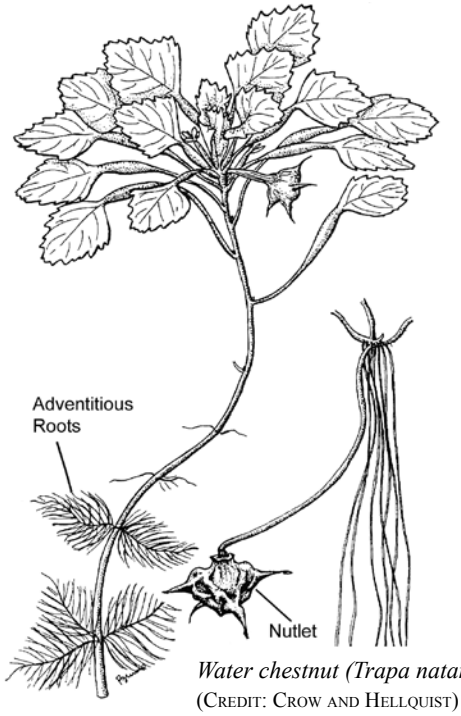

Water chestnut (Trapa natans)
(CREDIT: CROW AND HELLQUIST)

Preface to the Second Edition

Since its inception in 1983, the goal of the New York State Federation of Lake Associations, Inc. (NYSFOLA) has been to provide a source of dependable information and resources to the diverse lake associations across New York State. The first edition of *Diet for a Small Lake,* published in 1990, was intended for a growing group of lakefront property owners who had a wide-ranging level of understanding about lakes, streams and watersheds. This expanded and updated version of *Diet for a Small Lake* was prompted by questions from NYSFOLA members as well as new developments in watershed management techniques.

The first *Diet for a Small Lake* was a high-water mark in the cooperation between New York State Department of Environmental Conservation (DEC) personnel and the NYSFOLA staff and members. The book benefited both the people and the state. This cooperation has continued with both organizations working together to monitor and improve the lakes in New York State.

When the NYSFOLA Board of Directors authorized the revised and updated second edition of *Diet for a Small Lake, s*everal officers and directors agreed to assist, and Scott Kishbaugh from DEC joined them again. Committee members met regularly, traveling in all seasons to review and critique the developing chapters, suggest additional information for inclusion, and work on organizational procedures for the revision.

- Sharon Anderson, a former NYSFOLA Director, served as chair. In addition to contributing to the writing, she arranged numerous details with DEC and kept the rest of us on track, even though very busy with her job as Watershed Steward at the Cayuga Lake Watershed Network.
- Nancy Craft, retired librarian from Tompkins Cortland Community College, contributed ideas, indexing and editing, and worked tirelessly to maintain consistency in format and style.
- James Cunningham, New Water Technologies, Inc., shared his extensive knowledge of septic and wastewater management systems for Chapter nine, shared some of his image collection, and assisted with the mechanics of publication.
- George Kelley, NYSFOLA Past President and geologist retired from Syracuse University and Onondaga Community College, contributed ideas, this preface, and information about the glacial geology involved in lake formation and change.
- Scott Kishbaugh, DEC Division of Water and CSLAP Program Coordinator, stayed awake many nights writing and editing, and drove many miles to contribute from his professional background and his extensive experience assisting lake associations in New York State.
- Nancy Mueller, NYSFOLA Manager and CSLAP Assistant Program Coordinator, was one of the people who realized the need for a revised edition since she is the focal point for questions from the membership. She kept us in touch with the true needs of the reader, edited text and assisted with images and graphics.
- Lyle Raymond, retired Water Resources Specialist from Cornell University, shared his extensive knowledge in Chapter ten and his experience working with water laws, regulations agencies and local governments to remind us of the roles that policy and people play in protecting lakes.

- Rebecca Schneider, Cornell University professor and NYSFOLA Director, shared her knowledge regarding watersheds for Chapter nine. She also shared her perceptive assessments of how to best present complex materials, and inspired the re-ordering of the content of several chapters.
- Dr. John Foster of SUNY Cobleskill is thanked for sharing his extensive knowledge in authoring Chapter five, "Fisheries Management: Matching Expectations to Reality." Except for Figures 5–3, 5–6, and 5–8 through 5–19, illustrations are from his collection and any copyright remains his.

Other contributors deserve acknowledgement and they retain their individual copyrights.

- The cover photograph (which is also used on the title page and in the table of contents) is courtesy of Carl Heilman II / Wild Visions, Inc., Brant Lake, NY and the copyright remains his. (www.carlheilman.com)
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- North American Lake Management Society (NALMS) granted permission to use images from their book *Managing Lakes and Reservoirs*. (Holdren et al, 2001) (www.nalms.org)
- Roy Reehil of The Forager Press, LLC gave permission to use his photographs. The copyrights remains his. (theforagerpress.com)
- The Iowa Department of Natural Resources gave permission for the spiny water flea picture in Chapter three. (www.iowadnr.com)
- Eric Engbretson, U.S. Fish and Wildlife Service, Bugwood.org is the photographer and gave permission for the grass carp image in Chapter six. (www.forestryimages.org)
- The University of Florida Center for Aquatic and Invasive Plants gave permission to use their line drawings of plants for Chapter six. (www.aquat1.ifas.edu)
- Wayne Wurtsbaugh, Utah State University; David F. Brakke, James Madison University; and American Society of Limnology and Oceanography, gave permission for a couple of pictures. (www.aslo.org)
- Original cartoons were provided by Mark Wilson, a member of the Shore Owners' Association of Lake Placid, and copyright remains his (www.EmpireWire.com).
- Some images were used with permission from various government agencies (see Appendix F, "Internet resources").
- Artists Wendy Skinner and Chris Cooley improved the presentation of information through their excellent illustrations (© NYSFOLA).

We appreciate the cooperation of individuals in DEC who helped us maneuver around bumps along the way to completion of the new book. DEC also provided funds to support the editing of this document, and provided staff time for the development of Chapters three and six in support of on-going changes in the state aquatic plant management program. Fish images were originally prepared by Ellen Edmonson and Hugh Chrisp as part of *1927-1940 New York Biological Survey*, and are used with permission. Tim Sinnott provided information regarding invasive fish species.

The members of the committee dedicate this book to the people, present and future, who use, appreciate and protect the waterways of New York State.

Preface to the First Edition

Several years ago, the Federation of Lake Associations of New York (FOLA), in response to requests from its membership, saw the need for a publication that would describe lake management activities to the public. Although several excellent publications were available that covered the topics of lake ecology and lake restoration techniques, we felt that none of the publications adequately met this need. It was at this time that I began discussions with Dan Barolo, the Director of the Division of Water of the New York State Department of Environmental Conservation (NYSDEC). Dan agreed with the necessity of such a publication and assigned his staff to work on the manual. Thus, the publication *Diet for a Small Lake: A New Yorker's Guide to lake Management* was engendered.

The 7,500 lakes ponds and reservoirs of New York State need our help. It is often thought that the role of managing our water resources is best left to the "experts" in academia, private industry and government. How will these experts communicate with members of the public? Each individual citizen has his or her own personal beliefs based on education and life experiences. Do these citizens have a minimum knowledge about the ecological and societal aspects of lakes? This manual, and other similar publications used in an integral fashion, are designed to raise the level of understanding for members of the public who are genuinely interested in protecting and preserving out lakes.

The manual is a joint publication of the Federation and DEC. Its title page shows no authorship, but this "oversight" is related to the dilemma of trying to give credit to the spectrum of individuals who contributed to its genesis. The primary authors of the publication were Scott Kishbaugh and Jay Bloomfield of DEC and Ann Saltman of the Federation. Elizabeth Smith of DEC did much of the editing, and without her contribution the manual would probably still be a few faded ideas and a pile of papers in a box. The following NYSDEC employees contributed greatly to the preparation of individual chapters: Jim Sutherland, Sue Benjamin, Mike Rafferty, Jim Swart, Pat Longabucco, Ed Woltmann and Bill Morton.

Finally, my deep gratitude is extended to Italo Carcich, Dan Barolo and Sal Pagano from the Division of Water in NYSDEC for providing the leadership required to complete the manual, particularly when there were equally pressing demands on their staff's time o protect New York State's waters. I also am grateful to Commissioner Tom Jorling of NYSDEC for his strong support of lake management activities in the face of current budgetary constraints. Lastly, I would like to express my appreciation to the 50,000 or so members of the State's lake property owners associations, which make up the Federation. Without their commitment to cleaner lakes, the preparation of this manual would not have been possible.

John Colgan. M.D.
President, NY Federation of Lake Associations
Rochester, New York
June 1990

About NYSFOLA

The Federation of Lake Associations, Inc. was founded in 1983 by a small consortium of lake associations concerned about a variety of problems facing their lakes. Water quality was of concern to nearly all of the lakes, and little information was available on methods to combat the increasing presence of aquatic invasive species. In 1995, the name was changed to the New York State Federation of Lake Associations, Inc. (NYSFOLA) in recognition of the geographic area it served.

With the assistance of the New York State Department of Environmental Conservation (DEC), NYSFOLA spearheaded the development of the Citizens Statewide Lake Assessment Program (CSLAP). This nationally-recognized water testing program, detailed in the Appendix A, "Citizens Statewide Lake Assessment Program," trains and uses citizen volunteers to monitor the health of their lakes. This statewide lake monitoring program remains an important part of NYSFOLA's mission:

> To protect the water resources of New York State by assisting local organizations and individuals through public dialogue, education, information exchange and collaborative efforts.

Since its founding, membership has grown to more than 200 lakes throughout the state, as well as many individual members. Members are invited each May to attend a conference that brings together lake managers from government, academia and the corporate sector to share new technologies and case studies in lake and watershed management.

In 1990, NYSFOLA and DEC collaborated to collect the best lake management information in a single publication. Since its publication, *Diet for a Small Lake: A New Yorker's Guide to Lake Management* has been shipped all over the world and has been used by lake associations, colleges and professional lake managers.

In 1993, the organization became the New York State Chapter of the North American Lake Management Society. This brought the organization into a broader spectrum of lake-related issues and made its members' voices heard at the national level.

In the late 1990's NYSFOLA and DEC again collaborated to study how to develop watershed management plans. Six member lakes worked on the pilot project. The lessons and conclusions from that project are contained in *A Primer for Developing a Successful Watershed Management Program.* Information developed during this and other projects has been incorporated into this manual.

The organization continues to be actively involved in emerging lake management issues. Members of its Board of Directors serve with a number of lake-related advisory groups, including the Northeast Aquatic Nuisance Species Panel, The New York State Invasive Species Task Force, the New York State Water Management Advisory Committee, and the North American Management Society Board of Directors.

Introduction:
Designing a Health Plan for a Lake

Welcome

Diet for a Small Lake is a combined effort by the New York State Federation of Lake Associations (NYSFOLA) and New York State Department of Environmental Conservation (DEC). It is designed to motivate private citizens who may not have knowledge or experience in the field of lake and watershed management. Examples from within New York State are provided to illustrate the topics. References to state laws and government structure are specific to New York State, making this book a valuable reference for professionals in the field of water resources management. The information will build the knowledge and confidence required to delve deeper into lake management. Appendices F, G and H contain internet resources, references cited, and additional readings for those who seek more information.

This manual focuses on New York State and refers to common situations faced by lake associations and lakeshore residents. *Diet for a Small Lake* is a practical source to help address immediate problems. The goal is to demonstrate the importance of a management plan as the best tool for long-term reduction and prevention of problems. A comprehensive management plan is the key to the long-term health of a lake and its watershed. A management plan describes the activities that can be undertaken by lake associations, government, the private sector and individuals. It empowers local residents, and helps to balance conflicting interests.

Experience has reinforced the belief that management plans are the best method to ensure optimum use of the lake and surrounding land. Beginning in 1996, NYSFOLA and DEC worked with six lake associations and created several management plans. The results can be found in *A Primer for Developing a Successful Watershed Management Program* (NYSFOLA, 2001), available on the NYSFOLA website (see Appendix F, "Internet resources" and Appendix G, "References cited"). The participating associations represented a wide breadth of lake ecology found in New York. Their experiences, the lessons shared at annual conferences, and countless conversations and emails have been combined with DEC input to create this expanded second edition of *Diet for a Small Lake.*

App's Landing on Oneida Lake's North Shore at dawn. (Credit: Roy Reehil)

The ideal lake

Ask any audience of lake enthusiasts to imagine the ideal lake and each person will have a slightly different picture. A composite description of an ideal lake might include a completely forested watershed, a beautiful home with a large veranda, tennis courts, a pleasure boat and canoe in the boathouse, and no noise except the songs of birds. The water is clear enough to see the bottom in 20 feet of water. A few blocks away are well-supplied shops and entertainment. Public utilities are reliable, cell phone reception is exceptional, and cable and internet

access are affordable. There are no messy weeds in the lake, no troublesome neighbors, and taxes never seem to increase.

Is all this possible? Even spectacular lakes such as Lake George and Upper Saranac don't come close to this fantasy. Many of the features listed conflict with each other. Crystal clear water, a sandy bottom and weed-free lake may provide great swimming but will not provide what a fishery needs to flourish. Nearby stores, municipal water and sewers only come to an area when there are a sufficient number of people to support them. Conflicts typically arise, however, as the sound of powerboats break through the peace that others cherish. Remember the natural limitations that exist. A lake cannot be all things to all people.

Lake management

Lake management is an art, informed by science, of balancing the demands of various users of the land and water. To keep lakes healthy, it is no longer possible to expect nature to take care of problems. Human activities combine with naturally occurring processes to create pollution and disturbances that exceed the natural capability of waters to dilute and purify. Managing a lake means accounting for the needs of fish, plants, wildlife and people.

Lake management is the responsibility of the users of the lake and its watershed and not solely a government function or a job for professors or private consultants. Lake and watershed property owners must understand natural processes, limitations of science, tradeoffs, and even how to work with people. A management plan pulls together all of these factors and then recommends a systematic approach to protecting and enhancing water resources. Lake associations can play a powerful role in motivating, cajoling and supporting governments and professional lake managers who work to draft and implement a management plan.

The resulting document may be called a Lake Management Plan or a Watershed Management Plan. Both terms are used in this publication as applicable to a particular discussion. Lake and watershed management is only possible when the ideas from the entire watershed and all interested parties are taken into consideration. Shoreline property owners, for example, may find a way to get rid of excess water weeds using a process that must be repeated every few weeks. Longer relief, however, means recognizing that the weeds are really a symptom and the cause may be soil and fertilizer washed off their shoreline lawns as well as from farms miles away from the lake.

Accept what you cannot change and manage the rest

Property owners, lake users, and municipalities must be realistic about to what extent a lake and its watershed can be controlled. Disagreements at this fundamental level are among the challenges involved in developing a realistic management plan.

A blend of human and natural laws influences water and watersheds. A reservoir is an example of a system designed by humans and generally conforming to natural laws. An engineer designs the dam, including size, structure and material, based on "natural laws", such as the existence of water pressure. As time passes, human-influenced factors will change how dams are built due to the availability of new building materials, better understanding of technical options and amended regulations. Nature's "laws," however, will always exist.

Another challenge is the limitations of existing knowledge. The best scientists and engineers can do is study the system using observations, models and experiments. It may not be comforting to the reader, but most scientists who study lakes (limnologists) believe that they understand only a fraction of what could be known about lake ecosystems. A lake watershed management plan needs to remember that science is not always black and white, and that the different values of people greatly influence decision-making. To design effective ways for resolving lake problems, lakeshore property owners must join with other watershed residents and with government officials to make decisions that are crucial to creating and implementing a management plan.

How to use this manual

See Preface two for full information on contributors to this publication and the names of the people and organizations who gave permission for use of their copyrighted images. The image owners, organizations and government agencies are also listed more fully in Appendix F, "Internet resources". The copyright for those images remain with the originators; they do not come to NYSFOLA. The artist-created images are © NYSFOLA.

Conventions used include:

- Important terms appear in boldface where they are defined within the context of the paragraph. Refer to the Index of Terms for a listing of the page on which a word is first used and defined.
- Units are given in their standard English versions (gallons, feet, Fahrenheit) except for scientific reporting where the convention is to use metric units (liters, meters, Celsius).

The book is organized to be read from start to finish. A chapter may be selected that addresses an urgent concern, but the reader may need to refer back to previous chapters for background information. This manual attempts to:

- Help the reader understand the overall workings of a lake and how activities on the surrounding land affect it;
- Familiarize the reader with how lakes differ across New York State;
- Explain the most common lake problems and possible solutions;
- Introduce the legal framework that allows for the management of lakes; and
- Walk through the steps for creating a lake management plan.

The NYSFOLA website posts significant new regulations, permitting procedures, and supplemental information as they become available (see Appendix F, "Internet resources").

Summing it up

The best "treatment" for a lake will resemble a health plan rather than a bandage. An effective lake management plan will include immediate actions as well as long-range watershed approaches and will combine both preventive and remedial options. A comprehensive management plan charts a course to identify causes and sources of problems, and a course to plan and implement solutions to the problems. A management plan must be revisited on a regular basis to keep it viable as the lake conditions and people's expectations change. The success of the plan is measured by the degree to which people and actions work together to solve conflicts, protect the lake, and prevent future problems.