MarinaNet
Bibliography of
Sea Grant Marina and
Boating Publications
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Boating Publications

Edited by
Rachel Calabro and Mark Amaral
in cooperation with
the National Sea Grant Depository

Rhode Island Sea Grant
and URI Coastal Resources Center
University of Rhode Island
Narragansett Bay Campus
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Bibliography of Sea Grant Marina and Boating Publications

This is a catalogue of Sea Grant publications, including technical reports, journal reprints, videos, posters, maps, and other research, education and outreach materials. The catalogue contains materials from 1975 to the present. Each item is available on loan only from the National Sea Grant Depository, or may be obtained directly from individual Sea Grant programs. Several publications are also available on line at program web sites.

Each publication that is located in the National Sea Grant Depository is assigned a unique document number consisting of four parts. For example: NCU-T-87-001 consists of 1) the institution code, 2) the type code designating the type of publication, 3) the last two digits of the year of publication, and 4) the accession number which represents the order in which the publication is entered into the data base. Other publications have similar number assigned by individual programs.

References were chosen for their usefulness, and relevance to marinas and recreational boating. Where possible, abstracts have been included to enhance the catalogue as a reference tool for researchers, educators, and the marina industry. It is hoped that this catalogue will continue to develop as Sea Grant programs extend their ties with the marina and boating industries.
Institution Codes and Addresses

AKU
Alaska Sea Grant College Program
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AZU
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602-626-2931

CONN
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Groton, Connecticut 06340
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CUIMR
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Davis, California 95616
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ILIN
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Urbana, Illinois 61801

LDGO
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LSU
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MASGC
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MDU
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MEU
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MEDMR
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State House Annex
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NIMSC
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NSGD
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MICHU
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SCSGC
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SCU
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213-740-1964

SGO
National Sea Grant College Program
NOAA, Sea Grant, R/OR1
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301-713-2431

TAMU
Texas Marine Advisory Service
Texas Sea Grant College Program
1716 Briarcrest Drive, Suite 702
Bryan, Texas 77802

VIMS
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Marine Advisory Services
Virginia Institute of Marine Science
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WASHU
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Type Codes

B   Books, including textbooks
C   Atlases and other collections of charts and maps
D   Directories
E   Education materials including program bulletins, course syllabus, or other
classroom and career information.
E1  Educational series
ES  Collection of student reports or single reports prepared as group projects
F   Film lists and description of non-print media
G   General public and advisory bulletins
G1, etc Report series for general public
H   Single handbooks, manuals
H1  Series of handbooks, manuals
I   Indexes as separate entities. An index in a separate volume that is part of a report in
several volumes is numbered in the same manner as the volume that is covers.
L   Bibliographies, publication lists
M   Single maps, charts
N   Newsletters
P   Proposals
Q   Progress reports, annual, quarterly, or final; committee reports; evaluations
QA  Progress reports, annual, quarterly, or final, on a single project
R   Reprints and preprints from journals, proceedings (includes abstracts of same), and
copies of papers presented but not published
T   Technical reports
TL  Technical leaflets and booklets or single-page papers
T1, etc A second series of reports from the same institution or reports considered advisory in
nature
U   Miscellaneous special collections or complete issues of journals that contain one or
more Sea Grant articles
W   Proceedings, symposiums
WA  Summary or highlights of proceedings
X   Miscellaneous papers or reports
X1  Abstracts, Ph.D. theses (dissertations)
X2  Abstracts, M.S. theses
Y1  Unpublished Ph.D. theses (dissertations)
Y2  Unpublished M.S. theses
Z   Parts of longer documents (articles located in one main document)
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Conference Proceedings/Bibliographies


Goodwin, Robert F. (ed.) 1988. *Boating and Moorage in the ’80s*. WASHU-W-88-001. These proceedings address how to meet new demands from a burgeoning pleasure boat fleet in the coming decade. Among the topics included are: siting marinas in ways that maintain water quality and minimize fishery losses; taking advantage of innovations in marina design and management; dealing with tourism and guest moorage; practicing preventive maintenance; financing marinas and setting up effective accounting and budget control systems; marketing and pricing boater services; and organizing for political effectiveness. Specific paper titles available through the NSGD search.


Grifman, Phyllis M. and James A. Fawcett (eds.) 1991. *International Perspectives on Coastal Open Space Utilization*. SCU-W-91-003. 789 pages. This volume contains the edited essays printed at the Coastal Open Space Utilization Symposium. Because of the broad geographic representation at the conference, discussions covered a wide range of topics, from land reclamation activities along the coast of Bangladesh to the marine policy issues raised by multiple uses of marine and coastal resources around the world’s oceans. Papers are divided into thematic sections, including summaries of national efforts to protect and utilize the coasts, developments in the uses of coastal space, including the creation of ‘sea cities’ by means of reclamation and developing artificial islands, especially in Japan. Other sections discuss means to wisely manage the extraction of minerals in the seabed, increase fisheries resources, and utilize the vast energy potential of ocean waves, thermal gradients and winds. The development of ports and harbors, and issues concerned with the safety of shipping are covered, along with means for improving decision making about competing uses, environmental values and priorities for future use and protection of the world’s coastal margins. Specific paper titles available through the NSGD search.

Grifman, Phyllis M. and Susan E. Yoder (eds.) 1991. *Perspectives on the Marine Environment*. SCU-W-91-001. 130 pages. This symposium covered a range of topics concerning the coastal marine environment of the Southern California Bight. The objective of this volume is to contribute to an understanding of the problems associated with monitoring and managing this environment, and to suggest ways to improve existing efforts. Topics addressed include contamination trends, the health of fish populations in a large local marina, problems posed by the invasion of exotic plants in coastal wetlands, methods of enhancing coastal fisheries, ways to improve methods of monitoring marine biota, and problems associated with major oil spill clean-up efforts. Specific paper titles available through the NSGD search.


Louisiana Sea Grant College Program. 1992. *Second Louisiana Rural Tourism Development Conference*: Lake Charles, Louisiana, October 1992. LSU-W-92-001. 50 pages. The key to effective tourism development and management lies in understanding the ‘specialness’ of a place or region and the attachment of financial and human resources to maintain those special qualities. Like a vein of gold, tourism annually contributes tens of billions of dollars in direct expenditures to the South’s economy, and that aggregated economic sector is the fastest growth ‘industry’ for many southern states. Communities eye
the impressive tourism dollar-generation figures and want a piece of the action. But, without a plan for tourism management, community business districts, locally-owned restaurants, and quaint shops which originally attracted visitors, slowly yield to a plethora of ice cream parlors, fast food burger outlets, and tee-shirt emporiums; a commercial homogeneity replaces economic diversity and a tourist ghetto is born. Like the metaphoric gold vein, tourism is a fickle economic base, easily played out without careful nurturing. This conference summary addresses these issues. Specific paper titles available through the NSGD search.


Null, Barbara (ed.) 1991. Shoreline Management. WASHU-W-91-002. 151 pages. Twenty years ago, some far-seeing citizens of Washington State drafted an initiative to protect and manage the State's shorelines. Washington's voters affirmed the need for statewide shorelines management and chose the Legislature's alternative initiative to achieve it. The public-spirited efforts of those citizens, the responsiveness of their Legislature, and the leadership of their governor resulted in one of the nation's pioneering shoreline management programs. Twenty years later, more than 200 Washingtonians gathered at a symposium to celebrate two decades of shoreline management in their state, and to honor some of those responsible for the passage and implementation of the state's Shoreline Management Act of 1971. Participants in the Shorelines Management Symposium had the opportunity to learn about and assess what had been achieved under the Shoreline Management Act. They also looked ahead to the challenges the state's shoreline managers will face over the next 20 years, and considered whether or not the 20-year-old Shoreline Management Act will be sufficient to meet them. This proceedings documents the stories, ideas, and observations which symposium participants heard during one and a half days of plenary and break-out sessions. Specific paper titles available through the NSGD search.


Saxena, Narendara K. (ed.) 1992. Recent Advances in Marine Science and Technology, 92. HAWAU-W-92-002. 475 pages. Recent Advances in Marine Science and Technology, 92 is the first refereed publication of a series based upon papers presented at the fifth Pacific Congress on Marine Science and Technology (PACON 92) held in Kona, Hawaii, 1-5 June 1992. A unique process was adopted to bring about this refereed publication: session chairs selected authors (based on presentations at PACON 92) and recommended their manuscripts for possible inclusion in this publication. Out of 205 PACON 92 presentations, 47 papers were accepted for this publication. Papers dealt in areas of ocean sciences, technology, management and policy. Specific paper titles available through the NSGD search.


Interpretation International was attended by over 500 persons from nearly 40 countries. The Congress theme, "Joining Hands for Quality Tourism," focused on the global concerns for preserving cultural and natural heritage, while providing opportunities for public enjoyment. A major premise of the Congress was that—by working together—professionals in heritage interpretation, preservation and the international travel industry can play a major role in the conservation and sustainable development of the world's natural and human resources. The program promoted exchange of useful information, sharing of success stories, and networking among the participants. Attendees came from many diverse cultures and professions, but shared a common desire to preserve and interpret the Earth's cultural and natural treasures for enjoyment and appreciation by residents and visitors. These proceedings contain 131 papers emerging from Congress presentations, seminars, workshops and poster sessions. Specific paper titles available through the NSGD search.

Wortley, C. Allen. 1988. Docks and Marinas Bibliography. WISCU-L-88-001. A comprehensive selection of the latest information on docks and marinas is presented in this 1988 updated edition. More than 200 references cover seven subject areas, including marina construction and management, hydraulic engineering, ice engineering, wood preservation, geotechnical and structural engineering, and mechanical and electrical systems. Many entries are annotated. Index of principle authors is included.

Environmental


Fisher, John S., et al. 1987. A Comparison of Water Quality at Two Recreational Marinas During a Peak-Use Period. NCU-T-87-001. 46 pages. As development flourishes on North Carolina's coast, so does the number of proposed marinas. Many of these marinas are planned near waters used for harvesting oysters, clams and other shellfish. Prospective marina operators must ensure specific water quality standards will be met before they can obtain a permit. Predicting that a certain marina design will satisfy these standards is difficult; many factors must be taken into account. Researchers from North and South Carolina are developing a predictive water quality impact model. To that end, in 1985, they studies two marinas for six days over the Labor Day holiday to document the relationship between boat use and water quality during a period of peak boat use. Their findings are reported here in detail in both text and tabular form.

Florida Sea Grant College Program. 1995. What Responsible Boaters Can do to Keep Florida's Waters Clean. FLSGEB-27. Topics include fuel management, engine maintenance, boat cleaning and maintenance, dealing with hazardous materials, recycling and responsible boating actions.

Good, James W. 1987. Mitigating Estuarine Development Impacts in the Pacific Northwest: From Concept to Practice. The Northwest Environmental Journal: vol. 3., no. 1, p. 93-112. ORESU-R-87-013. Projects undertaken in recent years are generally ones with public benefits, such as ports, marinas and other water-oriented development. But these projects also result in adverse environmental impacts that chip away at the estuarine resource base which supports commercial and recreational uses. Natural resource managers
at the local, state and federal levels have made an effort to stem this tide of adverse impacts. They have implemented procedures aimed at restoring, creating or enhancing estuarine habitat to mitigate unavoidable environmental damage. This paper discusses estuarine mitigation in the Pacific Northwest and the relationship of mitigation to other resource management strategies. Overall, mitigation strategies and goals for individual projects are outlined, followed by a discussion of regional goals and estuary-wide mitigation planning. Information sources for wetland creation and restoration are presented, and design principles summarized. Finally, suggestions for improving mitigation technology and procedures are offered.

**Kelch, David O.** 1992. *Boaters—Slow the Spread of Zebra Mussels, and Protect Your Boat Too.* OHSU-G-92-003. Since their initial “invasion”, zebra mussels (Dreissena polymorpha) have spread throughout the Great Lakes and connecting water channels. Biologists believe that eventually the zebra mussel will be dispersed, via human and natural methods, throughout the United States and southern Canada. Zebra mussels attach themselves to any solid surface not protected by antifoulant paints, such as unprotected boat hulls, motors, swim platforms, trim tab plates, and electronic transducers. Veligers can be transported in five wells, bilge water, marine toilets, water trapped in trailer frames and safety light compartments, and in water collected inside the boat’s decking. Water trapped in the lower portion of the boat motor cooling systems can also harbor veligers. Zebra mussels cause extensive damage to boats and motors if their attachment is not prevented. This fact sheet describes precautions to take to avoid spreading the mussel and damaging equipment.


**Rheault, Robert B. and Michael A. Rice.** 1989. *Nursery Culture of Shellfish Seed in Marinas.* Proceedings of the First National Marina Conference: Neil Ross (ed.), Wickford, Rhode Island p. 204-231. RIU-R-89-025. Growth and survival of young 2 mm hard clam (‘Mercenaria mercenaria’) seed were monitored in three marinas and a control site in Rhode Island coastal waters. Growth of seed in a hatchery upwelling system was monitored for comparison. The clams were suspended below floating and fixed docks screen bags in cages designed to protect the seed from predators. This procedure could be used to generate additional revenue for marina operations by sale of the seed for subsequent grow-out in certified waters. Growth rate data from the various sites are presented along with a detailed economic analysis of the project’s costs and projected revenues of a larger-scale commercial endeavor. The financial, social and ecological implications of such an enterprise are discussed.


**Ross, Neil W.** 1985. *Environmental Impacts of Marinas and Their Boats.* RIU-R-85-005. Docks and Marinas. 12th National Technical Conference: Madison, Wisconsin, October 1985. Recent U.S. coastal trends show decreasing numbers of marinas, even while most boating areas report an unmet demand for slips. Marinas can have very favorable economic and esthetic effects on a community, but aren’t without adverse environmental impacts, even if “relatively minor”. Brief discussions of such impacts are presented here and include: site selection, dredging, bulkheads, breakwaters, piers, fuel, noise, litter, auto traffic, and boat sewage.

Texas A&M University Sea Grant Program. 1992 *Protecting Marine Mammals (poster)*. TAMU-G-92-002. This poster, designed to be displayed at marinas and charter boat docks or in bait houses, is a reminder to the general public to keep a distance between themselves and the naturally sociable dolphins, porpoise, seals, sea lions and whales. The emphasis is on enjoying the sight of the animals while ensuring that they also can return another day.

**Waste Streams**

Amaral, Mark and Virginia Lee. 1994. *Environmental Guide for Marinas: Controlling Nonpoint Source and Storm Water Pollution in Rhode Island*. RIU-H-94-002. Nonpoint source pollution (NPS) is associated with any discrete source of pollution that enters surface waters, such as hazardous material spills, excess or residue detergents and solvents, and fertilizers. Currently, federal and state government agencies are working to build upon existing management policies and practices to minimize the effects of nonpoint sources of pollution. To support and build upon this initiative, this document, based upon experience gained in designing and testing best management practices at selected model recreational boating facilities, will provide guidance to the managers of recreational boating facilities, to reduce NPS associated with marina operations.

Birstain, Melissa. 1989. *Long Island Sound Study: Nonpoint Source Pollution in Long Island Sound*. NYSGI-G-89-002. There are many unseen sources of pollution. For example, every time it rains or snows, pollutants are added to Long Island Sound. Precipitation picks up pollutants from the atmosphere and deposits them on the surface, a process called atmospheric deposition. Excess rain or meltwater which is not absorbed washes soil and contaminants from the land on the way to its final destination; this process is called stormwater runoff. Both processes contribute to nonpoint source pollution; other examples include contaminated groundwater, failing septic systems, and marinas and recreational boats. Nonpoint source pollution is much more difficult to identify and regulate because its origins are so diffuse. The fact sheet describes some of its sources and effects as they relate to the sound.

Doyle, Brian and Roland Barnaby. 1990. *Reducing Marine Debris: A Model Program for Marinas*. NHU-R-90-001. Proceedings of the International Marina Institute Conference: Clearwater Beach, Florida, January 1990. The pollution of our nation’s oceans and shoreline from persistent marine debris has presented a formidable challenge to our society. Both legal and illegal dumping of items such as medical waste, plastics, fishing line, balloons, sewage, and ship’s garbage have raised serious questions about the ocean’s assimilative capacity and future health. It has been estimated that more than 7 million tons of litter reaches open oceans each year. In response to the growing marine debris problem, the project was initiated to reduce the amount of TRASHMASTER marine debris discarded in the ocean by New Hampshire’s recreational boaters, and to develop a model program which other marinas in the region would use. The project resulted in approximately 5,000 bags of trash being returned for onshore disposal by the 91 participants. More than 90% of the boaters indicated they would likely participate again next season and a number of other seacoast marinas have expressed interest in developing similar programs.

Eldredge, Maureen E. 1989. *The Contribution of Recreational Boats to Bacterial Water Pollution: A Model for Determining Sewage Loading Rates*. National Marina Research Conference: p. 143-155. RIU-R-89-016. This study obtained data on boat use in Rhode Island to determine sewage loading factors. Preliminary results, which indicate a correlation between boat use and boat length, were used to create a modified formula which
factors in relevant data on occupancy rates and number of people aboard. These data were
used in conjunction with aerial photographs taken during the July 4th weekend to develop
two models for the contribution of recreational boats to bacterial water pollution. Applied
to a harbor, allowable boat numbers in the mooring field are obtained; the exact number is
dependent on boat length and occupancy rate. The methodology of this study, as well as the
resultant formula, can be used by harbor planners to balance use conflicts in sensitive areas.

Falk, James; M. Anderson and N. Bennett. 1989. Recreational Boaters: Take Care of
Your Discharge. DELU-G-89-004. Bacterial pollution of Delaware's tidal waters comes
from many non-point sources, and can remain in the bays for up to three months because of
the system's slow flushing rate. One source of bacterial pollution is boat sewage. On April
1, 1989, a new law went into effect regulating vessel sewage pumpout and discharge into or
upon all the state's tidal waters. Recreational boaters are required to adhere to all boating
discharge laws and regulations in effect. And marina and other boating-facility operators
now must provide adequate sewage pumpout stations for docked vessels using Type III
marine sanitation devices (MSDs) and for any live-aboard vessels docked at their facility.
All portable toilets used aboard boats in Delaware waters should be returned to shoreside
locations for proper wastewater disposal. Recreational boaters are highly encouraged to take a
lead role and demonstrate their support for this piece of environmental legislation.

for Minnesota Resorts. MINNU-H-91-001. 16 pages. Minnesota's recreational fishing
industry provides an estimated $788 million dollars annually to the state. Sport anglers
catch 30 to 35 million pounds of fish from the state's numerous lakes and rivers; cleaning
those fish produces at least 15 million pounds of fish waste. Getting rid of the waste is a
major problem. Composting fish waste reduces odors, insect problems, and the amount of
waste. Composting effectively stabilizes organic materials that can be returned to the soil.
Five demonstration projects were conducted to determine the feasibility of composting at
Minnesota resorts and marinas. Each site used a different design and mixture of sphagnum
peat moss and wood chips. The information presented here is the best combination of
design and materials for small scale composting fish wastes.

Hollin, Dewayne, Michael M. Liffman and Marilyn Barrett. 1995. Recycling for a
LSU-H-95-001. Laws give ports, marinas, and terminals responsibility for protecting the
marine environment which is critical to each facility's livelihood by offering vessels various
acceptable disposal options. Each port or marina will implement the marine debris laws
differently, but these laws assign all ports, terminals, and marinas the responsibility for
providing adequate waste reception for vessels. Port, terminal, and marina managers are
required to develop and implement a waste management plan. This book is intended to help
with one portion of that plan: recycling.

Humphreys, Jim; Patti Mullin and Gail S. Weir. 1990. Getting a Grip on Marine Debris
at Port of Seattle Facilities. WASHU-G-90-002. The Port of Seattle's Shilshole Bay
Marina and Fishermen's Terminal, with their combined fleets of twenty-two hundred boats,
constitute two of the largest and most important recreational and commercial terminals in
the Puget Sound area. Like all marinas, however, they have a problem with the proper
disposal of plastic and other wastes generated by the fleets that use their facilities. The Port
of Seattle has taken steps to alleviate the situation by improving the waste collection
facilities to include recycling stations, and by helping to educate the boaters and commercial
fishermen who use their terminals. This pamphlet describes the effort, which is applicable
to any commercial or recreational port facility.
Mullin, Patti and Jim Humphries. 1989. *Getting a Grip on Marine Debris at Squalicum Harbor.* WASHU-G-89-002. Bellingham’s Squalicum Harbor, with its year-round fleet of more than sixteen hundred recreational and commercial fishing boats, is the second largest marina in Puget Sound. Like most other marinas, however, it has a problem with the proper disposal of plastic and other wastes that are generated by this fleet. The Washington Sea Grant Program and the Port of Bellingham have been working together to help alleviate the situation at Squalicum Harbor by improving the waste collection facilities and then by educating the boaters and commercial fishermen who use the harbor. This pamphlet describes the problems and solutions, and includes a poster of the harbor’s waste disposal sites.

**New York Sea Grant Institute.** 1988. *If You See It...Report It!* NYSGI-G-88-001. This tri-fold brochure outlines steps for the recreational boater to follow after spotting any one of the following incidents in New York coastal waters: illegal (off-site) ocean dumping, oil or hazardous materials spills, or unusual conditions—fish kills, algae blooms, or debris. A map of dumping sites, a chart containing the Loran C coordinates for those dumping sites, telephone numbers for appropriate state and federal agencies, and tips on preserving New York’s water quality are provided. No charge for copies.

Rhodes, Jared, Mark Amaral, Jason Marino, and Virginia Lee. 1996. *Nonpoint Source Pollution Abatement for Recreational Boating Facilities: Applying Innovative Best Management Practices.* This document is the final report for the Rhode Island marina outreach and best management practice implementation project. This project was a statewide initiative undertaken by the Rhode Island boating industry and the State to develop marina operations and maintenance procedures that are cost effective and environmentally compatible. The document contains lessons learned from the implementation of BMPs at five Rhode Island marinas.

Rogers, Spencer. 1991. *Marinas Should Offer Free Pumpout Service... Trade Only Soundings.* May 1991, p. 33. NCU-R-91-030. Public concern for environmental issues is at an all-time high, and marinas have a public image problem. The public looks at a marina full of boats and assumes it is the source of sewage pollution in the surrounding waters. Marinas could improve their public image by installing and providing free pumpouts for boat waste.


Ross, Neil W. 1985. *Towards a Balanced Perspective...Boat Sewage... Docks and Marinas.* 12th National Technical Conference: Madison, Wisconsin, October 1985. RIU-R-85-007. Managing boat sewage will become a major political concern especially as the federal government withdraws its sanitation regulations for boats under 65 feet in length. Unfortunately, concerned citizens and boat owners often take emotional stances that are ill-informed and overly polarized. If marinas provided clean, dry, lighted and heated restroom facilities, boat owners would use them in preference, and most of the problem would be solved. This and other middle range alternatives are reviewed. It is emphasized that there is little research documenting the effects of boat discharges, but they are likely to be only minor contributions to (even colloform) coastal pollution.

Tanski, Jay. 1989. *Boater Use of Pumpout Facilities in Suffolk County, Long Island, New York.* NYEXT-R-89-002. In response to the increasing concern regarding the discharge of sanitary wastes from recreational vessels and the search by various federal, state, and local entities for effective strategies to address this issue, a survey was conducted to assess the
level of use and availability of pumpout stations in Suffolk County, Long Island, New York, and area characterized by high boating activity. Fifteen operating pumpout stations were available to service over 56,000 boats registered for use in the county. Since 1981, the number of facilities had decreased by almost 50% while boating registrations increased by 5%. Over 90% of the decommissioned stations were reportedly removed because of insufficient use. Usage at individual stations ranged from 2 to 630 pumpouts per season; however, 63% of the stations were used less than 50 times per year. Factors limiting use may include the portion of boats having holding tanks (89% of the recreational boats were less than 25 feet long), patterns of boat use, and the perceptions of boaters. 5% of the registered recreational vessels could be expected to use these facilities. Practical, economical alternatives for disposing of collected boat wastes must be identified if efforts to promote the proper use of holding tanks and pumpout facilities are to be successful. Available for $2.00 from New York Sea Grant Extension.


Tiedemann, John. 1987. *If You See it...Report it! An Ocean Dumping Fact Sheet for Coastal New Jersey.* NJMSC-G-87-004. You can be a valuable source of assistance in preserving the quality of New Jersey's coastal waters. If you're fishing or boating in coastal waters and encounter any unusual conditions, please take a few moments to record your observations and report them to the appropriate agencies! This fact sheet tells you what to look for and whom to report it to. In addition, currently active dump sites located in the New York Bight are listed. No charge for single copies.

Marina Construction and Design


Lucy, Jon, Ann Breen and Dick Rigby. 1985. *Urban Waterfronts: Positive Directions, New Problems.* Proceedings of the National Outdoor Recreation Trends Symposium II: Myrtle Beach, South Carolina, February 1985, vol. II p. 66-80. VSGP-R-85-004. The nationally popular and successful waterfront redevelopment trend is experiencing major cutbacks in federal funding and interest. Use conflicts over remaining urban shorelines private sector demands vs. public access needs, congested marinas, and loss of piers enforced relocation of the "working waterfront" and loss of individual cities waterfront "character" through mass design are some of the problems discussed. Guidelines for resolution of such conflicts are presented.


Ross, Neil W. 1985. *Auto Parking in Marinas.* Docks and Marinas 12th National Technical Conference: Madison, Wisconsin, October 1985. RIU-R-85-008. Based on what is known about what actually happens with marina use, one car for every two boats seems adequate as a national guideline at least in the absence of a restaurant, store, or other facilities that attract customers.


Ross, Neil W. 1985. *Design Alternatives for Increasing Marina Capacity.* Docks and Marinas 12th National Technical Conference: Madison, Wisconsin, October 1985. RIU-R-85-006. Various berthing options are compared with respect to finger width, fairway, boats per acre, and thus slip efficiency. While real marinas are a mixture of boat and slip sizes, it is possible to increase slip capacity in existing docking areas with some sacrifice of convenience. By eliminating fingers, there are significant savings in capital costs, maintenance, and taxes. Increased space efficiency could translate into improved business profits, reduced growth of slip rental rates, and, most important, more access for new boaters.


Wortley, Allen C. 1987. *Floating Docks: Today's Choice for the Great Lakes.* WISCU-G-87-006. The use of floating docks is increasing at marinas throughout the Great Lakes region, with good reason. As recent dramatic fluctuations in Great Lakes water levels so clearly demonstrated, floating docks offer a major advantage over fixed docks: they automatically adjust to changes in lake levels. This fact sheet summarizes the site and need considerations for selecting a marina dockage system and describes the available types of floating dock and anchorage systems. It also discusses the problems of storm surges, seiches and winter ice, and what marina owners and operators can do to minimize ice damage.

**Ice Engineering**

Edil Tuncer B., Clifford J. Robice and C. Allen Wortley. 1988. *Design Approach for Piles Subject to Ice Jacking.* Journal of Cold Regions Engineering; vol. 2, no. 2, p. 65-85. WISCU-R-88-012. Ice jacking, repeated incremental pullout of a pile by an ice sheet, is a widespread occurrence in many large bodies of water in northern regions. The resulting damage to marina facilities costs many thousands of repair dollars annually. The damage is due, in part, to the fact that practical methods to evaluate uplift damage potential do no
exist, leaving most pile designs to be governed by lateral loads or small vertical loads. These loading conditions may or may not yield a design which performs successfully under ice uplift conditions. This paper focuses on the use of relatively long piles to develop sufficient pullout resistance and proposes a systematic method to predict likely levels of ice damage for given pile designs and environmental conditions. It is based on the analysis of about 60 pile designs from 33 Great Lakes marina sites. No charge for single copies.


This paper reviews a classification system of winter conditions to be used in design considerations for docks and marinas in Great Lakes coastal areas. An array of design choices is presented to correspond with the classified winter conditions at a given site.

Wortley, C. Allen. 1991. *Ice Engineering Design for Marinas.* Proceedings of the World Marinas '91 First International Conference, Long Beach, California, Sept. 1991, p. 524-533. WISCU-R-91-016. Northern marinas must be designed for the effects of ice and winter conditions. Marina sites, although themselves specific, experience forces and actions that can be predicted and generalized for design. Criteria and strategies for design of marinas and structures in northern climates are presented. Included are estimates of horizontal and vertical forces, structural and flotation dock arrangements, deicing systems, and moveable/removable constructions. Comparisons of strategies available to designers can be rationally made, and safe, economical docks can be constructed.

Wortley, C. Allen. 1991. *Designing for Control of Ice Conditions in Marinas.* Cold Regions Sixth International Specialty Conference, West Lebanon, New Hampshire, Feb. 1991. p. 386-395. WISCU-R-91-003. Each marina or small-craft harbor experiencing ice during the winter months must be designed for site-specific conditions. These conditions are governed by environmental factors (geology, climate, water levels and temperatures), geometrical factors (basin shape, confinement, location and depth), and operational factors (thermal discharges, power availability and vessel movements). A classification system of winter conditions is used for design to select ways to control the effects of ice in small-craft harbors. The system characterizes winter conditions over a wide spectrum ranging from mild to severe. Design methods are illustrated with actual case studies of varying winter conditions in Great Lakes harbors.

Wortley, C. Allen. 1990. *Ice Engineering for Rivers and Lakes Bibliography.* WISCU-L-90-001. 158 pages. A comprehensive bibliography on ice engineering for rivers and lakes has been compiled and updated to assist persons responsible for solving ice problems in rivers and lakes and coastal areas. Some 1500 technical references are listed under 10 general subject headings: (1) ice formation, growth, deterioration, classification, simulation, processes, thermal regimes; (2) ice strength, deformation, mechanics, properties; (3) bearing capacity and deflection, ice roads and bridges, construction methods; (4) ice forces and pressures on structures, buckling, vibrations; (5) hydraulics of river and reservoir ice, ice jams and hanging dams, frazil ice problems; (6) ice management and control, mitigation, suppression and removal, winter navigation; (7) design of structures, harbors, ports, quays, wharves, marinas; (8) instrumentation, testing, measurements, mapping; (9) data bases—climatological and hydrological; and (10) general reference, historical, and anecdotal. $12.50 U.S. and Canada, $17.50 elsewhere; order from Professor C. Allen Wortley,

University of Wisconsin-Madison, Agr. Professional Develop. Dep., 432 North Lake Street, Room 817, Madison, Wisconsin 53706; check payable to UW Engineering Professional Development Department.
Wortley, C. Allen and Guenther E. Frankenstein. 1988. Rebuilding Infrastructure for Pleasure Boating. Proceedings of the Fifth International Conference on Cold Regions Engineering, p. 188-201. University of Minnesota, October 1988. WISCU-R-88-033. Small-craft harbor infrastructure is deteriorating in many northern cities due to years of use and harsh winter environments, denying safe access to the water for recreation. This paper describes the performance of various types of small-craft structures in ice and presents methods for characterizing ice conditions in harbors. Construction techniques and various types of manufactured products are recommended for rebuilding and replacing deteriorating harbor structures. Examples of case studies where Great Lakes cities have successfully replaced harbor infrastructure are included.

Wortley, C. Allen. 1986. Systematic Design of Marinas for Ice Conditions. Ports '86, Proceedings of Specialty Conference on Innovations in Port Engineering and Development, p. 453-465, Oakland, California, May 1986. WISCU-R-86-006. Design engineers are presented with a systematic approach and recommendations for planning and building docks and marinas resistant to winter ice damage. The author—relying on more than 10 years of field research, published information and design experience in Great Lakes harbors—discusses various design criteria for piles, piers and docks subject to ice. In addition, he estimates ice forces and soil resistance and recommends materials and methods to mitigate ice problems. No charge for single copies.

Wortley, C. Allen. 1986. Marinas and the Elements. Boating Industry, p. 44-45, 115, November 1986. WISCU-R-86-031. Each winter, ice damages hundreds of small-boat harbors throughout the U.S. and Canada, both in saltwater and freshwater areas. Ice can bend iron railings, twist docks into crazy shapes, shove harbor structures off their foundations and lift piles completely out of harbor bottoms. Millions of dollars of damage is done each year, varying from large losses to minor problems. Everyone connected with small-boat harbors should be aware of the problems ice can cause. And new harbors should be designed and built to control ice's harmful effects. This article discusses some causes, effects and solutions of the problem.

Wortley, C. Allen. 1985. How to Reduce Winter Ice Damage to Marinas. WISCU-G-85-007. Lake ice causes extensive and expensive damage to Great Lakes harbors and marinas each winter. Protection methods depend on dock site conditions and type of dock (fixed, moveable, floating), as well as lakebed soil composition, water temperature, ice thickness, and general site features. Described here are some of the defenses against winter ice such as compressed-air bubbler deicing systems, flow developer systems, and new ice retardants. More detailed technical information on ice-resistant marina and harbor design is available from the University of Wisconsin Sea Grant Program.

Wortley, C. Allen. 1985. Understanding Ice and its Behavior in Marinas: Trouble and Intrigue. WISCU-G-85-006. Ice is a powerful force, at times beautiful, but for marina operators, damaging and expensive. Described here are the formation (columnar, frazil, and snow ice) and characteristics (crystal structure, impurities) of ice, the scenario of ice cover break-up, ice behavior at marinas, temperature effects, wind and wave effects, and effects of changes in water level. Data on water temperatures and ice conditions for several hundred Great Lakes harbors are available from the University of Wisconsin Sea Grant Program.


Engineering

Delaware Sea Grant College Program. 1987. Marine Corrosion—The Silent Enemy. DELU-F-87-001. Marine corrosion costs the United States an estimated 18 to 20 billion dollars annually. However, the National Bureau of Standards estimates that nearly one third of that total could be eliminated by the widespread application of some basic principles of corrosion prevention. These principles are covered in “Marine Corrosion—The Silent Enemy”, a 15-minute audiovisual presentation. Designed primarily for marina operators and recreational or commercial boaters, the presentation explains the basic electrochemical nature of corrosion, illustrates the most common types of corrosion, and outlines simple steps to prevent them. “Marine Corrosion—The Silent Enemy”, is available as a slide/tape presentation ($50 purchase, $5 rental), as well as a videotape (VHS and Beta—$25 purchase, $5 rental), but can be borrowed from the National Sea Grant Depository.

Doelling, Norman et al. 1994. Preventing Failure in Mooring Systems. MTS '94: Challenges and Opportunities in the Marine Environment. Washington, DC, September 1994. MIT-R-94-003. Studies of failures of mooring systems in Hurricanes Gloria (1987) and Bob (1992) made it painfully obvious that very little is known about the forces on a mooring caused by a sailboat subjected to wind and waves. This paper describes a system for measuring actual forces on a mooring caused by a sailboat while simultaneously measuring some significant environmental variables. Preliminary data give good insights into the range of forces involved and the system dynamics.


Tanski, Jay. 1987. Electrical Submetering in Marinas. NYEXT-G-87-003. Because dockside power can account for up to 60 percent or more of a marina’s electrical bill, operators are looking for ways to reduce and control these costs. One of the methods most frequently discussed is metering each boat’s energy usage and charging the customer accordingly. This technique, known as submetering, is relatively new to the marina industry. The purpose of this fact sheet is to provide marina operators and others with an overview of some of the legal, economic, and technical aspects of submetering. This information will assist the reader in evaluating whether submetering is suitable for his or her facility.

Thomson, Ewen. 1994. Lightning and Sailboats. FLSGB-E-17. 24 pages plus a video. Provides new information on how to ground your sailboat to prevent serious damage and potentially fatal injuries as a result of a lightning strike. Presents results of a survey of boats struck by lightning, documents damage sustained, and discusses specifics of installing an efficient lightning protection system.
Flushed/Sedimentation


Economics


Baker, Edward K. 1993. *Analysis of Hurricane Andrew Economic Damage and Recovery Options for the Boating, Marina and Marine Service Industries.* Technical paper (Florida Sea Grant College) no. 72. FLSGP-T-93-003. 105 pages. 1992’s Hurricane Andrew had a devastating effect on the recreational boating industry in South Florida, impacting boaters, marinas, boat yards, boat dealers, and boat manufacturers. The objectives of this study were: (1) to evaluate the hurricane preparedness plans of the boaters, marinas and other marine-related businesses in Dade County; (2) to assess the damage caused by Hurricane Andrew to the boats, marinas, boat yards, and other boating businesses; and (3) to determine the future boating activities of Dade County boat owners and the rebuilding plans of the marine businesses.

Bell, Frederick W. 1990. *Economic Impact of Bluebelting Incentives on the Marina Industry in Florida.* Florida Sea Grant College Program. 131 pages. FLSGP-T-90-003. In 1983, a committee was appointed by the governor of Florida to investigate problems encountered by water-dependent activities in the state with an emphasis on marinas and recreational boating. They concluded that more and more of the waterfront is being developed for private as opposed to public access. The Committee recommended that the legislature establish a “Bluebelt” ad valorem tax relief mechanism for the encouragement of water-dependent facilities to offset the conversion of the waterfront to value-enhanced
activities such as condominiums and restaurants. The term bluebelting is derived from the practice of granting tax relief to farmers to preserve agricultural land (greenbelting). The main focus of this report is to investigate the economic benefits, cost and limitation of all forms of bluebelting for the marinas in the State of Florida.

Bielen, Mary H. 1994. *A Comparison of Characteristics and Economic Expenditures of Boat Show Patrons at Two Types of Boat Shows*. *Marinas, Parks and Recreation Development Proceedings*: p. 248-256, Milwaukee, Wisconsin, June 1994. OHSU-R-94-005. Local marine dealer associations conduct boat shows as a means of displaying and selling their products and to promote the sport of boating. The location of the boat show can highly influence the demographics of boat show patrons. The purpose of these surveys was to analyze and compare the difference in the characteristics and expenditures of show patrons at two different types of boat shows and boat show locations. The results should help Toledo area marine dealers make wise decisions about future boat show locations and other marketing strategies. The results may have implications for other marine dealers and related businesses.


Cato, James C. (ed.) 1994. *The Potential Impact on Florida-Based Marina and Boating Industries of a Post-Embargo Cuba: An analysis of Geographic, Physical, Policy and Industry Trends. Past, Present and Future Recreational Boating and Marine Relations with Cuba: The Florida Perspective*: June, 1994. FLSGP-W-94-001. 132 pages. A June 1994 workshop called “Past, Present and Future Recreational Boating and Marine Relations with Cuba: The Florida Perspective” confirmed what many already suspected—namely, that Florida and the island nation of Cuba have many traditional links despite political and ideological differences. Of course, one of the most important of these linkages is the sea that both unites and divides. Throughout the workshop, experts spoke of how this stretch of blue water may some day be a pathway once more by which Cubans and Americans can easily enjoy the best of what each of our countries has to offer. The information in this technical paper addresses the future of the US-Cuban marina and recreational boating industries from the geographic, physical, policy making and economic perspectives for a post-embargo Cuba. Each individual paper builds on the presentations made at the workshop, the information obtained in a subsequent trip to Cuba, and presents in detailed form information which should be useful to all readers.


Comerford, Robert A. 1988. *Marina and Boatyard Industry Financial Performance*. RIU-T-88-002. 99 pages. This report presents figures and analyses of the URI National Marine Financial Data Bank which currently consists of about 400 separate pieces of mainly financial information, for which primary data were developed around 61 financial and 26 descriptive data points, on nearly 130 marine related businesses. The impetus for the study came from requests by marina and boatyard owners and operators and financial institutions. Content of the data bank and the methodology used in the study are described; a brief tutorial on the use of financial ratio analysis is presented, along with tables of financial and descriptive data.


Glenn, Sophia J., Leroy J. Hushak and David O. Ketch. 1995. *An Economic Evaluation of the Lorain County, Ohio Artificial Reef*. OHSG-95-004. In early 1992 Ohio Sea Grant undertook an economic evaluation of the Lorain County artificial reef, interviewing approximately 850 individuals at Lorain County marinas and boat launch sites who stated that they were willing to participate in a survey of recreational activities. During February 1993 these individuals were sent surveys. A total of 466 questionnaires were returned for a respondent rate of 55 percent. The primary goal of this study is to estimate the economic value placed on the artificial reef by those who use it.


Goodwin, Robert F. 1991. *The Marina Industry in Washington State: Growth and Change 1981-200*. WASHU-T-91-002. 21 pages. This report characterized the moorage industry in Washington State, documents the evolution of market conditions over the last decade, and assesses the likely trends over the next decade. The consequences of having both public non-profit and private for-profit providers operate in the same boating marketplace are discussed.

Goodwin, Robert F. 1991. *Moorage Markets in Western Washington: County Synopses 1989/90*. WASHU-T-91-003. 41 pages. During the winter and spring of 1990, Washington Sea Grant conducted a mail survey of all known marinas in Washington State. Included were questions about market conditions facing the marina operator: moorage lease rates in summer and winter, seasonal occupancy rates, and number of boaters on waiting lists. This report presents the results including in addition to market information, a summary of each regions stock of moorage, a list of the facilities that provide it, and the quantity and kind of moorage slips they lease or rent.

Haberlein, Thomas A., Geraldine E. Alfonto and Laurie H. Ervin. 1986. *Using a Social Carrying Capacity Model to Estimate the Effects of Marina Development at the Apostle Islands National Lakeshore*. Leisure Sciences; vol. 8, no. 3, p.257-274. WISCU-R-86-021. This research focuses on a policy question: what will be the effects of adding additional marina slips on the boating experience at the Apostle Islands National Lakeshore? It also explores a more basic research issue. Can a social carrying capacity model be developed for this type of recreation? Using descriptive data it was possible to predict the effects of additional slips on the number of boats moored at each of the two most popular locations among the islands. Surveys showed that boaters had clear preferences for mooring with fifteen or fewer boats at each site. The social carrying capacity model was found to be useful both for developing projections and measuring visitor preferences, suggesting that it is applicable to complex nonwilderness settings.

Hushak, Leroy J. 1990. *Economic Impacts of the Coastal Marine Trades Industry: A Case Study of Ohio's Lake Erie Marinas*. OHSU-R-90-008. Second National Marina Research Conference: Neil W. Ross, (editor), Clearwater Beach, Florida, 1990, 22 pages. Lake Erie marinas constitute a significant industry in Ohio's coastal economy. Recent growth reflects improvements in water quality and sportfishing expansions. This study found that in 1986 Ohio's marine services generated an estimated $342.4 million in gross sales which contributed $151.3 million to regional value-added sales, $56.1 million to personal income, and 3,347 full-time equivalent jobs. The total economic impact attributable to marine trades that year was $233.0 million in value-added sales, $158.2 million in personal income, and 5,121 full-time equivalent jobs.

Johnson, Leigh Taylor and Constance Jane Ryan. 1989. *California Coastal Waterfront Managers Survey. II. Full Report*. CUIMR-Q-89-002. 26 pages. The annual economic impact of California's boating industry exceeds six billion dollars. Coastal ports, harbors, and marinas are the foundation for this economic productivity. Managers of these multimillion-dollar facilities must make effective decisions in a rigorous environment. They need the latest technical and management information to provide the best service to boat owners and the greatest benefit to waterfront communities for which these facilities are an important economic resource. In 1986 coastal waterfront facility managers in California were surveyed to determine their needs for technical and management information, their operating circumstances, and how best to deliver information to them. This document reports the results of that survey. The executive summary (CUIMR-Q-89-003/UCSDEP 89-6) of this report may be ordered free of charge from the address given below. $2.00; order from Sea Grant Extension Program, Univ. of California, Davis, CA 95616. Checks payable to U.C. Regents.


Kinnunen, Ronald E. and John D. Schwartz, 1994. *Upper Peninsula of Michigan Lake Superior 1992 Transient Boater Marketing and Economics Survey*. MICHU-S-94-001. 35 pages. A marketing study of transient boaters at three Upper Michigan Lake Superior marinas is described. Survey methods are briefly presented along with findings in five major areas: (1) characteristics of transient boats and boaters, (2) market areas and travel patterns, (3) information sources, (4) boater spending and local economic impact, and (5) boater preferences and evaluation of marina attributes and services. Guidelines and recommendations are given for the use and application of the findings.

Kinnunen, Ronald E. and John D. Schwartz. 1994. *A Comparison of the Escanaba 1988 and 1992 Transient Boater Marketing and Economics Surveys*. MICHU-S-94-002. 24 pages. Michigan has extensively studied registered boats and boats stored in seasonal slips at marinas. While providing excellent information on the boating fleet, these studies have provided little detailed information on the transient boater market (boats or boaters on overnight trips away from their home ports). In 1988 research was initiated to better understand the transient boater market, and a survey of transient boaters was carried out at
Escanaba. Escanaba had a need for information on how much the transient boater markets and economics changed over time. Thus data acquired from this 1992 study was compared to the original data acquired from the 1988 study in Escanaba marina.

Lai, Padma Narsey and Athline M. Clark. 1991. Personal Recreation Boating Industry in Hawaii: Physical Characteristics and Economic Contribution. HAWAU-T-91-002. 39 pages. This study was undertaken to better identify the economic contribution of the personal boating subsector to the Hawaiian economy and to understand the type of income-generating activities carried out with its various components. More specifically the objectives were to identify: (1) the economic contribution of the personal boating sector, its principal components and major characteristics; (2) the socioeconomic characteristics of the personal boat owners, as well as the types of boats and boating facilities utilized; (3) perceptions of the major constraints and problems which might hinder further expansion of the personal boating sector in Hawaii; and (4) some of the ways that the state government could better serve the needs of boaters.

Lichtkoppler, Frank R. and Leroy J. Hushak. 1989. Characteristics of Ohio’s Lake Erie Recreational Marinas. Journal of Great Lakes Research; vol. 15, no. 3, p. 418-426. OHSU-R-89-009. The number of marinas identified on Ohio’s north coast has increased from 237 in 1979 to 383 in 1986. The marinas were mailed a confidential survey regarding gross sales, number of employees, taxes, number of ships, etc., in the spring of 1987. The response rate was 30.5%. This paper provides a description of characteristics of Ohio’s Lake Erie marina industry that will be useful in assisting researchers, marina developers, public officials and others to better understand the industry. No charge for single copies.


Pomeroy, Robert S. 1987. Economic Analysis of Coastal Marinas in South Carolina. SCSGC-T-87-001. 27 pages. The purpose of this study was to measure the economic impact of the coastal marina industry on the South Carolina economy. Specifically, study objectives were (1) to determine the location of marinas throughout coastal South Carolina; (2) to identify services and facilities available to the boating public; (3) to estimate the direct and indirect economic impacts of the marina industry on the South Carolina economy; and (4) to identify business problems related to the marina industry. Information regarding marina businesses is needed so that proper decisions can be made regarding expansion and improved management of existing facilities to help assure success of these businesses.
Ross, Neil. 1985. *National and Recreational Boating Facilities Inventory: Phase 1: National Report.* RIU-O-85-002. This national report provides the boating industry and the nation with far more data on boating facilities in the United States than has ever been available before. State, regional, and national patterns and trends should become apparent from further analysis of these numbers. Information includes number and types of facilities, and total numbers of moorings, slips, automobile parking spaces, launching ramps, etc.

Ross, Neil. 1985. *National Recreational Boating Facilities Inventory: Phase 1: National Recreational Boating Facilities List.* RIU-O-85-003. This original list of recreational boating facilities contains 10,669 private and public marinas, boatyards, yacht clubs, and dockominiums. The lists are organized alphabetically by state. Each state list contains all the recreational boating facilities in alphabetical order by the name of the facility. Compiled from published and unpublished lists of boating facilities assembled from collections gathered by URI and NMMA, the list is limited by the information contained in the sources used.


Ross, Neil. 1985. *Recreational Boating Facilities in the Nation.* RIU-T-85-001. Some common trends and patterns in recreational boating have been identified by Sea Grant researchers in Rhode Island and other states and are briefly described in this report. Possibilities for expansion of public access to waterways are also discussed.


Taylor, Keri H., Fred J. Prochaska, and James C. Cato. 1982. *Economic Returns in Operating Atlantic Coast Charter and Party Boats, 1980-81.* FLSGMAP-28. 16 pages. The charter and party boat industry in Florida is a major component of Florida's commercial fishing industry. This publication discusses the economic characteristics for each of these business endeavors.


**Marina Operations/Management**


Amaral, Mark. 1992. *Hurricane Plan for Boaters.* RIU-G-92-001. If your boat is moored, docked, or stored in a recreational harbor on the East Coast, the threat of hurricanes is a very real concern. Even a Category 1 storm, with winds between 74 to 95 mph and a storm surge of 4 to 5 feet above normal, can have devastating effects in today's crowded harbors. In order to protect personal property and the vessels around them, owners must: (1) know their boat and their own skills; (2) know the surrounding area; and (3) have a plan. This plan should review all the options available. Prior to the hurricane season, decisions
should be made as to where the safest place for the vessel would be, the adequacy of the present mooring or dock, and what type of equipment is necessary to have onboard. Some options are described.


Antonini, G.A., et al. 1993. *Location and Assessment of Hurricane Andrew Damaged Vessels on Biscayne Bay and Adjoining Shore Areas: Vol. 1: Text and Appendices.* FLSGP-T-93-004. 58 pages. Biscayne Bay, Florida, experienced damage to shoreline boating facilities and docked/anchored vessels as a result of Hurricane Andrew. The purposes of this project were to assess damage to in-the-water vessels, to map the locations of these vessels, and to determine areas of potential impacts of vessel sinkings and wreckage on the bay environment. Problems encountered with available remotely sensed data sources and the coordination of the data following such a sudden catastrophic event are discussed. The project provides guidelines for developing hurricane vessel damage assessment strategies to cope with similar future natural hazards. See also volume 2: Maps (FLSGP-M-93-001).

Antonini, Gustavo A., et al. 1994. *Feasibility of a Non-Regulatory Approach to Bay Water Anchorage Management for Sustainable Recreational Use.* FLSGP-74. 150 pages Summarizes the findings of surveys to determine if recreational boaters, shore residents, and interested government agencies could agree on acceptable anchoring practices. Results show which anchorages are most popular, how the nearby homeowners perceive the recreational boaters and the effect the boaters were having on the immediate environment. Presents the survey methodology, the process for selecting respondents, and the conclusions determined by the surveys.


Brillat, Thomas H. 1990. *Harbor Management Planning: Issues and Problems in Rhode Island* Maritimes: vol. 34, no. 3, p. 12-15. RIU-R-90-010. In 1988 the Rhode Island Coastal Resources Management Council (CRMC) initiated a program that required each coastal municipality to develop and implement a harbor management plan (HMP). A number of common issues were identified: (1) water quality; (2) enforcement of existing rules and regulations pertaining to boating safety, commercial fishing, water-related activities; (3) public access to the shoreline; (4) water-dependent uses; (5) rights of waterfront property owners, known as littoral/riparian rights, and (6) growth of recreational boating. The complexity of each issue varied from town to town, but local governments became more aware of coastal waters and waterfronts. New ordinances were established, highly qualified harbor masters were hired, funds were dedicated for harbor management, and permanent harbor commissions were installed. For the first time, common sense management principles integrating water activities with adjacent land uses are being designed and implemented.


Falk, James M. 1993. *Guidelines for Winter Boat Lay-up.* DELU-G-93-004. When the recreational boating season ends, boaters are faced with a number of options for laying up their boats. A marina or boatyard can haul, winterize, and store boats—or boat owners might want to tackle the winterizing themselves. This pamphlet provides guidelines on the following topics to help recreational boaters prepare their vessels for winter: boat haul; engine; propeller; steering and controls; fuel tank; battery; electric and ignition system; cooling system; plumbing system; interior; bilge; exterior; frame and cover; and general checks.


Lee, Virginia and Mark Amaral. 1995. *Hazard Mitigation for Rhode Island Recreational Harbor Communities.* The threat of storm-created hazards to small harbors can be minimized through proper planning and management. Much of the damage occurs because there is a lack of planning and storm preparedness on the part of the boaters, facility operators, harbormasters, and emergency management personnel. The main elements of this report are: 1) A Rhode Island Coastal Resources Management Council regulatory framework for incorporating hazard mitigation into local harbor management plans; 2) Model harbor preparedness and hazard mitigation plans for communities, marinas, and boaters. The models include easily adaptable checklists that would be used immediately by harbormasters, marina operators, and boaters.

Lichtkoppler, Frank R. 1990. *Level Forecasts From the Users' Perspective: Lake Erie Boaters and Marina Operators.* OHSU-R-90-010. 11 pages. Surveys were conducted to provide data on the uses and perceptions of Great Lakes lake level forecasts from the recreational boater and marina operator's perspective. Both groups receive lake level forecast information from a wide variety of sources. The boaters utilize lake level forecasts and wave height forecasts to help make decisions concerning daily and seasonal boating decisions. Marina operators use lake level forecasts to make seasonal and long-range business-related management decisions. Both groups expressed a desire increased accuracy in the forecasts.


Michigan Sea Grant Program. 1994. *Great Lakes Water Levels.* MICHU-G-94-002. After a decade of lower water levels, the Great Lakes are rising again. Also rising are the concerns of coastal property owners along Michigan's 1,066 miles of erosion-prone shoreline. Extremely high water levels can damage coastal buildings and other property, flood docks and boat ramps, create lower bridge clearance for ships, and flood municipal infrastructures. Still, some interest benefit from higher lake levels. The Great Lakes ore, grain and limestone carriers can carry heavier loads without grounding. Marinas and harbors incur reduced dredging costs, and docks are easily accessible to recreational
boaters. The International Joint Commission conducted a just-completed multi-year study to explore options for reducing property and economic damage. The major programs recommended are land-use planning, comprehensive emergency preparedness planning, improvement to existing regulation plans, coordinated financing, and the establishment of advisory boards and improved data gathering and communication systems.


Villanueva, Maria L. and Donald W. Pybas (eds.) 1993. *Recommendations for Hurricane Preparations and Responses for Boating Communities and Industries*. FLSGP-W-93-001. 69 pages. Hurricanes such as Hurricane Andrew, which hit the greater Miami area in August 1992, can cause severe damage to wet berthed boats and destroy thousands of boats on trailers or in dry storage. Additionally, boat storage facilities, boat repair facilities, and other marine businesses can be damaged by a storm. These events can be especially difficult for local economies that depend on boating and related activities. It is apparent that coordinated plans for hurricane preparation, response, and recovery should be developed to address the needs of the boating sectors of coastal communities. This workshop addressed the need to reevaluate marine hurricane policies and programs. The recommendations are listed in this report, along with invited presentations that set the stage for the workshop discussion groups.


White, David G. 1991. *New York’s Great Lakes Marinas: A 1990 Analysis and Profile*. New York Sea Grant Institute. 13 Pages. NYSGI-G-91-014. This paper presents results of a survey of Great Lakes marinas conducted in 1990. Included are general business descriptions, dockage/storage capacity, services, and economic status. The responses are compared to those from a similar New York Sea Grant survey conducted in 1972. Seven tables and the questionnaire sent to the marinas are included to assist those who operate or plan to operate marina facilities.


**Boaters Guides**

comprehensive coastal Georgia marine services information by providing a detailed listing of marinas, boat and motor retailers, marine service and support centers, and bait and tackle dealers. The information presented here is part of a larger economic survey intended to determine the extent of the marine services business sector along the Georgia coast. Survey results indicate that marine service resources are far more extensive than expected, and it is hoped that this guide will be helpful both to business and the boating public.


Delaware Sea Grant College Program. 1985. A Guide to Sport Fishing in Delaware. DELU-G-85-002. This guide to sport fishing in Delaware offers information on sport fish and shellfish found in Delaware waters, including where to catch them (a list of marinas and marine access ramps, charter vessels and headboats), how to identify them (with illustrations), how to keep them (freezing techniques), and how to cook them (fried, poached, baked, steamed, broiled or barbecued).

Florida Sea Grant College Program. 1994. Boater's Guide to Charlotte Harbor. FLSGP-H-94-001. This guide to Charlotte Harbor is a unique cartographic reference to the area's marine resources and facilities. Included in the guide are map locations for marinas, municipal boat ramps, fishing reefs, popular anchorages, state park docks with beach access, and dockside restaurants. Underwater seagrass meadows, shallow waters, shellfish harvesting areas, and man-made waterway systems are also mapped. Tables provide detailed information on marina services, as well as ramp facilities, reef coordinates, anchorage water depths, and restaurant names and telephone numbers.


Goodwin, Robert F. and Timothy J. Farrell. 1991. Washington State Marina Directory, 1991. WASHU-D-91-002. 310 pages. Many people want information about marinas in Washington State. Boaters are looking for places to moor their boats; government agencies need to know where moorage is located in relation to fisheries they manage, or waterways they dredge and maintain; marina equipment and service firms need access to customers; trade associations want to know how various segments of the moorage industry will be affected by proposed laws or regulations; and planning and engineering consultants want a readily accessible, common base of detailed information about marinas, statewide. This directory provides that information; 379 facilities are listed alphabetically by county and marina name.

Henning, Brenda R. and Michael M. Lifflmann. 1993. Louisiana Marina Directory, 1993. LSU-D-93-001. 141 pages. The first edition of this directory, compiled in 1984, contained only information provided by the 114 marinas that responded to a mailed questionnaire. Information for the second edition includes a more detailed description of services provided by each business. It lists 141 marinas with a total of 5,968 slips and 117 launch ramps. Marinas are listed alphabetically within the parish (county) location. Each listing provides the mailing address, telephone number, number of slips and other information. A parish map that includes water bodies is included in this edition to give those unfamiliar with the state a better idea of marina locations.

Henning, Brenda R. and Nicole L. Braud. 1995. Louisiana Marina Directory. LSU-D-95-001. This directory delineates location, ownership and services of most of the marinas in Louisiana. A parish map and index are included.

Law, Martin (ed.) 1992. *Boating Guide to the Lower Columbia and Willamette Rivers.* OREXT-H-92-001. 33 pages. This guide encourages recreational boaters to explore the lower Columbia and Willamette rivers. It describes places of scenic and historic interest, offers navigating advice, and lists boating facilities. A chapter on sportfishing is included. Other sections discuss river hazards and conditions, boating courtesy and safety, high and low water, and how to understand navigation charts.

Lowery, Tony A. and William Hosking. 1987. *Guide to Boat Launching Sites in Coastal Alabama.* MASGC-H-87-002. Coastal Alabama offers boaters and sportfishermen a wide variety of waters to enjoy. This guide is intended to help the trailer boater make the most of Alabama's waters. There are many public access boat ramps and privately owned commercial fish camps and marinas available to get you to the water. Many of these facilities offer specialized services. A map and key provide a listing of the facilities, services offered, and phone numbers. Some safety tips are included in the brochure.

New Hampshire Marine Advisory Program. 1991. *The Port of Portsmouth: A Boaters Guide to the Piscataqua Basin.* NHU-H-91-001. While designed to serve as a guide for visiting boaters from other areas, this booklet is also a valuable source of information for local boaters who want to know more about recreational boating in the region. The guide includes information on the many historic, scenic and cultural attractions the Piscataqua Basin has to offer in both New Hampshire and Maine. It also covers navigation, safety and environmental concerns; provides a directory of services and facilities visiting boaters are likely to need; and contains a chart listing area yacht clubs, marinas, and public docks and the services they provide.

Oregon Sea Grant Program. 1995. *Boating in Oregon Coastal Waters.* ORESU-H-95-001 48 pages. Oregon's coast is a beautiful but sometimes hazardous place to boat. Shoals, bar entrances, river and tidal currents, ocean swells, and winds often create dangerous conditions for vessels of all sizes. Pleasant seas and fair weather can change quickly on the open ocean and across the bar. The latest revision of this popular handbook includes general boating safety information, from how to identify buoys and storm signals to the dangers of boating too close to larger vessels, along with specific information and maps describing 20 separate coastal bars, bays, and rivers. Eighth Revised Edition 1995.


Reutter, Jeffrey M. 1987. *Lake Erie Facts.* OHSU-G-87-002. Facts and figures on Lake Erie are encapsulated. Some examples: 11 million people drink its water; sport anglers on the lake catch 25 million fish per year; 100,000 recreational boats ply its waters and 250 marinas dot its shores. No charge for single copies.


Tiedemann, J. 1994. *Boaters and the Bay: Public Boat Ramps on Barnegat Bay.* NJMSC-G-94-004. As the number of people taking to the waters of Barnegat Bay continues to increase, trailer boating is becoming more popular. Many marinas boat liversies and bait and tackle shops around Barnegat Bay provide launching free. There are also a number of public launch sites that provide affordable access. This fact sheet lists public boat launching sites on Barnegat Bay and outlines proper procedures for launching boats.
Washington Sea Grant Program. 1992. *Kitsap County Afloat*. WASHU-G-92-004. A guide to environmentally safe boating in the waters of Kitsap County, this laminated card (5"x11") features a guide to area marina services, a list of important phone numbers, and a calendar of County events.

**Maritime Law and Policy**

Alaska Sea Grant College Program. 1989. *MAPROL Poster — Don’t Go Overboard with Plastic Trash*. AKU-G-89-002. A new poster on trash disposal regulations has been printed for sea-going vessels. The 14" x 22" plastic-laminated poster graphically summarized the MARPOL Annex V ruling on refuse disposal, with emphasis on the ban on disposing of all plastics at sea. The poster is suitable for posting on board vessels, in fisherman’s union halls, marinas, and other spots for vessel owners to see. No charge for up to 25 copies.

Brillat, Tom. 1988. *MARPOL Annex V: How it Can Affect You*. RTU-G-88-004. By the end of 1988, the U.S. Coast Guard will have issued new regulations implementing the requirements of the ‘Marine Plastic Pollution Research and Control Act of 1987’. As a signatory to the International Convention for the Prevention of Pollution by Ships 1973 and the subsequent Protocol of 1978, known as MARPOL 73/78, the United States will enforce Annex V of this treaty, entitled ‘Regulations for the Prevention of Pollution by Garbage by Ships’. The scope of the law is very broad and every effort should be made to understand how it will affect you and your life in and around marine waters. The regulations will affect the smallest recreational craft to the largest supertanker, as well as commercial ports and terminals, including marinas and fish-processing facilities.


Hamann, Richard and Brenna Malouf (eds.) 1985. *Marina Dockage Agreements: Sample Provisions*. FLSGP-T-85-005. 68 pages. Provisions related to dockage agreements in Florida are compiled and categorized without editorial change or legal commentary. The sole purpose of the compilation is to enable marina operators or their attorneys to see what others have done. Part I contains dockage agreement provisions; Part II, marina rules and regulations; and Part III, special provisions for commercial vessels.

boats you are charged a special tax. This tax goes into the Sport Fish Restoration Fund and is later given to state fishery agencies for sport fisheries and boating access projects which have been evaluated and approved by the U.S. Fish and Wildlife Service. The projects must involve fishfishe and provide a significant benefit to recreational fishing. People complain that fish stocks are dwindling, but fishermen have not always shown an interest in the management of fishery resources. No one knows the resource and what’s happening to it better than the fishermen. Make your views known to those who will act on or vote on legislation.


Texas Sea Grant. 1989. *Everyone’s Trash Hurts Someone Sometime.* TAMU-G-89-002. On January 1, 1989, a new international treaty became law. More than 30 nations, including the U.S. ratified Annex V of the MARPOL (maritime pollution) Treaty. Annex V and supporting laws state that no plastic trash may be dumped in the ocean, gulf, bays, sounds, lakes, rivers, or any navigable waterways. Annex V also states that marinas, fish processing facilities, small private docks, and large international ports must have adequate reception facilities for trash, including all plastic trash. This trash will be around for a long, long time to cause problems unless we all work together to bring it home to be recycled or properly disposed of on land. This brochure addresses the problem.


Wypszynski, Alex. 1989. *MARPOL Annex V: For your information - Recreational Boats*. NJMSC-G-89-001. This booklet provides an update on the restrictions, regulations and guidelines of the MARPOL Annex V treaty on garbage disposal as it affects recreational boats. Rules and regulations for ports are included, along with a modified reference chart summarizing these rules as they relate to New Jersey and nearby waters. No charge for single copies.

Wypszynski, Alex and Kim Kosko. 1990. *Plastic Pollution Solution*. NJMSC-G-90-002. The Marine Plastic Pollution Research and Control Act of 1987 provided for U.S. ratification of MARPOL Annex V, part of an international treaty dealing with marine pollution. Annex V focuses on preventing the discharge of plastics and other debris from ships. Annex V regulations apply to all U.S. ships including commercial fishing vessels and privately owned recreational boats, wherever they operate, and to every port and terminal in the nation. This publication includes a list of all forms, materials and placards now required to be kept on board in order to comply with the new regulations, and an easy-to-read, full page chart which details specific and acceptable procedures and locations for discarding refuse.