

EVANSTON HARBOR SECTION 107

Environmental Concerns Preliminary Evaluation

Introduction

Study Initiation

The Corps of Engineers was requested by the City of Evanston to undertake the evaluation of the feasibility of constructing a small-boat harbor in Evanston, along the shore of Lake Michigan, under the Continuing Authority of Section 107 of the 1960 River and Harbor Act. The location of the harbor was specified to be immediately adjacent to Calvary Cemetery on the far south side of the City, immediately north of the Evanston-Chicago boundary.

Demand Analysis

The Corps undertook a demand analysis which indicated that the most likely demand for slips at the Evanston Harbor would be 365 boats. This would consist of an incremental increase in demand from current boat owners of 275 boats, and new demand from 90 people who currently do not own boats.

Preliminary Design

At this preliminary stage of study, the Corps relies on existing data, to the extent possible. The District is currently working on design of a very similar small-boat harbor for Whiting, Indiana, of approximately the same size. One Whiting design is for a harbor with capacity for 378 boats. This is very close to the projected demand for the Evanston marina. Therefore, this design was modified slightly, relocated to the Calvary Cemetery location, and used as the model for the preliminary Evanston Harbor design. The rubblemound breakwaters for the harbor will have a crest height of 15-feet above Low Water Datum (LWD), with a crest width of 20-feet. This crest height is lower than for the Whiting harbor, as the wave climate at the Evanston location is not expected to be as severe as that at the Whiting site.

One problem with the Evanston Harbor location is parking. There does not appear to be any area nearby adequately sized to accommodate the vehicles expected at the harbor. Therefore, one design calls for lake fill to create a parking lot immediately lakeward of the current shore. This parking lot will extend into the lake for approximately 65-feet, and will be approximately 1400-feet long (with a total area of about 2-acres. This parking lot should accommodate approximately 310 automobiles. A second design assumes satellite parking somewhere in the vicinity of the harbor, with shuttle service, but it is not very likely that the assumed satellite parking areas will be found. Preliminary costs for these harbor designs were then computed. Costs were also developed for a 340 boat harbor. These costs were pro-rated from the 378 boat harbor costs based on number of boats.

Preliminary Cost Analysis

Plan 1 - 378 Boats/Satellite Parking	\$22,057,400
Plan 2 - 378 Boats/Lakefill Parking	\$22,601,590
Plan 3 - 340 Boats/Satellite Parking	\$19,840,000
Plan 4 - 340 Boats/Lakefill Parking	\$20,329,470

Environmental Concerns

General

Marinas and recreational boating are very popular uses of coastal waters. The growth of recreational boating, along with the growth of coastal development in general, has led to a growing awareness of the need to protect the environmental quality of our waterways. Because marinas are located at the water's edge, there is a potential for marina waters to become contaminated with pollutants generated from the various activities that occur at marinas, such as boat cleaning, fueling operations, and marine head discharge, or from the entry of storm water runoff from parking lots and hull maintenance and repair areas into marina basins.

While some non-boaters may be concerned that marinas are a significant source of pollution of the water bodies they are located on, this is not the case. Any group activity carried on at the shore of a lake can result in pollution if not carried out responsibly, but this need not be the case, and in fact, will not be the case if the activity is carried out responsibly. This is the case for recreational boating, just as well as for any other type of lakeshores activity. There are many convergent factors marshaled towards protecting water quality and the environmental values of water bodies which are focused directly towards boaters and marinas. Water quality legislation, Federal, State and local, is one of these factors. There are many laws, many strictly enforced, which prohibit pollution of open water bodies. Many of these have been enacted since the Federal Clean Water Act of 1972, and more have been enacted since the inception of the Coastal Zone Management Program in the early 1980's. More so than just because of legislation, boaters and marina operators have come to realize, particularly through education, that clean water significantly benefits boaters by enhancing the recreational boating experience. Clean water and clean marinas are much preferred by boaters and marina operators. Many marina operators, in particular, have become clean water advocates, going even further than operative legislation requires to maintain clean water. They realize that clean marinas are much more aesthetically pleasing to all involved, boaters, marina operators and workers, and it is definitely good for business. While there are certainly costs involved with keeping marinas clean, studies have shown that the benefit-cost ratio is greater than one, and the operators certainly are attuned to that. However, that is not the only reason they have come to focus more attention on maintaining clean marinas - it turns out to be a win-win situation for all involved.

Clean Water & Clean Marina Legislation

Some of the primary Federal laws that govern pollution of waters bodies are:

The Federal Water Pollution Control Act of 1972 (Clean Water Act - CWA)

Addresses many facets of water quality protection. It provides authority for the National Pollutant Discharge Elimination System (NPDES) Program; prohibits discharge of oil or hazardous substances into U.S. navigable waters; and prohibits the use of chemical agents like soap, detergents, surfactants or other emulsifiers to disperse oil, fuel or other chemicals without Coast Guard permission.

Clean Vessel Act (CVA)

Provides funds to states to construct, renovate, and operate marine sewage pump-out stations and to conduct boater environmental education.

Coastal Zone Reauthorization Amendments of 1990 (CZARA)

Section 6217 requires that nonpoint source pollution from marinas be contained. Provided impetus for the Clean Marina initiatives many States have implemented.

Clean Air Act Amendments, 1990

Established emission standards for marine gas engines.

Marine Plastic Pollution Research and Control Act (MPPRCA), 1987

Restricts the overboard discharge of garbage, with primary emphasis on plastics. It is illegal to dispose of plastic material into the water anywhere. The disposal of other garbage is restricted according to a vessel's distance from shore, the nature and size of garbage pieces.

Oil Pollution Act of 1990 (OPA)

While primarily focused on large oil tankers and the like, some of its requirements are applicable to recreational boats. The responsible party for any discharge of oil is responsible for the removal costs, and any damages to the environment. Substantial civil penalties may be imposed for failing to report a spill, for deliberate discharge of oil, for failure to remove oil, failure to comply with regulations, and for gross negligence.

Organotin Antifoulant Paint Control Act (OAPC) of 1998

Restricts the use of Organotin antifouling paints, including tributyl tin-based paints.

Refuse Act of 1899

Prohibits throwing, discharging, or depositing any refuse matter of any kind (including trash, garbage, oil, and other liquid pollutants) into waters of the United States.

Resource Conservation and Recovery Act (RCRA)

Provides the legal authority to establish standards for handling, transporting, and disposing of hazardous wastes.

State & County Clean Marina Programs

A number of states (particularly those with Active Coastal Zone Management Programs) and Counties, have adopted active, comprehensive, pro-active programs to assist marina operators in their efforts to maintain clean marinas and to assist patron boaters in their individual efforts to maintain pollution-free boats and to avoid pollution of marinas and surrounding waters. The impetus for starting these programs was the 1990 Coastal Zone Act Reauthorization Amendments (CZARA) which requires all coastal states to address nonpoint source polluted run-off within the coastal zone. To a large extent, marina operators do not regard these programs as onerous or a problem to be avoided, but have bought into the concept of clean marinas and regard these programs as a helpful resource. These programs, which are not specifically mandated by Federal law, began initially in the mid-Atlantic states (Maryland and Virginia), but have since spread to many other coastal states. These programs are not parochial in nature - public education and outreach are primary features of these programs - and relevant information on pollution-reducing measures is readily shared among the various state programs and the boating public at large. Brief notes on some of these programs follows.

The **Maryland Clean Marina Initiative** is an evolving effort to assist marina, boatyards and yacht club operators to protect the resources that provide their livelihood: clean water and fresh air. The Initiative has prepared and distributed a comprehensive pollution prevention guidebook (Maryland Clean Marina Guidebook) for marinas, recognizes "Clean Marinas" through an awards program, and conducts outreach activities to further promote environmentally responsible marina and boating practices.

In 1999, the **Commonwealth (of Virginia)** initiated a Marina Technical Advisory Program and a **Clean Marina Program** to help prevent and mitigate nonpoint source pollution from marina operations. The Marina Technical Advisory Specialist will work directly with marina owners and operators to promote participation in the program. The Clean Marina Program will sponsor 4-5 technical workshops each year in which marina operators, their staff, and other marina related businesses will be encouraged to attend. Attendees will be provided with a copy of the Clean Marina Guidebook and asked to complete the included self-evaluation form. The Marina Technical Advisory Program specialist will then work with interested parties to help them achieve designation. During the initial phase of the Virginia Clean Marina Program an effort to establish a regional approach to address marina and recreational boating issues was started. It is anticipated that continued coordination with Maryland, Washington, D.C. (the National Park Service), Delaware, North Carolina, the Chesapeake Bay Program, and EPA will provide some level of consistency for the recreational boating community. Establishment of common goals among these partners will limit the potential of nonpoint source pollution entering the water. The Virginia Clean Marina Program is working directly with a number of other marine and water quality related entities to improve the delivery of services to marinas, recreational boaters, and marine industries. The Clean Marina Program will implement the

outreach/education strategy for the boating public by providing an educational display at two to three regional boat shows, which may also include a workshops for boaters to promote clean boating practices and to encourage boaters to patronize Virginia and regional clean marinas. Staff will work to continually develop new materials with fresh approaches for these venues. Feedback will be provided to the Marina Technical & Environmental Advisory Committee to guide future outreach efforts.

During the last eight years, federal and state agencies have worked together to develop strategies to reduce nonpoint source pollution from various land uses and activities, including marinas. The Commonwealth of Massachusetts adopted these strategies in **The Massachusetts Coastal Nonpoint Pollution Control Plan**. Rather than create new laws, this plan is built on existing laws and regulations and focuses on providing education and technical assistance. The Commonwealth's Marina Assistance Program is a key component in this effort, providing information and technical assistance to marina owners and operators on how to reduce nonpoint source pollution impacts. The Massachusetts Office of Coastal Zone Management (CZM) is taking the lead on the Marina Assistance Program with support from the Office of Technical Assistance (OTA) and other agencies within the Executive Office of Environmental Affairs (EOEA).

The Marina Assistance Program has three major components:

1. The **Massachusetts Clean Marina Guide**.
2. Workshops designed to help marina owners and operators understand and implement pollution reduction practices.
3. On-going technical assistance.

The **Connecticut Clean Marina Program** is a voluntary, incentive-based education and outreach campaign to encourage environmental compliance and the use of Best Management Practices (BMPs) at the state's marinas and boatyards. The Clean Marina Program operates in conjunction with the Clean Boater Program which encourages boaters to pledge to use clean boating practices. The goal of the Clean Marina Program is to reduce nonpoint source pollution associated with recreational boating facilities in Connecticut's inland and coastal marinas, and to promote clean water and clean air.

New Hampshire is fortunate to have some of the best quality waterways in the United States. Water based recreation is one of the state's primary industries and its economic success is dependent upon a healthy environment. Marinas are a valuable part of this industry, providing important services such as maintenance and repair, fueling for boats, and winter storage. Environmental regulations are necessary to control the amount of pollution potentially released to the environmental and to ensure a clean, healthy world for everyone, now and in the future. Seeking to reduce or eliminate pollutants from marina operations is the key to success. By becoming more efficient in the usage of raw material, marinas will reduce the amount of money needlessly spent to purchase products and dispose of wastes.

Best Management Practices for New Hampshire Marinas

Best Management Practices for New Hampshire Marinas: Guidelines for Environmentally Proactive Marinas

The **New Jersey Clean Marina Initiative** assists marina, boatyard, and yacht club operators to protect the resources that provide their livelihood: clean water and fresh air. It is a voluntary program that gives managers the resources they need to minimize pollution. The Initiative also recognizes environmentally-responsible facilities as "Certified Clean Marinas."

Based upon the highly successful Clean Marina initiative in Maryland, Delaware Sea Grant, DNREC's Division of Soil and Water Conservation and Division of Water Resources are developing a **Clean Marina initiative for the State of Delaware**. The Delaware Clean Marina will assist marina, boatyard, and yacht club operators in protecting the natural resources that provide their livelihood - clean water and fresh air. It is a voluntary program that gives managers helpful resources to protect the environment and minimize pollution.

By adopting pollution prevention measures, marina operators can:

- Reduce costs associated with waste disposal,
- Generate new sources of revenue,
- Attract responsible customers that will respect and follow good boating practices,
- Enjoy free publicity,

and take satisfaction in the fact that they are doing their part to protect Delaware's waterways. The program will recognize environmentally responsible facilities as "Certified Clean Marinas". The environment will benefit from:

- Improved water quality for living resources,
- Reduced trash and chemicals entering our waters,
- Maintenance of healthy ecosystems;
- and Preservation of the scenic beauty of Delaware's waterways.

The Ohio Clean Marinas Program is a proactive partnership designed to encourage marinas and boaters to use simple, innovative solutions to keep Ohio's coastal and inland waterway resources clean. The Program assists these operators in protecting the resources that provide their livelihood — clean water and fresh air. The basic goal of the Program is pollution prevention by making marinas and boaters more aware of environmental laws, rules and jurisdictions, and to get as many marinas as possible to follow best management practices and to be designated as "Clean Marinas."

The **Michigan Clean Marinas program** has officially begun with the signing of a Memorandum of Understanding between the Michigan Boating Industries Association (MBIA), Michigan Sea Grant College, and the DEQ. This voluntary program was initiated to preserve and protect Michigan's Great Lakes and its connecting waterways. The program is unique given its partnership among the boating industry, academic institutions, and the regulatory community. **The program**, which relies on voluntary commitment, **is open to the entire Great Lakes community.** The targeted membership will include marinas, marine dealers/suppliers, and other marine related industry. "The program promotes best management practices along with pollution prevention through the application of cost effective and practical solutions. This leads to overall reductions in waste generation, increased reuse and recycling, and other increased beneficial uses," says Jeff Spencer, who will be coordinating the program for DEQ. Spencer pointed out that with the adoption of best management practice, Michigan's marinas and boaters will gain important environmental and economic benefits while preserving and enhancing the state of Michigan's clean marina natural resources."

Clean Marina is a nationwide program developed by the National Marine Environmental Education Foundation, a nonprofit organization that works to clean up waterways for better recreational boating. The foundation encourages states to adapt Clean Marina principles to fit their own needs. North Carolina joins South Carolina, Florida and Maryland as states with Clean Marina programs in place. **The N.C. Clean Marina program** is a partnership between Marine Trades Services, the N.C. Marine Trade Association, the Division of Coastal Management, the U.S. Coast Guard Auxiliary and N.C. Big Sweep. The Clean Marina program is designed to show that marina operators can help safeguard the environment by using management and operations techniques that go above and beyond regulatory requirements. Clean Marina is a voluntary program that began in the summer of 2000.

The University of Georgia Marine Extension Service (MAREX) proposes to implement a national **Clean Marina Program (CMP)** that will reduce the amount of nonpoint source pollution in coastal **Georgia** counties through voluntary marine business compliance. MAREX specialists will ask marinas to participate in the program and provide technical support. Project goals are (1) to help marinas prevent water pollution, (2) to recognize marinas for doing so, and (3) through publicity, show boaters which marinas participants in the program. The state governments have recognized that the current regulatory process for marinas and boatyards is reactive, not proactive. Environmental and regulatory problems are addressed after they occur rather than being evaluated beforehand, and applying preventive measures. The new voluntary programs will utilize a positive approach that is non-confrontational and non-adversarial, providing a level of compliance not possible under current regulatory processes. This proposal addresses the need to balance between economic development in Georgia's coastal area with preservation and an increase in water quality.

The Florida Department of Environmental Protection, Division of Law Enforcement, formed the Clean Boating Partnership to work with private organizations such as Marine Industries Association of Florida in their commitment to improving the health and cleanliness of our waterways. There is a direct link to the future of the marina industry and clean water. Clean water is necessary for the well being of our communities. If the waters are too polluted to recreate, then boaters will go elsewhere. To meet both the letter and the spirit of our state's environmental laws, our agency is in partnership with both private and public entities in the marine industry to develop a **Clean Marina Program**. First, and most importantly, the department and our partners want to ensure that educational information

is provided to boatyards, marinas and boaters on pollution prevention measures. These measures will not only benefit our environment, but also, our families and future generations. If you recreate in Florida's beautiful waters, your participation will be important to achieving these environmental goals -- not because you have to, but because you care. The aim of the Clean Marina Program (CMP) is prevention. Marinas and boaters may not be aware of the environmental laws, rules and jurisdictions with which they must comply. Compound that with the reality that environmental and operational problems are usually addressed after they happen rather than anticipated. The goal of CMP is Clean Marina Designation. Designation lets boaters that use the marina know that these businesses adhere to -- or exceed program criteria, including *Marina Environmental Measures* or MEMs. MEMs are simple, innovative solutions to day-to-day marina operations that protect the environment. These MEMs have been developed through examination of best management practices around the country and the partnership of Florida's marinas, boatyards, boaters and government. Florida also participates in The Clean Vessel Act Grant Program, a federal program that focuses on providing pumpout facilities for recreational boaters

The **Boating Clean and Green Campaign** is an education and outreach program that promotes environmentally sound boating practices to marine business and boaters in **California**. The Campaign is funded, in part, by the California Integrated Waste Management Board used oil program. Started in April 1997, the Campaign conducts boater education throughout the state in partnership with many public and private agencies that share a concern about educating boaters about environmentally sound boating practices. As part of its efforts to promote clean green boating, the Commission facilitates the **northern California chapter of the California Clean Boating Network (CCBN)**, trains "Dockwalkers" to conduct face-to-face boater education, and influences the purchasing power of boaters through its "Shopping Clean and Green" project.

The Clean Texas Marina Program is a proactive partnership designed to encourage marinas, boatyards and boaters to use simple, innovative solutions to keep Texas coastal and inland waterway resources clean. The Program assists these operators in protecting the resources that provide their livelihood — clean water and fresh air. The Program is distributing a comprehensive pollution prevention guidebook for marinas, recognizes "Clean Marinas" through a designation and incentive awards program, and conducts outreach activities to further promote environmentally responsible marina and boating practices. The basic goal of the Program is pollution prevention by making marinas, boatyards and boaters more aware of environmental laws, rules and jurisdictions, and to get as many marinas as possible to follow best management practices and to be designated "Clean Marinas."

Boaters cruising and docking in the northern Gulf of Mexico will find a pleasant surprise this summer—marinas that are cleaner and more efficient. This new offering is the result of **two new Sea Grant-coordinated "Clean Marina Programs:"** one in **Louisiana**, and a **bi-state program in Alabama and Mississippi**. The first Clean Marina Program (CMP) began 12 years ago in Maryland. As a result of the program's success, there are now 11 established Clean Marina Programs along the Nation's coasts with an additional six under development. "Clean Marina Programs are voluntary programs aimed at helping marinas improve those parts of their operations that impact the environment," says Tim Reid, Communications Coordinator for Mississippi-Alabama Sea Grant Consortium. "The result is that the marina operates in a more efficient and environmentally-friendly manner. In return, the marina should see long-term cost savings and increased income from boaters looking for clean marinas at which to stay."

The Environmental Health Services Division of the **Macomb County Health Department**, with funding from the **Michigan Department of Environmental Quality (MDEQ)**, formed a cooperative partnership to promote voluntary pollution prevention in the marine industry. The goals of the program were to increase awareness and promote use of marina and boating Best Management Practices (BMPs) to help alleviate pollution to Lake St. Clair from marine industries and recreational activities.

Of the other coastal states and U.S. territories:

South Carolina is participating in the Clean Marina Program.

Maine is developing a program.

Rhode Island, Pennsylvania, Wisconsin, Minnesota, Washington, Oregon, Alaska, Hawaii, Guam, Puerto Rico, the Virgin Islands, and Samoa are participating in the Coastal Nonpoint Pollution Program.

Illinois and Indiana are not participating.

Marina Operators Support of Clean Marina Programs

A number of marina operators have become strong advocates of preserving good water quality and other environmental values which are potentially threatened by irresponsible boating practices. They realize that good water quality is critical to boating enjoyment, and actions to preserve it are not only environmentally responsible, but also good for business. In addition, management measures they take are actually cost effective. A statement from one such marina operator (Moccasin Point Marina, California) follows. It is by no means unique or unusual.

"Moccasin Point Marina is committed to exceeding those environmental and safety standards established where we do business. We are committed to comply with applicable laws pertaining to human health and the environment. Top priority is given to the preservation and conservation of our natural resources. Health, safety and environmental sustainability are of utmost importance. We are moving forward through continuous education in order to protect the quality of life for our employees, guests and the environment of the areas in which we operate.

Moccasin Point Marina's vision is to become a recognized leader for progressive environmental programs and practices through conducting our business activities in a highly responsible manner. Using Best Management practices, we are meeting our goals to comply with environmental legislation, regulations and additional voluntary standards to which Moccasin Point Marina subscribes.

Moccasin Point Marina does:

- Proactively participate in partnership programs with Federal, State, County, City and other companies, including our competitors and any other group who has a commitment to improving the environment;

- Continue to improve, through education, in order to better understand the latest updated environmental processes and improvements to the health of the ecosystem

- Promote environmental educational programs by giving real world learning experiences;

- Conduct environmental monitoring by using the latest information to improve environmental management systems and to share this information with others;

- Promote the prevention of pollution and promote public awareness of pollution prevention programs;

- Assess the environmental impacts of products, services and activities and incorporates appropriate controls and changes where practical;

- Establish environmental objectives and targets commensurate with the nature and scale of our operations, and takes into consideration the expectations of interested parties;

- Determine the effectiveness of our environmental management system on an annual basis;

- Communicate this policy to Moccasin Point Marina employees, guests and the general public."

Potential Pollution and Related Problems at Marinas

This report section will only discuss potential pollution and other similar problems presented by recreational boat marinas. It will not discuss potential remedies or management measures to counteract the problems. These will be discussed in the next section.

Marina Interference with Littoral Sediment Transport

All structures that are constructed perpendicular to the shore (groins, jetties, piers, boat harbors) and extend into the lake interact with shore parallel littoral currents that transport littoral sediment along the shore. Evanston Harbor will be no exception. Along the west shore of southern Lake Michigan, littoral currents and littoral transport are from north to south. The south shore of Lake Michigan is sediment starved (primarily due to the many shore perpendicular structures all along the Illinois and southern Wisconsin shore of the Lake). However, what sediment does move southward along the southern Evanston shore will be largely trapped by the Evanston Harbor (some small portion will get around the harbor structures, however). This will be a minor benefit to Evanston's South Boulevard Beach, and a minor problem to the small pocket beaches at Chicago's Rogers Avenue Park and Juneway Terrace Park. This minor problem for the City of Chicago can be addressed.

Marina Flushing & Circulation

Poor circulation and lack of adequate flushing can potentially be a problem in any nearly totally enclosed lake structure, if not adequately designed. If there is no flow through the marina, and if there are obstructions to flow in the interior of the marina, any oil or other trash that collects upon the water surface can collect in stagnant corners of

the marina. Proper design can minimize this problem, as can careful attention to minimizing any discharges of petroleum products or trash in the interior of the marina.

Petroleum Contamination

Fuel Spills

It is always possible that some fuel may be spilled when boat fuel tanks, whether gasoline or diesel fuel, are being refilled from the fuel dock, if the process is carelessly done. This need not happen if the process is carried out in a professional manner.

Engine Oil Contamination

Engine oil from poorly maintained inboard engines tends to accumulate in bilge water. If this contaminated bilge water is allowed to be pumped directly into the marina water, marina contamination would occur. These processes are avoidable.

Outboard Motor Water & Air Contamination

Old style two-cycle outboard motors do allow a small percentage of their unburned gasoline and oil to enter the water during operation (because some unburned gas/oil/air mixture is used to "scavenge" exhaust gas from the cylinder(s)). Current environmental legislation, and industry trends will soon lead to a complete elimination of production of this type of engine.

Sewage Disposal

Larger boats with installed toilets or heads could conceivably discharge untreated or partially treated sewage into the Lake water. This is prohibited by State law.

Vessel Maintenance

All vessels require some maintenance at various times in the boating season. Major (and probably moderate) maintenance activities will not be permitted at the marina. However, minor maintenance, such as sanding, trim repair, painting and anti-foulant bottom painting will be allowed. If not done carefully and responsibly, these activities could lead to some minor pollution of the marina waters.

Trash Disposal

Any collection of people will generate trash. All trash can be collected and placed into proper receptacles by educated, responsible people, or it can be thrown willy-nilly by other types of people. An adequate number of proper trash receptacles will be provided by the professional marina operators, and they will also make every effort to advocate and educate marina patrons to handle trash responsibly. As a last resort, they will collect mishandled trash.

Management Measures & Best Management Practices (BMP's)

Definition

A Best Management Practice (BMP) is defined as: any management measure, program, process, design criteria, operating method or device, which controls, prevents, removes, or reduces pollution.

Best Management Practices (BMPs) are effective, practical, structural or nonstructural methods which prevent or reduce the movement of sediment, nutrients, pesticides and other pollutants from the land to surface or ground water, or which otherwise protect water quality from potential adverse effects of human activities. These practices are developed to achieve a balance between water quality protection and productive human activities, including boating, within natural and economic limitations. Care must also be taken to select BMPs that are practical and economical while maintaining both water quality and the enjoyment of recreational boating.

The Federal Water Pollution Control Act Amendments of 1972, Public Law 92-500 (and as amended by Sec. 319, 1986), require the management of nonpoint sources of water pollution from sources including marina activities. BMPs have been developed to guide marina managers and boaters toward voluntary compliance with this act. Maintenance of water quality to provide "fishable" and "swimmable" waters is central to this law's objectives. The Environmental Protection Agency (EPA) recognizes the use of BMPs as an acceptable method of reducing nonpoint source pollution. Nonpoint source is diffuse pollution that comes from almost everywhere. It is unrealistic to expect that all nonpoint source pollution can be eliminated. However, BMPs can be used to minimize the impact of boating and marina practices on water quality. These practices must be reasonable, achievable and cost effective. The adoption and use of BMPs will provide the mechanism for attaining water quality goals without unreasonable interference with marina and boating activities. Effective BMP's for marinas and boating activities have been developed over the years by all with an interest in boating and water quality, including Federal agencies, State agencies, other regulatory agencies, marina owners and operators, and organizations of marina operators and boaters.

The Evanston Harbor marina will be operated and managed by a thoroughly trained professional marina management company, and they will be advocates (and educators) of "Clean Marina" policies. A manual or guidebook (such as the Maryland Clean Marina Guidebook) will be the basis for all Clean Marina actions.

Management Measures

Commonly used BMP's to minimize or eliminate nonpoint pollution and related problems from boating and marina activities are listed below.

Marina Interference with Littoral Sediment Transport

The harbor structures will tend to trap littoral sediment moving along the shore from north to south. However, previous studies have indicated that the amount of sediment moving along the shore is not great, and is probably significantly reduced from the quantity moving in the early 1900's, before all the many coastal structures were constructed along the Illinois and southern Wisconsin shore of the Lake. Whatever sand is trapped will be a temporary benefit to the South Boulevard Beach, and a slight detriment to the two small pocket beaches just south of the Evanston-Chicago boundary line (Rogers Avenue Park and Juneway Terrace Park). A coastal analysis will be performed to determine the quantity of sediment denied to the Chicago beaches, and that volume of sediment will be dredged and deposited into the nearshore water just south of the Evanston-Chicago boundary. Some of this sediment will come from that which will naturally shoal the entrance channel to the harbor (on the south side of the harbor) and the rest will come from that quantity of sediment trapped on the updrift (north) side of the harbor.

Marina Flushing & Circulation

The harbor structures will be designed with openings on both the updrift (north) and downdrift (south) sides of the harbor to allow flow-through circulation within the marina. The opening on the south side will be the main harbor entrance. The opening(s) on the north side will be determined during the feasibility phase of design. They will be either:

- (1) 2 large (4-foot diameter) culverts;
- (2) a second entrance channel; or
- (3) a large opening (5 to 8-feet wide) between the shore and the landward end of the north breakwater structure.

In addition, all floating dock structures and piers will be open beneath the water, presenting minimal resistance to flow-through currents. And lastly, the marina staff will patrol the marina regularly with nets, to remove any concentrations of trash that may tend to build up in one section or another within the marina.

Petroleum Contamination

Fuel Spill Prevention

- Use double-walled storage tanks, with less than 12,000 gallon capacity, on fuel dock;
- use positive measures to prevent filling to more than 95% capacity;

- locate storage tanks on fuel dock away from side that boats approach, to prevent damage from collisions with approaching boats;
- maintain hoses, nozzles and all connections in good condition;
- install back-pressure shutoff nozzles;
- place non-ferrous drip trays lined with oil absorbent material beneath fuel connections at dock;
- always have a trained employee oversee fueling;
- attach container to external vent fitting on boat to collect overflow.

Engine Oil Contamination Reduction

- Encourage all boaters with inboard engines to keep them well-maintained, with intact seals and hose connections;
- encourage all boaters to place oil absorbent materials in the bilges of their boats, and to dispose of these properly;
- provide an oil/water separator for water pumped from bilges;
- provide spill-proof oil changes to boaters; or
- rent them a non-spill pump system to withdraw crankcase oil out through the dipstick tube.

Outboard Motor Water & Air Contamination

Current inboard gasoline engines are all four cycle, just like automobile engines, and so do not contaminate the water at all. They also meet the same air emission standards as do automobile engines. Likewise with all modern inboard diesel engines. As stated by a Volvo diesel boat engine designer:

"The requirements to be introduced in the US in 2006 stipulate low emission levels and, as far as **diesel engines** are concerned, will in principle require state-of-the-art fuel systems and electronic engine control," continues Kjell. "However, if we look at the new Volvo Penta D3, D4 and D6 engines, all of which will meet these requirements, we can see that it is entirely feasible to combine low emissions with high performance. In regard to gasoline engines used as inboard power sources or via drivelines, electronically controlled fuel injection is essential to meet the requirements that are now proposed. We are also involved in tests in the US to determine whether it is possible to use catalytic converters in boats. This is a rather complex process, since, for safety reasons, we would like to cool down boat exhausts, while catalytic converters require extremely high temperatures in order to function. As regards outboard engines, the new regulations mean the end of the standard two-stroke engines; either four-stroke engines or advanced fuel-injected two-stroke engines will be required in the future."

Currently most outboard motors in use are the old style two-stroke type - very popular because of simplicity, relatively low cost and high power to weight ratio. The down side is unacceptable (by today's standards) air and water contamination with unburned gasoline and oil (hydrocarbons), and poor fuel economy. As stated by the Volvo representative, these have probably been legislated out of existence in the near future, if not already.

Related quotes on outboard motors:

(1) "**The conventional two-stroke outboard motor** has been an essential and prized possession of fishermen and recreational boaters for nearly 75 years. Although smelly and loud, they have been engrained in the American summer culture. Their sound brings back a flood of memories filled with fishing trips and lazy summer afternoons on the lake.

However, changes in the outboard market are on the horizon. Like their counterparts in the motorcycle and snowmobile markets, traditional two-stroke outboard motors are being replaced by cleaner four stroke engines and direct fuel injected two stroke engines. The change is being driven by the Environmental Protection Agency (EPA), which is mandating a 75 percent reduction in outboard hydrocarbon and NOx emissions by 2006. That standard has already been implemented in California, with tougher ones on tap for 2008."

(2) "Through **new technology**, including 2002 model year **4-stroke and direct injection (DFI) 2-stroke engines**, **personal watercraft** manufacturers now offer greatly reduced noise and exhaust emissions as well as outstanding fuel efficiency. Personal watercraft manufacturers responded to the regulations set forth by the EPA in 1996 with 2-stroke technology utilizing direct injection and catalytic converters in every model year since 1999. These engines offer as much as a 70% reduction in emissions. In the 2002 model year, three manufacturers of PWC will also offer 4-stroke engines, making the personal watercraft fleet one of the cleanest and quietest on the water.

Older technology 2 stroke engines flush out, or scavenge, their cylinders and refill them with a mixture of air and gasoline each combustion event. Some of this mixture remains unburned, since no combustion is 100% efficient, and is lost during the scavenging leading to higher emissions and less fuel efficiency. However, the direct injection designs used by personal watercraft manufacturers since 1999 scavenge the cylinders with pure air containing no fuel at all. The fuel is then directly injected into the cylinder after the exhaust port is closed. This not only results in significantly reduced hydrocarbon emissions, but also improves fuel economy."

(3) **Mercury 4-Stroke Outboards** "By combining our FourStroke combustion process with the proven, powerful performance of electronic fuel injection, we're surpassing traditional horsepower limitations, to help you go further and faster than ever before. And like all of our FourStrokes, every EFI FourStroke offers the same smooth, smoke-free operation whether you're trolling or at full-throttle. With almost 40 percent better fuel economy and 90 percent fewer emissions than comparable 2-Strokes, it's no wonder Mercury FourStrokes are the power of choice for many. Our FourStroke technology exceeds the EPA's emission standards for the year 2006. Mercury FourStrokes provide up to 39 percent better fuel economy than comparable 2-Strokes. Special sound-dampening cowls combine with an already quiet combustion process to make Mercury FourStrokes among the quietest engines on the water—whether at idle or full-throttle. So now you can actually have a conversation while boating.

(4) **Mercury "New Technology" 2-Stroke Outboards** " But there's more to the story than just speed. Thanks to its unique 2-stage direct fuel injection process, OptiMax® can deliver an amazing 45 percent better fuel economy than traditional 2-Strokes. And all with approximately 82 percent lower emissions, so you get quiet, smoke-free operation. OptiMax also provides reliable turn-key starts, misfire-free running, instant throttle response - for more control and maneuverability - and low idle speed - for easier shifting, trolling and docking. Every OptiMax engine already exceeds the EPA's emission standards for the year 2006. And the Optimax 135 meets California's stringent "Three-Star" rating . . . which means it's compliant with 2008's 91 percent reduction in emissions. An OptiMax 135 yields at least 20 percent more miles per gallon and an average of 26 percent greater cruising range than even a competitive 130 hp 4-Stroke—when cruising between 20 and 40 mph. Which translates into better overall fuel economy and fewer stops at the pump."

(5) The **new direct injected 2-Strokes, as well as four-strokes**, achieve greater than 80% reductions in hydrocarbon emissions, compared with conventional 2-Strokes. Larger four-strokes emit fewer hydrocarbons than most current Direct Injection 2-Strokes, but more nitrous oxides and carbon monoxide. The fuel efficiency of Direct Injection 2-Strokes is, on average, better than four-strokes - especially at trolling speeds. Direct Injection 2-Strokes are a brand new technology, and are expected to improve as future development continues. Direct Injection 2-Strokes are engineered with oil injection systems which precisely meter oil to ensure reliable operation. Most of the oil is burned during the combustion process, and only a very small amount of oil is present in the exhaust. Oil in four-strokes is contained in lubrication sumps, which must be periodically drained during the oil change process.

(6) California water district studies continue to show that the amount (of unburned hydrocarbons getting into the water from **Existing Technology 2-stroke outboards**) is very small. Recent data from East Bay MUD and Metropolitan Water District indicates that benzene, ethyl benzene, toluene and xylene (gasoline compounds of greatest concern) are nearly undetectable. These results continue to show that recreational boating does not constitute a threat to California's water supplies. A 50-hp engine (Existing Technology 2-stroke outboard) operated for four hours during a full day of fishing will consume roughly six gallons of gasoline. As a result, several ounces of fuel will be initially deposited into the water. This small amount will immediately begin to vaporize and biodegrade. It will be difficult to detect any presence of gasoline within a very short period.

(7) **New technology engines** trap all incoming fuel in the combustion chamber and expose it to the combustion process. This ensures that nearly all of the fuel is efficiently burned. However, due to the fact that no combustion system can be 100% efficient, very small amounts of hydrocarbons are exhausted from the new technology 2-Strokes and four-strokes.

BOTTOM LINE - all power boat motor producers (inboard, outboard, gasoline, and diesel) have devoted a high degree of effort into developing boat motors that are significantly more pollution-free (for both air and water) and more fuel efficient, at minor sacrifices in power using new technology. While such pollution was not generally seen as a significant problem in the past, such pollution levels are now expected to be reduced anywhere from 70 to 91%, with fuel economies (for outboards) climbing in the range of 20 to 40%.

Sewage Disposal

Any sewage disposal from onboard toilets into open waters of the State is prohibited. All large boats with fixed toilets must be equipped with holding tanks to contain any onboard-generated sewage. The Evanston Harbor marina will be equipped with a holding tank pump-out facility to clean out holding tanks of patron boats.

Vessel Maintenance

All vessels require some maintenance. Major maintenance (engine overhauling; major hull reconstruction; and similar work) will not be permitted at the marina. However, other minor maintenance activities such as oil changes, minor hull repair, scraping and painting, including anti-foulant bottom painting probably will be permitted at the marina. Best management practices for these activities include:

- designate specific work areas for some moderately intensive maintenance (minor maintenance can be done at the slip);
- require collection of all maintenance debris;
- vessel maintenance areas should have an impervious surface;
- require tenants to use vacuum sanders (the marina will rent or loan these to tenants);
- recommend anti-fouling paints with minimum amount of toxins needed for effectiveness;
- avoid soft ablative paints;
- use brushes and rollers whenever possible;
- use small containers when painting with brushes or rollers (small containers - small spills);
- limit in-water painting to small jobs;
- mix paints and solvents in a designated area;
- conduct all minor engine maintenance with care.

Trash Disposal

All marinas will generate a certain degree of trash and debris. This need not be thrown into the water of the marina and surrounding lake. The marina will act to minimize such unwise and irresponsible disposal of trash through advocacy, education, example and implementation of an efficient waste collection system at the marina. Best management practices for the marina include:

- development of a waste management strategy based on number of patrons, marina layout and type of wastes generated;
- provision of adequate and reasonably attractive trash receptacles, of adequate size to hold expected trash volume;
- locate trash receptacles in convenient locations;
- keep them emptied regularly;
- post signs indicating what can and cannot be placed in trash receptacles;
- require employees to regularly police the marina grounds and water surface;
- use pool skimmers or nets to collect floating debris from marina water;
- consider recycling.

USEPA Benefit Analysis of Clean Marinas (1995)

When Congress passed the Coastal Zone Act Reauthorization Amendments of 1990, known as CZARA, it required EPA to describe sets of management measures to be used for the control of pollution from various nonpoint sources, including marinas and recreational boating. States will incorporate these measures into their own nonpoint source pollution control programs to help achieve water quality standards.

One of the stipulations that Congress made in the law was that the management measures be economically achievable so as not to impose any unnecessary financial hardship on those who will be required to implement the management measures. EPA, therefore, did complete economic analyses that demonstrate the economic achievability of the management measures for marinas and recreational boating in its Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters. This study focuses on the economic benefits realized by marina managers who have implemented management measures at their marinas. The study

focused on 25 marinas that had implemented one or more of 14 management measures the EPA had identified as important to maintenance of a clean marina. The object of the study was to determine if implementation of these management measures had a net positive economic impact on the marinas studied. The 14 selected management measures are:

- (1) Marina Flushing
- (2) Water Quality Assessment.
- (3) Habitat Assessment.
- (4) Shore Stabilization
- (5) Storm Runoff Control
- (6) Fuel Station Design
- (7) Sewage Pump-out Facility
- (8) Sewage Pump-Out Facility Maintenance
- (9) Solid Waste Control
- (10) Fish Waste Control
- (11) Liquid Material Control
- (12) Petroleum Control
- (13) Boat Cleaning
- (14) Public Education

The findings of the study indicate that clearly, the marina industry has begun to embrace the need to promote clean boating, clean facilities, and clean operations. The case studies presented highlight good examples of clean marinas that have found clear value in their environmental improvements. Each of the 25 case studies in the report illustrate different lessons learned from implementation of many of the 14 coastal management measures applicable to marinas, but with interesting variations on best management practices (BMPs).

Every marina has active solid waste management and public education programs.

All but one have pumpout stations and are promoting their use. Most have issued marina no-discharge regulations. Eight were highlighted here for the way they promote or use pump-out service.

Nearly 90 percent have been involved in shoreline stabilization, storm water runoff control, liquid material management, and petroleum control.

Over 70 percent have improved their fuel docks and boat-cleaning practices.

Surprisingly, only 28 percent found sport fishing activity high enough to need cleaning stations.

Two marinas met or exceeded the requirements for all 14 of the federal coastal management measures applicable to marinas -- Elliott Bay and the Hammond, Indiana Marina.

Some of the examples are very simple and inexpensive, whereas others are complicated and costly. All of them, once understood, make common sense. However, all will not work well everywhere.

Every marina included in the study, as well the many others contacted demonstrated innovation, determination, and an almost missionary zeal for clean operations. It seems that once facility owners and managers take the first few steps to protect the environment, they quickly take many other steps toward facility improvement. And the process continues as they strive to become even better after seeing the positive reaction of their customers following environmental progress.

The majority of marinas in the study made environmental changes voluntarily because they wanted both to improve their service to boaters and to stay ahead of the regulations. Three marinas, however, did so as a direct result of being told to do so by a local or state regulatory agency, but in every case they exceeded the minimum and went on to make enhancements well beyond their instructions. Not one regretted making environmental changes. All felt good that their business activities were also better, and they have plans to continue making headway toward cleaner marinas and clean boating.

All of the managers were pleasantly surprised with the results when asked to determine the benefits derived from the environmental changes they had made. When asked to describe costs/benefits, some managers easily found accounting figures to demonstrate an economic advantage. For many others, the request required digging, analysis, and in many cases best estimates. When their numbers were set to paper, all were very pleased with their cost-to-benefit comparisons. The case studies in the report make clear that real, measurable bottom-line benefits can result from cleaner operations. Actual monetary benefits, as tabulated by the EPA, for the environmental changes made for the 25 marinas considered ranged from \$2,000 to \$294,000, in 1995 \$.

All environmental improvements and changes don't result in measurable benefits. However, each marina manager consulted added a statement to the effect that "environmental protection is just part of the cost of doing business today along the waterfront. We've got to do what we can to have good water quality for the sake of our business."

Many marina managers use environmental contracts with their customers to enforce their rules. Many report the loss of a few customers at slip renewal time, but those were soon replaced with customers who supported clean operations. Contracts resulted in tighter control on and reduction in the number of outside contractors doing boat

repairs on the marina property. All the managers indicated that their operations were much cleaner after "banging a few heads." The marinas prospered with the customers who remained and were happier with the clean marina philosophy.

When marina managers and owners were asked how their occupancy and rates compared to those of other facilities nearby in their boating market area, all but one said, "Our rates and occupancy are higher." They generally believed that their visible efforts to operate clean marinas translated into customer confidence that management would also give extra care to the boats. Plus, an increasing percentage of the public today wants to use only nice, clean, service-oriented facilities. And it seems that a growing percentage of the boating public, according to these managers, is willing to pay a higher slip cost for a better and cleaner facility.

"When we started to clean up the yard several years ago," Mike Keyworth (General manager, Brewer's Cove Haven Marina, RI) explained, "our customers gave us many compliments. So we kept on cleaning up and making improvements. And they complimented us more and more, which made us feel good. The thing about this process is that once we started, the more we wanted to do." Without realizing it, Keyworth spoke for everyone in the study.

Other Concerns

The citizens for Lakefront Preservation in Evanston are also concerned that a recreational boat harbor will decrease the aesthetic quality of the shoreline by interfering with their unobstructed view of the lakefront, and that the parking lot for harbor users will be an eyesore. They are also concerned that the harbor will attract a huge influx of automobile traffic to the area, which will increase traffic congestion and noise pollution.

Aesthetics

Boat Harbor

The boat harbor will not directly obstruct anyone's view of the lake, situated as it is directly across from a cemetery. Those few homes nearest the boat harbor, on both the north and south sides, will still have 120 degrees (out of a possible 180 degrees) of view of the unobstructed lake. Those homes located 800-feet away from the harbor will lose only about 15 degrees of the possible 180 degrees of view of the lake.

Many people find small boat harbors picturesque, attractive and interesting, and they break up the monotony of residential or open shores. Beauty is in the eye of the beholder. What follows are some short quotes about scenic areas around the world, indicating that small-boat harbors add to, not detract from, the natural beauty of the surrounding scenic areas:

New York - The Boat Club offers a well protected anchorage for the membership's boats in a picturesque residential setting. The Long Island Sound is easily and quickly accessed by the short harbor in which it is situated between the many harbors of Stamford and Norwalk.

British Virgin Islands - Virgin Gorda. One of the most picturesque small boat harbors anywhere, with restaurants, a market, and nice gift shops.

Newport Harbor has been acclaimed as one of the finest small boat harbors in the world. In addition, Newport Harbor and its surrounding shoreline is a place of beauty and scenic wonder Newport Harbor is as functional as it is beautiful

Mediterranean - Turquoise Coast - Enjoy the little towns that dot the shoreline, each with wonderful cafes, outstanding restaurants and picturesque harbors

Rhine River - Inviting swimming spots, garden restaurants, and boat harbors abound for rest and recreation.

Cape Cod boasts 45 marinas, nestled in protected harbors and coves in some of the most picturesque parts of the peninsula.

Turkey - of Phaselis with its You will see the ancient site harbors, harbor way, Roman theater and Hadrian's Gate.

The Chesapeake Bay, one of the richest estuaries in the world, is the largest bay in the United States, and has a beautiful natural area offering scores of rivers, coves, picturesque fishing villages and small boat harbors.

Puget Sound, Roche Harbor -- This is the epitome of cruising elegance, tucked into a protected bay on San Juan Island with a large moorage

Bahamas - It is smooth sailing from one picturesque spot to the other, where you'll find snug harbors, deserted white sand beaches, and cozy Caribbean villages.

Harbor Parking Lot

The parking lot as envisioned will extend only about 65 feet into the lake. Due to the lay of the land - with the lake shore adjacent to the cemetery at the toe of a low steep bluff, extending lakeward and heavily rip-rapped with stone revetment, the parking lot will not be easily or clearly visible, either to passing automobiles or to homes close to the harbor. With distance away from the harbor, more of the parking lot will become visible, but it will then be less distinct, due to the increased distance.

Traffic Delays

An analysis of the impact of marina traffic on the normal traffic patterns in the vicinity of the harbor was completed by the Northwestern University Transportation Program of the Civil Engineering Department. The analysis was performed using standard traffic engineering traffic simulation assignment tools (VISTA and CORSIM software packages) as well as road capacity analysis (HCS) procedures. First the Base Case traffic conditions were evaluated, and then the future with Harbor traffic conditions were evaluated. The analysis was performed for the worst case conditions - the Worst Day Peak hour base traffic volumes with the worst case marina traffic superimposed on this peak base traffic volume. Five variations of the "Worst Case" situation were evaluated. Differences had to do with differing assumptions of the directions of traffic flows for the local street network and for the marina access roads, but total traffic volumes remained at the worst case condition. Two assumptions of the marina generated traffic were also investigated. One assumption was that each boat attracted one automobile, while the second assumption was that each boat attracted 1.5 autos.

The worst of the 5 Worst Case scenarios is designated as scenario 5 (80% of the local street network traffic is northbound, and 80% of the marina traffic is leaving the marina). Scenario 5A is the case for 1.5 boats per marina boat being used; scenario 5B is the case for 1 boat per marina boat being used. The analysis computed delay times at 6 intersections along Sheridan Road in the vicinity of the marina.

The impact of marina traffic was not significant for even the worst possible scenario. For Scenario 5B, the maximum delay time per vehicle is at the intersection of Sheridan-Howard (7.1 seconds). For Scenario 5A the maximum delay time is also at Sheridan-Howard (10.1 seconds). Both of these cases are highly unlikely. For the most likely Worst Case (traffic volume-wise) Scenario, the maximum delay is 3.2 seconds at Sheridan-Rogers.

An estimate of increased/decreased air emissions was also made for that peak one hour of traffic interaction. For the most likely scenario, for 1.5 vehicles/boat, estimates were calculated for three contaminants (hydrocarbons [HC]; carbon monoxide [CO]; and nitrous oxide [NO]). Readings are given in grams/mile.

HC - decreased 0.06 gr/mile (from 0.50 to 0.44).

CO - increased 3.64 gr/mile (from 37.53 to 41.17).

NO - increased 0.24 gr/mile (from 1.94 to 2.18).

Increases in noise pollution should be commensurate with the increase in traffic delays. This is expected to be negligible.