U.S. Department of Transportation
United States Coast Guard

Commandant
United States Coast Guard

2100 Second Street, S.W.
Washington, DC 20593-0001
Staff Symbol: G-OPB-2
Phone: (202) 267-1077

COMDTINST 5223.1
24 JUL 1997

COMMANDANT INSTRUCTION 5223.1

Subj: MULTIPLE USE WATERWAY MANAGEMENT PLANNING GUIDE

1. PURPOSE. To provide direction to field commanders on the use of subject guide. A Guide for Multiple Use Waterway Management (Guide), was developed to provide a user friendly document that illustrates a process by which waterway management issues can be addressed by partners and stakeholders in an analogous manner. This planning and management Guide is used by selected agencies and organizations (federal, state, local, volunteer, and international) which have responsibility for ensuring the safe and efficient use of waterways within their respective jurisdiction(s).

2. ACTION. Area and district commanders, with units assigned boating safety waterway management and planning responsibilities, shall ensure enclosure (1) is used as a planning process guide.

3. DIRECTIVES AFFECTED. NONE

4. DISCUSSION. Prior to, as well as after the enactment of the Boating Safety Act of 1971, there have been waterway use conflicts within and between recreational boating communities and commercial watermen. The development of non-traditional watercraft (PWC, "muscle" boats, sailboards, jet boats, high speed non-displacement craft, etc.), and the increased number of watercraft over the last 25 years has escalated the types and severity of conflicts over waterway use. Issues not previously recognized such as Boating Under the Influence (BUI), water pollution, shoreside erosion, wildlife protection, noise pollution, and child safety, just to name a few, have exacerbated waterway usage conflicts.

   a. Numerous federal, state and local agencies share or have concurrent jurisdiction over a multitude of waterways, inland and coastal. These agencies have individually applied a variety of theories and methods for managing these waterways. The only previous guidance the Coast Guard has provided is "A Guide to Managing Recreational Boating

DISTRIBUTION – SDL No.135

	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z
A																										
B		2	10		1																					
C					2																					
D	2			2																						
E																										
F																										
G																										
H																										

NON-STANDARD DISTRIBUTION: MLC'S 6 extra copies

Areas", CG-D-21-83. Only in the last few years have these agencies recognized that the majority of waterways management issues are universal, and that a planning process, which includes input from all partners and stakeholders, is essential in creating a plan which incorporates the needs of all waterway users and balances all concerns (commercial, recreation, defense, and environmental).

b. In 1992, the National Boating Safety Advisory Council (NBSAC) recommended that the Coast Guard provide additional leadership to help solve multiple use conflicts through the development of a waterways management guide to be widely distributed as a reference tool. The Coast Guard awarded (as part of the Wallop-Breaux Aquatic Resources Trust Fund Grant Program) a grant to the National Water Safety Congress (NWSC) to research and produce a guide which delineates a "process" for determining the best solution(s) for individual waterway use. After two years of inspired effort from over 30 organizations such as the US Army Corps of Engineers (USCOE), Federal Energy Regulatory Commission (FERC), National Transportation Safety Board (NTSB), National Association of State Boating Law Administrators (NASBLA) and U.S. Coast Guard, the "Guide" was released on 01 October 1996.

c. The "Guide" is available nationally and internationally to any agency having responsibility for waterways management. Additionally, commercial and volunteer partners and stakeholders have access to it and are being encouraged to participate in the process. Since the "Guide" was developed under a grant administered by the USCG, the USCG has a responsibility to its partners to ensure the "Guide's" tenants are followed when creating a cooperative waterways management plan in which we have an interest. Additional color copies of enclosure (1) can be purchased through the National Water Safety Congress as per instructions on the inside cover. Additional copies of this instruction and enclosure (b/w) can be acquired through the Coast Guard publications system.

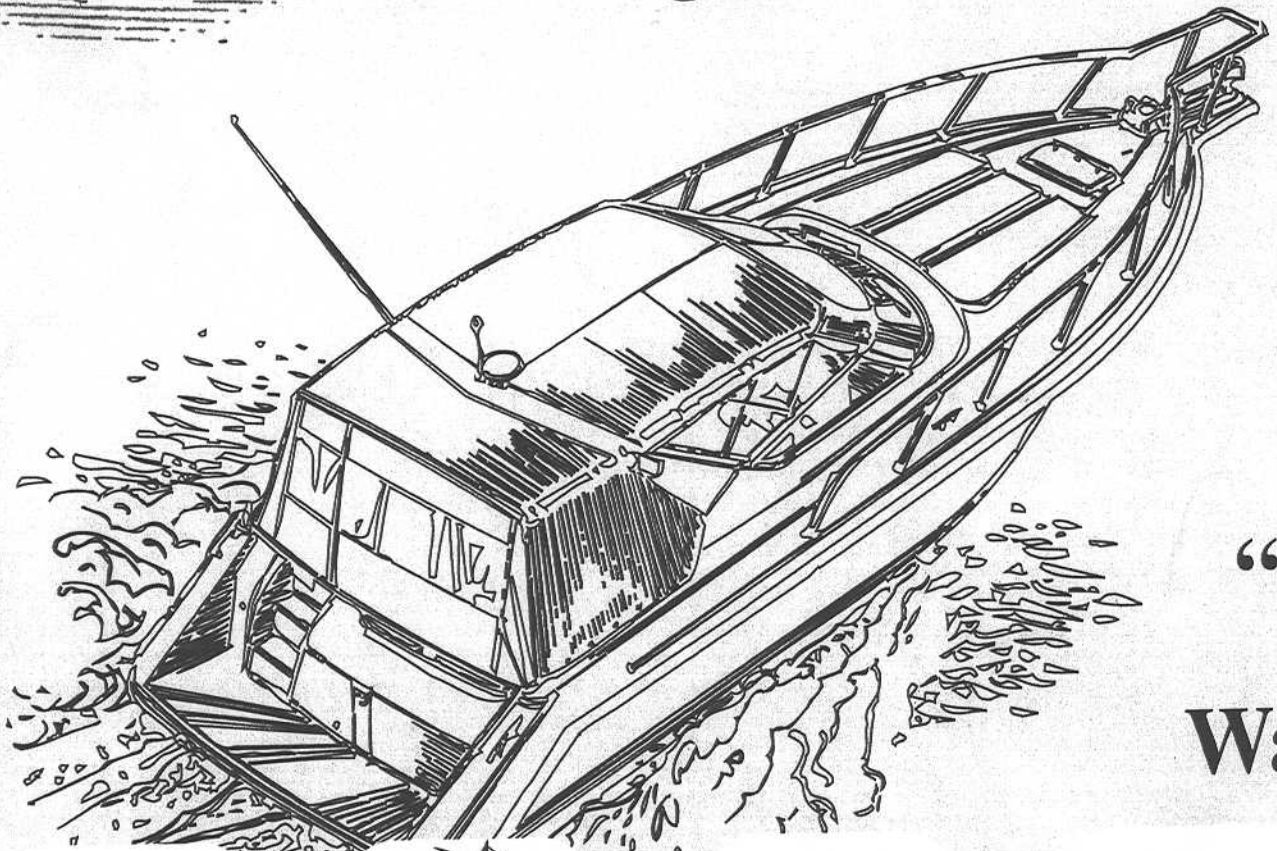
5. CHANGES. This "Guide" will be updated and distributed when sufficient changes in procedures and/or regulations warrant its revisions.

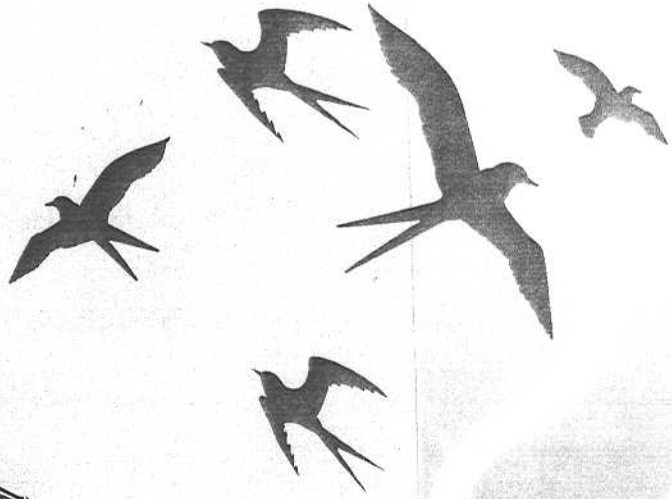
JAMES D. HULL
Director of Operations Policy

Encl: (1) A Guide for Multiple Use Waterway Management

A Guide for Multiple Use

Waterway Management





"Creating Safer Waterways"

Encl: (1) to COMDTINST 5223.1

© Copyright 1996 by National Water Safety Congress, Inc.

All rights reserved

All inquires for use of any material should be directed to:
Pete O'Connell
Project Manager
8003 Broadlawn Drive
Pittsburgh, PA 15237
(412) 367-2865

ISBN 0-9654946-0-8
PRICE $12.95
First Edition

The National Water Safety Congress (NWSC) publishes and distributes 'A Guide for Multiple Use Waterway Management' ~ NWSC, its members, agents, and affiliates do not accept any liability resulting from compliance or noncompliance with the procedures given herein, or for the accuracy or completeness of the information contained herein.

A GUIDE FOR MULTIPLE USE WATERWAY MANAGEMENT

Directed by:

NATIONAL WATER SAFETY CONGRESS, INC.

Prepared by:
~ URBAN RESEARCH AND DEVELOPMENT CORPORATION
lidli
URDC Bethlehem, PA

PRODUCED UNDER A GRANT FROM THE
AQUATIC RESOURCES (WALLOP-BREAUX) TRUST FUND
ADMINISTERED BY THE U.S. COAST GUARD

ACKNOWLEDGEMENTS

The National Water Safety Congress (NWSC) and Urban Research and Development Corporation (URDC) thank the Steering Committee and Advisory Committee, the U.S. Coast Guard and the many others who have provided input and suggestions during the preparation of this Guide.

We also acknowledge the valuable assistance of JM Lainm Associates, Inc., for report design and Mosby Lifeline for report publication.

Steering and Advisory Committee Members

Steering Committee

Mick Blackistone, National Marine Manufacturers Association
Jimmy Cottongim, Georgia Power Company
Michael R. Crowson, Tennessee Valley Authority
Paul Donheffner, Oregon Marine BoardINASBLA
Bill Gossard, National Transportation Safety Board
Jeff Hoedt, Ohio Department of Natural Resources/NASBLA
Larry R. Innis, Marine Retailers Association of America
Glyn Johnston, Bombardier Sea-DooJPWIA
Bob McKeever, National Park Service
Phil Moy, U.S. Anny Corps of Engineers
Pete O'Connell, National Water Safety Congress
Paul H. Rafalski, National Water Safety Congress
J. Mark Robinson, Federal Energy Regulatory Commission
Brian Romanek, Federal Energy Regulatory Commission
Lowry Wilson, U.S. Coast Guard

Advisory Committee Members

Alan Bernstein, BB Riverboats
John Birkinbine, Personal Watercraft Industry Association
Elaine Dickinson, National Safe Boating Council
James Ellis, BOAT/US Foundation
Lee H. Hill, American Waterways Operators
Phyllis Horowitz, American Whitewater Affiliation
Phil Keeter, Marine Retailers Association of America
Deborah Macmillan, American Canoe Association
James I. Meredith, U.S. Dept. of the Interior
John Miller, American Camping Association
Wayne Mitchell, Safety Department Walt Disney World
C.T. Moyer Ill, American Boat & Yacht Council
Dick Snyder, American Power Boat Association
Tom Vaughn, States Organization for Boating Access
Ted Woolley, Utah Division of Parks & RecreationlNASBLA

Page

PREFACE lY

SECTION 1:
THE NEED FOR THIS GUIDEBOOK 1
Recreational Waterway Use 2
Use-Related Accidents, Conflicts and Concerns 2

Need For Multiple Use Waterway Planning and Management 3

This Guide as a Planning and Management Tool 4

SECTION *2:*
A BASIC PLANNING PROCESS 7
Overview 8

Features 8

The Six Steps 9

organization 9

Research

1

3

Planning,

1

7

Decision-Making

1

8

Action

2

5

Monitoring

2

7

Page

SECTION 3:

WATERWAY MANAGEMENT TECHNIQUES

Planning .47

Information and Education

.49

Rules and Regulations

Water Use Activity Control and Traffic Management

Access Distribution and Development Control

5

Resource Protection

2

Selection of Appropriate Techniques

.29

.30

.33

.36

38

.45

SECTION 4:

RESEARCH, PLANNING and MANAGEMENT

GUIDELINES 51

Inventory and Survey Guidelines

Citizen Involvement Guidelines 55

Communication and Education Guidelines 58

Monitoring Guidelines 59

Carrying Capacity Guidelines 61

SECTION 5:

APPENDIX 75

Glossary 76

References 77

Contacts 80

The National Water Safety Congress (NWSC) is pleased to present the First Edition of A Guide for Multiple Use Waterway Management.

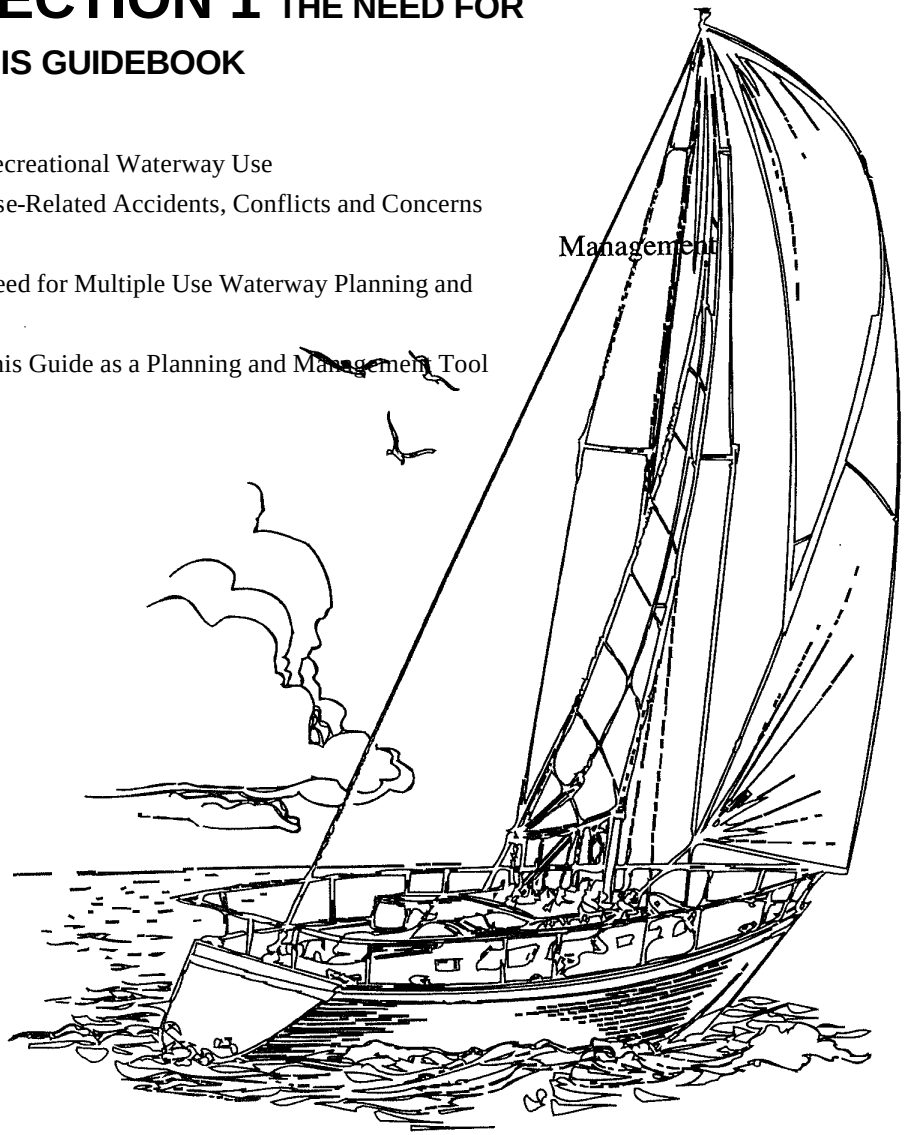
This Guide will serve as a useful tool for multiple use waterway planning and management at all levels. It stresses the importance of comprehensive and systematic waterway research and analysis, and it presents a basic waterway management planning process for easy use or modification based upon your situation. In addition, the Guide provides an introduction to the many waterway management techniques and offers helpful guidelines for consideration when preparing effective, balanced multiple use waterway management plans.

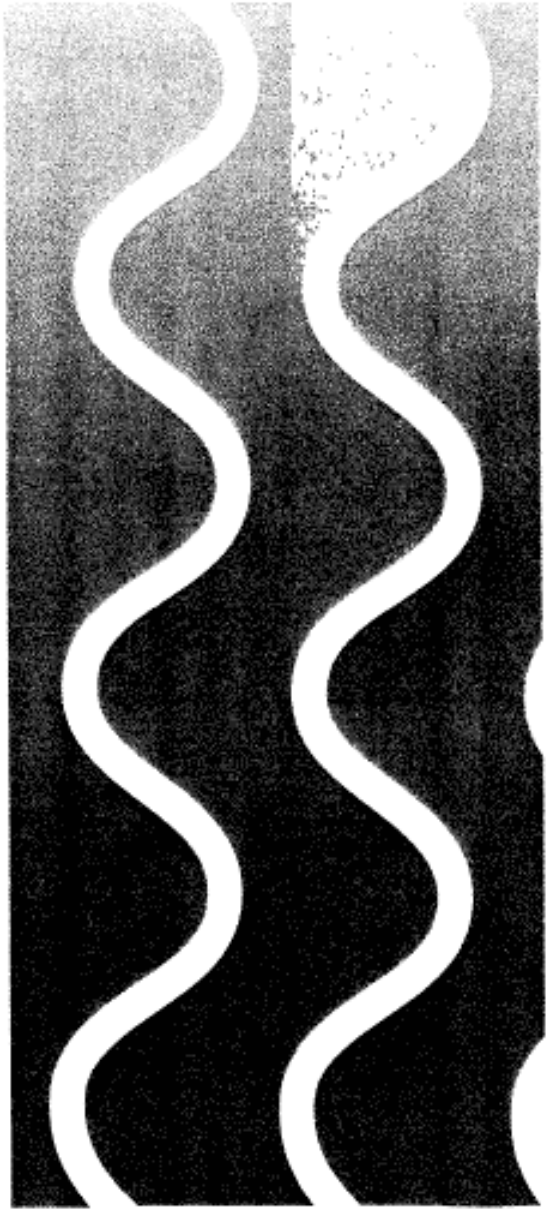
The preparation of the Guide involved direct participation of many professionals in the fields of boating and waterway management. The process of preparing this new Guide is an example of dedication, sharing, cooperation and mutual understanding in the rapidly expanding and increasingly complex field of boating and waterway recreation.

Pete O'Connell, Project Director
National Water Safety Congress, Inc.

SECTION 1 THE NEED FOR THIS GUIDEBOOK

- Recreational Waterway Use
- Use-Related Accidents, Conflicts and Concerns
- Need for Multiple Use Waterway Planning and Management
- This Guide as a Planning and Management Tool





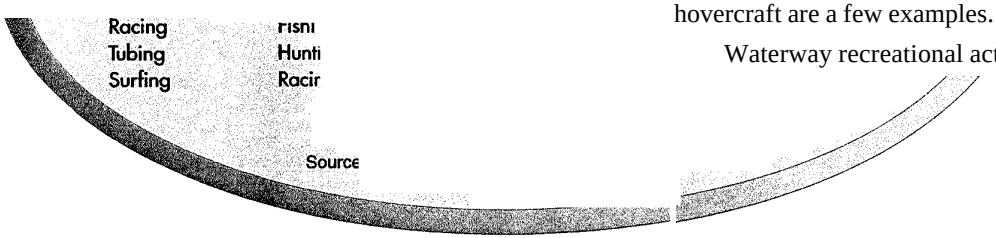
E EEDFORTHISGUIDE

Recreational

Waterway Use

Waterways are limited natural resources and public demand for space on the water has never been greater. Rivers, lakes, bays and other water bodies play a vital role in meeting people's diverse needs for active and passive leisure time activities, including: water sports, nature study and tourism. The nation's waterways are valuable physical, social and economic assets.

New boating trends and the increase in traditional motorboating, sailing, waterskiing and canoeing activities are accompanied by other water-related activities such as swimming, drifting, tubing, paddling, snorkeling, sightseeing and wildlife observation.



WATERWAY ~TIVITY SPECTRUM

9~ Personal! Recreational

Individual	Occupational! Boating	Commercial Professional	Aviation! Vessel	Aircraft
Swimming	Cruising	Law enforcement	Barges	
	Seaplanes			
Diving	Sailing	Racing	Tankers	
Snorkeling	Wing/ground Skiing	Marine facility Maintenance	Ferries Liveries	
ng planes ig	Hovercraft Hangliders	Test & evaluation	Passenger	Float
Environmental		Defense	Fishing Cargo	

capt. Anthony Stimatz, U.S. coast Guard

Boat registrations, watercraft sales and purchases of diverse water-based recreational products are rising. Boats and other water recreation products are more varied and more technologically advanced. Many of these modem products are more powerful and challenging. Personal watercraft, high speed bass boats, jet boats, high speed sail-boards, muscle boats and hovercraft are a few examples.

Waterway recreational activities are competing with each other for space, as well as with non-recreation functions, such as commercial shipping, hydro-power generation, irrigation and ecological research.

Use-related Accidents, Conflicts and Concerns

The increases in recreational use of public waterways, the creation of new water-oriented recreational products and technological changes in watercraft are changing the ways in which people use waterways. Speed, mobility, human behavior, human error, lack of boating education/information, equipment failure and conflicting uses can sometimes cause accidents and fatalities.

Boating collisions, the most common type of boating accidents, continue to increase. Fortunately, boating fatalities appear to be on the decline as a result of safety improvements in watercraft design, increases in use of personal flotation devices (PFDs), improved emergency rescue and medical response activities, better education and increased law enforcement.

The rapid growth of personal water-craft (PWC) and the imprudent behavior of many operators have contributed to increasing boating collisions. Many people believe, and reliable accident data are beginning to show, that the operation of PWC too close to other PWC and to other watercraft is a factor in the increase of reported boating accidents.

Preface

Conflicts and accidents may increase if recent trends in the multiple recreational use of our waterways continue at the current rate. Many people are concerned about reductions in safety, user satisfaction and environmental quality due to more recreational use of the nation's waterways. Boaters, waterway resource managers, product manufacturers and retailers, boating law administrators, citizen and special interest groups, insurers, conservationists, property owners and others are recognizing the need for more and better multiple waterway use planning and management. Many people are aware of the need for a rational, planned and balanced approach to waterway use in the public interest of safety, enjoyment and environmental protection. Responsible and balanced decision-making is necessary to achieve this goal.

Use Wa er' ay P~ani ing at d Management

Strategic planning and management of waterways can help to:

- Save lives
- Prevent injuries
- Protect the natural environment
- Preserve and enhance the quality of boating and other water-related experiences
- Reduce conflicts
- Protect property
- Prevent damages and repair costs
- Reduce liabilities and insurance costs
- Build consensus among the many interests in boating and non-boating waterway use

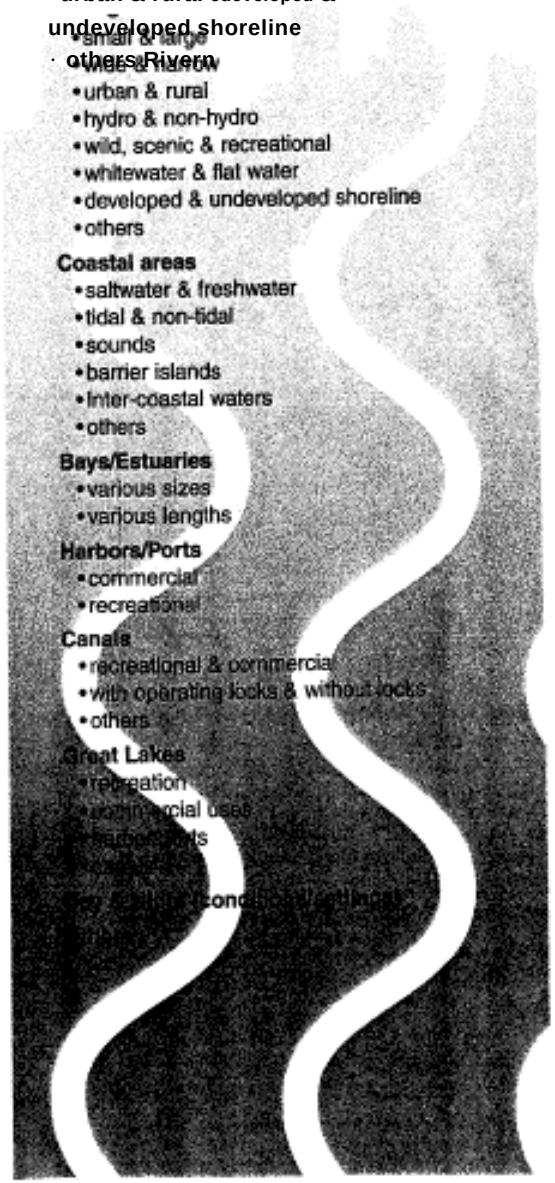
Water safety is a major reason for waterway planning and management. Safety accomplishes more than saving human lives, avoiding bodily harm or preventing equipment damage. Safe conditions contribute significantly to people's enjoyment and satisfaction of water activities by reducing fear, anxiety and stress. Effective waterway management protects and enhances the quality of the recreational experience, while protecting the natural environment as well. if waterways are to provide for sustained use, we have to plan and manage them as vital natural resources.

Earlier Efforts

Government agencies at every level, special purpose authorities, utility companies, volunteer interest groups and others are active in planning and managing our waterways. The approaches, techniques and participants have been as varied as the multiple use waterway situations they address. No single planning approach, therefore, adequately addresses the growing challenge of multiple-use waterway management. There are very few solutions on which all

Where Multiple Use is Occurring Lakes & reservoirs

- **large & small**
- **regular & irregular in shape & shoreline**
- **urban & rural edeveloped & undeveloped shoreline**
- **others Rivern**



affected parties can agree. Most parties do agree, however, that more and better planning and management are needed to ensure safe, enjoyable boating and non-boating waterway recreation through rational and fair solutions.

The (June, 1983, United States Coast Guard) 'A Guide to Managing Recreational Boating Areas" has been a valuable guide for anyone developing and implementing a recreational boating area management plan.

The increase in boating and other waterway use, the change in the type and speed of watercraft, the

variety of new water sport products, and the complexity of fair waterway resource management requires updating and expansion of the original guidebook. Recognizing the need for a new guide, the U. S. Coast Guard commissioned the National Water Safety Congress (NWSC) to develop this updated version.

About The Guide

The Guide for Multiple Use Waterway Management, hereafter referred to as the Guide, is based upon the research and experience of many professionals in the fields of boating and waterway management. The preparation of the Guide involved their direct participation in numerous stages over approximately twelve months. The process included:

- an information search;
- questionnaires to and written responses from key participants;
- selected telephone and in-person interviews;
- a review and documentation of past research and experience;
- the formation of a Steering Committee and Advisory Committee comprised of representatives from the public and private sectors involved with information, discussions, meetings and the review of draft reports;
- workshops with specific organizations, associations and interest group representatives; and
- participation in selected conferences.

The process of preparing this new Guide for Multiple Use Waterway Management is an example of dedication, sharing, cooperation and mutual understanding in the large, rapidly expanding and increasingly complex field of boating and waterway recreation.

This Guide as a Planning and Management Tool

The Guide is one of many tools available to policy makers and resource managers who must ensure safe boating and water-based recreation activities. It is a general guide for the development of more comprehensive, well-balanced multiple use waterway plans.

Unlike most waterway management source materials, the Guide stresses the importance of systematic waterway-use research and planning, while presenting a basic planning process for easy use or modification based on the situation.

As an education and training tool, the Guide can help people to follow a logical process, consider logical alternatives, make rational decisions, achieve consensus among divergent interests, and set priorities under imposed budgets and time schedules.

Many planning and management techniques are introduced in this single reference document, which includes additional sources for more detail. Users of the Guide may choose from a wide range of management techniques and actions for use separately or in combination to address conflicts. No single solution is likely to solve

Preface

all problems and please everybody. Proper planning and careful, timely selection and administration of the right actions can make the difference between success and failure.

This Guide provides a framework for a deliberate planning effort, with the goal of creating a responsive and responsible management plan. A well-organized, properly conducted, multiple-use waterway planning and management process will create excellent communications while fostering support among many interest groups.

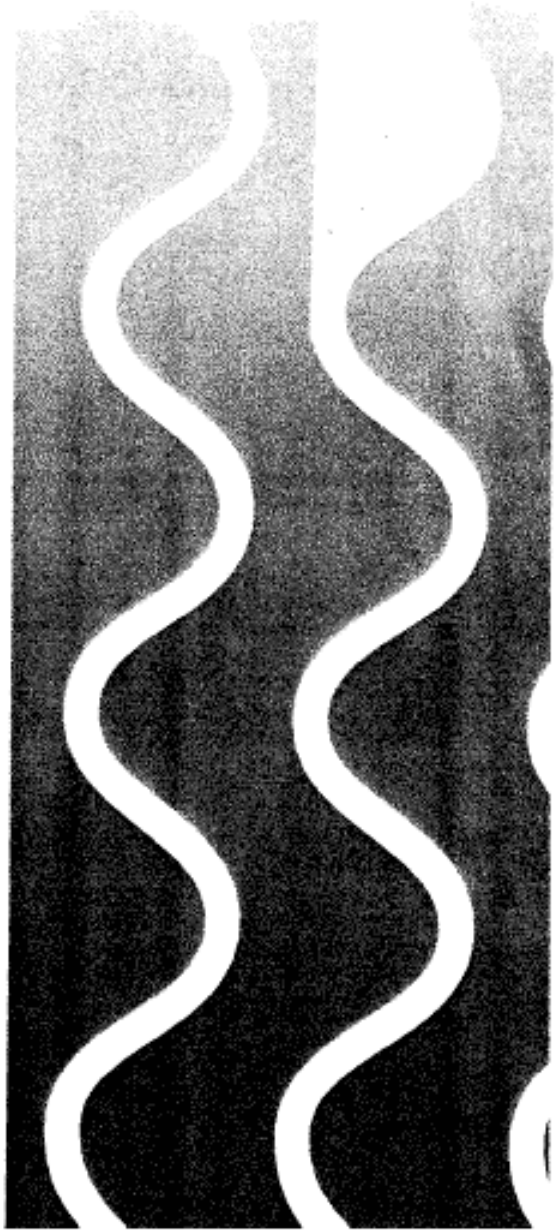
An effective planning process enables proactive policy makers and resource managers to develop long term strategies and short term action plans that respond to immediate needs and anticipate future problems. Deliberate and rational planning helps decision-makers avoid quickly-conceived and extreme solutions often brought on by one dramatic incident or interest group agenda.

Social capacity, resource capacity and optimum carrying capacity are addressed in the Carrying Capacity Guidelines section. Carrying capacity considerations can provide a sound basis for the determination of responsive management techniques for improved safety and quality of the waterway experience.
This Guide is useful to:

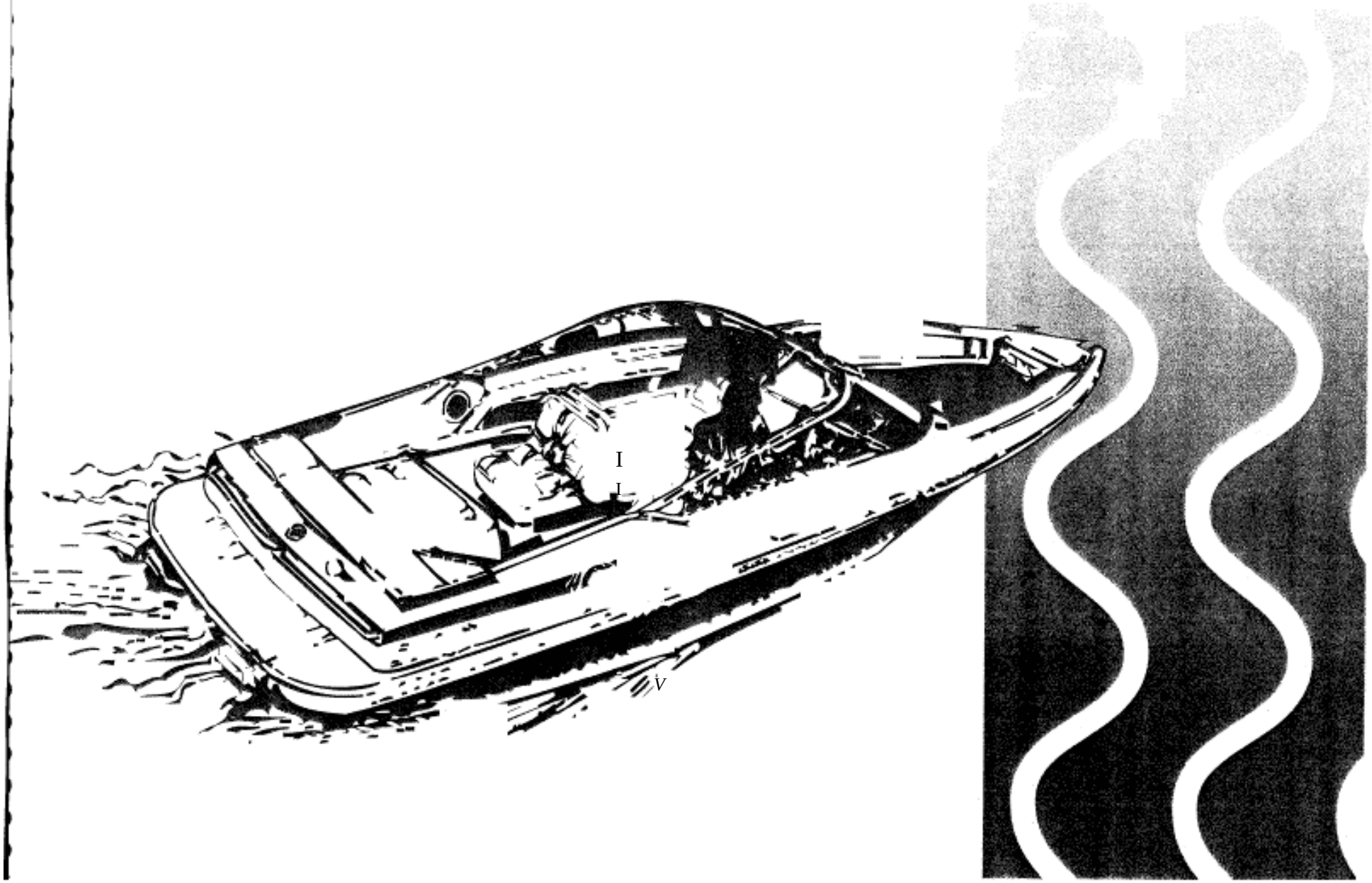
- Waterway Planners and Managers
- Water Safety Agencies and Organizations
- Governmental Agencies at all Levels
- Boating Law Administrators
- Waterway Commissions and Authorities
- Special Interest Groups
- Citizen Organizations
- Educators and Trainers
- Utility Companies
- Others

It is useful as a:

- Single-source technical reference for full-time waterway managers by simplifying the process of accessing technical material
- Quick overview for overall policy-makers and elected/appointed officials by abbreviating the introduction to waterway planning
- Convenient guide for advisory and interest groups by guiding participants through a waterway planning process
- Structured training tool for use in formal education curricula by adapting to specialized training courses and workshops
- Useful document to build public awareness and information by communicating the importance of responsible waterway use and management



Preface



SECTION 2

A BASIC PLANNING PROCESS

- Overview
- Features
- The Six Steps
  1. Organization
  2. Research
  3. Planning
  4. **Decision-Making**
  5. Action
  6. Monitoring

A BASIC PLANNING PROCESS

Overview

Effective planning and management for multiple use of waterways requires a well-organized and comprehensive process. This process encompasses many factors and con-•siderations. Poor planning, or no planning often causes complications, confusion, unnecessary time consumption and high cost. Effective, responsible planning and management requires a systematic, rational and disciplined approach.

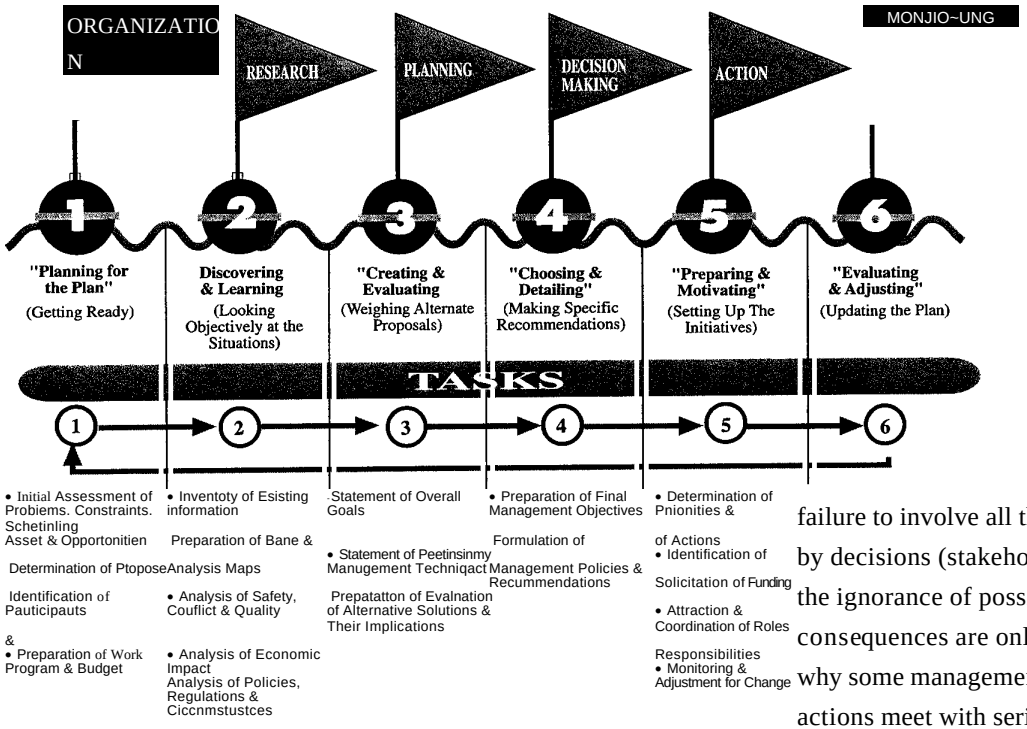
This section of the Guide offers a basic, yet comprehensive, way to prepare and conduct a planning and management process. This approach may be used comprehensively in a particular situation or it can be modified for the unique needs of the individual planner or manager. It is flexible in procedures and levels of detail. It can be done simply or more scientifically and sophisticated with little alteration. Other approaches have merit and may also be considered.

Certain steps, procedures or even entire processes may already be mandated, prescribed or in place. They may be related to:

- federal or state legislation programs, such as wild, scenic and recreational rivers legislation;
- environmental regulations compliance or other mandates.

4

Source materials and contacts are referenced in this Guide.



A rational, logical and complete planning process should contain at least six fundamental steps:

Features

The true value of a planning and management process is in its logical, systematic approach. By encouraging its comprehensive coverage of the many factors to be analyzed, responsible decisions about multiple use of our waterways can be made.

Examples of improper, incomplete and insensitive planning, or no planning, are plentiful. The failure to involve all those affected by decisions (stakeholders), and the ignorance of possible decision consequences are only two reasons why some management plans and actions meet with serious opposition.

Good planning most often yields better and more sustainable solutions.

This

B asic Planning

Preface

Process may not meet every need, but it can be used as a checklist of items normally considered appropriate. Although each area and situation may be different, the sixstep process in this Guide provides plenty of flexibility in how and when it may be used by waterway planners and managers.

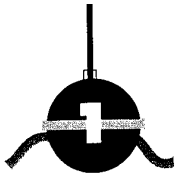
Preface

If a process has never existed, or if an existing process is no longer used, the approach taken in this section may be helpful. If parts of a process are already initiated or completed, they can serve as building blocks for completing the process in this Guide. If a systematic process is well under way, this Guide might assist in its completion. If a quick response is needed on one or more issues, this process can be used as a "shortcut" to cover the bases while a long-term solution is being devised.

The Six Steps

ORGANIZATION

STEP 1- Organization



The importance of preparing a "plan for planning" is often underestimated. Proper preparation can make the difference between an effective or ineffective planning process and management plan. Lack of organization often translates into the exclusion of key participants; poor decisions made on the basis of insufficient research, misunderstandings and miscommunications; wasted energy, time and money; and delays in the completion of the plan. It is wise to make an early assessment of the problems and opportunities the process will address. By stating the specific reasons why the planning process is necessary, you can determine who will be involved and prepare detailed work programs, schedules and budgets.

Since many waterways fall under several jurisdictions, successful management efforts require cooperation among numerous agencies. One agency is rarely responsible for all aspects of waterway management. Cooperation and coordination among agencies are a critical part of this initial organizational step.

Avoid the temptation to proceed with the process before thinking about the details that make a planning process good for your situation.

Assessment of Conditions

Six quick, easy and inexpensive work items can help people learn more about the multiple use waterway conditions when entering into the planning process. These conditions are expressed in terms of problems and constraints, along with assets and opportunities.

ITEM 1 Collect and Review Available Data, Documents, Maps, Previous Studies and Plans

the regional level may help to reduce waterway conflicts. Opportunities may exist within the region to plan different waterways for different management objectives. Thus, on a regional level, it may be possible to separate conflicting activity areas and plan different areas for multiple user groups.

Sometimes planners are surprised at what is readily available from previous efforts of agencies and organizations directly involved in waterway use and management. Plans, economic analyses, environmental studies and other existing sources may be helpful. Information is available from state, regional, county or municipal comprehensive plans, in addition to parks, recreation and open space plans. Accurate maps and aerial photos may show waterway information, bridges, docks, marinas, harbors, topographic features, land use, vegetation and parks. These tools provide an excellent start to the planning process and can save considerable money. Computer mapping and geographical information systems (GIS) are also becoming more prevalent and may be available for your area.

Discover and obtain all relevant studies, plans, surveys and maps. Understanding the regional waterway situation and planning at

Preface

ITEM 2 Identify Current Rules and Regulations

Many waterways are subject to the rules and regulations of several levels of govermnent and of the private sector. These rules and regulations may cover subjects from coastal waterway and deep harbor rules to lake and river shoreline regulations. Existing rules and regulations may often overlap and conflict. Government agencies are the best source of information on existing rules and regulations.

Identify and document the rules and regulations, stating who bears or shares enforcement responsibility. Enforcement of existing rules and regulations solves many problems. High visibility of patrols during peak times of use will reduce safety problems.

ITEM 3- Conduct Field Reconnaissance Trips

The best way to learn about a waterway is to experience it first-hand. Existing maps, charts and aerial photos can be used to record notes and observations. Use an itinerary to conveniently and completely cover the desired areas. Look for hazardous areas, safety concerns, activity conflicts, use patterns and other water surface and shoreline characteristics. Ideally, conduct at least one trip during known peak use periods and another trip during off-peak periods. Talk with boaters and other waterway users, area residents, business people and others during these initial reconnaissance trips. Discuss findings and opinions with other field reconnaissance participants.

ITEM 4 Describe Waterway and Related Activities, Conflicts and Changes

Many planners, managers and waterway users know where activity concentrations, circulation patterns and conflict situations exist or develop. Their insights should be summarized on maps. This information will be very helpful in organizing a meaningful planning process.

ITEM S Draw Planning-Area Boundaries

Choose the most significant area for research, planning and action. The planner will delineate this area on the map and use it as the geographic focus of attention during management plan preparation. A boundary may be mandated by a certain program. Previously established boundaries can be reevaluated. Boundaries of jurisdiction, waterway linkages, enforcement agency coverage, watershed and shoreline characteristics, water accessibility and the relationship between water use and land use are factors to consider in determining a suitable planning area boundary.

ITEM 6- Summarize Problems and Opportunities

The findings of Items 1 through 5 should be summarized on a table, and on a map where appropriate, for easy use in completing the other tasks in Step 1. These findings may best be articulated as problems and opportunities. Although these lists provide only a start, they can be expanded as Step 2 is completed and the management plan evolves.

Clarification of Purpose

The Initial Assessment of Conditions will define the purpose of a management plan. The main purpose of the plan will be to update an existing plan, to respond to legal mandates for compliance with licensing agencies, state wild, scenic and recreation river programs, or to meet other requirements. Frequently, multiple use waterway planning will be important to forecast, correct or prevent the worsening of a specific safety concern, activity conflict, environmental threat or public outcry on an issue.

Example purposes for planning include:

- to address safety issues and concerns;
- to reduce water use activity conflicts (or a specific identified conflict);
- to respond to water user, landowner or community complaints;

Preface

EXAMPLE
PROBLEMS & OPPORTUNITIES

Opportunities/Assets

- The waterway is very arge and has ample opportunities for new access areas to disperse use.
- Stakeholders are willing to communicate, meet and discuss ways to resolve conflicts.
- The waterway is a major tourist attraction and is important to the area's economy.
- A grant is available to prepare a Boaters Guide.
- The potential exists to share costs with others for waterway management.
- Opportunities exist for zoning certain areas of the waterway for certain activities during peak use periods.
- There are several existing volunteer groups (e.g., U.S. Coast Guard Auxiliary, adopt-on-access-area group, etc.).
- There are very few conflicts between recreational boats and commercial vessels.
- Potential exists for encouraging recrentional boating in other waterways in the region.
- Others

Problems/Constraints

- Limited budget for waterway patrols and new access area development.
- Some very narrow areas exist which tend to choke traffic during peak use periods.
- Many different lurisdictions are involved in various aspects of waterway management.
- Several shallow areas with rocks exist and are not marked.
- The shoreline is almost fully developed.
- Same areas on the water surface are very overcrowded, while other areas are underused.
- Many different activities are competing for use of the water-way.
- Water levels fluctuate severely.
- Existing lawn preclude use of certain management techniques.
- Local municipalities do not hove local zoning ordinance to control land developments.
- Others

- to protect the environment (natural and cultural);
- to maximize water use opportunities; and
- combinations of the above purposes. Clear articulation of the plan's purpose will facilitate the determination of specific guidelines, budgets, funding resources and participants.

Identification of Participants

Participants who represent the many and varied interests of multiple users of waterways should be involved early in the planning process. The participant group should contain parties who can offer expertise, insight and opinions. The group should also include participants who have the ability, contacts and financial resources to help implement the management plan. The "public sector," the "private sector" and the "general public" should all be represented.

Determination of Participants' Involvement

Review the list of participants and the list of available options in the Citizen Involvement Guidelines to determine the most effective and most appropriate mechanisms for involving the desired participants.

Check governing regulations and administrative procedures to determine if particular methods, such as public hearings, are mandated as part of the planning and decision-making process. A

Public

- Waterway management entities (resource managers, etc.)
- state boating law administrators and legislators
- state boat and commission
- rangers and waterway officers
- U.S. Coast Guard
- U.S. Army Corps of Engineers
- National Park Service
- U.S. Coast Guard Auxiliary
- recreation providers
- park managers
- port authorities
- federal, state and local agencies
- water safety organizations and entities
- U.S. Power Squadrons
- law enforcement agencies
- federal licensing agencies
- boating access program administrators and managers
- military
- recreational water users
- volunteers
- citizens
- YMCA/YWCA
- schools
- non-profit groups

Private

- commercial vessel operators
- commercial liveries and boat rental agencies
- marinas and marine trade associations
- harbor masters
- marine industry representatives
- waterfront property owners
- local nearby property owners
- utility companies
- economic development agencies
- real estate agencies
- commercial water park managers
- chambers of commerce and tourist bureaus

successful participant involvement process or a “good management practice” may already be available for continuing use or with appropriate modifications.

Examples of Possible Public and Private Sector Participants Include:

Preface

Select an approach that allows for participant involvement throughout the process rather than only at the end. Although a final public meeting or public hearing is a good technique (and may be a legal requirement), other techniques may be used during the entire planning process. It is important to make a conscious effort to involve the "boating public" in the planning process.

Participant involvement techniques may include:

- Establishment of an advisory group

The primary and consistent guiding force in the planning process should be an organized advisory group. The group should supplement the technical expertise and day-to-day planning efforts of a staff or consultant who has responsibility for research, planning and management plan preparation. The advisory group, which might be nan~ed a "waterway planning committee," should include the representation discussed above. The group should meet regularly in workshops throughout the planning process. While comprehensive in its representation, the group should be small enough to function as a direct participant in the process. An executive committee might be established to overcome group-size limitations. The group's role must be made clear to its members immediately. Advisory groups usually offer input and advice during the planning process, while other appointed officials assume decision-making responsibility.

· **Conducting Interviews**

One-on-one interviews are valuable. They are an excellent way to obtain unpublished information, to discover major issues and concerns, and to dis cuss possible solutions and realistic water use and shoreline management techniques. These interviews tend to be most productive with people who have technical or special interests, talents and concerns.

- User surveys

Surveys of the people who actually use the waterway and have first-hand knowledge of water use situations are valuable. User surveys may be the only way to gain input from the "boating public" because many of the water users are unable to attend local public meetings and may lack an organization or personal representative to speak for them.

· **Paper scoping**

The "paper scoping" technique involves sending an information package to appropnate persons and/or businesses, and requesting written comments.

Work Program and Budget

A detailed work program should include written descriptions of all necessary steps and tasks. Be careful not to prepare a scope of work that may be too ambitious for the need or the budget.

A flow diagram of steps and tasks is a simplified, graphic way to:

- present each major work item;
- show their relationships;
- illustrate the sequence and time schedule of the work.

Workshop meeting times, places and participants should be identified. Interim and final products such as working memo randa, analysis and plan maps, draft and final reports, and deadlines should be listed on the flow diagram.

Some planning programs may have a budget under which a work program should be prepared for maximum benefit. Other programs may have to prepare a budget and obtain funds using the desired work program as a basis.

Preface

Make a list of cost items in as much detail as possible. Cost estimates can be based upon known costs, comparable costs from similar projects, various price quotes and discussions with knowledgeable individuals. If a request for proposal (RFP) is being issued, the consultant can include a fixed-fee cost for the various work scope items and end products. Although a consultant or contractor may have major responsibilities for plan preparation, some costs for project administration and coordination are inevitable. Be realistic about the budget, remembering that it may be preferable to re-evaluate work priorities in the interest of maintaining a rational step-by-step process.

Consider various funding sources for plan preparation. It might be possible to "phase" the work over a two-year period, to take advantage of two budget years. Private donations or federal and state planning grants may also be available. A budget may ultimately include a variety of funding resources.

RESEARCH

STEP **2-**

Research

The research step is the discovery and learning phase of the planning process through a planner's objective look at the characteristics, activities and users of waterways and adjacent land areas. Research can be a "tender trap"—interesting and valuable if done well, but time-consuming, frustrating, expensive and embarrassing if done poorly. Be cautious about too much research for its own sake, which could leave little time for consideration of alternative solutions or for management plan preparation.

Inventory of Existing Information

A detailed inventory of the waterway and environs, followed by a comprehensive and objective analysis, will lead the way to a rational and defensible multiple-use waterway management plan.

Obtain as much information as possible through readily available source materials and previous contacts. Gather all the data and information before conducting field surveys. Be sure to check the reliability of the sources and the validity of the methodology and the data.

A field survey should then be conducted to fill informational voids, to validate and update existing information, to obtain other information which should be acquired through field observations and to become familiar with the realities of waterway conditions and uses. Information assembled as part of Step 1 Organization (Initial Assessment of Conditions) will determine where data and information are insufficient and will enable planners to decide where to update existing information or to conduct original research.

Base Maps

Acquire or prepare an appropriate base map showing roads, waterways and political boundaries as soon as possible. A suitable base map (or maps which can be used to prepare a base map) may be obtained from state agencies or from regional, county or municipal planning commissions.

The 15 minute (1"= approximately 1 mile) U.S. Geological Survey (USGS) Topographic Maps showing roads, railroads, utility lines, political boundary lines and other useful items may be used to create a base map. More detailed 7 minute quadrangles (l"=2000') are also available in many areas. Computer generated maps and geographical information systems (GIS) may also be available.

Two base maps may be necessary; one showing the project area and adjacent lands and the other, at a smaller scale, showing the regional setting. A "Regional Setting" map would be used to identify outside factors which affect planning.

The base map should be on a stable, translucent material such as mylar. This durable material will allow reproduction of paper ozlid prints for recording field notes and preparing analysis and plan maps.

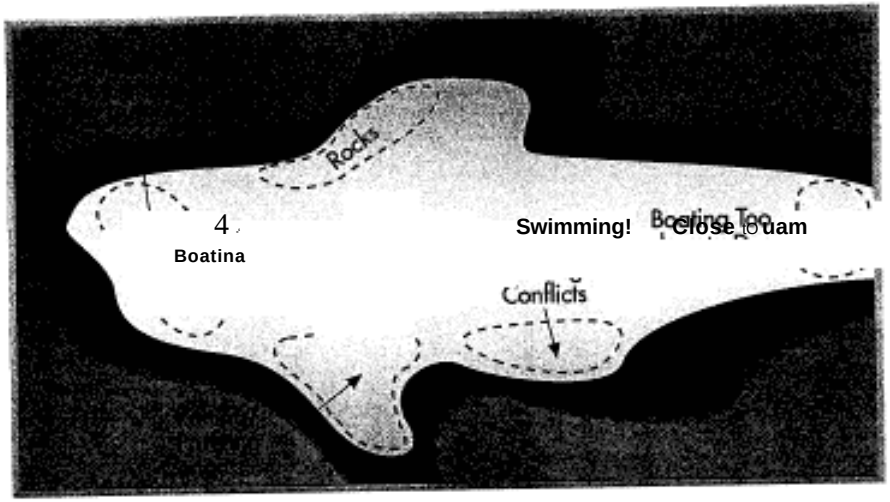
Analysis Maps

Analysis maps prepared on base map prints or on overlays, should include natural and cultural features and include other important items for plan preparation and for making decisions about multiple use waterway management.

While more than one analysis map will be needed, there are advantages to mapping related information together on one map. Here is an example of an analysis map and a listing of possible analysis map types:

- Natural features analysis map;
- Cultural features analysis map;
- Current rules and regulations analysis map;
- Existing land use analysis map;
- Existing facilities analysis map;
- Existing waterway activity and use levels analysis map;
- Major influences analysis map;
- Water safety problems analysis map; and
- Access areas analysis map.

If clear acetate mylar overlays are used to map features, each map could be prepared on a separate overlay. Two or more transparent overlays can be layered to illustrate relationships among various features.



ater Safety Problems/Cot fikis

Sa ety Survey Analysis

Survey and analysis subjects may include waterway activities, activity patterns, activity conflicts, user characteristics, behavior patterns, accidents and impacts on natural resources. Boaters, other water-based recreationists, shoreline users, planners, commercial users, resource managers and waterway and boating law administrators should be primary participants.

Research surveys and studies run the gamut from the assembly and evaluation of published activity and accident statistics to personal interviews with boaters and those who investigate accidents and fatalities. Various suggestions for inventories and surveys are presented in the Inventory and Survey Guidelines section of this Guide.

Research in multiple use of water-ways planning should focus mainly on safety, conflicts and the enjoyment of the waterway recreation experience. Before deciding on the type, breadth and depth of research required, the planner should quickly learn as much as possible from at least these sources:

- Water Use Accidents and **Near Accidents**

Each year the U.S.C.G. publishes Recreational Boating Statistics, which includes statistics on recreational boating accidents. The statistics, however, are based only on those incidents where Boating Accident Reports (BAR) have been submitted to the U.S.C.G. Current regulations (33 CFR 17 3-4) require the operator of any vessel, numbered or used for recreational purposes, to file a BAR if the vessel is involved in an accident which results in loss of life, disappearance of a person, personal injury which requires medical treatment beyond first aid, damage to the vessel and other property exceeding $500, or

complete loss of the vessel. These BARs may be helpful in identifying the nature of accidents, but not all accidents and no near accidents are reported.

Each state has a Boating Law Administrator (BLA) who is responsible for collecting and reporting boat accident information. Also, many states keep additional detailed data regarding boat accidents.

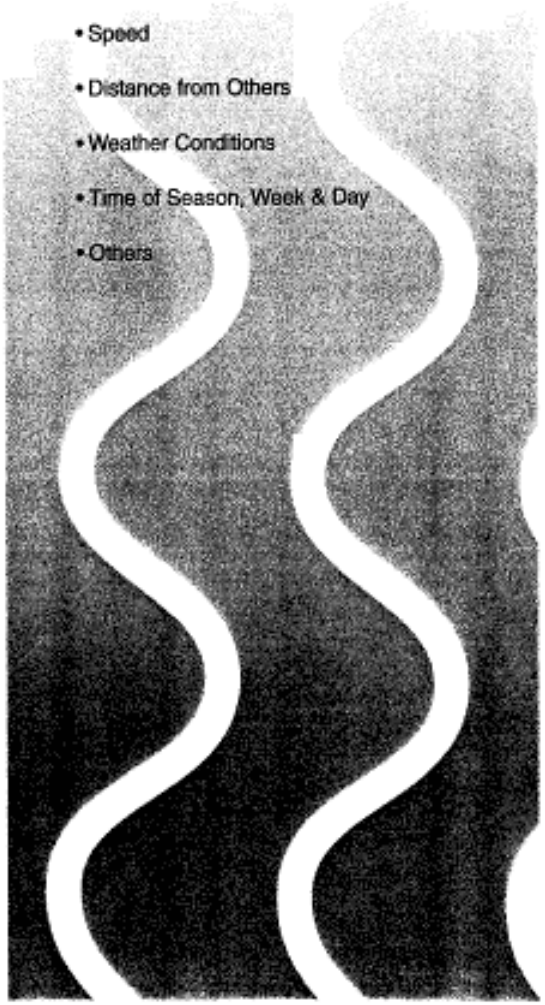
User surveys, key person/entity interviews and field observations will provide other ways of obtaining accident information.

Ask waterway users, waterway managers and boating-law administrators questions like:

- Which waterway areas are prone to accidents? Why?
- Which situations cause most of the accidents?
- Which boating activities (based on actual exposure time) are causing the most accidents and conflicts?
- When are the conflicts taking place? (Time of day? Day of week? Season?)

What Determines Boating Safety

- Knowledge of Waterway
- Knowledge of Rules
- Operator **Skill &** Experience
- **Operator Condition & Behavior**
- Condition of **Craft**



· High-hcident Conditions

Past accident data can be obtained and mapped to help identify high-incident conditions. The agencies which use, manage, patrol and enforce rules on waterways are good sources for identifying high-risk areas and situations. Also, the Reconnaissance Trip taken during Step 1 is an excellent time to observe and begin identifying high-risk areas.

- Water-Use Conflicts

The agencies which use, manage, patrol and enforce rules on the waterway are good sources for identifying water use activity conflicts.

- Which management techniques are used? Are they working well?
- Which management techniques could be used to reduce accidents and

mnimze waterway-activity

~ conflicts?

- Are users having a safe, enjoyable recreation experience?

The user survey (see Guidelines

section), interviews with knowledgeable people and field observations will help answer the above questions.

Economic Impact Analysis

Multiple use of waterways frequently affects local and regional economies. It is important to understand the nature and extent of economic effects on inter-related business and boating interests. An analysis should explore direct benefits such as local jobs, spending at marine dealers and marinas, motels, campgrounds, bait and tackle shops, etc. and real estate and other tax revenues. Indirect (spin-oft) benefits, such as restaurant, beverage, pharmaceutical and grocery sales should be included.

Economic impacts should be determined based on a variety of factors including market value increases, assessment ratios, values and resultant property taxes, sales volumes, and resident versus visitor sales activity. Many useful studies to determine economic impacts have been published (see References section).

Local and regional planning agencies, marine trade associations and chambers of commerce are good sources of information and input. Interviews with various people can be conducted to obtain useful economic insights. These individuals might include tax assessors, county and local officials, local taxing authorities, school administrators, and state and local tourism and commerce officials. Consideration should be given to conducting an area Business Survey (see Inventory and Survey Guidelines section).

Resource Impact Analysis

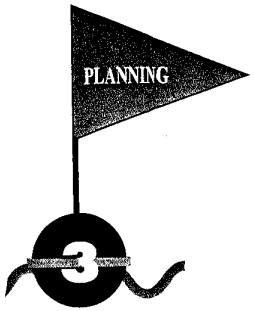
An analysis of the effects of multiple use on the waterway resource should be performed as part of this step. The Monitoring Guidelines and the Carrying Capacity Guidelines sections of this Guide have information on possible items and approaches for examining resource conditions and the effects of use.

Current Policy and Regulatory Evaluation

Existing policies, rules and regulations should be reviewed and evaluated before management options are considered. Restrictions may be imposed by a variety of government agencies, by utility companies or by multi-jurisdictional authorities. Policies affecting waterway use and management vary, from licensing, use and access restrictions to speed controls and waterway area zoning for certain activities.

Policy statements and restrictions are sometimes “hidden” in documents which are riddled with detail and fine print. Examine documents carefully for restrictions and for clarification of procedures and administrative responsibilities. Existing regulations will often include federal, state, and local boating and other laws (coastal zone management, off-shore anchoring, etc.); local zoning ordinances; and federal and state enabling legislation. The discovery and clarification of enabling legislation will create an awareness of the legal constraints under which management plans may be prepared and implemented.

Prepare a current policy and restrictions map for future reference. Many policies, rules and regulations are expressed in terms of management techniques. These techniques should be reexamined to determine whether each is still appropriate or no longer appropriate.



STEP 3-

Planning

The Planning step is the heart of the planning process, yet planners and managers often feel that once Step 2 is complete, they are ready to proceed directly to Step 4. This Planning step between Research and Decision-Making is the place where clear direction among interests is established and all solutions are given serious attention. Step 3 is where much of the soul-searching occurs about what is right or wrong, how much is too much, what is feasible and what may be acceptable. Dedication to goals, to the variety of management techniques, and to viable plan alternatives at this step will pay handsome dividends when approaching Steps 4 and 5.

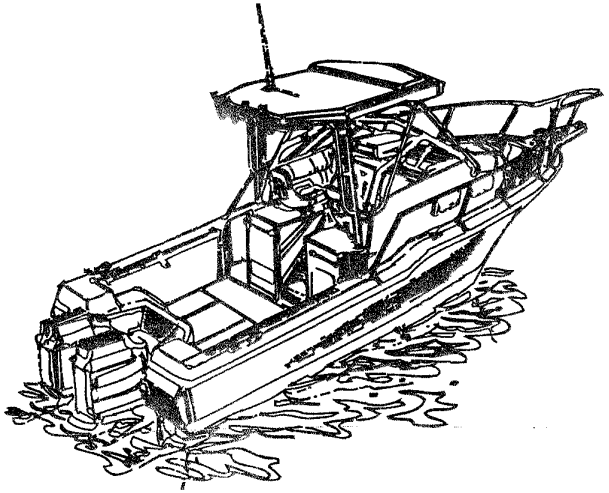
Overall Goals

Goal setting makes the transition from research to planning. Stating cogent and meaningful goals is often difficult, especially regarding the complexities and challenges of multiple-use waterway management.

A goal is defined as an ultimate end to be achieved; a long range direction. Goals guide decisions on management objectives, recommendations and actions toward their achievement. They should be as specific as possible without becoming exact management objectives or recommendations. Some examples of goals are:

- to increase waterway recreation opportunities;
- to offer a wider range of water recreation activities;
- to improve safety for waterway users;
- to protect and upgrade environmental conditions;
- to reduce and prevent conflicts and accidents.

Goal statements are somewhat general, but they should be specific enough to represent choices between one direction and another.



A wide range of management techniques is available for consideration and recommendation in the multiple use waterway planning process. Techniques can fall under certain categories, such as information and education; rules, regulations and law enforcement; water use activity controls; access distribution and development controls; resource protection; and others. The Waterway Management Techniques section of this Guide describes many waterway management techniques for consideration in this step of the planning process.

Since waterways have different conditions, characteristics and circumstances, certain techniques may work well for one specific setting and situation, but not for another. When evaluating various management techniques, consider such factors as ability to help meet stated goals, anticipated effectiveness, ease of implementation, costs, user acceptance and legal constraints.

P1 n Iternatives n[1] Their in~ pik~ ions

Process participants should consider alternative ways of dealing with problems and conflicts, protecting and enhancing assets, and taking advantage of new opportunities. The previously prepared maps, overlays, research reports and goal statements will be primary tools for proper consideration of plan alternatives.

Alternatives may not be in the form of complete and distinctively different plans. Plan alternatives can be the use of one technique, or a selected set of management techniques, instead of other possible choices.

Planners should avoid the assumption that they know what the plan should be before the preparation and systematic evaluation of alternatives. Even if many of the plan recommendations seem obvious, the exercise of choosing among alternatives ensures that something good and obvious is not overlooked. This approach also gives credibility to the recommendations in Steps 4 and 5.

As important as plan alternatives are, there is also the danger of overdoing this part of the process. The more difficult issues and choices are likely to require more emphasis on the evaluation of alternatives. It is far better to deal with important issues at the alternative plan stage than to delay these issues until later in the planning process when other, perhaps contrary, decisions have already been made.

Three steps are suggested here for the preparation and evaluation of alternative plans:

1. Write descriptions and prepare maps of alternatives. Maps can be very informal for use in small professional staff discussions and in waterway planning committee workshops. Write informal notes on the maps and attach additional ideas and comments as discussions proceed. One of the alternatives might be a synopsis of an existing plan or a "status quo" alternative. Other alternatives might be oriented more toward safety enhancement, conflict resolution, preservation, environmental protection or economic development.

2. The implications of alternative plans should be determined and evaluated in a systematic, objective way. An evaluation sheet with criteria listed is a quick and easy way to evaluate and to compare alternatives. Final evaluations and comparisons of remaining alternatives can use progressively more refined criteria as old alternatives are eliminated. Criteria may relate to such subjects as:

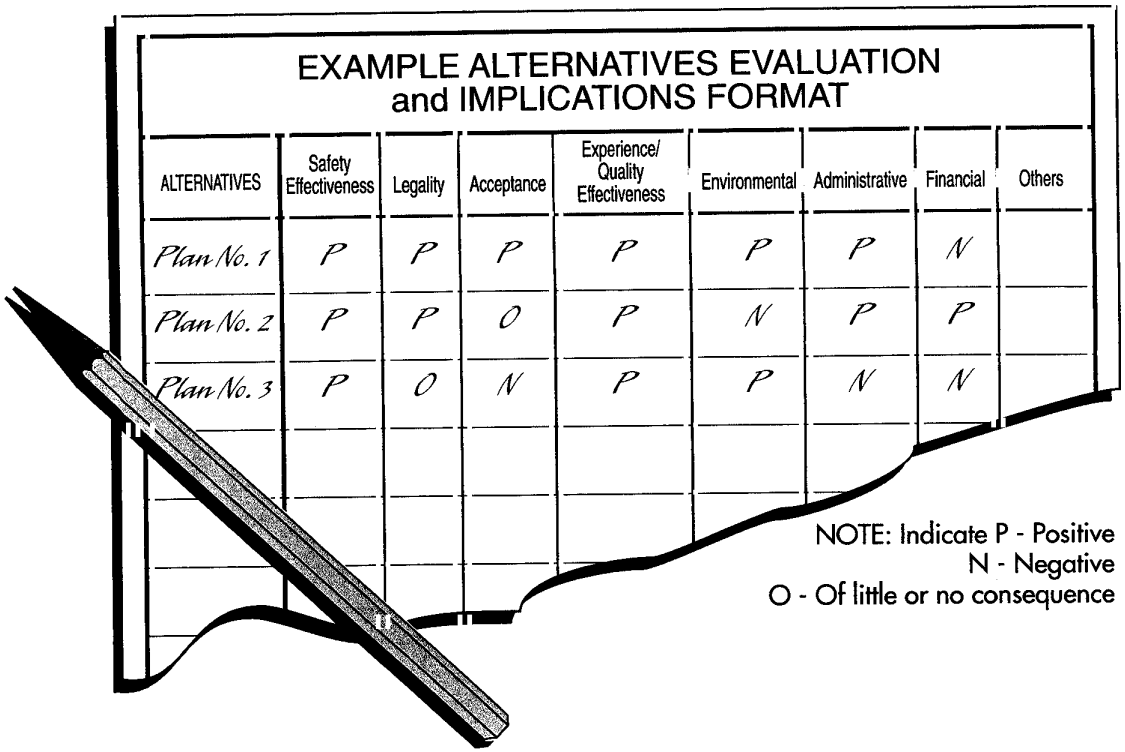
   - Effectiveness in solving the high priority safety problem(s);
   - Legality or legal risk involved;
   - Cost to implement;
   - Positive influence on quality of experience;
   - Positive influence on resource protection;
   - User and public acceptance;
   - Other stakeholder acceptance;
   - Administrative changes required;
   - Legislative changes required.

3. The preferred alternative plan (or combinations of alternatives) should be selected and then subjected to more detailed management planning and decision-making in the next phase. Alternatives on which there is still uncertainty should be carried forward to Step 4.

STEP 4 - Decision-Making

Decisions are easier if adequate research is done and if the alternative solutions are understood. This step is challenging because it requires more specificity and it becomes more finite regarding the influence of decisions on stakeholders and on the administrative and financial actions for implementation.

Step 4 involves the use of selected alternatives from Step 3 as a basis for the creation of sound management objectives and for the preparation of a detailed management plan. The management plan must contain balanced solutions; those that are backed up by facts that have or can easily receive the acceptance and support of waterway users, managers and other interest groups. The last task in Step 4 is



EXAMPLE ALTERNATIVES EVALUATION and IMPLICATIONS FORMAT

ALTERNATIVES	Safety Effectiveness	Legality	Acceptance	Experience/ Quality Effectiveness	Environmental	Administrative	Financial	Others
Plan No. 1	P	P	P	P	P	P	N	
Plan No. 2	P	P	O	P	N	P	P	
Plan No. 3	P	O	N	P	P	N	N	

NOTE: Indicate P - Positive
N - Negative
O - Of little or no consequence

to determine the "effectiveness and feasibility" of management plan recommendations and to state the rationale for balanced decisions.

Management Objectives

Management objectives guide the management plan. The management plan contains comprehensive recommendations that will achieve the management objectives. The management plan is the blueprint for specific actions in Step 5.

Management objectives take their cue from the overall goals and the preferred alternatives from Step 3. Because they are based on the results of the Planning step, management objectives can be prepared with a considerable degree of technical understanding and with some comfort in knowing that the results are achievable. Management objectives are really those statements specifically targeted to why and how the waterway shall be managed. Some example management objectives are:

- to consider safety as the top priority regardless of the type of activity;
- to preserve and protect unique and environmentally-sensitive natural areas;
- to manage the use of land and water resources in a manner that recognizes and protects the capability of the resources to sustain their designated recreational use;
- to monitor the use, user behavior, development trends and environmental condition of the waterway and vicinity;
- to make management adjustments necessary to preserve the experience expected by waterway users and to protect the sustainability of the natural resources;
- to educate boaters and other waterway users about safety, waterway use rules and regulations, courtesy and etiquette;
- to provide effective enforcement of all existing waterway-use regulations;
- to promote (or accommodate) new waterway use experiences while preserving traditional recreational activities;
- to provide and encourage more off-peak waterway use opportunities in the fall, winter and spring seasons;
- to coordinate zoning, access, regulation, education and awareness programs with other federal, state and local agencies as well as the private sector and users;

- to integrate the management of diverse natural resource components such as fish, wildlife, forests, wetlands, grasslands, soil, air, and water with the provision of public recreation opportunities;
- to conserve natural resources and provide public recreation opportunities that contribute to the quality of life;
- to provide safe recreation opportunities on a multiple-use basis while minimizing use conflict and maintaining a sustained environment;
- to provide safe commercial and recreational use of our waterways by minimizing use conflict while protecting our natural and cultural resources.

The management objectives should be created with a working knowledge of their possible effects on administration, finances, public relations, education, legislation and others.

Mau~ genici t P an

The management plan must be as comprehensive and detailed as possible. Recommendations should be stated clearly and justified by research findings and relationships to goals and management objectives. More elaborate maps and presentation materials are required at this stage of the planning process.

A multiple-use waterway management plan should include, at a minimum, recommendations relating to the following categories:

- physical;
- operational;
- legal;
- financial; and
- promotional and educational.

Other categories and subcategories can be added, depending upon the particular situation. More detail may be required for some categories than for others.

The five categories are discussed here to present examples of items addressed when preparing a plan. This effort does not attempt to prescribe a "best approach." Certain preferences and legal mandates may cause or require planners to use other plan formats and to address different topics.

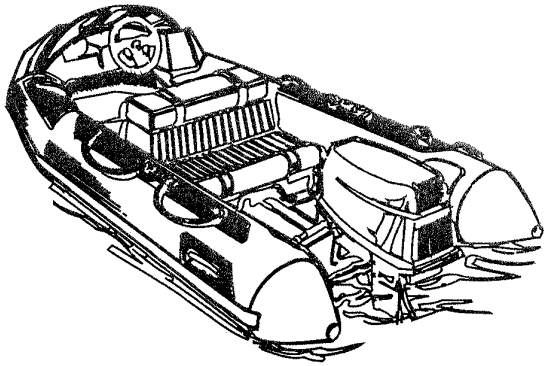
Physical Element

The physical element deals principally with recommendations on the location and use of the waterway and shoreline. It can include the designation of areas to be devoted to certain activities, the use of certain areas at designated times and the identification of areas where low wake or speed limits are imposed. Other physical recommendations can include the location, number and size of access points, launching ramps, parking lots and marinas; the number, location and types of docks and mooring areas; and the delineation of watercraft traffic patterns.

Water Surface Management

Most physical recommendations will be based on the nature and extent of activity conflicts and safety considerations. Although certain activity conflicts tend to be common in more heavily used waterways, conflicts differ depending upon circumstances, the amount of crowding and the physical characteristics of the waterway and shoreline.

Carrying capacity analysis may be helpful in determining the location and size of support facilities and optimum levels of use on the



waterway. Unfortunately, there is no single carrying capacity number or magic formula that can be applied across the board. Each waterway

has unique condi

tions and characteristics, and its own goals and management objectives. Carrying capacity approaches are included in the Guidelines section.

Activity conflicts and the reasons for them will call for certain physically-oriented management techniques. Planners will need to match the appropriate technique (see Waterway Management Techniques section) with the type and severity of the conflict. It is appropriate to use the system for evaluation of alternatives in Step 3 to make final recommendations on the most effective, feasible and acceptable solutions.

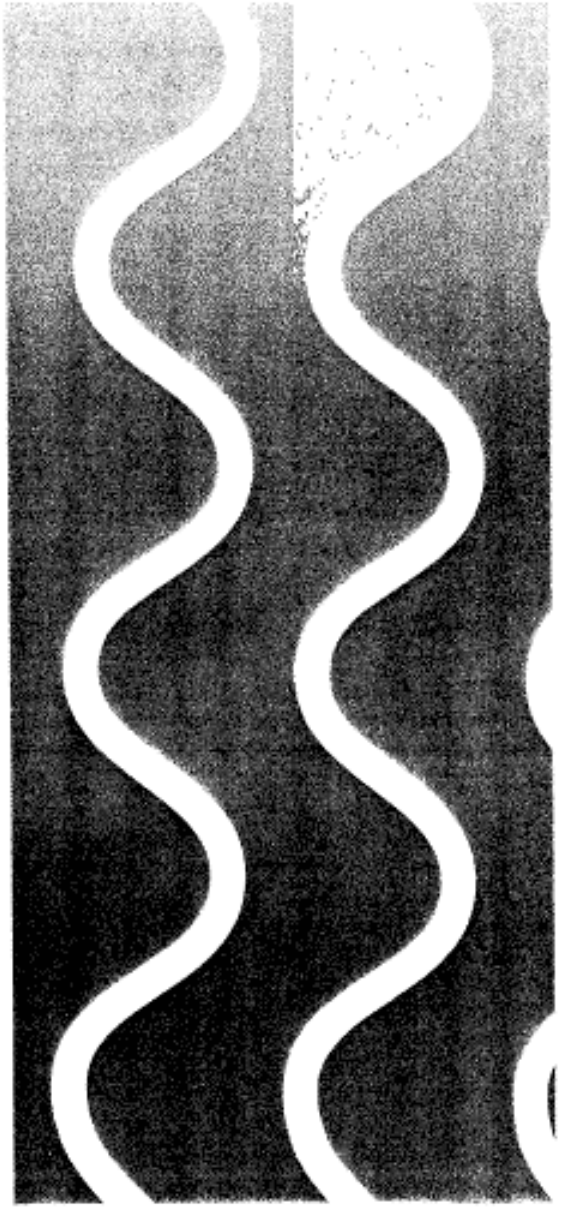
Recommendations regarding various support facilities may be included. Launching ramps, access areas, parking lots, marinas, pump-out facilities, emergency and rescue facilities and other facilities related to waterway use are possible subjects.

Shoreline and Vicinity Management

Water surface management is very important, but shoreline and vicinity management is significant. This is often true at smaller and mid-sized waterways in more urban areas and at tourist and resort locations.

In some areas, unplanned and uncontrolled waterfront development is a major cause of activity conflict on the water. Improper development along the shoreline can destroy the natural appearance of the waterway and can cause resource degradation. Excessive numbers of docks, slips, floats and mooring buoys reduce the area of water surface available for boating and other water-use activities. Shoreline and vicinity (e.g. back-lot developments) planning and management are needed to prevent these and other problems.

Shorelines can be managed in many ways. The appropriate approach depends upon the particular situation. Federal, state, county and local governments often have established rules and regulations relating to shoreline and vicinity management (wetlands protection, sewage disposal controls, tree and vegetation removal, etc.). In some cases, shorelines are in public ownership as parks, natural areas and other uses. Local zoning ordinances, if enacted, may regulate the specific types and density of uses permitted along the shoreline. However, in most instances local ordinances do not regulate the size, spacing and extension of docks; the number of slips allowed per dwelling or use; or the number of anchoring buoys, floats and other features at the water's edge.



On some waterways, permits are issued to regulate shoreline development. This approach is common along private waterways such as those owned by utility companies. Permits are licenses to use shoreline and the water's edge and they may be revocable. Permit fees can be charged to pay for permit processing and administration costs involving such items as the printing of informational brochures on rules and regulations.

Operational Element

The operational element of the waterway management plan concentrates on administration, personnel, equipment, maintenance and enforcement. It is the element of reality regarding the ability of implementing agencies to create and administer policies, rules and regulations in tandem with the physical element recommendations.

Operational recommendations include procedures, full- and part-time staffing needs, volunteer requirements and sources, use of outside contractors, and possible changes in roles and responsibilities for waterway management. Law enforcement, safety and rescue operations are a vital part of the operational plan element.

Legal Element

The legal element deals with recommendations on the acknowledgment and use of existing legal authority and on proposals for legislative change. Recommendations must address any unmet legal mandates imposed on the management agency. If legal authority to carry out the recommended management techniques is not in place, new legislation will be necessary or the desired techniques will have to be replaced by other solutions. Considerations should be given to the topics of liability and liability insurance.

Guidelines amending existing regulations and ordinances should be written at this time, and representatives and legal counsels of related agencies should be contacted. The process for amending existing regulations and ordinances normally requires public involvement (hearings) and is often a time consuming process.

Financial needs and funding source are paramount in making a plan feasible. Costs of implementing the recommendations must be estimated. The existing budget implications should be addressed and projections made. Sources of government, non-profit and private sector funding should be thoroughly explored, and services-in-kind and volunteer availability should not be overlooked.

Cost estimates for implementation can be developed using various methods: comparable costs, past costs on similar items, price quotes and discussions with knowledgeable persons.

If costs cannot be covered, implementation of the plan may have to be spread over a longer time period. The plan may have to be modified, perhaps to concentrate oniy on the recommendations that ensure safer boating and some others that are not as aggressive but are less expensive. Creative and resourceful approaches to financing will be necessary in many instances.

Promotional and Educational Element

A good educational and promotional element contains two major types of recommendations:

1) those covering the receipt of final input on the proposed management plan prior to adoption, and

2) those dealing with the manner in which the adopted management plan will be communicated to the public, to waterway users and to those responsible for implementing the management plan.

The final input on recommendations should be based on the already existing system of communications and citizen involvement initiated in Step 1. The effectiveness of this system to date should be considered and if effective, the original organization plan should be continued and used to obtain final input to the management plan. Any adjustments to the current system or any additional approaches required should be initiated at this time. Target interest group meetings, general public meetings or hearings, summary plan brochures and mail-outs with requests for response are a few specific approaches for consideration.

Specific recommendations should be made for publication, presentation and distribution of the adopted plan. Focus should be on how to reach and involve responsible public and private sector entities to increase their awareness and knowledge about overall plan recommendations and their individual and joint responsibilities for plan implementation. The audiences will be the general public, waterway users groups, administrative and enforcement agencies, private business interests and waterway planning and management professionals.

Extensive use of the media in traditional and innovative ways, speakers bureaus, and various public relations and training techniques should be considered. The “Citizen Involvement Guidelines” and the “Communication and Education Guidelines” sections of this Guide provide additional information and ideas.

Making Defensible Decisions

Good planning produces defensible solutions that will help planners and managers justify and explain their decisions and actions. Factual information, technical expertise, stakeholder participation, proper examination of alternatives, and objective recommendations contribute to the defensibility of solutions. Solutions based on facts and documented evidence will help ensure the objectivity which often produces the most defensible solutions. The factual side is important, but do not ignore the political side which can defy pure logic and objectivity. Objectivity, then, as it pertains to waterway use and management solutions, should be a broad-based term to include both factual and political rationale.

One approach to objectivity and defensibility is the creation of a Plan Effectiveness and Feasibility Rating Matrix. Unless a major research grant or special academic assignment is received, every precaution should be taken to ensure that the matrix is as simple as possible. It is nothing more than a tool to help planners make prudent decisions.

This matrix is one example of a systematic approach to evaluating both the effectiveness and the feasibility of solutions. In this approach, *effectiveness factors* are those relating to how well each recommendation is likely to solve the problems and realize the opportunities. *Feasibility factors* are those relating to the chances of successful implementation for each recommendation. Each recommendation is evaluated according to each effectiveness and feasibility factor using a scoring system, say a scale of “0” to “5”, with “0” as the lowest rating and “5” as the highest. Scores for each factor are totalled for each recommendation to determine that recommendation’s rating.

The developer and user of the matrix and scoring system has flexibility in the number and type of factors and the scoring range. The factors may also be “weighted” to reflect any differences in their importance.

Some examples of effectiveness and feasibility factors are:

Effectiveness Factor Examples

A. Accident reduction potential
B. Conflict reduction potential
C. Quality of user experience improvement potential
D. Environmental protection and enhancement potential
E. Overall user satisfaction and acceptance potential
F. Others

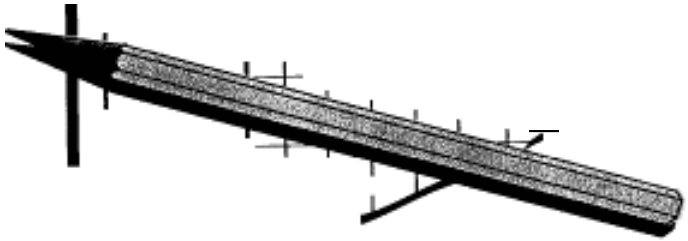
Feasibility Factor Examples

G. Ease of administration and enforcement potential
H. High benefit to cost potential
I. Financial-resource availability potential
J. Human-resource availability potential
K. Special-user or interest group acceptance potential
L. Limited new or revised legislation or regulatory potential
M. Others

EXAMPLE EFFECTIVENESS & FEASIBILITY MATRIX

RATINGS

SOLUTION I RECOMMENDATION	VENESS FACTORS — A	EFFECTI — — B c D E TOTAL	FEASIBILITY FACTORS — SUB- F G I H ~ TOTAL	TOTAL SCORES
1, 3Ok&~S~OPW ~ a,~fIti2/h1/ ~	*3 4 2 1 5 15*	*: 3 4 / 3 /3 :~*		



~ ~g~YfriAd	*323*	/	*5/4134*	/	*0*	*9*	*% 3*
	~j32		*4110123*	/	*7*	/ *3*	

recommendations will be the most effective, most feasible and most defensible. When recommendations do not receive high total scores or certain factors score low for recommendations, the planner may be able to modify the recommendations to improve their score.

t17

When the effectiveness and feasibility factors are determined, they can be used in a scoring and evaluation matrix similar to the one illustrated above. A matrix can also be developed by the planner or may

be obtained from other sources.

Financial Element

The object of this decision-making system is to have the highest possible score for each recommendation. High scoring

Please note that a plan effectiveness and feasibility matrix is only one approach and that systems of this type are only one tool for making final management plan decisions. Certain recommendations may score low on a systematic evaluation but may be absolutely necessary and appropriate from a purely safety, technical, environmental or political perspective.

Defensible decision-making is extremely valuable as planners and managers prepare to explain the rationale behind their decisions. This is where a plan effectiveness and feasibility matrix and the factual and political bases for decisions are indispensable. A carefully prepared statement of justification for each recommendation will go far toward creating an understanding of the true need for and value of that solution. Here are the beginnings of some justification statements:

- The facts from our user survey say that...
- Field research data showed that,..
- Aerial flight information shows that...
- Managers of several other waterways with similar conditions have solved their problems by...
- The law requires us to...
- The law allows us to...
- Budget and personnel constraints require us to...
- Cutbacks on traditional funding programs limit our ability to...

STEP 5 - Action

ACTION

The Action step prepares the plan for implementation. It identifies and sets priorities for a range of actions necessary to make the plan a reality. Some plan recommendations will require detailed and immediate actions. Other recommendations entail more general longer-range, ongoing or periodic actions. The Action step includes a detailed program intended to:

- describe the specific actions;
- indicate financial needs;
- identify roles and responsibilities of action agents;
- document funding sources;
- provide an implementation schedule;
- indicate priorities.

Tasks of this step are prioritizing and scheduling, funding, assigning and coordinating roles and responsibilities.

Prioritizing and Scheduling Actions

An action program typically covers a period of three to five years. Certain actions may be taken immediately and others may be scheduled beyond five years. Actions directly addressing water safety problems may be the “high priority” actions. In addition to safety, other factors such as staff availability, costs, available funding and legal constraints will need to be considered as part of the prioritizing and scheduling process. Actions could be categorized as follows:

- Early actions (immediate actions and actions that can be carried out next year);
  - Short-range actions (1-3 years);
  - Longer-range actions (4-5 years);
  - Periodic actions (annual review of the plan);
- Continuous actions (monitoring of resource, use levels, etc.).

Funding

A variety of public and private funding sources may be available to help pay for plan implementation. Grants, user fees, special assessments, donations and trust funds are possible ways to augment traditional capital and operating budgets. Cooperative cost sharing, various forms of privatization and public-private partnerships are some creative approaches becoming necessary to overcome traditional funding source limitations. If available funding is inadequate, a longer time schedule may be necessary until new sources are identified or priorities can be altered.

IMPLEMENTATION PROGRAM
MULTIPLE USE WATERWAY MANAGEMENT PLAN
EXAMPLE FORMAT

Waterway Management Recommendation	• Provide additional patrol boats on	weekends and holidays between Memorial Day and	Labor Day.

• Prepare a Boaters Guide.	• Obtain additional funding for patrols.	• Boating law enforcement agencies.	(Date)	(Source)
	• Budget funds for preparation of Guide.	• Boating law enforcement agencies.	(Date)	(Source)
	• Prepare Guide.		(Date)	**(Source)**
	• Distribute Guide.	• Waterway Management Agency.	(Date)	(Source)
Actions for Implementation	**Responsible Entities**	**Timetable**	**Possible Funding Sources**	
• Patrol the waterway between 10:00 a.m. and 10:00 p.m. during Saturdays, Sundays, and holidays.	• Boating law enforcement agencies.	• Waterway Management Agency.	(Date)	(Source)
• Patrol the waterway at random times during weekdays.		• Waterway Management Agency/others.	(Date)	(Source)
• Increase the pool of available deputies.	• Boating law enforcement agencies.	(Date)	(Source)	

Roles and Responsibilities

A management plan needs accountability; someone with the responsibility to take action.

The assignment of roles and responsibilities to certain agencies and organizations will avoid misunderstandings about who is responsible for each action. Some responsibilities are dependent upon an entity that is legally mandated and authorized to take action. Other responsibilities may be more related to the financial strength of an entity or the volunteer base that can be available.

Roles and responsibilities considered for assignment to agencies, organizations and individuals should be cleared with the providers before their assignment appears in the action program.

MONITORING

STEP 6-
Monitoring

A management plan should be a dynamic rather than a static document—a tool for directing, responding to and 'readjusting the conditions and the forces of change. The monitoring step ensures that the plan is part of a continuing process. The plan should be evaluated and updated regularly and when significant changes occur.

Monitoring the physical condition, use and users of the waterway should be ongoing. Monitoring assesses the waterway situation, identifying resource degradation, user overcrowding (or underuse), activity conflicts and other problems. A monitoring program should be included in the waterway management plan. Some suggestions for developing and applying a monitoring program are in the Guidelines section.

Monitoring enables planners and managers to compare changes of condition and the effects of the plan's actions with the established management objectives. Each management objective should be reconfirmed and the status and appropriateness of each specific recommendation evaluated in the monitoring process. Recommendations and actions can be categorized as "implemented' "still appropriate" or "no longer appropriate." The plan should be updated, amended or rewritten to reflect its status and relevance over time. Detailed studies may be necessary to properly monitor and amend the plan.

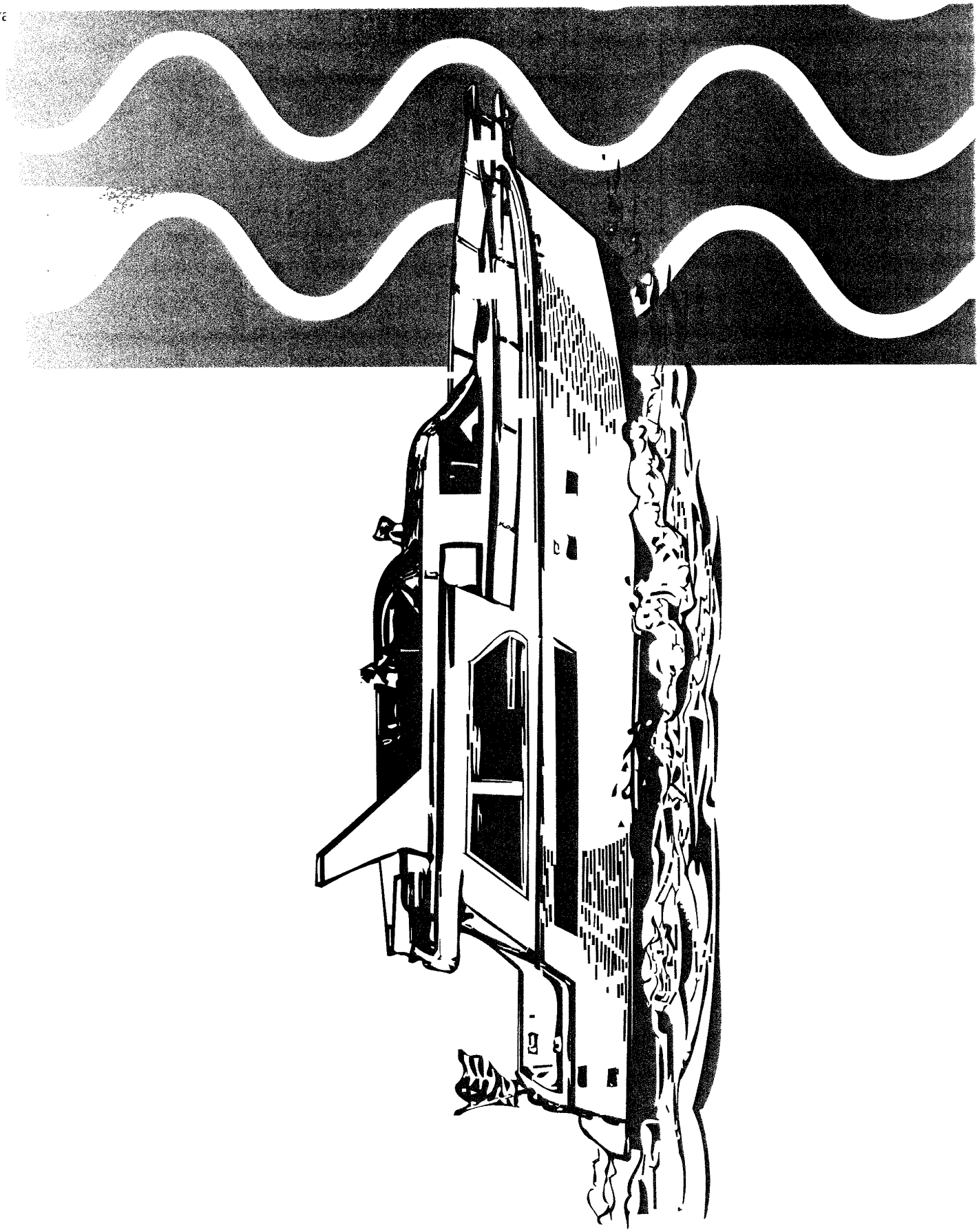
Although monitoring is a continuing activity, a formal plan evaluation and adjustment is recommended annually and a major reassessment and update is advisable every five to ten years.

Communication of Success Stories

Part of the Monitoring Step should include the documentation and communication of management successes.

These successes may relate to the use of certain management techniques, a particular monitoring procedure, an implementation activity, a creative funding approach or various other items relating to the waterway management plan. After the success stories are documented they should be shared with others.

0



~jl~

u

I

—I

w

Z
0
w
I— IZ
W

HS
,O~
~O
c~t
ct~

0

0
~
~
~
0
~
H

(W~ ‘4 ~

Z

~~

Z’4

O ~ W
0

TERWAY MANAGEMENT TECHNIQUES

Waterway management techniques encompass many levels of decision-making. Whether it's a decision applied at the concept planning stage of a waterway area or a day-to-day judgment of waterway management personnel, several techniques may be used to prevent or alleviate waterway activity conflicts.

Some techniques are easy to define, while others are troublesome and difficult to administer. Cost and user acceptance are other factors that should be considered. Various waterway conflicts and carrying capacity problems often require the application of different techniques.

This section of the Guide summarizes waterway management techniques. The summary was prepared from the research conducted during the preparation of this Guide and information contained in the U.S. Coast Guard's 1983 Report, A Guide to Managing Recreational Boating Areas.

The techniques in this section are not recommendations. Rather, they are many techniques from which to choose, given your particular waterway area and circumstance. There is no one single, best technique. Some techniques might be applied on an interim-basis while others might be permanent.

The management techniques are presented under six categories which acknowledge major differences and similarities:

1) Planning;
2) Information and Education;
3) Rules and Regulations;
4) Water Use Activity Controls;
5) Access Distribution and Development Controls;
6) Resource Protection.

Planning

General Planning and Master Planning

General planning can be effective in achieving appropriate water use levels and in reducing activity conflicts. This technique tends to be preventive, subtle, readily accepted by users and less costly. Planning also tends to be more easily applied than remedial problem solving techniques.

The planning process outlined in this Guide is an overall framework for addressing carrying capacity, activity conflicts and other management issues. Problems of overuse, overcrowding and underuse can be minimized through more effective comprehensive planning.

Dispersing Activity Areas

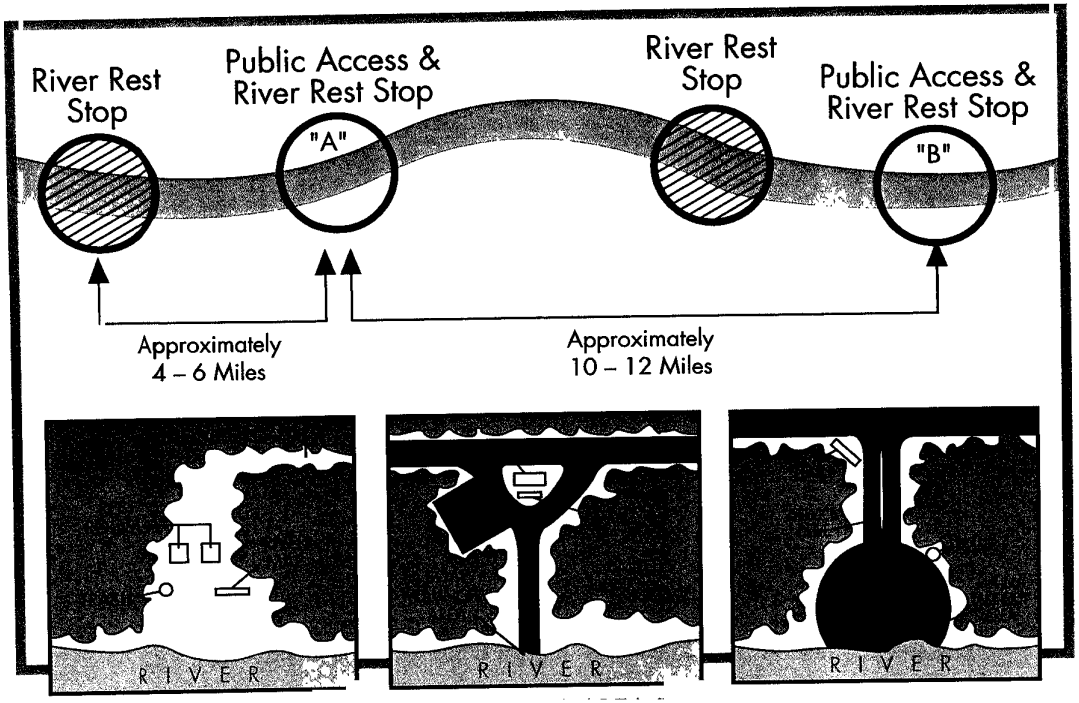
The carefully selected location and distribution of activity areas can help prevent overcrowding, activity conflicts and resource overuse. Planners can disperse recreation and other activity areas at waterways to allow for more evenly distributed use of the resource.

While distributing launching ramps, fishing access points, marinas and other activity areas throughout a waterway may be advantageous, the costs of operation and maintenance may increase considerably.

Planning and Designating Public Use Activity Nodes

Planning and designating activity nodes can help reduce conflicts between waterway users and adjacent landowners. These conflicts are common along many waterways, especially rivers. Many times, river users are not aware that land along the river is privately-owned.

Evaluation of the Plan



RIVER REST STOP RIVER ACCESS AREA “A” RIVER ACCESS AREA “B”

Examples of Waterway Planning Management Techniques:

General planning and master planning

- Dispersing Activity Areas

Planning and designating public use

- Separating conflicting activity areas and planning areas for homogenous user groups
- Planning more at the regional level
- Planning for special events
- Planning for emergencies

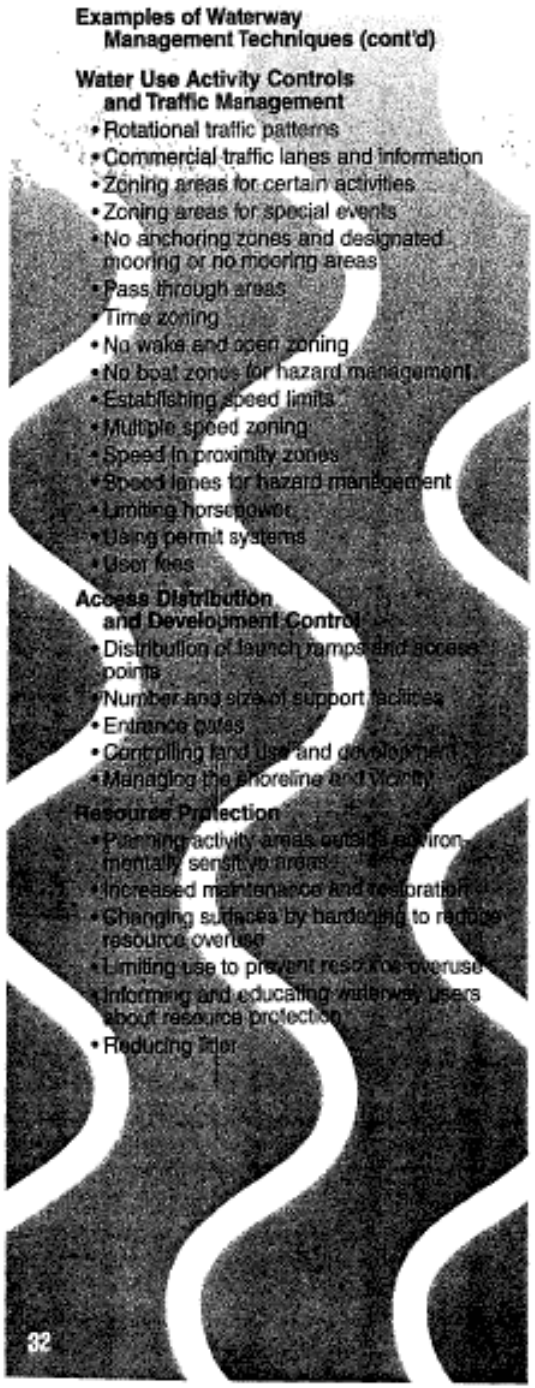
Information and Education

- Providing safe boating information
- Providing information about how to use the waterway
- Developing and implementing a boater education and safety program
- Preparing an educational package
- Preparing and distributing a boating guide and map
- Using navigational charts and aids
- Network of numbered and lighted buoys
- River condition information systems
- Radio broadcasts
- Wind warning systems

Rules and Regulations

- Increasing enforcement
- Strict enforcement of existing rules and regulations

Public use activity nodes should be planned, designated and publicized in order to provide for an enjoyable waterway experience and to reduce conflicts with adjacent landowners. In the case of rivers, these nodes might include basic facilities such as public access areas, river rest stops, camping areas and fishing access points. Public access points might be provided approximately every ten miles. River rest stops might be approximately five miles apart. Public access areas can double as river rest stops, while providing basic facilities. When planning waterfront areas, it is wise to consider available nearby access roads, physical suitability of the site (size, topography, soils), suitability of the shoreline, adequate water depth and land ownership.



Examples of Waterway Management Techniques (cont'd)

Water Use Activity Controls and Traffic Management
- Rotational traffic patterns
- Commercial traffic lanes and information
- Zoning areas for certain activities
- Zoning areas for special events
- No anchoring zones and designated mooring or no mooring areas
- Pass through areas
- Time zoning
- No wake and open zoning
- No boat zones for hazard management
- Establishing speed limits
- Multiple speed zoning
- Speed in proximity zones
- Speed lanes for hazard management
- Limiting horsepower
- Using permit systems
- User fees

Access Distribution and Development Control
- Distribution of launch ramps and access points
- Number and size of support facilities
- Entrance gates
- Controlling land use and development
- Managing the shoreline and vicinity

Resource Protection
- Planning activity areas outside environmentally sensitive areas
- Increased maintenance and restoration
- Changing surfaces by hardening to reduce resource overuse
- Limiting use to prevent resource overuse
- Informing and educating waterway users about resource protection
- Reducing litter

Planning and designating other types of activity nodes such as boat access camp sites, transient moorages and temporary tie-ups may help reduce conflicts. For example, transient moorages for cruising boats could be used to draw traffic away from a working harbor.

Information and maps of the activity nodes should be prepared to direct waterway users. Strategically located and well-designed directional and location signs are needed in compliance with local municipal zoning ordinances.

Separating Conflicting Activity Areas and Planning Areas for Homogenous User Groups

User conflicts can be reduced by separating incompatible activities. Some examples include separating water-skiing areas from boat fishing areas, swimming areas from boating areas and commercial vessels from recreational boats. Each individual activity area can be safer and achieve a higher carrying capacity by using this technique.

Application of this technique requires knowledge about the basic incompatibility of various activities and participants. Although this technique can be used remedially to solve conflicting activity situations, it is less costly and more advantageous to separate these potentially conflicting areas when initially planning waterway areas (see “Area Zoning”).

Planning areas for waterway users who are involved in similar activities can be very effective in reducing conflicts. The technique can be applied to entire waterways or sub-areas of larger waterways. It is most commonly used at smaller lakes and reservoirs, where non-power and limited power boating activities are encouraged.

Planning More at the Regional Level

Understanding the regional waterway situation and planning more at the regional level may help to reduce waterway conflicts. Thus, it may be possible to separate conflicting activity areas and plan areas for homogenous user groups on a regional level. Opportunities may exist within the region to plan different waterways for different management objectives.

Planning for Special Events

Special events often conflict with regular waterway activities. Fishing contests, boat races, fireworks displays and air shows need to be carefully planned and scheduled well in advance. Special event times should be planned and scheduled to avoid peak use periods.

Many waterways require permits for special events. The permit process allows waterway managers to prevent scheduling conflicts and to determine accountability when problems arise. Waterway users should be informed about these events, so they can participate in them or avoid them (see Zoning Areas for Special Events).

Planning for Emergencies

Plans to address emergency situations are needed at waterways. Waterway users should receive directions on what to do in case of emergencies—whom to contact for assistance, the names and locations of nearby medical facilities, and other advice. This information can be included in a “Boaters Guide” or a special brochure and be posted on bulletin boards, at access areas, restrooms and telephones. A local Water Safety Hotline might also be established.

Information and Education

Providing Safe Boating Information

The public and private sectors, including the marine industry, provide information about safe boating. A variety of techniques have been used including, but not limited to, informational brochures, public service announcements and water safety videos. These techniques can receive widespread use and are generally acceptable to most boaters and other waterway users.

Providing Information About How to Use the Waterway

Basic Information

More and better information to users about how to properly use the waterway may help prevent activity conflicts, reduce accidents or lessen user over-crowding and resource overuse. This technique is more subtle than most other management techniques. People need to be reminded about why boating laws and management controls are necessary. Programs, handouts and brochures can educate users and make them aware of their responsibilities for protecting natural resources and the quality of experience of other waterway users.

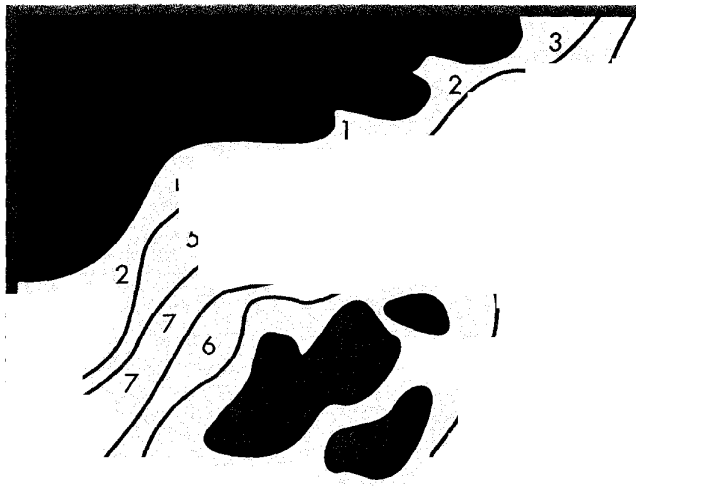
Information material could be presented during interpretive programs, movies and slide shows; in brochures or handouts; or placed at well-selected sites, such as com
fort stations, activity area entrance points and boat ramps. Information could be presented or provided to area schools.

Signs

Signs and message boards are useful in communicating information about directions and regulations. Signs should have positive wording and clear messages for maximum effectiveness. Attractive, courteous and helpful signage is a good, relatively easy technique. Informational signs should be located at access areas and restrooms, and on bulletin boards.

BOATING
GuiDE
0

Evaluation of the Plan



NAVIGATIONAL CHARTS 7

12
2
3
8
12
22
25 27
32
16
20
19
27
25
35

Developing and Implementing a Boater Education and Safety Program

A special "Boater Education and Safety Program" could be developed for your waterway. The program might consist of basic information to waterway users through mailings, newsletter articles and signs. Posting of information at access areas, restrooms, bulletin boards and other key locations at the waterway can be effective.

Boating experiences and boating safety will improve if every boat operator has fundamental knowledge of basic boat operation, waterway regulations, common courtesies and safe boating.

The Boater Education and Safety Program might also be expanded to include boater education and safety training courses which could be offered by the U.S. Coast Guard Auxiliary, U.S. Power Squadron and other appropriate entities. It might also be possible to coordinate the scheduling of Courtesy Marine Examinations (CME's) with the U.S. Coast Guard Auxiliary. Public boat access areas are generally excellent locations for these CME's.

Programs offered by the National Water Safety Congress, the National Safe Boating Council, and other agencies, are advantageous in addition to active participation in National Safe Boating Week.

Communities should be encouraged to organize a local water safety council through assistance of the National Water Safety Congress.

Preparing an Educational Package

A separate informational package can be prepared and could be used in the "Boater Education and Safety Program." The package could include:

- Summary of state boating rules and regulations (especially for rentals and out-of-state boaters);
- List of any special boating regulations for the waterway;
- List of safe boating practices and common courtesies;
- A boater safety check list; and
- A waterway boater's guide.

Preparing and Distributing a Boating Guide and Map

A "boaters guide" with map can be prepared and distributed. A well-designed, clearly written piece, with a large map and large, easy-to-read type is most effective. The guide should list and graphically depict the boating rules and regulations for the specific waterway. A simple layout and large typeface will make the guide easy to reproduce and use. Restricted and limited boating use areas and potentially hazardous areas should be shown on the map.

Using Navigational Charts and Aids

Navigational charts and navigation aids are used to help reduce water use conflicts and increase safety. These materials include charts, maps, waterway markers, and vessel traffic systems (VTS). They are commonly used with success at large, heavily used waterways. Navigational charts are required items on navigable waters of the United States.

Network of Numbered and Lighted Buoys

Navigation systems of numbered and lighted buoys or fixed marks are particularly useful for large waterways with irregular shorelines. This system provides navigational assistance to boaters during periods of darkness or poor visibility. The buoys are positioned so that a boater can see the next buoy in the line of travel from any other buoy. Buoys should not be placed on the water without coordination with the local law enforcement officer.

Cost is a major drawback to the widespread use of this technique. These costs are often borne by the state governments, U.S. Coast Guard and other waterway agencies. However, waterways with heavily populated shorelines sometimes use the buoy or marker technique to assist waterfront occupants find their way to and from other waterfront locations at night and when visibility is poor. In these situations, waterfront occupants, with the help of waterway associations, may help pay for the system.

In addition to lighted buoys, it is helpful to provide lights at boat ramps. These lights will help boaters find their way off the water.

River Condition Information Systems

Various types of river condition information systems have been instituted throughout the country. A telephone hotline could be used to provide “river runners” with up-to-date information on river flow rates. Using this information, a boater can determine which areas are safe for any particular skill level.

Color coded information systems can be used to warn boaters of hazardous conditions. River conditions might be classified as follows:

Red Indicates that of water temperature plus air temperature is less than 120^0F: unsuitable conditions.

Yellow Indicates that water temperature plus air temperature is more than 120^0F, but water level is high: generally unsuitable conditions.

Green Indicates that water temperature plus air temperature is more than 120^0F, and water level is low: suitable conditions.

This information can reach the public through the media.

When developing such a system, please contact local and national canoe organizations such as the American Canoe Association (ACA), the American Whitewater Association (AWA) and the U.S. Canoe Association (USCA). Skill levels vary widely among canoeists. River conditions, which could be fatal for a novice, may be relatively safe for an experienced group.

River condition information systems will help increase safety for river use by providing users with critical information to carefully plan their activities.

Radio Broadcasts

Low-power AM radio broadcasts are sometimes used to convey waterway information. Waterway conditions, warnings, rules and regulations, advisories and other information are included.

Wind Warning Systems

Wind warning systems can be implemented on various types or sizes of waterways. One technique consists of a public address (PA) system. Generally, to be effective, the PA system must be heard over the entire body of water.

A popular wind warning system for large lakes and ocean bays is the use of colored flags or beacons. Generally, a red flag or light means "Danger, winds over 25 mph;" a yellow flag or light means "Caution, winds from 15 mph to 25 mph;" and a green flag or light means "Safe Conditions, winds under 15 mph." A major advantage of the red, yellow and green color scheme is that its meaning is easily understood by the boating public, due to its similarity to automotive traffic light systems. The flags or lights should be seen from any point on the body of water.

A wind waming system can be a supplement to the "Small Craft Warning System" which reports on storms.

Rules and Regulations

Rules and regulations tend to be direct, clear and concise compared to many of the other management techniques. Increasing patrols and stricter enforcement of existing rules may be favored by waterway users over the creation of new rules and regulations.

Increasing Patrols

The mere presence of waterway patrols makes boaters more cautious, imparts an implicit safety message and shows that rules will be enforced. Some waterways increase the number of patrol boats during peak use periods (11:00 a.m. to 4:00 p.m.)
on Saturdays, Sundays and holidays between Memorial Day and Labor Day. Increasing the number of patrol boats, together with strict enforcement, can be very effective. It can also be costly.

More innovative approaches may be needed to stretch limited dollars. These approaches might include increasing patrols through interagency cooperation and coordinated schedules, and the use of volunteers. Costs of a patrol boat and other necessary equipment, (such as lights, radios, public address system and safety equipment) will have to be determined and budgeted. Increasing of patrols is most appropriate for waterways that are heavily used and currently underserved with patrol boats and staff.

Strict Enforcement of Existing Rules and Regulations

Strict enforcement of existing regulations can help solve and prevent many waterway use problems. More patrol boats and stricter enforcement of existing regulations could help reduce the number of boater conflicts and increase the carrying capacity of the waterway.

Application of this technique might be costly, especially when additional patrol boats, vehicles and patrolling officers are required. Although it may be costly and sometimes difficult to administer, strict enforcement is effective and generally acceptable to users.

New rules and regulations may be necessary to enhance boating safety and to address specific problems that cannot be solved with existing or other new techniques. New rules and regulations can be imposed at the federal, state or local waterway level.

Logical, objective decisions are necessary when law makers establish new rules and regulations. Understanding the impacts of new laws and the participation and input from affected parties are critical in this process.

Overregulation and the use of extreme measures based on a specific incident or a special interest group concern should be avoided. A new law may solve one problem, but create many more.

Age Limits

Some places have age limits for certain waterway activities. Age limits are often tied to adult supervision or some form of mandatory safe boating education. For example, in some states persons younger than 12 years of age must be supervised in order to operate a motor vessel with 10 hp or more. In others, a boating safety education certificate is required for persons 16 and younger in order to operate a power vessel. Many states have enacted similar

legislation.

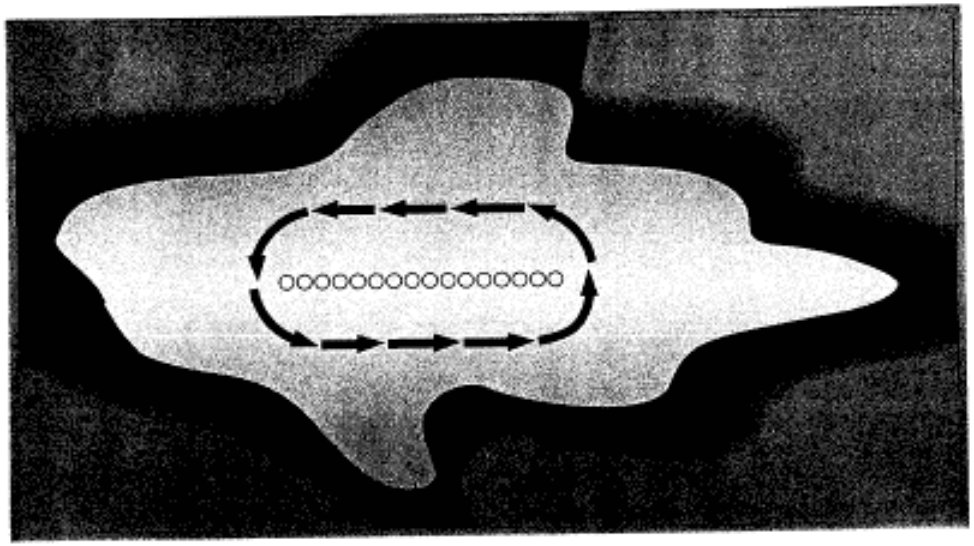
IV idatory Education

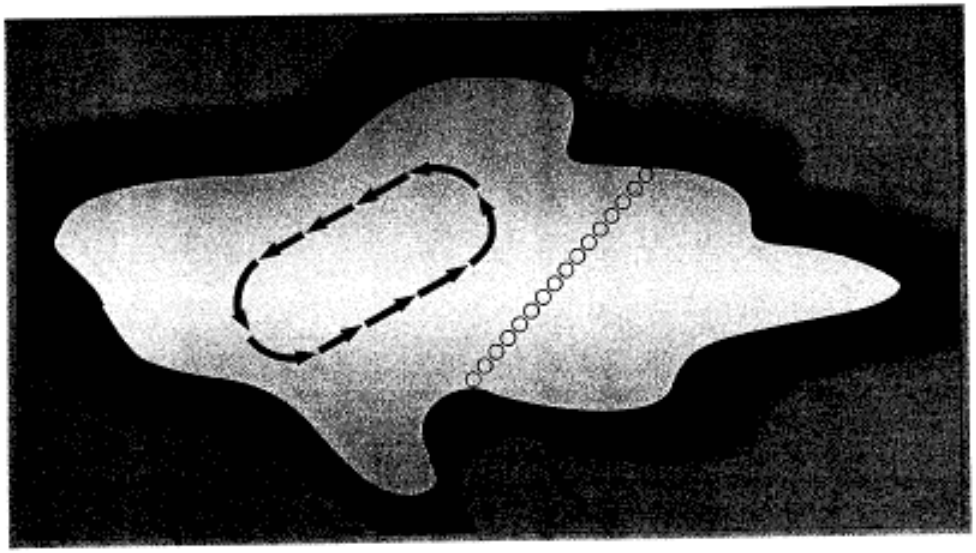
Several states have adopted mandatory education requirements for all recreational boaters. These requirements are phased over a specific time period. Some states also require mandatory education for operators of personal watercraft.

Boat rental establishments (commercial liveries, etc.) are sometimes required to provide education and training prior to waterway use. Waterway managers may consider these requirements as part of the license or permit which typically allows for the operation of rental facilities under certain criteria and standards.

Licensing Requirements

All waterway users should know the laws. Accident data suggest that the individuals involved in fatal boating accidents operated their vessels in a manner that portrayed a lack of basic knowledge of the rules of the road (collisions, speed); a lack of understanding of safe boating practices (speed, alcohol, improper loading, inclement weather); and a lack of proficiency in operating skills (capsizings, collisions, weather).





Few states require a recreational boat operator's license; some are considering such legislation. Several countries have enacted laws that require boat operators to have a license. If licensing is used, it is usually applied on a statewide or national level to avoid confusion and provide uniformity of laws.

Water se Activity Controls and Traffic Management

Rotational Traffic Patterns

A rotational traffic pattern is one of the more common boat traffic management techniques used throughout the country. A preset traffic pattern can help ease boating congestion, reduce activity conflicts and create more uniform traffic flow. This technique can be applied to specific activities or activity areas within a waterway (waterskiing) or to the entire waterway area. The rotational pattern is best utilized on small to medium-sized lakes and bays (1,500 to 2,500 acres in size). A fairly round and regular shoreline configuration makes the use of this technique most effective.

Rotational traffic patterns can be implemented by isolating a rectangular area, marked by buoys, with specific instructions. This area may be limited to traffic headed in a counterclockwise direction only. At small lakes, the entire water surface might be designated for counterclockwise rotation.

The rotational technique helps create safer boating conditions by reducing boating congestion and activity conflicts. It also enables an area to support more waterski traffic at any given time.

Coiuiuei'cial Traffic Lanes and Information

Conflicts between commercial traffic and recreational traffic is a problem along some waterways. Unlike many other boats, big ships must often keep to a narrow channel, and Rule 9 of the rules of the road specifically states that small craft "shall not impede the passage of a vessel which can safely navigate only within a narrow channel or fairway."

The establishment of commercial traffic lanes in heavy use areas (e.g., harbors, ports) can help reduce these waterway activity conflicts. The commercial lanes (sometimes referred to as Safety Areas) can

or other navigational information.

Recreational waterway users should be informed and educated about the dangers of travelling close to commercial vessels. Recreational boaters need to be aware of the constraints under which these big ships operate, such as the fact that: it takes 4 to 6 minutes and 3,000 to 4,000 feet for a ship to stop after its engines are reversed; larger, difficult-to-maneuver ships cannot successfully avoid smaller craft in narrow channels; and it often takes less than 10 minutes for a fast ship to reach you once you spot it in clear weather and in hazy weather a lot less. This information, along with a "Collision Avoidance Checklist" such as the following, can be included in an informational brochure for recreational boaters:

- Avoid ship channels where possible, or cross them quickly at right angles.
- Be alert. Watch for ship traffic.
- Think before you drink!
- Be seen, especially at night. Carry a radar reflector.
- Know whistle signals—five or more mean danger.
- Use radio channel 13 for bridge-to-bridge communication. Monitor channel 16.
- Use up-to-date navigation charts.
- Keep in mind that few survive collisions with ships.
- When in doubt, keep clear.

Areas Zoned for Certain Activities

The zoning of entire waterway areas or designated subareas for certain activities is a widely used management technique. Designating separate areas for activities which normally conflict (such as boat fishing and waterskiing, powerboating and swinmiing) can result in the accommoda

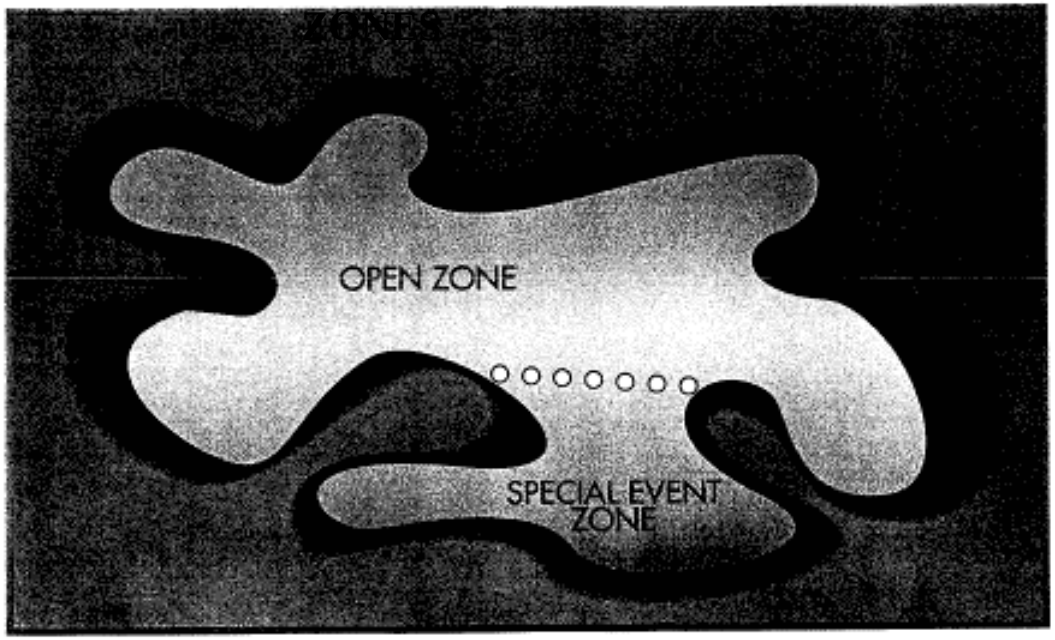
- Waterskiing Zones—Waterskiing zones are sometimes used on lakes and bays to segregate waterskiing from other activities such as sailing, canoeing and fishing. The zones are usually marked by buoys or indicated on a map. This technique can help reduce activity conflicts and make waterskiing safer.

- Activity Area Zones—Special zones for the operation of watercraft, such as personal watercraft (PWC), are not widely used. However, this technique may be considered where usage is popular and conflicts are serious. Special zones may benefit the one-person PWC users who want to be totally independent of other watercraft including two- and three-person PWC.

Trends show that most of the PWCs being built today are of the larger two- and three-person versions. Special zones are marked with buoys or are indicated on a map. Dock or launch facilities are often provided for easy access to the area. No other boat activities are allowed in these designated activity area zones.

· **Buffer** Zones—Buffer zones are sometimes used to reduce conflicts at launch ramps and other areas of activity. The zones are marked with buoys or are indicated on a map.

SPECIAL EVENT



Zoning Areas for Special Events

Segregated special event zoning may be considered on lakes, ocean bays and flat water rivers having frequent special events with high speed activities such as waterskiing tournaments and boat races. The nature of these activities requires segregation from normal boating activities for safety reasons. Special event zoning eliminates activity conflicts and increases safety at these times. Usually, a highly specialized zone, such as a competitive waterskiing area, has permanent courses which are isolated from other traffic. Signs and/or maps should inform the public of the special event zone.

No Anchoring Zones and Designated Mooring or No Mooring Areas

"No anchoring" zones can be established and "mooring" or "no mooring" areas can be designated to prevent obstructions and congestion on heavily used channels. These techniques are effective in keeping boat traffic moving through these channels. The technique is sometimes a

tion of more boats while increasing safety and enjoyment. Examples of how this technique can be applied include:

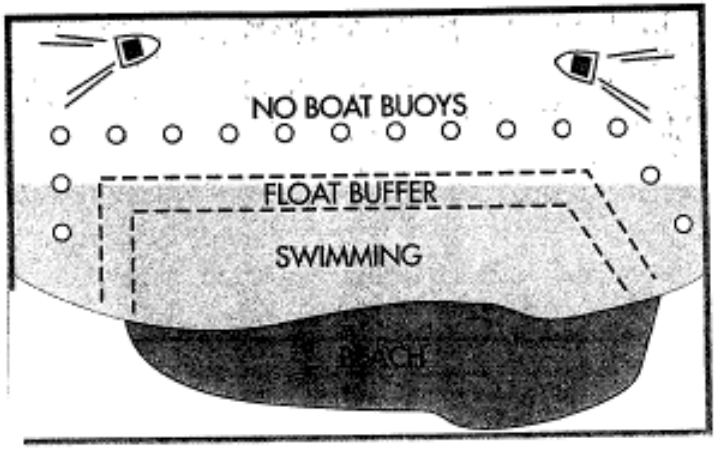
- Designating portions of the waterway for different activities;
- Designating the type of boating over the entire waterway; and
- Installing buoys on the waterway to designate waterskiing lanes or restricted boating in coves, swimming and other areas.

Here are some examples of how zones might be established on a waterway:

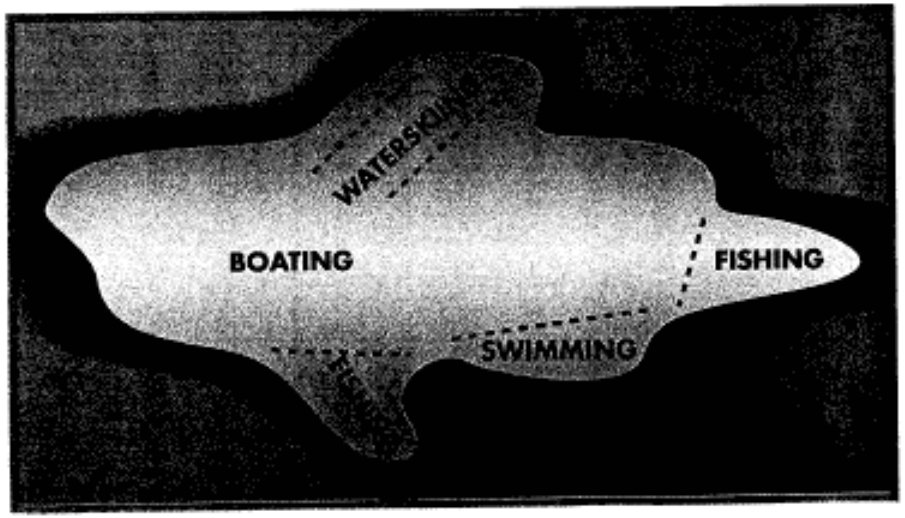
- Fishing Zones—Fishing zones are usually created in upstream or cove areas to preserve the quality of fishing. These zones are established by either making

AREA ZONING

an area "No Wake" or setting the speed limit below 6 mph. An alternate method of creating a fishing zone involves marking an area with buoys or signs or indicating it on a map. These zones might allow only low speed activities that would not interfere with fishing. This technique can be implemented on lakes, bays or flat water rivers where waterskiing and other high speed activities adversely affect fishing. This technique can help reduce activity

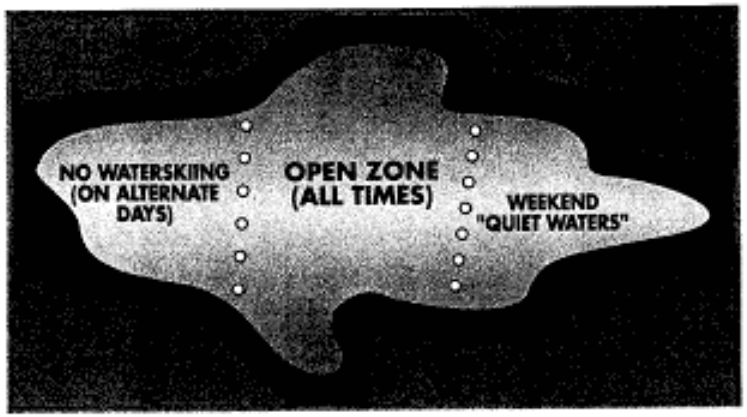


conflicts, improve fishing conditions, and protect small boats and canoes from damage due to excess wake.



SWIM ZONES

- Swim Zones—Designated swimming areas or zones are used where both boating and swimming are prominent. Like fishing zones, swim zones can be successfully implemented on lakes, ocean bays and flat water rivers. The most simple type of swim zone is an area sectioned off by a string of bright-colored floating buoys. A "buffered" swim zone can be created by placing a set of navigational "No Boat" buoys beyond the swim area. The area between the floating buoys and the "No Boat" buoys thus becomes a "buffer zone," where neither swimmers nor boaters are allowed. An alternative to the string of buoys is a series of docks or rafts sectioning off the area.



TIME ZONING

problem with fishing boats that want to anchor near locks or in a narrow channel.

Pass Through Zones

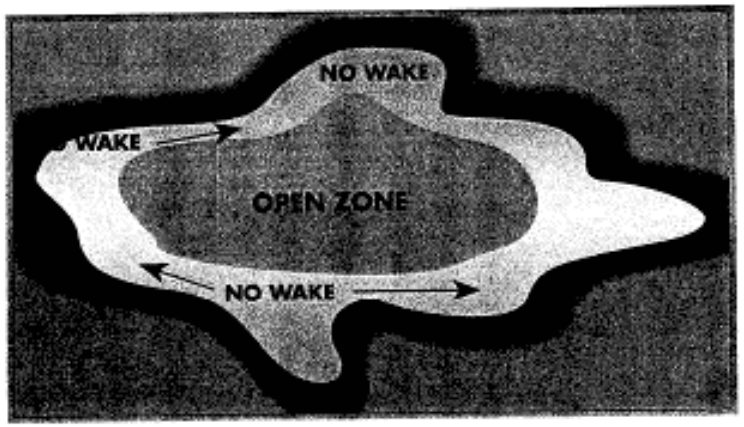
"Pass through" zones and regulations to help move boat traffic more safely through narrow waterways. These zones are generally used along rivers and narrow waterway segments, especially in areas near private waterfront developments. The zone serves solely as a transportation channel, with recreational activities prohibited. They can be effective in reducing conflicts between recreational boating (waterskiing, PWC riding, etc.) and adjacent development.

Time zoning establishes days or times of the day when certain activities may occur. This technique can be applied to areas where high traffic density or space limitations tend to create activity conflicts. For example, a lake with increased activity on weekends could prohibit waterskiing and high speed traffic in cove areas, thus increasing safety and reducing noise on weekends. Another example relates to areas which experience diverse activities over limited water space. This type of area could be managed with different time zones or alternate days for sailing and waterskiing. Waterskiing could be one day and sailing another or waterskiing could be only in the morning and sailing only in the afternoon or vice versa.

Enforcement of this technique often requires a "presence" of enforcement officers among the boaters. Time zoning can be very effective in reducing activity conflicts and increasing safety and the quality of experience.

The "No Wake" zone is probably the most widely used management technique. Nearly every state has a law that requires "No Wake" or "Slow and No Wake" in some areas and especially near the shoreline. The "No Wake" zone technique helps prevent damage to shoreline structures, to craft moored in shallow waters and to craft tied to docks. It helps reduce shoreline erosion, makes congested areas safer and reduces activity conflicts. Some states imply "No Wake" by setting 5 mph to 6 mph speed limits within 100 to 300 feet from shore on all types of waterbodies.

For some areas, "No Wake" zoning is combined with the "Open" zone, an area open to all activities. This combination allows high and low speed activities to be



Time Zoning

segregated on a single body of water. Canoeing and fishing might be suitable around the perimeter, while waterskiing and high speed boating are restricted to the center. A 35 to 50 mph speed limit could be set in the “Open” zone if desired.

“No Wake” zoning is a commonly used technique for hazard management to prevent collisions, groundings and swamp ings. The zone is usually marked by buoys or signs and sometimes indicated on a map. This “No Wake” zone typically covers areas with shallow depth or submerged objects. The “No Wake” zone may also apply where two or more channels converge, and there have been numerous collisions and swampings. Designating the convergence areas as “No Wake” zones forces approaching vessels to slow down and avoid accidents.

“No Wake” zoning may be used to protect sensitive wildlife, plant life and natural areas. For example, some waterways use “No Wake” zoning at the end of coves to protect prime fish-spawning sites.

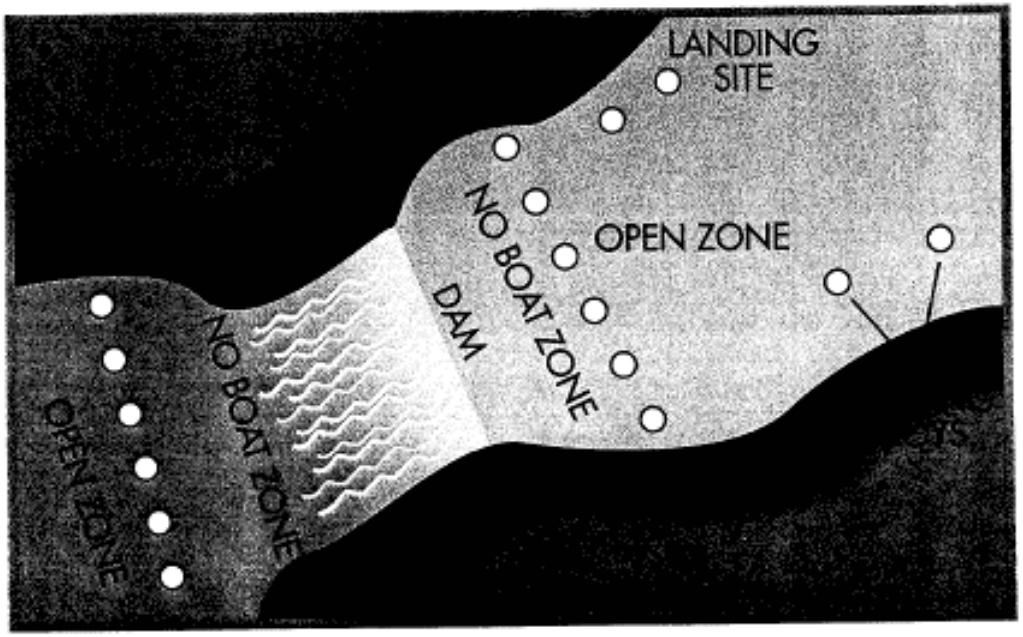
“No Bo~ Zo ics and “Restricted” Lreas for lIaz’ rd Management

“No Boat” zones and/or “Restricted” areas can be used to prevent boats from operating too close to dams, spillways, powerlines, waterfalls and other potentially

life-threatening hazards. These areas should be marked with waming buoys and/or signs and shown on maps and charts. Signs and warning devices should be placed and maintained in accordance with agency sign and graphic standard guidelines.

Where strong currents exist or steady water flows over dams or falls, warning signs and buoys should be placed far upstream and downstream from the

NO BOAT ZONES



hazardous area. A boater may also fall overboard while maneuvering around obstacles—a danger that may be prevented if a means of portage is made available. On navigable rivers, a lock or series of locks and dams are used by recreational and commercial vessels.

Establishing Speed Limits

Speed limits are sometimes established to reduce water use conflicts and enhance boating safety. This technique is more common at heavily used waterways. Speed limits can be established for both day and night. Speed limits might be imposed only during peak use periods, such as daylight

Time Zoning

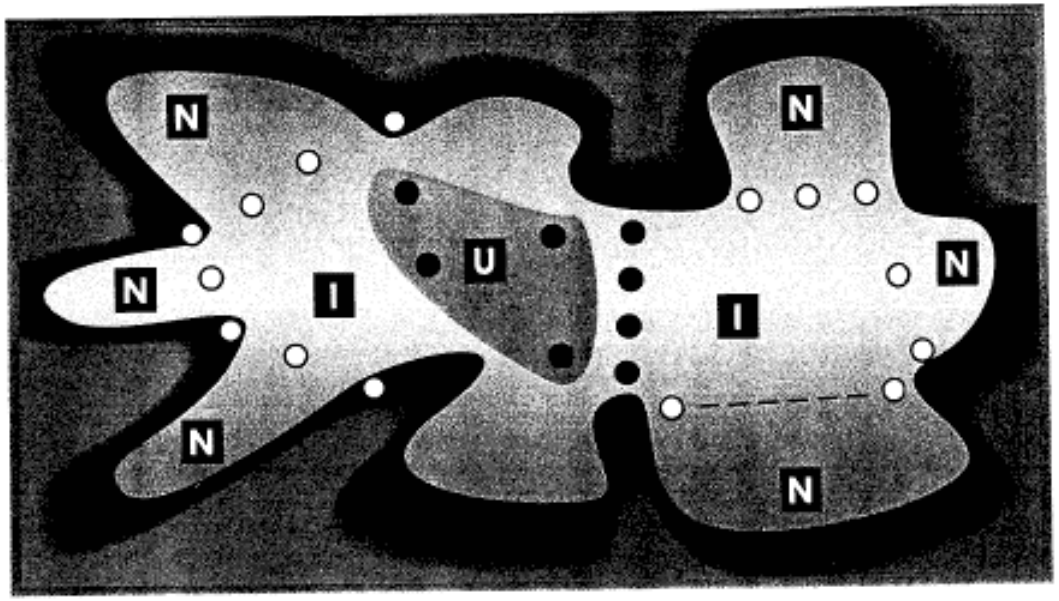
hours on summer weekends and holidays, between Memorial Day and Labor Day. Nighttime speed limits might apply between sunset and sunrise throughout the year.

Waterway users have to be informed about speed limits by providing written information and posting speed limits at public and commercial launch ramps and marinas. Enforcement of speed limits may be a problem due to the technical difficulties of determining accurate boat speeds.

Multiple Speed Zoning

Multiple speed zoning usually consists of two or more speed zones on the same body of water. For example, a lake may have a “No Wake” or 6 mph speed zone, a 15 mph speed zone and an unlimited speed zone. These zones can be marked by buoys or indicated on a chart. Multiple speed zoning is less commonly used than general speed limits and “No Wake/Open” zoning. It is most applicable to large bodies of water with moderate to high density traffic and with many islands, coves and channels.

Although multiple speed zoning can help reduce activity conflicts and cause safer conditions, adequate personnel must be available to enforce the various speed limits.



Unlimited Speed flintermediate Speed ~ No Wake

O No Wake Buoy or Sign 0 Speed Limit Buoy or Sign

(Depth Dependent) (Depth Dependent)

Speed in Proximity Zones

This technique is being used by several states to require slower speeds of specified watercraft operating within a designated distance of other watercraft and waterway users. For example, a rule might require watercraft to slow down to 5 mph or no wake when within a certain distance (usually 100 or 200 feet) of otherstopped vessels, swimmers, surfers, anglers, skiers, or the shoreline.

Sp ed Lanes br Hazard an~ ~eni ot

Speed lanes are useful for segregating high and low speed traffic and for hazard management. This technique is most commonly used on large shallow lakes with many submerged objects, such as stumps and rocks. Speed lanes are set up where no submerged objects exist, thus creating a marked “safe boating” area. Boaters may use the entire waterway, but use outside the designated speed lane is at the user’s

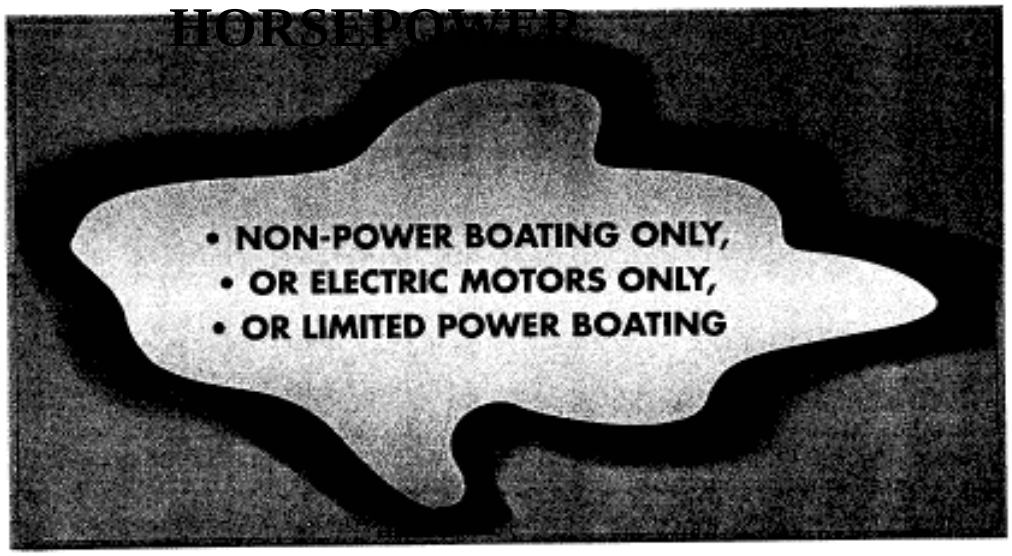
Time Zoning

Time Zoning

This technique provides increased safety through prevention of groundings, collisions with submerged objects, skiing accidents and damage to boats. An existing channel or deep water area is necessary for successful use of this technique.

Limiting Horsepower

This technique is generally used on small lakes or on lakes managed as a primitive area or water supply reservoir. A horsepower limitation is usually set at one of the following limits: 1) no motors, 2) electric motors only, or 3) less than 10 horsepower. Horsepower



limitations can help make an area more desirable for canoeing, fishing or sailing. Prevention of excess wash and wake and the preservation of natural conditions are primary benefits. The use of this technique restricts the availability of Sport Fish Restoration Funding (Wallop/Breaux) for public access projects.

Using Permit Systems

Permit systems are another method of controlling the number of users for a given area. These systems are most often used at popular whitewater canoeing and rafting areas to prevent overuse and dangerously overcrowded conditions. Generally, use is regulated during the summer months, Memorial Day through Labor Day. The number of issued permits is allocated between private boaters and commercial outfitters on a percentage basis. Permits could be issued according to a first-come-first-served, price, lottery, merit or advanced reservation system. Each method has certain disadvantages and advantages that managers must carefully consider.

Permit systems should pertain to areas located between designated controlled access points. This type of system has also been effective on wilderness lakes and rivers where it is desirable to maintain the natural state of the area.

Time Zoning

Permit systems could also be used to inform and educate waterway users and to help offset management costs, rather than for controlling the number of users. For example, “boaters” could be required to obtain a permit prior to using the waterway each season. The fee might only pay for the administration costs incurred to issue the permit. When boaters purchase the permit, they could receive a map showing the waterway and buoy system, plus a listing of boating facilities, and rules and regulations. Unsafe and environmentally sensitive areas could also be designated.

Time Zoning

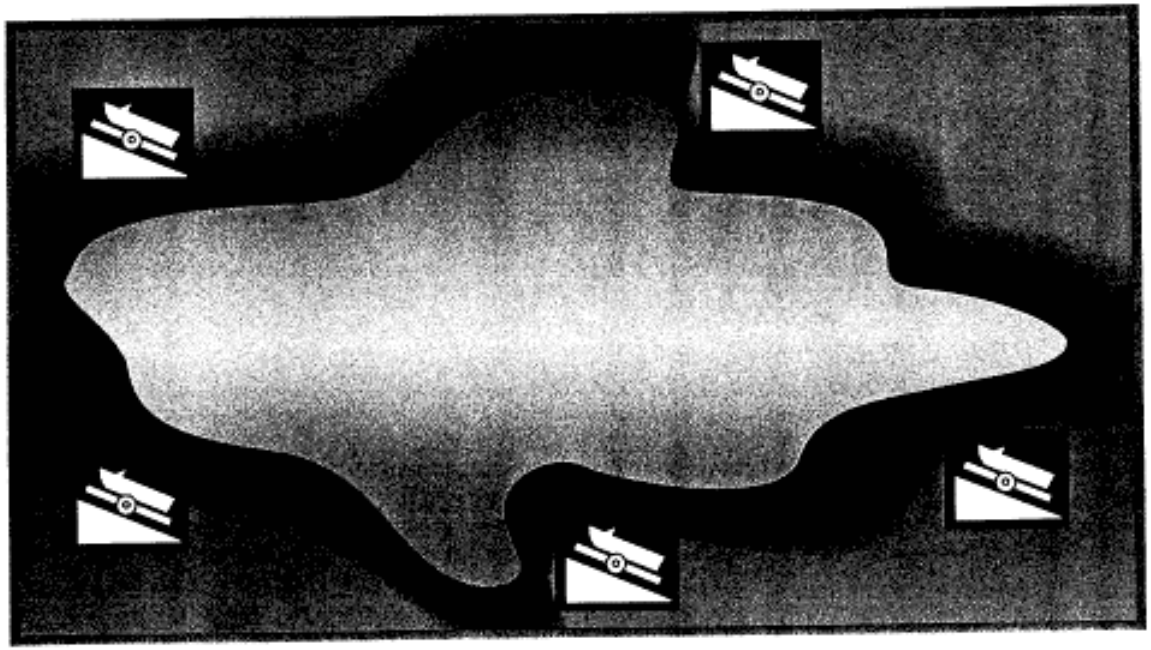
Charging or increasing fees may be considered to help reduce conflicts, user overcrowding and overuse. Charging fees will likely discourage use and be unacceptable to most users. Fees might be used in a positive manner in which current fees might be reduced (or discounts provided) to encourage off-peak use or to encourage the completion of boater safety courses.

Charging or increasing fees may cause increased user demands about expected level of services. However, fees may also produce revenues for waterway management and maintenance.

The number and size of support facilities, such as parking areas, marinas and campgrounds, generally can have a direct relationship to the amount of waterway use. Where overcrowding and overuse exist, the location, number and size of new support facilities may have to be distributed more evenly along the waterway. It is very important to examine potential future impact when additional support facilities and activity areas are planned.

Using entrance gates to control use levels is a direct and effective technique. This alternative is sometimes used at boat launching areas and at other individual activity areas. When parking areas fill up, the gates are used to allow vehicles in as others leave. It is less effective where large private land-holdings surround waterways and where numerous private slips and docks exist. This technique is often unpopular with waterway users, requires significant management effort and it benefits those users who access waterways early.

BOAT LAUNCH AREAS



Access Distribution and Development Control

Distribution of Launch Ramps and Access Points

The appropriate number and location of launch ramps and access points should be addressed as part of the development of a Waterway Management Plan. Careful distribution of launch ps and other access points throughout a waterway may disperse use and reduce congestion. Access controls can be an effective technique on small waterbodies. While distributing access ts may be advantageous from a carrying capacity standpoint, operation and maintenance costs may be higher than if access points are concentrated in a few locations.

Controlling Land Use and Development

The amount of development along the shoreline (e.g. residential, second-home, commercial, recreational) and the amount of waterway use are directly related. Land use and development regulations in zoning ordinances and subdivision ordinances are tools for controlling development along a waterway. Most states have enacted legislation enabling municipalities to prepare and adopt zoning ordinances and subdivision regulations. Typically, these ordinances regulate the types of uses permitted, the density of development, the procedures for submitting development plans and the standards for development.

Managing the Shoreline and Vicinity

Water surface management is very important, but shoreline and vicinity management may be equally important. This is especially true at smaller and mid-size

waterways in urban areas and resort locations.

Unplanned and uncontrolled waterfront development can be a major cause of activity conflicts on the water. Improper waterfront development along the shoreline can usurp prime waterway access, destroy the natural appearance of a waterway and can cause resource degradation. Excessive amounts of docks, slips, floats and mooring buoys may reduce the amount of water surface available for boating and other water use activities. Shoreline and vicinity planning and management are needed to prevent these and other problems.

Many of the items that should be addressed when developing recommendations and policies for shoreline and vicinity management include:

- land use;
- storm water drainage;
- marinas;
- boat launching ramps and community access areas;
- docks (#, size, length, removal, etc.);
- slips (for commercial and community access docks);
- floats;
- mooring buoys;
- vegetation removal and earthmoving;
- visual appearance of man-made features (aesthetics quality);
- patios, walls, roads, buildings and building extensions, other structures;
- permanent improvements;
- encroachments;
- electric wires for shore lighting;
- utility poles (for lights, flags);
- steps;
- fireplaces and fire circles;
- picnic tables, benches, chairs;
- roads and paths;
- grandfathered uses;
- prohibited activities (waste water disposal; gasoline, oil or fuel; etc.);
- noise.

The appropriate shoreline management approach depends upon your particular situation. Federal, state, county and local governments often have established regulations relating to shoreline and vicinity management (wetlands protection, sewage disposal controls, tree and vegetation removal, etc.). In some cases, much of the shoreline may be in public ownership for parks, natural areas and other public or institutional use.

Local zoning ordinances, if enacted, may regulate the specific type and density of uses permitted along the shoreline. Most local ordinances do not regulate the size, spacing and extension of docks; the number of slips allowed per dwelling or use; or the number of anchoring buoys, floats and other features at the waters' edge.

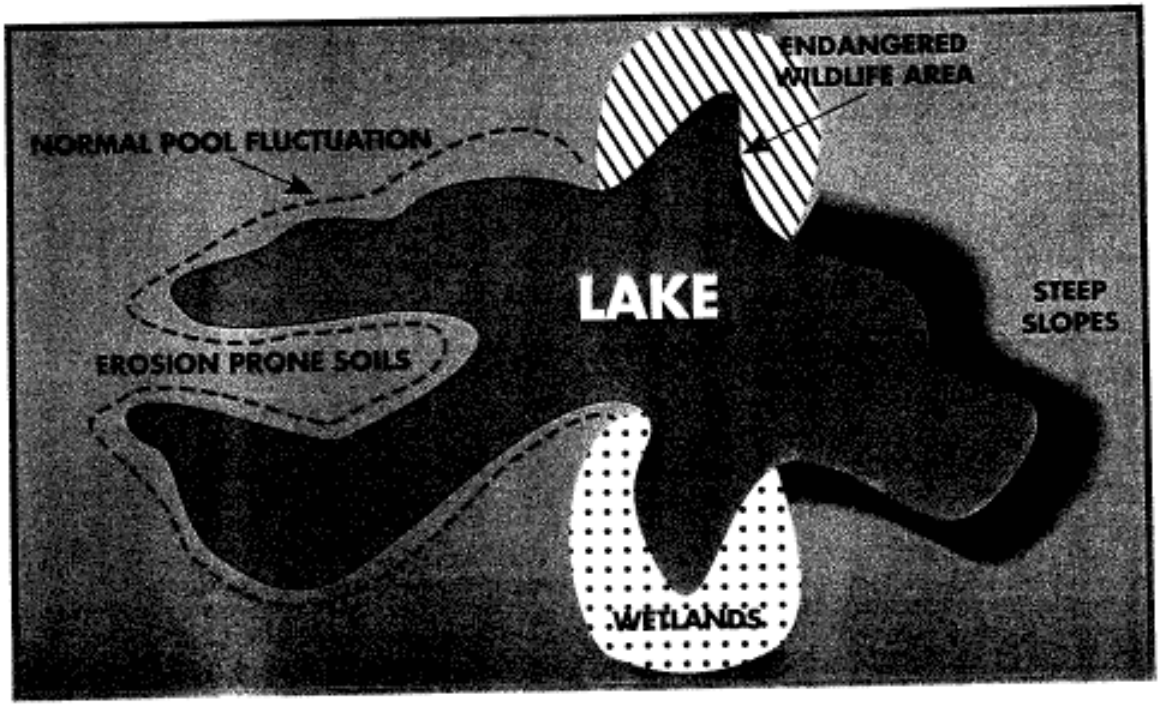
Permits may be issued to regulate shoreline development. Often, these permits are revocable and represent a “license” to use the shoreline and waters’ edge. This approach is most common along private waterways, such as those owned by utility companies. Normally, a fee is charged to pay for permit processing and administration costs, such as printing informational brochures with rules and regulations.

Resource Protection

study, or perhaps serve as a wildlife preserve. More resilient areas can sustain more use and can be planned for more intense activities. Applying this technique initially will be much less costly than correcting problems caused by resource overuse or degradation.

Increased Maintenance and Restoration

Increased maintenance and restoration can create enjoyable recreation experiences. The success of this alternative depends upon the severity of the problem and the degree of maintenance and restoration applied. Maintenance and restoration of an already eroded waterway shoreline is a formidable task. Corrective measures are costly and the temporary or long-term closing or severe activity reductions in an area may cause overcrowding elsewhere. Overuse situations might require hardening the resource (bulkheading, riprap, etc.), bringing in topsoil and seeding, using a hydro-seeder or completing a comprehensive restoration program.



Planning Activity Areas Outside Environmentally Sensitive Areas

Recreation and other activity areas should be located away environmentally sensitive areas such as flood-prone , steep slopes and erosion-prone soils to avoid or nize resource overuse. Identification and mapping of the ive areas and the more resilient areas are important for plication of this technique.

Some of the most sensitive areas (wetlands, steep slopes, are also the most attractive recreational resources. The sensitive areas can be avoided or used for less intense activities, such as nature

ENVI NMENTALLY SENSITIVE AREAS

User FeesNumber and Size of Support Facilities

Entranc

Changing Surfaces by Hardening to Reduce Resource Overuse

Changing surfaces by hardening them with man-made materials or resilient natural materials can increase resource capacity and prevent overuse. This tech nique is commonly used along shorelines, at support facility areas and at land-based recreation places near waterways.

Site hardening can be applied in many situations such as surfacing walkways with wood chips, gravel, wooden platforms and steps; paving or using gravel to harden campsite pads; developing impact sites; and using concrete slabs under picnic tables.

Hardening can be costly. Waterway users are more likely to prefer surfaces of wood, fine pea gravel or small stones rather than concrete and asphalt paving. The technique of hardening is better applied initially in the more sensitive recreation areas where overuse is likely. The more sensitive areas can be identified and mapped during the initial planning of project recreation areas.

Examples of Hardening Surfaces

- Stabilizing eroding shorelines with rock nprap, wood or steel bulkheading and soil cement to prevent shoreline erosion.
- Hardening the shoreline or riverbank where shore fishing, picnicking or camping occur to reduce compaction and erosion.
- Providing steps or ramps down a bluff or steep bank to the water from picnic or campsites to eliminate worn paths, erosion and the trampling of ground cover.
- Hardening worn pathways to prevent further overuse.
- Reseeding ditches and swales to minimize erosion and installing gravel or riprap and/or wood, concrete or asphalt at critical areas such as around culverts, inlets and outflow pipes to prevent erosion.
- Planting shrubs, willow and various types of grasses resilient to inundation along shorelines.

When using “hardening” and selecting appropriate materials, it is important to consider impacts on fish and wildlife. Fish feeding and wildlife nesting areas may be positively or negatively impacted by hardemng.

Limiting Use to Prevent Resource Overuse

Limiting use of areas when natural land and water resource destruction reaches a critical point will prevent further resource damage. Managers should be knowledgeable about indicators or signs of potential overuse and resource degradation in order for this technique to be effective and acceptable. Some examples of related alternatives include: rotating use to different areas each recreation season; limiting use in a jeopardized cove of a waterway; and using a different loop of a campground or a section of a picnic area for a full season. Opening some recreation areas later in the season than others can also prevent overuse.

Decisions about limiting use should be based upon sufficient scientific and environmental documentation. Economic impacts also should be addressed, along with the environmental impacts.

Informing and Educating Waterway Users About Resource Protection

This technique involves increasing the awareness of waterway users and others about the importance of resource protection. It can be implemented through: the use of news releases and news stories (newspapers, TV and radio); the preparation of informational pieces; and the development of educational programs. Educational programs about waterway resource protection could be developed by area schools. Public and membership organization presentations could be given about the value and conservation of natural, cultural and recreational waterway resources.

Selection of Appropriate Techniques

Some techniques may be better than others for a variety of reasons: cost, ease of use and application, effectiveness, user acceptance, etc.

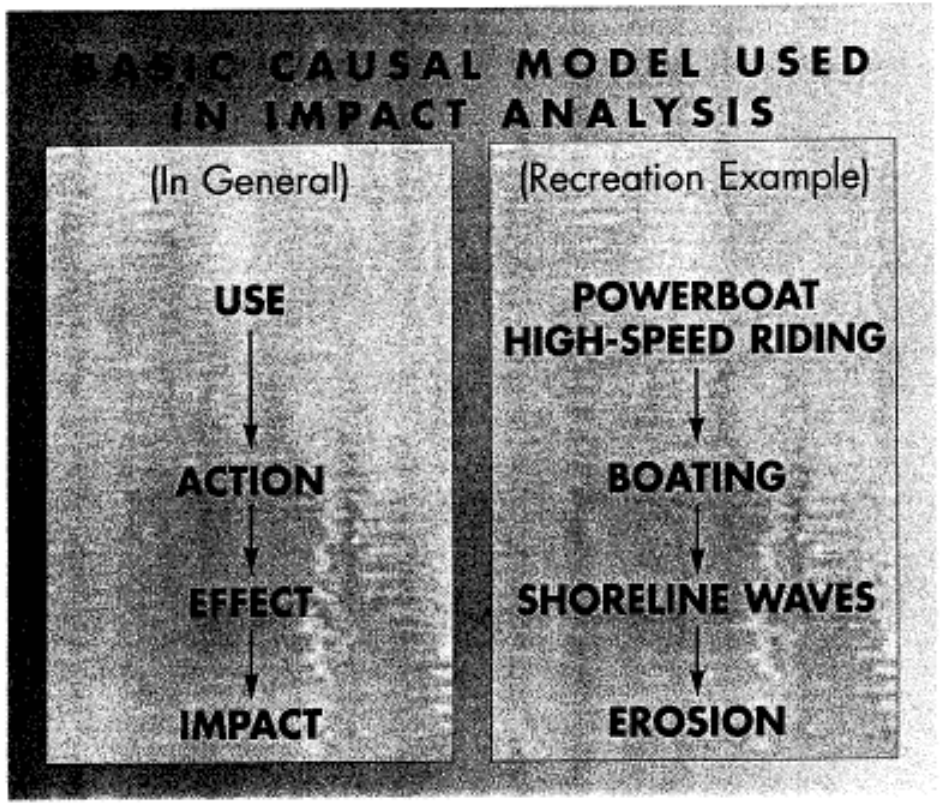
Reducing Litter & Waste

.itter and waste can be reduced through public education and ·ness programs, establishment of carry-in and carry-out policies nforcement of litter and sewage waste laws. Volunteer groups can couraged to undertake "cleanup" efforts at key points along the way. New programs such as "Adopt-AShoreline" and 'Adopt-A-" might also be encouraged. Trash containers and dump stations e provided at strategic locations along the waterway.

These and other factors should be considered prior to selecting a technique or a combination of techniques.

One Possible Approach

A first approach is to use "planning" and "information and education" techniques. Strict enforcement of existing rules and regulations might also be part of this initial approach. These techniques are usually more subtle and generally are more widely accepted among waterway users than heavy-handed techniques such as using entrance gates. More direct techniques, such as area zoning or time zoning, may be necessary to reduce activity conflicts and ensure water safety. An overall approach is to move through a continuum of progressively more difficult techniques, while continuing to monitor their success and eventually arriving at the "best" solution.

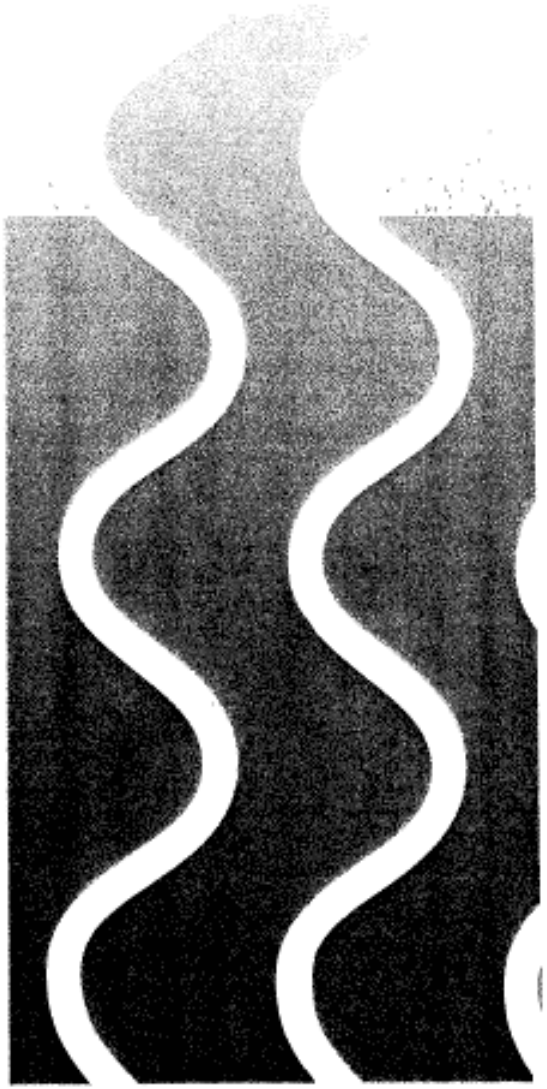


SECTION 4

RESEARCH, PLANNING & MANAGEMENT

GUIDELINES

- Inventory and Survey Guidelines
- Citizen Involvement Guidelines
- Communications and Education Guidelines
- Monitoring Guidelines
- Carrying Capacity Guidelines



User FeesNumber and Size of Support Facilities

Entranc

4
I
I
I

I

I

4
4
4
4

Using Impact Analysis

An approach to technique selection might also involve “impact analysis?’ Impact analysis consists of a set of concepts that order our understanding of how different types of problems can be addressed most effectively by public policy. These concepts provide a way of:

1) analyzing how a particular problem has developed;
2) identifying the alternative public policy approaches to solving the problem; and
3) evaluating which of the alternative policies will be most effective and equitable.

Impact analysis begins with a basic causal model of how public policy problems (such as those that confront water use management) develop. The model identifies four elements considered to be links in the causal chain that make up a management problem.

By identifying each of these links in a particular problem, waterway managers can systematically identify the types of techniques that are targeted to each of those links and select the alternative which is most appropnate.

Impact analysis can help waterway managers deal with carrying capacity issues (significant harmful impacts). It is equally suited to the analysis of social capacity problems. Impact analysis points out how both social and resource capacity problems can result from the same Effect, Action or Use.

Impact analysis is more than simply identifying the links in the causal chain that define a policy problem for waterway management. Each of the links in the casual chain is an opportunity for a separate technique to be used to lessen the likelihood or degree of an unwanted impact.

GUIDELINES

Inventory and Survey Guidelines

Inventories and surveys are basic to the waterway management planning process. When done objectively (i.e., without bias, prejudice and preconceived results), they yield data and information that are essential in understanding waterway resources and users. This section of the Guide offers suggestions for conducting a resource inventory and a user survey. Other surveys or special studies may be undertaken to provide additional bases for decisions.

Resource Inventory

A complete inventory of the waterway resource includes information about: physical and environmental conditions; existing activities, patterns of use and use levels; buoys, channels and channel markers; restricted use areas; the type and number of existing support facilities (boat ramps, parking areas, docks, slips, marinas, etc.); and other resource related items. These inventories may be more appropriate and much easier for smaller waterways than for larger ones such as the Great Lakes and the Intracoastal Waterway (ICW).

Although much information may be obtained through in-office source materials, some field work is required. Aerial photos, together with field observations, can be used to document waterway activities and use levels (boat counts), as well as for documenting support facilities (type, number, use levels, etc.). A detailed form is valuable to record information, and make observations relating to various factors, such as site access, existing natural features, existing man-made features and areas of overuse and under-use.

User Survey

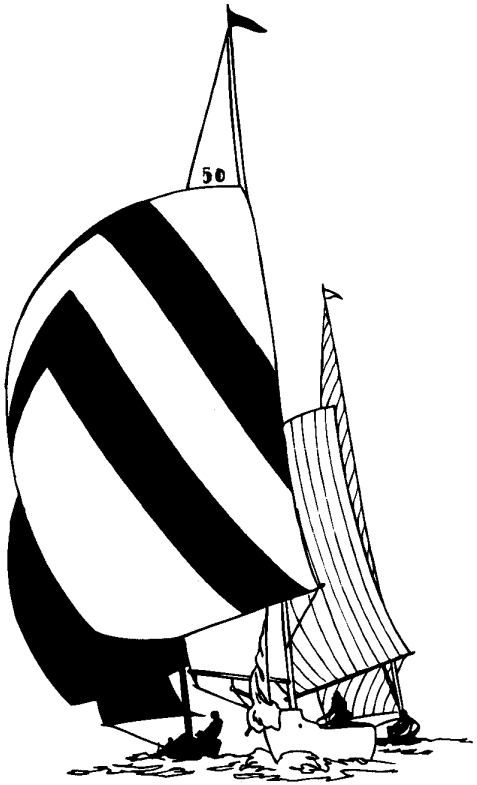
User surveys (including questionnaires) provide information from the people who are actually experiencing the waterway. This is often the only way to obtain information and insights from the “boating public,” who cannot attend public meetings or hearings. Ideally, an on-site interview approach should be used. The person being interviewed can provide insight based on recent experience, while the interviewer can observe actual conditions and record information on a first-hand basis.

A user survey should be preceded by the following actions: determination of appropriate waterway activities; the identification of interview locations; the selection of the best days (peak, off peak, etc.) and times for the survey; the preparation of the survey instrument (and possibly obtain clearance, if required, from appropriate agencies); and the necessary training of the interviewers. A training manual should be prepared to ensure proper and consistent administration of the questionnaire and interview.

User surveys should be carefully designed and formulated to be statistically valid and representative of all user groups. The survey instrument should be pre-tested prior to use.

Personnel requirements for administering the survey will be needed and a specific schedule and interviewer deployment plan developed. Ideally, an independent entity should be used to conduct the survey. This can help ensure objectivity, prevent skewed survey results and provide more reliable, credible survey results.

Criteria for any aerial photography and flight plans to be conducted during peak use periods will have to be determined. The scale of aerial photographs should be suitable for use in counting boats, docks and slips, and for observing waterway use patterns. Aerial photos should be taken the same day (at peak and non-peak time) that the user surveys are being conducted. This approach permits correlation of the aerial flight data (use levels) with the user survey data (opinions about use levels),



Survey respondents should be asked about their characteristics, their waterway activities, their experiences, their perceptions of overcrowding and safety hazards, incidences of activity conflicts and possible solutions. The user survey data should be statistically analyzed, with the results summarized and applied to decisions about the management plan. When administering the survey, it is important to remember that most boaters have had no formal boating safety education, and that you are interviewing the untrained.

Here are some examples of the types of questions that might be asked:

General User Characteristics

- Do you operate or ride in a boat at (name of waterway)?
- What is your primary boating activity?
- Do you own or rent property in the (name of waterway) Area?
- Where are you staying during this visit?
- What is the ZIP Code of your permanent residence?
- How many times have you ever operated or ridden on a boat on this waterway in the past?
- How many days are you here at the waterway on this visit?
- How many days do you estimate you will use or occupy a boat on this waterway this year:
  a.On weekends & holidays?
  b.On normal weekdays?
- What is the average length of time you spend on the waterway when you go boating?
- On a typical boating day, what are the primary time periods you spend on the waterway? (Specify a.m./p.m.)
- In what age group are you?

Boating Use Characteristics

- What type(s) of boat(s) do you use on this waterway?
- Do you own the boat you use on this waterway?
- If so, please answer the following about your boat:
  a. Length in feet?
  b. Horsepower?
  c. In what state is your boat registered?
- Do you or a family/group member have a dock or slip on this waterway?
- What other recreation activities during this trip are you participating in at this waterway?

Level Of Use **On The** Waterway

- Have you boated on this waterway today? If so, what time period(s) of the day?
- Do you feel the level of boating activity on the waterway today was light, moderate or heavy?
- During what time periods, if any, do you feel there were too many boats on the water today?
- Did you personally have any “near-accidents” or uncomfortable, anxious moments today on this waterway? (Use map or chart to identify areas.)

- Are there any areas of this waterway where today you have experienced:
  a.Too many boats?
  b.Boating conflicts which make your expenence unsatisfactory? If so, where? (Use map or chart to identify areas.)
- When boating on this waterway at above idle speed, what is the ideal distance that you would like to keep from other boats?

Waterway Management Techniques

How would you feel about the following ways of dealing with the problems?

- Improving information to waterway users
- Enforcing rules and regulations
- Controlling use on the waterway
- Dispersing access
- Controlling development
- Other techniques

Business Survey

A business survey might also be conducted as part of the basic planning process. The purposes of the survey could be fourfold:

1) to determine the past, current and anticipated amount of waterway-related business activity;
2) to obtain information regarding customer (visitor) characteristics such as age and duration of visit;
3) to discover any plans for business expansion and new development in the waterway vicinity; and
4) to help in determining the economic impacts, and financial or economic benefits of waterway use. The business survey can employ a self-administered questionnaire in a mail-out, mail-back format. The survey instrument could be a double-sided, 8.5” x 11” questionnaire containing questions pertaining to items such as the respondents’ type of business, years the business has existed, type of clientele, seasonal variations in business volume and probable actions over the next five to ten years.

Some examples of possible questions are:

- What specific type of business do you own or manage?
- How long have you owned or managed this business?
- How long has this business existed?
- Please identify the appropriate percentage of your clientele represented
  d.Seasonal residents at the waterway
  e.Year-round residents at the waterway
  f. Non-waterway users
- Have your total sales increased or decreased over the past five years?
- Are you planning to expand your business? At this location?

All questions should be closed-ended and the questionnaire should be brief to increase response rate. The initial mailing would include a cover letter, a questionnaire and a return envelope. A second mailing, containing the same material, could be made to those businesses from which completed survey forms were not received. A timeline should be created to manage the progress of this research activity. by the following segments:

a. Day users at the Waterway
b. Overnight/weekend visitors to the waterway
c.Week-long to month-long visitors to the waterway

Citizen Involvement

Guidelines

Importance

Active citizen participation brings out the real needs and demands for the waterway. It offers opportunities for citizens to contribute their skills, backgrounds and resources toward meeting these needs. Involvement assures citizens that their voices are heard and it helps waterway admimstrators win and maintain public support when budget limitations threaten cutbacks in service. Citizens often introduce unusual perspectives and new ideas to the planning process. A better understanding of the relationship between sustaining and increasing services and efficient financing and management of the waterway is gained through citizen involvement.

Possible Citizen

Participation Approaches

Citizen participation mechanisms should honestly and openly solicit the public's help in determining problems, needs, preferences and the human and financial resources needed to fulfill them. Successful citizen participation programs usually include several approaches.

Open Public Meetings

Public meetings are one of the most commonly used approaches. Public meetings and/or public hearings are often required for the development and adoption of a plan.

Public meetings are for planners to listen and to present recommendations for public reaction. The public meeting approach has some significant limitations. Two of the most severe limitations are:
1) people who attend the meeting rarely represent the complete spectrum of people affected by the plan; and 2) the structured format of a large meeting inhibits many people from speaking freely.
the recommendation is "very appropriate," "appropriate" or "not appropriate". The handout would be distributed at the beginning of the public meeting and collected (or mailed back) after the meeting. The results are then tabulated and used to evaluate the plan and the potential for public support for the plan.

Workshops

Workshops are less formal and usually have fewer participants than public meetings. A typical workshop includes 10-20 people freely discussing issues and sharing information in a small group setting. This approach works particularly well when technical matters and sensitive issues are on the agenda. Other approaches are still needed to achieve a more complete and representative citizen involvement process.

Paper Scoping

"Paper scoping" mechanisms involve sending information packages to appropriate persons, business, etc. and requesting written comments.

if you are concerned about not getting input from the "silent majority' consider a handout which lists the major plan recommendations and includes check-off boxes for people to indicate whether they believe

User FeesNumber and Size of Support Facilities Entranc

Presentations to Groups Presentations of findings and recommendations to established groups will help reach citizens with particular waterway interests (sports clubs) and general civic responsibilities/service organizations. Group members will probably feel more comfortable expressing their opinions in an informal setting, but formal agendas may require reliance on a short formal presentation and an informal question and answer session. This approach tends to be better for presenting information than for receiving it.

Ad Hoc and Advisory Groups Ad hoc groups and advisory committees of citizens and/or stakeholders are valuable contributors on special subjects and at strategic times in the process. They provide an opportunity for ongoing involvement. Since these meetings will probably not be open to the public, these groups and committees lack full representation and are a limited form of public involvement. However, the groups do
provide an opportunity for ongoing involvement.

Contacts With Key Persons

One-on-one discussions with persons of special technical leadership or decision-making skill are valuable adjuncts to a comprehensive citizen participation program. This approach is not a substitute for a wider scope of citizen participation.

Direct Mail

Mailing information is a way of educating and infonning citizens, but its public involvement use is limited. Unlike the pre-viously mentioned approaches, direct mail does not ensure responses nor does it provide a forum for discussions between waterway planners and citizens. Direct mail does increase the public's awareness of the planning process and can invite citizen responses and further participation.

Questionnaires and Surveys

Questionnaires are among the best tools for obtaining facts about people, soliciting expressions of need and getting opinions on plan alternatives and recommendations. Results from properly conducted surveys can provide an empirical research base on which to develop responsive plan recommendations. Questionnaires and surveys have their greatest value in determining needs and receiving opinions on possible choices of action. Although very effective, this approach is not a substitute for face-to-face contact with a broader base of citizens.

4

4
4
4
4

News Releases and Mass Media

News releases and press coverage gets some information to the public and creates a broad awareness of the process and plan for only those who are exposed to it. Use of the media can be "free publicity" that should be a part of a comprehensive citizen involvement program. However, media relations should be handled very carefully and on a timely basis. One major limitation of this approach is that the message must often be too broad to be very informative or too focused on a special issue to present the total story.

Day-To-Day Public Contacts

The agency which makes day-to-day public contacts transfers information to citizens and provides the opportunity for interaction. Although the extent to which these citizen viewpoints reflect a consensus of public opinion is limited, this type of contact is a good way of obtaining very direct input.

TABLE 4-1
COMPARISON OF BASIC
CITIZEN PARTICIPATION APPROACHES

BASIC CITIZEN PARTICIPATION APPROACHES	Potential for Fulfilling Purposes of Citizen Participation					Public Cross-Section of the Poor Potentially Good
	Information		Interacting ~ the Public	Assuring the Public — Fair Excellent	Requimments Meeting Legal and Tradition	
	Providing Information	Receiving Information				
Open Public Meetings	Good	Poor	Poor		y	
Workshops	Excellent	Excellent	Excellent			
Presentations to Groups Ad Hoc and					Yes	
Advisory Groups					Yes	

	Good Good	Fair Good	Fair Excellent	Fair Excellent	Yes Yes	No Clear Assurance Potentially Good
Contacts with Key Persons Direct Mail to Solicit Information	Excellent Excellent Poor Good Good	Excellent Poor Excellent Poor Good	Excellent Fair	Excellent Good Fair Poor Fair	No No Yes Yes No	No Clear Assurance Potentially_Good Potentially Good Poor Poor
Questionnaires and Surveys News Releases and Mass Media Day-to-Day Public Contacts			Poor Poor Excellent			

NOTE: “Excellent,” “Good,” and “Poor” are generalized evaluations. The conditions unique to a community must be considered to determine the probable success of a particular approach.

This table was adapted by URDC from a paper, *Principles of Public Involvement,* Thomas A. Heberlein, Department of Rural Sociology a the University of Wisconsin, April, 1976.

C amunications and Education Guidelines

Good communication and education efforts will help ensure a successful waterway management plan. Some effective and easy-to-apply techniques are available to communicate information and educate people about the adopted plan and to help implement the plan.

Plan Suiiiin~ ry

A summary of the adopted plan's major policies and recommendations has various uses, is handy and can be easily distributed. It can be handed out during public or private presentations, and can be mailed to waterway users and many others upon request.

Public Presentations

Public presentations are perhaps the most traditional method for communicating the major features of the adopted plan. A slide-show approach with handouts, maps and other graphics can be very effective. Sign-up sheets might be circulated to engage peoples' assistance in carrying out the plan.

The adopted plan should be presented to established groups. These groups generally have special interest and may be strong advocates and participants for plan implementation. Presentations can be targeted to the groups' particular interest in addition to the overall plan.

Pr ~.sentations at Area Schools

School presentations inform and educate young people about the plan and the importance of water safety. Reaching young people is one of the most important objectives for a plan. School presentations could be in large assemblies or in small classrooms.

News Releases

In addition to using news releases for citizen involvement, (see Citizen Involvement Guidelines), news releases can also be used to quickly and easily announce the completion of the waterway management plan and to provide a brief summary of the plan's major features. The release can include a contact name and address where copies of the plan are available and questions can be answered.

Newsletters are very effective in providing broad and targeted coverage. Segments of newsletters that are already part of newsletter systems could contain articles or a series on the plan. A special newsletter could also be issued.

Interpretive Program

Many waterways and land-based recreation areas, such as campgrounds adjacent to waterways, offer interpretive recreation programs. These programs educate and inform people about topics such as unique natural and cultural features. These programs are an excellent opportunity to inform people about the plan, such as resource protection and responsible use of watercraft.

boaters Guide and

Informational Pieces

The preparation and distribution of a "boaters guide" and map will inform waterway users about rules and regulations. The guide should be attractive and clearly written, with a large map and large easy-to-read type. It should list and graphically show the boating rules and regulations for the waterway. A boaters guide could be designed and produced in large numbers for wide distribution and easy replacement. Areas of restricted use, limited use and hazards should be shown on the map.

Other informational pieces might be prepared to educate and inform waterway users about the plan. Special brochures and educational materials on such topics as boating safety and rules of the road are a few examples.

Signs and Message Boards

Signs and message boards educate and inform waterway users about water use rules and regulations. These messages alert users about special rules and regulations unique to a particular waterway, such as areas zoned for certain activities.

Monitoring Guidelines

li troduction

Monitoring is a vital management responsibility after the management plan is completed and is being implemented. Monitoring should be continual. User surveys, field observations (including aerial flights) and management records can all be used to provide selected types of information for effective monitoring. Successful monitoring demands diligent preparation and administration.

A monitoring program can provide information for making decisions concerning both user overcrowding (social capacity) and resource overuse (resource capacity) of waterways (also see Carrying Capacity Guidelines section). The type of information required will make social capacity monitoring programs different from those addressing resource capacity. Both monitoring programs are discussed in this section. Monitoring the social and resource capacity of a waterway is important for four main reasons:

- Monitoring permits the application of carrying capacities to the special conditions at specific areas.
- Monitoring can identify short- and long-term changes in environmental/site characteristics, user characteristics, and user preferences which may warrant periodic adjustment of the carrying capacity of an area.
- Monitoring offers a method for determining the resource capacity of a particular activity area.
- Monitoring provides a means to detect problems of resource overuse at the earliest possible stage to avoid intensification and/or dispersion of the problem.

A monitoring program is designed to evaluate an area under real-life conditions. Such a system can be selectively employed at areas where problems are known or anticipated. Anticipating and preventing social capacity problems require attention to threshold levels of the indicators. Monitoring programs can be relatively inexpensive, especially when conducted during routine patrolling, inspection and administration.

Approach

A basic approach for monitoring social and resource capacity is presented in the following tables.

Monitoring programs can collect three basic types of information: use levels, impacts of use levels and user attitudes towards use levels. Each type can be used as a measure for guiding social capacity and resource capacity decisions. This use level information provides a basis for determining what problems occur and when.

Various indicators can act as units of measure for each type of information. Indicators should be predictive: they should occur sufficiently before serious problems develop, so that actions can be taken to prevent problems. Indicators should also be

TABLE 4-2
APPROACHES TO RESOURCE CAPACITY MONITORING

How to Obtain Information

Typ. of Information	Indicators	FMd Obswvatiet~	Managun.et bcerds	User SurvW
use levels	Daily counts	•	••	••
	user characteuistics	••	•	
	Metered water usage		••	
	Sales af fuel and supplies at stores and marinas	•		•
	use levels of support facilities	••		
				•
Impacts of use levels	change in water quality condition	••	••	
	of shoreline Initial signs of	••	•	
	erosion Damage of	~	~7	••
	trees/vegetation compaction of	••		••
	soils Absence/change in	~		
	fish/wildlife	••		
user attitudes	User complaints User opinions	•		

• Good method •• Better method

Type of Information	Indicators	Amial p',~ Records	User Survey
Use levels	Daily counts (peak period, daily)	*	**
	User characteristics	••	••
	Use of overflow areas	••	•
	Metered water usage		••
	Sales of fuel and supplies at stores and marinas	•	••
Impacts of use levels	Use levels of support facilities	••	•
	Conflicts between users		s *
	Accidents	•	•
	Violations of regulations	••	•
	Recreation in unauthorized areas		
	Misuse of support facilities (extra vehicles on site, parking on grass, etc.)	••	•
	Vandalism	••	••
	Litter/trash	••	•
User attitudes toward use levels -	User complaints -	•	••
	User suggestions		••
	User opinions		••

TABLE 4-3
APPROACHES TO SOCIAL CAPACITY MONITORING

How to Obtain Information

I
4
4
4
4
4
4
4
4
4
4

certain: they should always precede serious problems, and serious problems should always result if preventative measures are not undertaken after an indicator occurs. Finally, indicators should be easy to use:

they should be phenomena which are readily observed and capable of objective measurement by nonexpert personnel. In many cases, indicators themselves are capacity problems, thus illustrating the importance of early determination of increased frequency or intensity.

The two tables in this section are not intended to be an exhaustive list of indicators for each type of information. Waterway managers should consider other factors for use as indicators, and they should tailor the monitoring program as closely as possible to the specific needs and sources of information available in their areas.

lvkthods

Three general methods are useful for obtaining the information embodied in the indicators: user surveys, field observations and management records.

User surveys can be tailored to the relevant information, type of user and area. The information can be very reliable, and the cost relatively inexpensive. However, user surveys require user cooperation. These

surveys can be misleading if improperly designed and analyzed, and if there is a lag in the time from when the information is recorded to when it is analyzed.

User surveys can be conducted formally (questionnaires) or informally (give and take discussions with users). Questionnaires can vary in the type, amount and detail of information they ask. They can be administered by project personnel or filled out by users and returned to a central location (e.g., suggestion box or gate attendant). User surveys are less likely to be employed in a program for monitoring resource capacity then in one for social capacity. But user attitudes are helpful for determining the levels of resource depletion which are acceptable (e.g., the number of fish, scenic quality, etc.).

Field observations can be used to obtain diverse types of information. Such observations can be inexpensive, especially when conducted during routine patrol duties. Field observation can provide reliable information, especially if the same personnel apply uniform standards in making their observations over time.

The utility of field observations depends on the development of a standardized system. The information observed should be capable of being reported in an objective or standardized manner. Field observations can be conducted formally (recording observations based on a prescribed checklist for each area) or informally (noting significant observations in a log book).

Management records can be used to provide selected types of information reliably or inexpensively (since the information has been compiled already). But management records cannot be used to obtain all types of information, and care must be taken that information from records is not misinterpreted or misapplied.

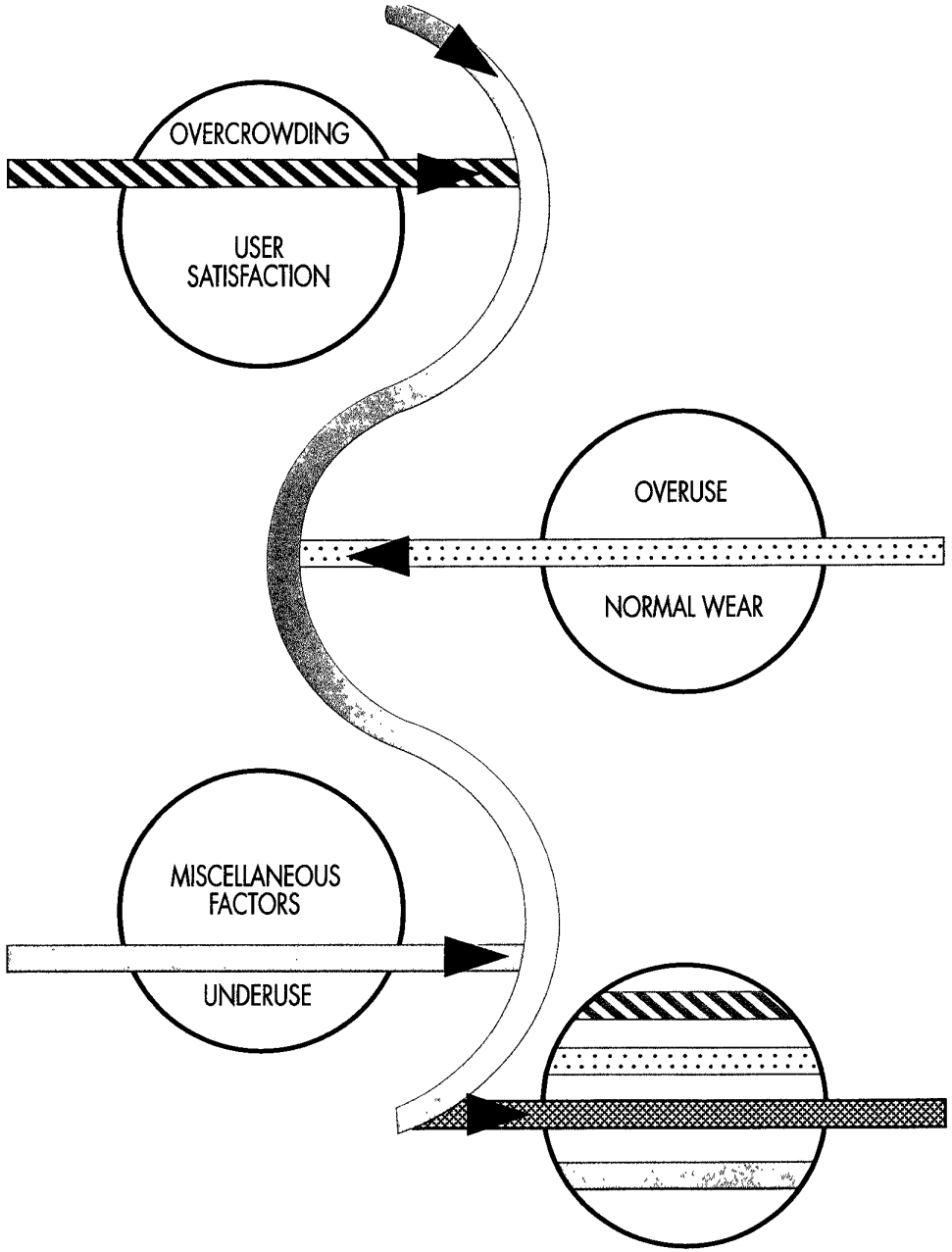
CARRYING CAPACITY GUIDELINES

Introduction

Carrying capacity is a term that is frequently used but often misunderstood. Environmentalists, ecologists and biologists have viewed and investigated carrying capacity primarily in terms of resource destruction and restoration. Sociologists and psychologists have been concerned with the quality of user experiences and the effects of crowding upon human behavior. Site and space planners tend to view capacity in terms of the physical space required to effectively and safely conduct an activity. Administrators and managers may look at capacity in terms of cost-effectiveness, administrative ease, and the feasibility of exercising controls. Ideally, the level and mix of activities on multiple use waterways should not exceed the carrying capacities as viewed from all of these perspectives.

Carrying capacity, as defined in this Guide, is the capability of a waterway to provide an opportunity for certain types of satisfactory and safe experiences over time without significant degradation of the resource (see diagram on following page). Inherent in this view of canying capacity are resource (biophysical) and social (psycho-social) capacities, and optimum capacities (all factors considered). For the purpose of this Guide, carrying capacity is viewed in three ways:

- Social **capacity.** Social capacity means the level of use of a resource or area beyond which the user's expectation of the experience is not realized and he/she does not achieve satisfaction.
- **Resource capacity.** This is the level of use of a resource beyond which irreversible biological deterioration takes place or degradation of the physical environment makes the resource no longer suitable or attractive for that use.
- **Optimum capacity. Optimum** capacity is the appropriate level of use based upon resource and social capacity considerations, management objectives, safety and other factors.



OTHER CAPACITY

4

4

The subject of carrying capacity is multi-faceted and contains variables far too numerous for the scope of this Guide. The many different waterway settings and multiple use situations, the unique circumstances which vary from place to place, and the wide-ranging management objectives make it impossible for this Guide to establish or suggest a single carrying capacity standard or formula for multiple use waterways. This section of the guidebook does offer useful canying capacity information and guidelines for

SOCIAL CAPACITY

consideration when analyzing carrying capacity at your waterway. Examples of several different carrying capacity studies are listed in the References section.

Resource Capacity Guidelines

Resource carrying capacity is the level of recreational use beyond which there is irreversible physical or biological degradation of the resource. This degradation may be considered unacceptable either because it diminishes recreational opportunities or because it produces undesirable conse-quences to the natural environment.

A large number of natural, physical and social factors influence resource carrying capacity. The ways in which these factors interact can be very complex. Although many of these factors can be stable over

OPTIMUM CARRYING CAPACITY

DIA~~RAM

RESOURCE CAPACITY

OPTIMUM CARRYING CAPACITY

many years, some of them may change in significant ways in short periods of time. For these reasons, it is difficult to accurately and reliably predict the "ultimate" resource carrying capacity of a particular area.

Resource capacity can be modified by different management techniques, such as hardening the shoreline and limiting use. The types and levels of recreational use that could potentially harm a particular resource can be modified by management (e.g., restricting certain types of activities, distributing access). Physical facilities developed by management can minimize or prevent certain types of negative impacts. Protection of the resource through the use of appropriate techniques is a central part of waterway management's mission.

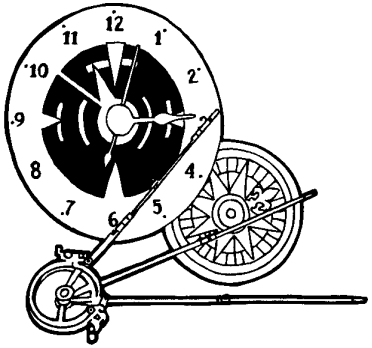
Monitoring guidelines offer waterway managers a systematic method for periodically examining the carrying capacity of different types of resource areas. The system provides a reliable and accurate method to detect when there are significant negative changes to the resource areas of a waterway. The system identifies the likely causes of these significant changes. Finally, the monitoring system provides several examples of the types of management techniques that could be used to address resource capacity problems.

Using the Resource Capacity Guidelines System

The resource capacity monitoring system consists of four steps. Each step should be taken to evaluate the resource capacity of an area. This section explains the goal of each step in this system and how to accomplish each goal.

STEP 1 Specification of Resource Areas

The first goal of the resource capacity guidelines system is specification of the different types of resource areas on a waterway system. A waterway is not a single physical and environmental resource. Rather, it is a system of interrelated resource areas. Resource areas are distinct because not all kinds of resource capacity problems occur in all types of resource areas. The resource areas are interrelated because a resource capacity problem that occurs in one resource area may have causes that are located in a different resource area.



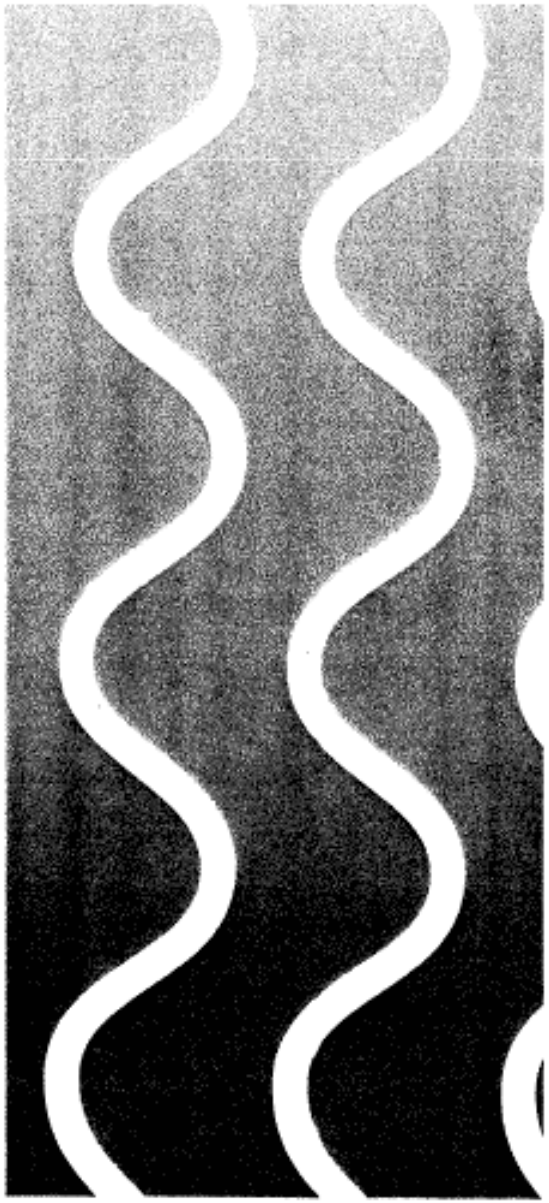


TABLE 4-4
EXAMPLE CHARACTERISTICS OF RESOURCE AREAS (AT A LAKE)

ESOURCE AREA	LOCATION	TYPICAL USES	ENVIRONMENTAL SIGNIFICANCE
ATERWAY AREAS			
d-waterway – Bottom	Deep-water portions of the waterway from the thermocline to the waterway bottom.	Scuba Diving, Ice Fishing	Habitat for organisms that can live at low oxygen levels.
d-waterway – Surface	Deep-water portions of the waterway from the thermocline to the surface.	Boating, Fishing, Waterskiing, Ice Fishing, Swimming	Habitat for algae, microscopic invertebrates, fish.
oral Zone – Cove	Shallow-water, narrow portions of the waterway where sunlight penetrates to the waterway bottom.	Swimming, Fishing, Waterskiing, Boating	Fish spawning, habitat for young fish, algae and invertebrates.
oral Zone – Shoreline	Shallow water portions of the waterway where sunlight penetrates to the waterway bottom that are along the waterway shore.	Swimming, Fishing, Boating, Docks	Fish spawning, habitat for young fish, algae and invertebrates.
ATERWAY SHORE AREAS			
terway Shore – Wetlands	Land areas adjacent to the waterway that are seasonally or chronically wet.	Hiking, Fishing, Nature Watching, Hunting	Fish spawning, habitat for young fish, algae and invertebrates and amphibian larvae and adults.
aterway Shore – n-wetlands	Land areas adjacent to the waterway that are not seasonally or chronically wet.	Fishing, Sunbathing, Hiking, Nature Watching, Waterway Shore Structures	Habitat for fish-eating animals and for plants that shade the waterway and slow runoff and erosion.
ATERWAY ENVIRONS EAS			
utary Streams	Perennial and intermittent streams that flow into the waterway.	Swimming, Fishing	Habitat for wildlife and plants, source of waterway water.
tlands	Areas of land not adjacent to the waterway that are seasonally or perennially wet.	Nature Watching, Hunting	Fish spawning, habitat for young fish and invertebrates and amphibian larvae and adults.
odlands	Undeveloped, wooded land areas away from the waterway.	Hiking, Picnicking, Nature Watching, Camping, Forestry, Hunting	Habitat for wildlife and plants that slow runoff and erosion.
elds	Non-wooded land areas of native and cultivated vegetation.	Hiking, Nature Watching, Camping, Picnicking, Agriculture.	Habitat for wildlife and plants that slow runoff and erosion.
eveloped Areas	Land areas used for residences, businesses, industries and recreation (including landscaped areas and facilities).	Camping, Picnicking, Hiking, Sunbathing, Intended Uses	

The first step of the resource capacity guidelines system is to identify basic information about the types of resource areas at the waterway. For example, Table 4-4 identifies eleven types of resource areas that are divided among three classes. The first class (Waterway Areas) contains four types of resource areas (Waterway-Bottom, Waterway-Surface, Littoral Zone-Cove and Littoral Zone-Shoreline). The second class (Waterway Shore Areas) contains two types of resource areas (Waterway Shore-Wetlands and Waterway Shore-Non-Wetlands). The third class (Waterway Environs Areas) contains five types of resource areas (Tributary Streams, Wetlands, Woodlands, Fields and Developed Areas).

Table 4-4 also outlines the locations, typical uses and environmental significance of each type of resource area. The location statements provide working definitions of the types of locations that make up each type of resource area. The typical uses statements indicate the type of activity which usually occurs in each type of resource area. The environmental significance statements outline the most important roles that each type of resource area plays in the interrelated environment of the waterway watershed area.

TABLE 4-5
EXAMPLE INVENTORY OF MAJOR POTENTIAL RESOURCE CAPACITY PROBLEMS TO RESOURCE AREAS

RESOURCE AREA	Siltation, Turbidity & Erosion	Excess Nutrient Loading	Coliform Bacteria	Grease & Oil	Insecticides	Herbicides	Acidification	High Temperature	Fluctuation in Waterway Level
A. WATERWAY AREAS									
1. Waterway – Bottom	O	+	O	+	O	O	O	-	-
2. Waterway – Surface	+	+	O	+	O	O	+	O	-
3. Littoral Zone – Cove	+	+	+	+	O	O	+	+	+
4. Littoral Zone – Shoreline	+	+	+	+	O	O	+	+	+
B. WATERWAY SHORE AREAS									
5. Waterway Shore – Wetlands	+	O	O	O	O	O	O	O	O
6. Waterway Shore – Non-wetlands	+	-	-	O	O	O	-	-	+
C. WATERWAY ENVIRONS AREAS									
7. Tributary Streams	+	+	O	O	O	O	+	O	O
8. Wetlands	O	O	O	O	O	O	O	O	O
9. Woodlands	-	-	-	-	O	O	O	-	-
10. Fields	-	-	-	-	O	O	-	-	-
11. Developed Areas	-	-	O	O	O	O	-	-	-

+ Likely to be a Problem O Possibly Could be a Problem - Unlikely to be a Problem

A map which illustrates the generalized locations of the eleven different types of resource areas at the waterway can be prepared and used as a general guide to the locations of the different types of resource areas at the waterway. A particular location may take on the characteristics of more than one type of resource area over time, perhaps even seasonally. In addition, the locations between different resource areas may share the characteristics of adjacent resource areas.

STEP 2 Evaluation of the Need for Monitoring

The second step of the resource capacity guidelines system is the evaluation of the need for monitoring different types of resource areas for particular kinds of resource capacity problems. This decision is made in two stages. One stage evaluates the likelihood that a particular kind of problem will occur in a particular type of resource area. The other stage evaluates the potential consequences of those kinds of problems that may occur in order to decide whether monitoring is justified.

The first stage of evaluating the need for monitoring identifies the likelihood that major resource capacity problems will occur in each of the types of resource areas on the waterway. Most problems are likely to occur only in some types of areas. This stage enables the system's user to identify the potential for particular kinds of problems that may result from changes to a particular type of resource area.

Table 4-5 identifies the likelihood of nine major types of resource capacity problems occurring in each of the eleven types of resource areas. It identifies three levels of likelihood. The levels of likelihood are estimates stated in general terms. The table is not a substitute for monitoring. Reliable, accurate predictions of the precise probability of each kind of problem occurring in each type of resource area are impossible. Such predictions may tempt waterway managers to incorrectly substitute unreliable, inaccurate predictions for monitoring. Table 4-5 only indicates the likelihood that monitoring of a particular type of area for a particular type problem is needed. if it is determined that monitoring is needed, the monitoring procedure will determine reliably and accurately whether a resource capacity problem exists and the degree of the problem.

TABLE 44

Erosion Siltation Turbidity	Add silt (particles) to water column causing decreased transparency, decreased photosynthesis, clogging of aquatic animal gills, smothering of aquatic animal eggs.	Decrease in aquatic plant and animal populations.	Diminished aesthetic appeal of the waterway; Less variety of sport fish species; Impaired use of shallow waterway areas by boats.	Diminished use of the waterway; Increased maintenance needs of recreational equipment.
Excess Nutrient Loading	Adds excess nutrients to waterway causing increased algae and decreased transparency. Adds excess sodium and/or chlorine to waterway; Adds toxic metals.	Decreased dissolved oxygen from decomposition of algae, resulting in stress on aquatic animals; Increased amounts of floating algal masses and decreased transparency; Some algae produce toxic metabolites resulting in eye and skin irritations; Toxic to aquatic plants and animals; Toxic to aquatic plants and animals.	Diminished aesthetic appeal of the waterway; Diminished swimming; Less variety of sport fish species; Decline in fishery.	Diminished use of the waterway; Increased maintenance needs of recreational equipment.
Coliform Bacteria	Gastroenteritis and other intestinal problems; Skin rashes.		Diminished swimming; Closing of polluted areas.	
Grease and Oil	Toxic to aquatic plants and animals; Surface films can coat aquatic plants and aquatic animal gills, lungs, eggs and feathers of waterfowl.	Decrease in aquatic plant and animal populations.	Diminished aesthetic appeal of the waterway; Decline in fishery.	Increased maintenance needs of recreational equipment.
Insecticides	Toxic to aquatic plants and animals.	Decrease in aquatic plant and animal populations.	Decline in fishery.	
Herbicides	Toxic to aquatic plants and animals.	Decrease in aquatic plant and animal populations.	Decline in fishery.	
Acidification	Toxic to some aquatic plants and animals; Increased transparency.	Decrease in acid-sensitive aquatic plant and animal populations; Increase in acid-tolerant aquatic organisms.	Change in size and composition of fishery.	
High Temperature	Kills aquatic animal eggs; Promotes growth of blue-green algae; Decreases dissolved oxygen levels.	Decrease in aquatic animal populations; Some algae produce toxic metabolites that cause eye and skin irritations.	Decline in fishery; Diminished swimming.	

SUMMARY CHARACTERISTICS OF RESOURCE CAPACITY PROBLEMS

RESOURCE CAPACFIY PROBLEMS	POSSIBLE ENVIRONMENTAL CONSEQUENCES		POSSIBLE RECREATIONAL CONSEQUENCES	
	DIRECT	iNDIRECT	DIRECT	INDIRECT
Fluctuation in - Waterway Level	Kills rooted aquatic plontt resulting in less spawn. ing areau for same -. aquatic animalu	~ecreasp in aquatic plants •and animal popelations. -	Di$_1$einished aesthetic -appeal of the waterway; Soeti docks made unusable; Impaired use af	Diminished cue of the waterway; In~reased mcsinlenance needs of recreational

		-	shallow water amos by boats.	equipment.

The second stage of evaluating the need for monitoring identifies the consequences to both the environment and to recreational use on the waterway if a given resource capacity problem continues to occur. This stage allows the user of the system to determine whether the consequences of a problem that is sufficiently likely to occur are serious enough to justify the use of a momtoring procedure.

Table 4-6 identifies the major consequences of the nine major kinds of resource capacity problems. For each type of problem, Table 4-6 identifies Environmental Consequences (both Direct and Indirect) of permitting the problem to continue. The Environmental Consequences focus on consequences to living things. Table 4-6 also identifies Recreational Consequences (both Direct and Indirect). Recreational Consequences focus on the impacts that each kind of problem can have on different types of recreation at the waterway.

STEP 3 Implementation of a Monitoring Program

The third step of the resource capacity guidelines system is the specification of a program to reliably and accurately determine if a particular kind of resource capacity problem is occurring at a particular resource area at the waterway. Different

TABLE 4-7
INVENTORY OF CAUSES AND EXAMPLE MANAGEMENT

1 1 RESOURCE CAPACWY PROBLEMS	POSSIBLE CAUSES	EXAMPLE MANAGEMENT OPTIONS: Preventing Causes	EXAMPLE MANAGEMENT OPTIONS: Controlling Impacts
Erosion Siltation Turbidity	Storm-water runoff from construction sites, tilled fields, developed areas; Shoreline erosion; Sediment churned up by boat wakes/props; Wind generated waves.	Storm-water management regulations; Speed limits; No-wake zones; Limit areas to non-power boats; Limit number of boats; Non-boating areas.	Storm-water management facilities; Shoreline reinforcement (e.g., rip-rap); Shoreline planting; Dredging
Excess Nutrient Loading	(Any of the factors causing erosion listed above); Improperly treated sewage/leaking sewers; Fertilizers; Runoff from roadway salts.	Storm-water management regulations; Sewage treatment regulations; Regulation of potential pollutants in watershed.	Storm-water management facilities; Sewage treatment facilities; Chemical treatment to inactivate/precipitate nutrients; Physical treatment (e.g., harvesting); Biological controls.
Coliform Bacteria	Improperly treated sewage/leaking sewers; Runoff of farm wastes; Erosion (see above).	Sewage treatment regulations; Storm-water management regulations.	Sewage treatment facilities; Storm-water management facilities; Chemical treatment.
Grease and Oil	Fuel discharge from marinas; Runoff from roads and parking lots;	Design controls of marine fuel dispensaries on the waterway; Storm-water management regulations.	Storm-water management facilities; Physical treatment/removal.
Insecticides	Runoff from farms and vegetation in developed areas.	Storm-water management regulations.	Storm-water management facilities.
Herbicides	Runoff from farms and vegetation in developed areas.	Storm-water management regulations.	Storm-water management facilities.
Acidification	Runoff from acid precipitation (1986 mean annual weighted pH of precipitation = 4.06); Runoff from coal mines and tailings.	Storm-water management regulations.	Storm-water management facilities; Chemical treatment (e.g., limestoning).
High Temperature	Runoff from parking lots	Limit impervious surfaces.	Storm-water management facilities.
qnd roads an summer.			
Fluctuation in Waterway Level	Lake drawdowns.	Regulate drawdowns.	Publish notice of drawdowns.

OPTIONS
FOR ADDRESSING RESOURCE CAPACITY PROBLEMS

kinds of problems require different monitoring programs. Each monitoring program should detail the agents who can conduct the monitoring measurements, the types of measurements, the timing of the measurements and the criteria that indicate the existence of a problem.

STEP 4 Identification

of Solutions to Problems

The final step of the resource capacity monitoring program is the identification of the causes of the resource capacity problem and the types of techniques that can be used to address the problem. This step is part of the monitoring program because the documentation of the problem through monitoring measurements should be undertaken only so that the problem can be minimized or eliminated.

Table 4-7 identifies Possible Causes for each kind of resource capacity problem. The determination of the causes is the first stage in determining the most effective and efficient remedy to the problem.

Table 4-7 also identifies the types of Management Techniques that might be used to address each problem. Some of these techniques are preemptive in that they operate to reduce the causes and the effects of causes on the resource. Other techniques are protective in that they operate to insulate or strengthen the resource to minimize the impact of the causes and the effects of causes. These and other waterway management techniques are described in greater detail in the Waterway Management Techniques section.

Introduction

The multitude of waterway settings and situations, and the numerous management objectives that may apply to them make it impossible for this Guide to suggest specific capacity levels or exclusive carrying capacity guidelines for all waterways.

A waterway managed for a wilderness experience will have a social carrying capacity much different from a waterway managed as a water park. Further, within a specific type of waterway (e.g., a lake), there are numerous factors such as the type of area, mix of activities, degree of control, level of education, information and awareness, location of facilities that affect social carrying capacity.

BASIC SOCIAL CARRYING CAPACITY PROCESS

Various approaches have been and are being used to deal with social carrying capacity. Most current approaches involve several common features: 1) the establishment of management objectives, 2) the determination of standards and use levels, 3) the identification and use of indicators, 4) the application of management techniques, and *5)* ongoing monitoring.

Management Objectives

Social carrying capacity must be based on management objectives. Management objectives should describe the type of visitor experience to be provided on a particular waterway. Objectives can be established as part of the Basic Waterway Management Planning Process (see Step 4 of the Process).

The User Survey data and other research-based data, together with knowledge of the overall goals or missions for the waterway (see Step 3 of the Basic Planning Process) will be helpful when establishing specific objectives relating to social capacity.

After management objectives are established, it may be possible to create various "management activity zones" which have inherent in them various social capaci ty intensity levels (e.g. low, moderate, high density). Social capacity determination at any given waterway should be based on specific management objectives and user opinions about perceived crowding and water use conflicts. The information in this section provides ideas and suggestions for consideration.

TABLE 4-8
A FEW EXAMPLE STANDARDS/USE LEVELS & RELATED INDICATORS

Example Standards	Example Indicators
• Fewer than "x%" of the waterway users believe the waterway is overcrowded.	• Waterway user opinions/ complaints.
• Use density of waterway use should not exceed "x" acres of water/boat.	• Boat counts (aerial flights/ field observations).
• Waiting time to launch a boat should not exceed "x" minutes.	• Congestion at the launching ramp.

Determination of Standards and Use Levels

challenging aspect of social carrying capacity determination. Please note that the standards/use levels that are established initially can be tested or changed as a result of ongoing monitoring.

A variety of approaches can be used to help determine and establish initial social capacity standards/use levels. Two brief examples are included here. Each approach has its pros and cons.

The determination of quantifiable social carrying capacity standards/use levels is the next step. This is the most difficult and

Delphi Approach

The Delphi approach is a way of determining social capacity standards/use levels based largely upon the knowledge and judgment of a group of experienced persons gathered together to exchange ideas and make choices. The group might include waterway managers, recreation planners and experts on the subject of carrying capacity. The group would use available information and data, field observations and their own knowledge to establish social capacity standards or use levels for momtoring. The Delphi approach may work best when staff time and funds are limited and useful data are already available.

Research-Based Approach

A research-based approach can be used. This approach would involve a User Survey designed to obtain information about perceived crowding and activity confficts (see User Survey suggestions in the Inventory and Survey Guidelines section). This is a straightforward way to obtain useful information to help establish social capacity standards and use levels. For example, the following scale could be used to ask users about perceived crowding at a waterway. The survey results would be tabulated and used to assess level of use conditions and to help determine social capacity standards and use levels.

12345

Not at all crowded | Slightly crowded

6

Moderately crowded

789

Extremely crowded

This approach, while more scientific, will undoubtedly take longer and cost more than the Delphi approach. However, it will provide a data base for periodic evaluation and analysis.

Identification of Indicators

After specific carrying capacity standards and/or use levels are developed, various indicators should be identified. Indicators are phenomena which can be used in conjunction with social capacity monitoring to help identify problems of overcrowding. Examples of possible indicators include: complaints about overcrowding, observed water use conflicts, accidents and congestion on the water or at support facilities (e.g. boat launching areas). (See Monitoring Guidelines section for examples of possible indicators.)

Application of Management Techniques

Various social carrying capacity problems, conditions and situations may require the application of different management techniques (see table 4-9 and the Waterway Management Techniques section).

If existing conditions of key indicators are approaching or exceeding the established standards/use levels, then some management action should be taken. This can begin by first evaluating the cause of the problem. Then, various management techniques can be considered and selected for use. It might be necessary to use a combination of techniques to address the problem.

Ongoing Monitoring

Ongoing monitoring is a key part of the social carrying capacity process. It allows waterway managers: to refine the social capacity standards/use levels; to detect problems of overcrowding and activity conflicts; and to evaluate the success of applied management techniques (see Monitoring Guidelines section for additional information).

Determining Optimum Capacity

Carrying capacity numbers are not a cure-all. They are tools which can be monitored and adjusted and provide a sound basis for responsive management.

Initial optimum capacity levels can be established based on decisions made as a result of various factors and considerations, including the social capacity guidelines, resource capacity guidelines, management objectives, safety and other key factors. These initial levels might be conservative at

first, and then gradually increased after monitoring and the application of additional management techniques.

Importance of Monitoring and Readjustment

The establishment of an optimum capacity level is not the final step. This level will have to be monitored periodically, adjusted and refined based upon future user surveys and water use situations. For example, the application of new waterway management techniques, increased boater education and other factors may make it possible to increase the social capacity of a waterway. On the other hand, periodic application of the resource capacity guidelines may signal a need to decrease the optimum capacity to protect the water quality, shoreline, vegetation and other resources.

The choice of an optimum capacity level provides a basis for further testing, refinement and modification. Optimum capacity level considerations can be used to determine the need for and effectiveness of various waterway management techniques.

TABLE 4-9
EXAMPLE CAUSES AND POSSIBLE MANAGEMENT TECHNIQUES FOR ADDRESSING SOCIAL CAPACITY PROBLEMS

SOCIAL CAPACITY PROBLEMS	POSSIBLE CAUSES	EXAMPLE POSSIBLE MANAGEMENT TECHNIQUES (See Waterway Management Techniques Section for More Information About These & Other Possible Techniques)
Accidents and Near Accidents	• Lack of education regarding boating safety. • People not wearing life jackets (PFD's). • Reckless operation of watercraft. • Boating under the influence of alcohol. • Hazards on the waterway. • Swimming in unauthorized areas. • Lack of water use activity controls. • Others.	• Information and education. • Strict enforcement of existing rules and regulations. • Waterway patrols. • Water use activity controls and traffic management. • Planning for emergencies. • Others.
Overcrowding	• Location and popularity of waterway. • Lack of dispersed access areas. • Uncontrolled shoreline management. • Others.	• Information and education. • Access distribution and development controls. • Water use activity controls and traffic management. · ~ontrols on me number and size of supp&t facilities. • Planning, including planning mare at the regional level. . · Others.
Conflicts Between Recreational Watercraft and Commercial Vessels	• Lack of information and education regarding the need to "Keep Clear" of large boats. • Competition for the same waterway space. • Lack of water use activity controls and traffic management. • Others.	• Information and education. • Water use activity controls and traffic management. • Planning. • Others.
Conflicts Between Water Users and Adjacent Landowners (trespass, noise, etc.)	• Water users don't know land is in private ownership (lack of information and education). • Lack of designated public use activity nodes (designated public access areas, etc.) • Others.	• Information and education (e.g. preparing and distributing a boaters guide). • Planning and designating public use activity nodes. • Others.

(Continued on Next Page)

• conflicting water use activities (waterskiing/ fishing. powerboating/swimming, etc.) competing for the same waterway space.
• Lack of water use activity controls.
• Lack of information and education.
• Others.
• Information and education.
• Separating conflicting activity areas.
• Water use activity controls.
• Planning.
• Strict enforcement of existing rules and
• regulations.
• Others.

Conflicts Among Rucreational Water Users

Ba

TABLE 4-9 (Continued)
EXAMPLE CAUSES AND POSSIBLE MANAGEMENT TECHNIQUES FOR ADDRESSING SOCIAL CAPACITY PROBLEMS

SOCIAL CAPACITY PROBLEMS	POSSIBLE CAUSES	EXAMPLE POSSIBLE MANAGEMENT TECHNIQUES (See Waterway Management Techniques Section for More Information About These & Other Possible Techniques)
Special Event Conflicts	• Lack of adequate planning prior to the event. • Lack of communication, information and education. • Others.	• Planning. • Water use activity controls. • Information and education. • Others.
Congestion at Access Areas	• Inadequate design of boat launching areas (not enough ramp lanes, lack of a boat preparation area, lack of courtesy docks, etc.) • Lack of controlled circulation and designated parking spaces. • Size of support facilities for the area (e.g. parking area may be too large for the ramp or the entire access area may be too small). • Others.	• Planning. • Design of support facilities. • Access distribution and development controls. • Information and education. • Others.
Congestion on the Waterway	• Choke points exist on the waterway such as at narrow areas and bridges. • Rafting/parking at certain locations on the waterway. • Others.	• Planning. • Water use activity controls and traffic management. • Information and education. • Others.
Underuse	• Remote location of the area. • Poor access to the area. • Lack of information. • Inadequate directional signs. • Poor design or location of support facilities (access areas, parking lots, etc.). • Others.	• Planning. • Information and education. • Others.

Overall Optimum Capacity Monitoring Process

An overall optimum capacity monitoring process can help ensure that waterways are being used and managed in a manner which does not exceed their optimum carrying capacity. The process is shown in the accompanying flowchart on the following page. Additional information is found in the Monitoring Guidelines section.

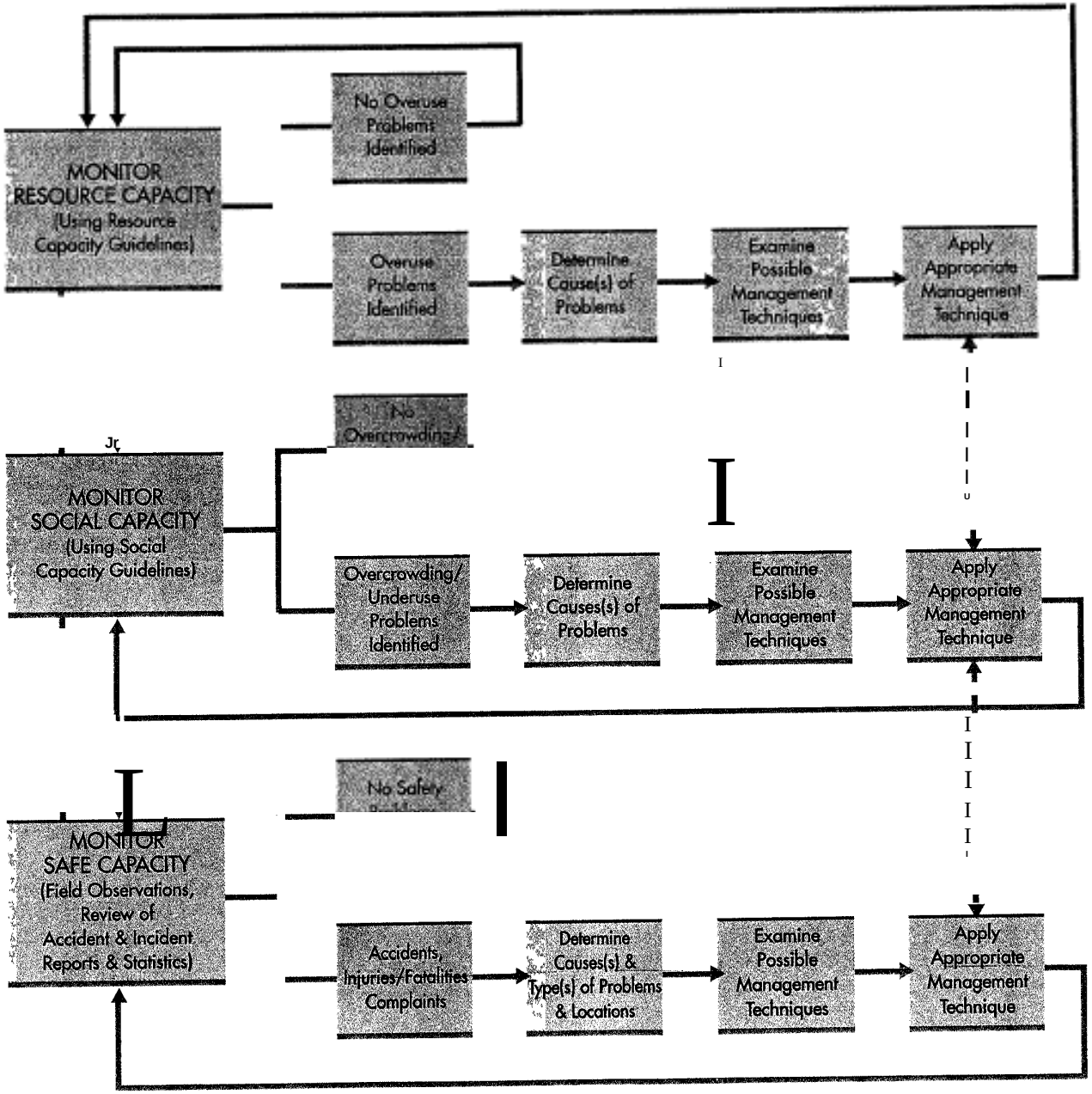
- Resource Capacity,
- Social Capacity, and
- Safe Capacity.

It involves the following steps: identifying problems; determining causes of the problems; examining possible management techniques; and applying appropriate management techniques. For example, when monitoring for safe capacity the first step is to conduct field observations and review accident reports and statistics. If accidents, injuries, fatalities or safety complaints are identified, the next step is to determine the specific causes and types of problems and the locations of these problems. After the causes and types of problems are identified, possible management techniques for addressing the problems would be reviewed. Then, the appropriate management techniques would be applied to address the safety problem.

Appropriate management alternatives, such as those described in the Waterway Management Techniques section, can be considered and used to solve safety problems, and problems of overcrowding and overuse. The overall optimum carrying capacity monitoring process should be continued on a regular basis.

During this overall monitoring process, under-used areas (if any) should also be identified. Managers should examine why areas are under-used (remote location, limited access, needed support facilities, etc.). Various management alternatives could be used to help solve problems of under-use.

The process addresses the waterway's:


MONITOR RESOURCE CAPACITY (Using Resource Capacity Guidelines)
No Overuse Problems Identified
Overuse Problems Identified
Determine Cause(s) of Problems
Examine Possible Management Techniques
Apply Appropriate Management Technique
MONITOR SOCIAL CAPACITY (Using Social Capacity Guidelines)
No Overcrowding
Overcrowding/ Underuse Problems Identified
Determine Causes(s) of Problems
Examine Possible Management Techniques
Apply Appropriate Management Technique
MONITOR SAFE CAPACITY (Field Observations, Review of Accident & Incident Reports & Statistics)
No Safety
Accidents, Injuries/Fatalities Complaints
Determine Causes(s) & Type(s) of Problems & Locations
Examine Possible Management Techniques
Apply Appropriate Management Technique

0

0—I

0

Z

U’

OVERALL OPTIMUM CAPACITY MONITORING PROCESS

GLOSSARY

Basic Waterway Management Planning Process - a comprehensive process for multiple use waterway planning and management. The process involves six fundamental steps: organization, research, planning, decision-making, action and monitoring.

Carrying Capacity - the capability of a waterway to provide an opportunity for certain types of satisfactory and safe experiences over time without significant degradation of the resource.

Delphi Approach - the Delphi approach is a way of determining social capacity standards/use levels based largely upon the knowledge and judgement of a group of experienced persons gathered together to exchange ideas and make choices.

Goal - an ultimate end to be achieved; a long range direction. Goals guide decisions on management objectives, recommendations and actions toward their achievement.

Impact Analysis - a set of concepts that order the understanding of how different types of problems can be addressed. Impact analysis involves the examination of the following four links of a basic causal model: use, action, effect and impact.

Indicators - the phenomena which can be used to identify or measure the degree user overcrowding or resource overuse, and which can be used in conjunction with a monitoring system to help predict when problems of overcrowding and overuse will occur if preventive measures are not taken.

Management Objectives - the specific, written objectives of a waterway management plan which serve to guide waterway management decisions, recommendations and actions.

Monitoring - 1) the periodic assessment of the impact that use levels have on the optimum carrying capacity of a waterway; 2) the term Monitoring also refers to the process involving the periodic assessment of a waterway management plan.

Optimum Carrying Capacity - the appropriate level of use based upon resource and social capacity considerations, management objectives, safety and other factors.

Resource Carrying Capacity - the level of use of a resource beyond which irreversible biological deterioration takes place or degradation of the physical environment makes the resource no longer suitable or attractive for that use.

Social Carrying Capacity - the level of use of a resource beyond which the user's expectation of the experience is not realized and he/she does not achieve satisfaction.

Waterway Management Plan - the official plan document which includes management objectives, recommendations and actions, and serves as the guide for management of a waterway.

Waterway Management Techniques - various techniques which can be used/applied to prevent or alleviate waterway activity conflicts and to help implement a waterway management plan.

OVERALL OPTIMUM CAPACITY MONITORING PROCESS

P~FERENCES

An Assessment of the Float-Trip Carrying Capacity of the New River Gorge National River (Roggenbuck, Joseph and Bange, Steven; Virginia Polytechnic Institute for National Park Service, 12/83)

Assessing Carrying Capacity (Arizona Outdoor Recreation Coordinating Commission, 9/81)

"Bighom Canyon National Recreation Area Summary of Survey Findings" (Bargas, Sandra for National Park Service, 1/92)

"Boaters at Crooked Creek Lake (PA) and Their Perceptions of Crowding" (Courtright, Daren and Chilman, Kenneth; Southern illinois University; draft, 2/94)

Boating Basics For Personal Watercraft (prepared by Outdoor Empire Publishing, Inc. in cooperation with Kawasaki Motors Corp., U.S.A., 1995)

"A Boating Capacity Evaluation of Berlin Lake" (Graefe, Alan; Drogin, Ellen; Cottrell, Stuart; Confer, John; and Titre, John; for Corps of Engineers, draft 12/92)

Boating Fundamentals: A Manual for Safe Boating (published by the National Recreation and Park Association, *1995)*

Boating Guide for Lake Wallenpaupack (prepared for Pennsylvania Power and Light Company, 1995)

"Boating Facilities Guide Northern Area" (California Department of Navigation and Ocean Development, 11/74)

Boating Safety (New Jersey State Police; 2/93)

"Boating Safety in Minnesota~' Research Summaries #8 (Tourism Center, Minnesota Extension Service, University of Minnesota, 1990)

Boating Statistics 1992 (U.S. Coast Guard, 6/93)

The Carrying Capacity of Lake Powell (Glen Canyon National Recreation Area, AZ & UT); A Management Analysis of Capacity for Boater Recreation (National Park Service, 11/87)

"Carrying Capacity Study of Shenango Lake, Pennsylvania" (Titre, John; Vogel, Jim; Dunk, William; Corps of Engineers, 12/94)

"Comparative Analysis of Crowding in Multiple Locations: Results From Fifteen Years of Research" (B. Shelby and others, Leisure Sciences, 11:269-291, 1989)

Control and Regulation of Reservoir Surfaces and Related Lands for Recreation and Other Uses (Stephens, Gene Albert; University of Tennessee, 8/68)

Delaware Canal Master Plan (URDC for Friends of the Delaware Canal, 7/87)

Economic Impacts of Protecting Rivers, Trails and Greenway Corridors: A Resource Book (National Park Service, Rivers, Trails and Conservation Assistance Program, 1991)

Federal Requirements for Recreational Boats (Brochure prepared by U.S Department of Transportation, United States Coast Guard, undated)

"Government Directory for Recreational Boating~' Federal and State, (draft, 4/94)

A Guide to Managing Recreational Boating Areas (Alston Colihan, Report No. CG-D-21-83, report prepared for the U.S. Department of Transportation, United States Coast Guard, 6/83)

Guidelines for Understanding & Determining Optimum Recreation Carrying Capacity (URDC for the Bureau of Outdoor Recreation, 1/77)

Handbook for Recreation Planning and Action (URDC for the Bureau of Outdoor Recreation as part of the Urban Parks and Recreation Recovery Program)

Information on boating accidents in Nebraska during 1993 (letter from Leroy Orvis, Nebraska Game and Parks Commission, to Gail Campos, Corps of Engineers, 10/26/93)

Keep Clear: Big Ships in the Delaware Bay and River (Brochure produced by the Delaware Department of Natural Resources and Environmental Control Division of Fish and Wildlife, and others; undated)

Lake Champlain Boat Study Report (Report prepared for the Lake Champlain Recreation Management Plan and the Lake Champlain Basin Program by the Vermont Department of Forests, Parks and Recreation in cooperation with the New York Office of Parks, Recreation and Historic Preservation and the United States Coast Guard, 3/93)

Lake Development (Minnesota Department of Natural Resources, Division of Waters, 1987, pp. 17-24)

Lake Mend (NV) National Recreation Area Visitor Survey

OVERALL OPTIMUM CAPACITY MONITORING PROCESS

OVERALL OPTIMUM CAPACITY MONITORING PROCESS

Lake Mead Management Study Overview (memo from Jim Holland dated 3/8/93)

Lake Mead Management Plan Briefing Package 2/26/93

"Lake Mead National Recreation Area (*AZ* NV) Carrying Capacity Study" (National Park Service, 8/80)

"Lake Mohave Sociological Carrying Capacity Report" (Steblina, Vladimir and Harvey, Michael, 9/77)

Lake Wallenpaupack Management Plan for Water-Based Recreation (URDC for Pennsylvania Power & Light Company and the Pennsylvania Fish Commission, 10/91)

Lake Zoning for Recreation; How to Improve Recreational Use of Lakes Through Regulation and Control; (Wilson, George; American Institute of Park Executives, Inc., Management Aids Bulletin #44; 12/64)

Malletts Bay (Colchester, VT) Capacity Study (The Henderson Group, 10/89)

Management Information Bulletin No. 4 Crooked Creek Lake, 8/15/93

Management plan synopses:

- Connecticut River (CT)
  - Lake Walienpaupack (PA)
  - Magothy River (MD)
- Municipal harbor management plans (RI)
  - Puget Sound (WA)
  - San Francisco and San Pablo Bays (CA)
  - Severn River (MD)
  - South River (MD)

"Managing Boating Use on Youghiogheny Lake" (flyer from Corps of Engineers)

"Mission Bay Guide", including boating regulations, boating safety guidelines and map

Mission Bay Park Master Plan Update, excerpts (draft, 2/93)

Mission Bay Water Use plan update; memorandum dated 8/29/9 1 to Ad Hoc Citizen Committee

MN Department of Natural Resources; Water Surface Use Management (WSUM) rules

National Association of State Boating Law Administrators survey of states results with table summarizing conflicts and solutions responses received from WY, NV, OR, MT, VA, UT, CA, NH, MD, VT, NY, DE, MI, NE, NC, KY, IA, MO, GA, WV, WI, OH, *AZ*, CT, Manitoba

National Conference on Access to Recreational Water, excerpts from proceedings (10/3 *5/65)*

New River Gorge National River (WV) Fisherman-Floater Conflict Study (Cockrell, David and Robinson, Carolyn; Virginia Polytechnic Institute for National Park Service, 1/15/84)

Presque Isle Bay Recreational Boating Study (Prepared by Grenhome & O'Mara, Inc. and Pennsylvania State University; report of the Pennsylvania Department of Environmental Resources to the National Oceanic and Atmospheric Administration, 3/94)

Ocoee River General Management Plan (Tennessee Department of Conservation, 10/88)

Ocoee River User Study (University of Tennessee, Clemson University, 1989)

"People, Human Behavior and Water-Based Recreation: A Working Bibliography" (Martinson, K.S. and Field, D.R.; National Park Service, undated)

"A Pilot Test of the Quality Upgrading and Learning (QUAL) Carrying Capacity Process at Youghiogheny River Lake" (Kenneth Chilman, John Titre and James Vogel for Corps of Engineers and PA Fish and Boat Commission, 5/21/93)

"Principals of Public Involvement Paper" prepared by Thomas A. Heberlein, University of Wisconsin, 4/96

"Proceedings of the Marine Safety Council" (Special Issue on Waterways Management, Volume *53,* Number *5,* 1995)

RecNotes (Corps of Engineers Information Exchange Bulletin); vol. R 92 1; 2/92) including an article by John Titre, Coping with Problems of Overuse on Lakes.

Recreation Areas on Conowingo Pond (boating guide and map prepared by Philadelphia Electric Company, undated)

Recreation Carrying Capacity Handbook Methods and Techniques for Planning, Design and Management (URDC for U.S. Army Corps of Engineers, 7/80)

Recreation Carrying Capacity Design and Management Study (URDC for U.S. Anny Corps of Engineers, 9/80)

"Recreation Planning for a Small Urban Lake (Conflict resolution of institutional and site constraints on Dow's Lake, Ottawa)"; Reiner Jaakson, Town Planning Review, 56 (1), 1984

OVERALL OPTIMUM CAPACITY MONITORING PROCESS

OVERALL OPTIMUM CAPACITY MONITORING PROCESS

Recreational Boating Impacts (3 volumes: appendices A-K to the Environmental Impact Statement for Fox River, Chain o' Lakes; Lake and McHenry Counties, IL, May, 1994)

"Recreational Boating on Delaware's Inland Bays: Implications for Social and Environmental Carrying Capacity" (Falk, James; Graefe, Alan; Drogin, Ellen; Confer, John; Chandler, LeeAnne for Delaware Department of Natural Resources, 12/92)

Recreational Carrying Capacity Study and Management Guidelines for Deep Creek Lake Natural Resource Management Area (URDC for MD Department of Natural Resources, 10/88)

Reference Guide to State Boating Laws (Council of State Governments and National Association of State Boating Law Administrators, James G. Noll and Ron Sarver, Editors, 1996)

"Regulating Development of Inland Lakes" (Zoning News, 3/91)

Safety Study Recreational Boating Safety (National Transportation Safety Board, Washington, D.C., April, 1993)

Shenango River Lake Marina Usage Survey

"Social Carrying Capacity in the National Parks" (Robert Manning for National Park Service, undated)

South River Comprehensive Vessel Management Plan (Maryland Department of Natural Resources, Boating Administration, 1/93)

States Organization for Boating Access (SOBA); Executive Board meeting minutes, Baltimore (MD), 10/9-13/93

States Organization for Boating Access (SOBA); Paper by C. Edwin Meadows, Maine Department of Conservation, presented to SOBA, 9/90)

Studies in Outdoor Recreation (Robert E. Manning; Oregon State University, 1986)

"Study of Recreational Boating and Lakeshore Management Needs at Lake Sidney Lanier (GA)" (Corps of Engineers, 3/85)

"Summary of the National and State l~conomic Effects of the 1994 U.S. Army Corps of Engineers Recreation Program" (paper presented by R. Scott Jackson and others at the Proceedings of the States Organization for Boating Access, Ninth Annual Conference, *9/95)*

Summaries of Visitor Use Surveys; Lake Mead and Lake Mohave, summer, 1993

Survey data for Lake Mead and Lake Mohave

Table Rock Lake Boater Survey Launch Ramp Users

Tennessee River and Reservoir System Operation and Planning Review, Final EIS (Tennessee Valley Authority, 12/90)

Upper Delaware Scenic and Recreational River Management Plan, Water Use Plan (URDC for the Conference of Upper Delaware Townships, 1/86)

"Vessel Traffic Management Techniques for Recreational Waters" (U.S. Coast Guard, 7/82)
"Water-Oriented Recreation Capacity Standards" (unmarked paper, 11 pgs.)

The Waterways Journal Weekly, vol. 107, no. 45, 2/7/94

"What do Boaters Want in Access" (Paper by Bill Becker, Minnesota Department of Natural Resources, undated)

Wild, Scenic and Recreational Rivers for New Hampshire (IJRDC for New Hampshire Office of Comprehensive Planning, 6/77)

Youghiogheny Lake Boating Capacity (Corps of Engineers Resource Analysis Group, 5/83)

"Youghiogheny Lake Water-Based Recreation Management Pilot Study Results of Boater Surveys" (James Vogel for Corps of Engineers Waterways Experiment Station, draft 12/9192)

"Youghiogheny River Lake 1992 Pilot Test Report (Draft) Location of Boats Observed During On-the-Water Boat Counts"

"Youghiogheny River Recreational Capacity Study" (Alan Graefe, Richard Gitelson, Anthony Fedler and Joanne Zeigler; Maryland Department of Natural Resources, 12/89)

Zoning (A Report of the Operator Controls Committee, National Association of State Boating Law Administrators, Excerps from the Proceedings of the Third National Conference on Access to Recreational Water, 10/65)

Zoning to Regulate On-Water Recreation; Reiner Jaakson (Land Economics, p. 382, 11/71)

Water surface use regulations and miscellaneous information from Minnesota Department of Natural Resources (transmitted 2/92)

OVERALL OPTIMUM CAPACITY MONITORING PROCESS

CONTACTS

American Boat & Yacht Council
3069 Solomon's Island Road
Edgewater, MD 21037
(410) 956-1050

American Camping Association
5000 State Rd. 67 N
Martinsville, IN 46151-7902
(317) 342-8456

American Canoe Association
P.O. Box 1190
Newington, VA 22122-1190

American Power Boat Association
P.O. Box 1939
6250 W. Pioneer
Fond dii Lac, WI 54936-1939
(414) 929-5503

American Waterways Operators
1600 Wilson Blvd.
Arlington, VA 22289
(703) 841-9300

American Whitewater Affiliation
P.O. Box 85
Phoenici, NY 12464
(914) 688-5569

BB Riverboats
Port of Cincinnati
1 Madison Avenue
Covington, KY 41011
(606) 261-6400

BOAT/US Foundation
880 5. Picket Street
Alexandria, VA 22304
(703) 823-9550

Bombardier Sea-DooJPWIA
730 E. Strawbridge
Melbourn, FL 32901
(407) 722-4000

Federal Energy Regulatory Commission
Washington, DC 20426
(202) 219-2750

Georgia Power Company
125 Wallace Dam Road
Eatonton, GA 31024
(706)485-8704

Marine Retailers Association of America
Chicago Office:
150 E. Huron, Suite 802
Chicago, II 60611
(312) 944-5080
Washington Office:
660 American Drive
Suite 13
Annapolis, MD 21403
(301) 858-8301

National Association of State Boating
Law Administrators
P.O. Box 8510
Lexington, KY 40533
(606) 244-8242

National Boating Safety Advisory Council
U.S. Coast Guard, G-NAB
2100 Second St. S.W.
Washington, D.C. 20593-0001
(202) 267-0950

National Marine Manufacturers
Association
Washington Harbour
3050 K Street, NW
Suite 145
Washington, DC 20007
(202) 944-4980

National Park Service
601 Nev. Hwy.
Boulder City, NV 89005
(702) 293-8939

National Safe Boating Council
Administrative Office
P.O. Box 8510
Lexington, KY 40533

National Transportation Safety Board (RE-b)
Washington, DC 20594
(202) 382-6566

National Water Safety Congress (NWSC)
8003 Broadlawn Drive
Pittsburgh, PA 15237
(412)367-2865

OVERALL OPTIMUM CAPACITY MONITORING PROCESS

Ohio Department of Natural Resources
Division of Watercraft
4435 Fountain Square Drive
Columbus, OH 43224
(614) 265-6476

Oregon Marine Board
435 Commercial St. NE
Salem, OR 97310
(503) 373-1405

Personal Watercraft Industry Association (PWIA)
Suite 525
1000 Thomas Jefferson St. N.W.
Washington, D.C. 20007
(202) 338-6662

Safety Dept. Walt Disney World
POBox 10000
3300 Bonnett Creek Rd.
Lake Buena Vista, FL 32830-1000
(404) 827-2769

States Organization for Boating Access
(SOBA)
P.O. Box 25655
Washington, DC 20007
(202) 944-4987

Tennessee Valley Authority
205 Ridgeway Drive
Norris, TN 37828
(423) 988-2444

U. S. Dept. of the Interior
Office of Occupational Safety & Health
P0. Box 25007 (D-l15)
Denver, CO 80225
(303) 236-7128
Urban Research and Development
Corporation (URDC)
28 Bethlehem Plaza
Bethlehem, PA 18018
(610) 865-0701

U.S. Army Corps of Engineers
111 N. Canal
Chicago, II 60606-7206
(3 12) 353-6400 ext. 2021

U.S. Army Corps of Engineers
Pittsburgh District
Room 1834
Federal Building
1000 Liberty Avenue
Pittsburgh, PA 15222
(412) 644-2798

U.S. Army Corps of Engineers
Waterways Experiment Station
3909 Hall Ferry Road
Vicksburg, MS 39180-6199

U.S. Department of Transportation
United States Coast Guard
2100 2nd St., SW
Washington, DC 20593
(202) 267-1263
(800) 368-5647 (Boating Safety Hotline)

U.S. Section Permanent International
Association of Navigational Congresses
(PIANC) 7701 Telegraph Road
Alexandria, VA 22315-3868

Utah Division of Parks & Recreation
1636 W. North Temple
Salt Lake City, UT 84116
(801) 538-7341

OVERALL OPTIMUM CAPACITY MONITORING PROCESS

OVERALL OPTIMUM CAPACITY MONITORING PROCESS

S3±ON

OVERALL OPTIMUM CAPACITY MONITORING PROCESS

The National Water Safety Congress (NWSC) is a nationally recognized organization dedicated to promoting recreational water safety in the United States. The NWSC was organized in 1951 to take a national leadership role in addressing the growing number of recreation-related boating accidents which were resulting in ever increasing property damage and drownings. The Congress has been on the forefront of many boating safety issues. Congress programs have grown to include: the publication of the nationally-distributed Water Safety Journal, a national water safety awards program, involvement in the formulation of legislative and regulatory initiatives, the establishment of a wide range of water safety educational and training programs and guidelines, the presentation of professional developmental training, focused research programs, and the formation and support of hundreds of local Water Safety Councils across the country.

The membership of the Congress consists of a diverse interdisciplinary group of full and part-time water safety professionals with representatives from almost every federal, state and local government agency as well as private orgamzations such as hydropower and utility impoundment managers, and water safety oriented groups. Included among its membership are members of the National Association of State Boating Law Administrators, The National Safe Boating Council, the U.S. Power Squadron, the Tennessee Valley Authority, the U.S. Army Corps of Engineers, the National Park Service, etc.

The basic philosophy of the Congress is that boating safety should be addressed through a combination of education, improved enforcement, and safe facility design and engineering principles.

The Congress obtains its funds from membership dues, sustaining memberships and federal grants. Funds are expended for research, development and production of water safety promotional materials, films and training programs, a water safety awards program, and support of the Congress' annual Professional Development seminar.