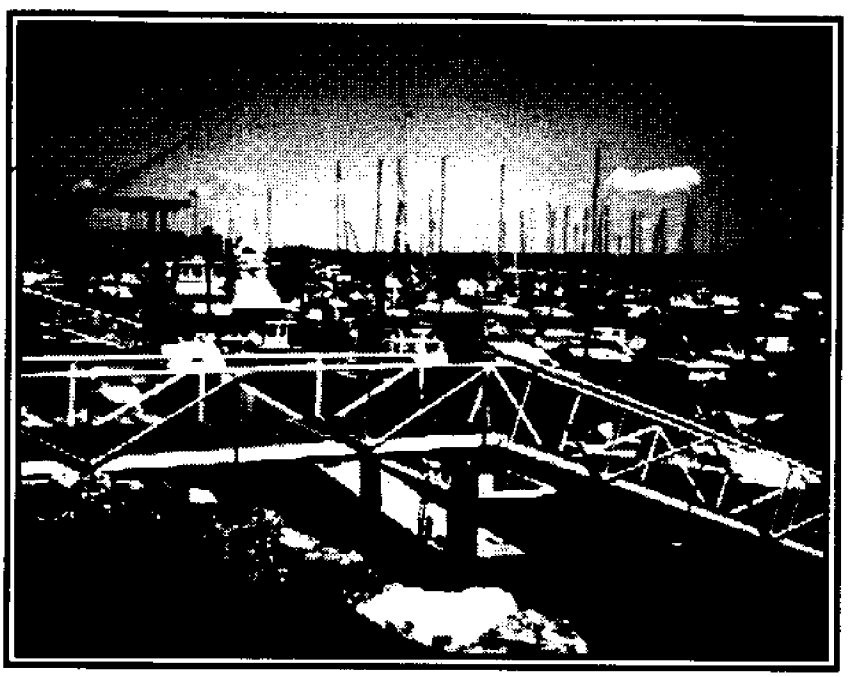
Nonpoint Source Pollution Abatement For Recreational Boating Facilities: Applying Innovative Best Management Practices



A Final Report Submitted to:

The Narragansett Bay Estuary Program
Rhode Island Department of Environmental Management
291 Promenade Avenue
Providence, RI 02903

By:

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February 1997

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PROJECT OVERVIEW

Problem/Purpose

In Rhode Island, nonpoint source pollution resulting from the operations of recreational boating facilities has been identified as a problem in the state's Nonpoint Source Management Plan (page 56). Boater discharges have also been identified as a potential problem in the Narragansett Bay Project's Comprehensive Conservation and Management Plan. According to Section 04-01-06 of the plan "given the present level of boating activity in Narragansett Bay, boater wastes may become a significant problem (page 4.102)." EPA/NOAA's "Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters" also finds that nonpoint pollution regularly introduces contaminants, such as bacterial concentrations, nutrients and BOD loading, suspended solids, and petroleum products. Studies referenced in the "Guidance" show that these contaminants can have significant effects on water quality relating to fin- and shellfishing and recreational activities, such as boating and swimming. In extreme cases, this pollution can have economic impacts on the tourism, recreational boating, and fishing industries as water quality decreases.

These impacts can be mitigated, however, through the implementation of Best Management Practices (BMPs). Recognizing this, the state of Rhode Island, with the assistance of the Coastal Resources Center (CRC), has recently completed the development of a BMP guidance manual for recreational boating facilities that meets the requirements of the management measures set fourth by the United States Environmental Protection Agency (EPA) and NOAA. With the adoption of this *Environmental Guide for Marinas Controlling Nonpoint Source and Storm Water Pollution in Rhode Island*, implementation of BMPs for controlling nonpoint source pollution will be required for every new and existing marina in state waters by 1999. To facilitate the implementation of this new program, this project was launched to provide technical support and funding for the installation, use, and evaluation of Best Management Practices at five selected marinas in the Greenwich Bay study area.

Activities Undertaken/Project Methodology

Selection of Participating Marinas

The first project task involved soliciting five marinas within the Greenwich Bay area to serve as laboratories for the ground truthing of the state's new policy and for the actual implementation and evaluation of BMPs. The original list of potential participants was generated by the Rhode Island Marine Trades Association and was then condensed to achieve minimal overlap and maximum diversity in facility size, type of ownership, services provided, and perceptions toward nonpoint source pollution control. Seven different marinas were solicited, of which five were selected to participate. A summary of the key characteristics for the final participants is presented in Table 1 (see Appendix A).

Identifying Priority BMPs

Once the participating marinas were selected, the project then identified the priority BMPs for implementation at each of the facilities. Chosen by the process outlined in the state's *Environmental Guide for Marinas*, all BMPs initially selected by the participating marina operators as "planned for implementation" constituted the original list of possible BMPs to be implemented and evaluated at each marina. These were then prioritized according to the needs of the participants and the ability of the project's budget to support their needs. As

depicted in Table 2, the BMPs originally selected for implementation generally fell into three categories.

Table 1. Key Characteristics of Participating Marinas

Marina	Size (# of berths)	Services Provided	Ownership
1. Apponaug	248	2	Private
2. Brewers	256	3	Corporate
3. C-Lark	380	1	Private
4. Ponaug	161	1	Private
5. Wharf	85	2	Private

***Note:** 1 = hauling and storage; 2 = minor mechanical and finishing procedures, along with the activities of category of 1; and 3 = categories 1 and 2 plus major mechanical, finishing, and structural repairs.
Source: Operation and Maintenance Plans as submitted to RI CRMC, 7/96.

Table 2. BMPs Selected for Implementation by Participating Marinas

BMP	Solid Waste Effort	Liquid Waste Effort	Educational Efforts
Vacuum Sander Use	2,4,5		
Recycling-glass, tin & plastic	1,2		
Secondary Containment		1,3,5	
Separate Collection Facilities		1,5	
Liquid Waste Drop-off Booth		2,4	
Spill Response Equipment		4	
Spill Response Plans		2,4	
Workshops			All
Literature Distribution			All
Signs			2,3,4,5

Note: numbers correspond to the marina at which the practice was implemented. See Table 1.

Developing BMP Implementation Plans

Once the original list of BMPs was narrowed and finalized, a plan was developed detailing how the BMPs would be implemented and evaluated at each marina. Specifically, these plans described the individual practices; the equipment N costs and suppliers; strategies for implementation and evaluation; and finally, a detailed schedule for completing the process. All BMP Implementation Plans were submitted to and approved by the Narragansett Bay Estuary Program (NBEP) prior to the actual implementation (see Appendix B).

Implementing BMPs

During the actual implementation phase, CRC worked with the participating marina operators and NBEP to purchase the necessary equipment; address operational and regulatory problems; ensure that the equipment was properly installed and operating; and to monitor and evaluate the patterns of BMP use at the five participating marinas. During the implementation of the plans all but one of the BMPs were installed and monitored. The drop-off booths for liquid wastes were not installed because of a lack of marina resources during the commissioning season. The only other modification to the approved

implementation plans (see Appendix B) involved the shift away from conducting boater workshops towards the development and distribution of educational literature and the provision of appropriate signage. This change was made due to poor results because of low attendance associated with conducting boater workshops. Only one such event was held at each of the participating marinas.

Evaluating BMPs

Once the implementation and monitoring of the selected BMPs was complete, the project shifted to focus on the actual evaluation of each practice's cost-effectiveness in reducing nonpoint source pollutants. The criteria used for evaluating these BMPs included their installation cost, use rates, amount of pollutants collected, or measured changes in boater behavior when regarding educational efforts. The primary data used in this evaluation was collected through log books, purchase invoices, and a boater survey. See Appendix C for detailed survey methodologies and the individual case studies for details on the specific evaluation approaches used in each instance.

Document Organization

This document presents the methodologies used and the outputs, impacts, and tools produced by this project. It is divided into two sections. The first section, titled Best Management Practice Case Studies, presents the primary project outputs for each of the practices implemented and evaluated. The second section summarizes other related project outputs and impacts, such as the overall quantity of pollutants collected, number of boaters trained, amounts of educational literature distributed, and positive behavioral changes in boaters.

Appendices referenced in this document may be found in the larger technical report from which this report is excerpted — *Nonpoint Source Pollution Abatement for Recreational Boating Facilities: Applying Innovative Best Management Practices.*

BEST MANAGEMENT PRACTICE CASE STUDIES

Introduction

The following are case studies for each of the individual BMPs addressed (see Table 3 for a complete listing). Categorized by solid waste, liquid waste, and educational efforts, each case study provides: a general description of the practice; a summary of the implementation and evaluation processes used; an explanation of the associated costs, pollutants collected, and overall effectiveness; and concludes with final statements regarding the lessons learned and recommendations for the future use of these individual practices.

Table 3. BMP Case Studies Produced

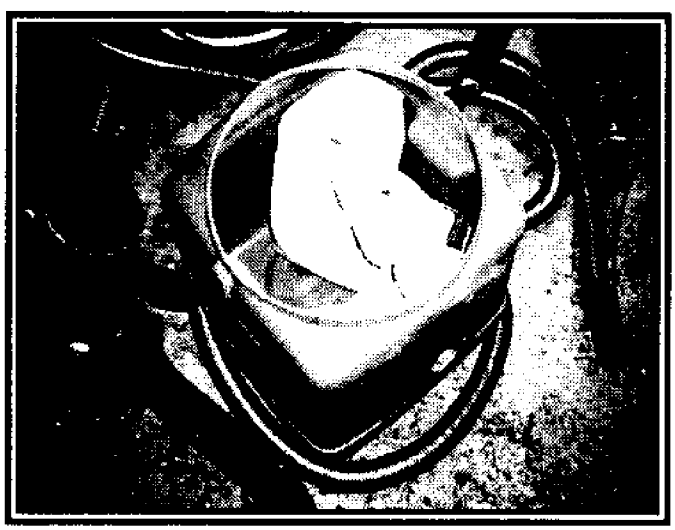
Solid Waste BMPs *(pages 4-7)*	Liquid Waste BMPs *(pages 7-13)*	Educational BMPs *(pages 13-18)*
1. Vacuum Sanders *(page 4)*	3. Separate Collection Facilities *(page 7)*	7. Literature Distribution *(page 13)*
2. Recycling *(page 6)*	4. Secondary Containment *(page 9)*	8. Signs *(page 14)*
	5. Spill Response Equipment *(page 10)*	9. Workshops *(page 15)*
	6. Spill Response Plans *(page 12)*	

Solid Waste Best Management Practices

Using Vacuum Sanders

Description

The dustless vacuum sander targets paint chips and other debris produced through hull maintenance activities, such as bottom sanding. As opposed to traditional equipment, this machine's sanding surface is ventilated to allow the attachment of a vacuum device, which automatically collects debris as it is removed from hull surfaces and before it can reach the open environment.



Implementation

The equipment purchased was the Fein Dust-Free Basic Sanding System. This high quality system included: Msf 636-1 Random Orbit Sander; Low Profile Dust Extractor with Auto Start; 16-foot Hose and Fittings; and a 5-pack of 1 micron filter bags. The equipment came with a full one year warranty and extended support plan that allows the owner to return the equipment to the factory every six months where it is cleaned and overhauled at no charge. For your local Fein distributor call 1-800-441-9878.

The equipment was used by staff and made available for tenant use at no cost. Tenants were notified by word of mouth, the mailing of two informational flyers (see Appendix D), and through the posting of these same flyers within the participating marinas. The equipment was offered on a first-come first-serve basis. Both staff and tenants were instructed on proper operating procedures before using the equipment and asked to fill out a brief questionnaire upon returning it (see Appendix D). The collected information was then compiled with the amount of material collected by the machine to establish a basis for evaluating its effectiveness.

Evaluation

Cost: $1,357 in equipment with an additional $50 in time and printing.

Pollutants Collected: With an estimated collection rate of 98 percent (Grlovich, personal communication), and in using standard 80 grit sand paper, this particular vacuum sander prepped 1,383 feet of vessel bottoms and in the process collected 171 pounds of bottom paint debris. By calculating a ratio, one can see that the machine averaged 1.98 ounces of collected material per foot of boat sanded. Standard ingredients of bottom paint for recreational boats, as exemplified by Interlux Fiberglass Bottomkot, is as follows: 42.75 percent cuprous oxide (of which 37.9 percent is elemental copper) and 57.25 percent inert ingredients.

Cost-effectiveness: With the project survey identifying that only 50 percent of the responding boaters actually sanded their hull this year, consider this: If just 35 percent of the State's 32,052 registered vessels (McGrath, personal communication) had their bottoms sanded with this type of equipment each year, at an average length of 20 feet per boat (McGrath, personal communication), approximately 27,765 pounds of solid waste could potentially be prevented from reaching the open environment annually. When considering the individual installation of these machines, the initial purchase cost appears to present a barrier to such wide spread use, but recent studies have shown that this is not necessarily the case. Ross (1996), points out that in addition to cleaning up the environment, the use of vacuum sanders can dramatically increase the efficiency of sanding operations while also generating significant profits through customer rental.

Lessons Learned/Recommendations

- Thoroughly research the market before purchasing your machine. Compare the overall cost, size of powerheads, quality of vacuum motors and filters, and the specifics of the individual warranties and product support plans.
- Consider developing a rental scheme to compensate for the initial investment. It can either be set up strictly to cover the cost of purchasing and operating the equipment, or it can be structured so as to become a profit center for the marina. Just remember: the lower the cost to the user, the more users you will have and the more pollutants you will capture.
- Publicize, publicize, publicize. If you do not get the word out, the machine will not be used enough to make a return—either in profits or pollutants collected—on the initial investment.
- In addition to the mailing or posting of temporary flyers, consider posting permanent signs in hull maintenance areas to inform tenants that the equipment is available for use.
- Do not forget about the benefits of word of mouth. Inform staff that whenever they see someone sanding with traditional equipment, they should advise them that a

professional vacuum sander is available for their use that is more efficient and will protect their health, as well as that of the environment.

- Always provide users with operating instructions and make sure that they understand them before using the machine. Take any steps necessary to limit liability on the part of the marina.
- Monitor the use and materials collected by the equipment for future reference. Such information could prove invaluable in making decisions regarding the continuation of the vacuum sanding program and/or regulatory compliance.

Recycling Glass, Tin, and Plastics

Description

Like homes, boats, and the marinas at which they are stored, produce many recyclable waste streams. But unlike most municipal neighborhoods, marinas often do not recycle these products because the service is not provided to them by local municipalities. Recognizing this, the aim of this BMP was to properly dispose of these solid wastes by privately providing recycling facilities for tin, glass, and plastics.

Implementation

Standard 96-gallon recycling totes were provided to two of the participating marinas by two different private waste disposal contractors for the collection of tin, glass, and plastics. The two marinas were of similar size (248 and 256 berths). Both marinas placed the totes at the head of their main piers, and adjacent to the dumpsters used for disposing of nonrecyclable solid wastes. All recycling totes were labeled with what they were designed to collect.

To further educate marina tenants on the use of the facilities, the second marina distributed additional educational flyers to each of the tenants (see Appendix E). Evaluation of this BMP was done by monitoring the volume of material collected prior to the weekly emptying of the totes.

Evaluation

Cost: The cost for providing recycling of glass, tin, and plastics averaged $32 per week, per facility.

Pollutants Collected: The two marinas averaged 1.95 full 96-gallon totes per week or the equivalent of 16.25 percent of a standard six yard dumpster's capacity.

Cost-effectiveness: This practice is effective in preventing reusable materials from being permanently discarded in landfills. However, it cost substantially more to recycle the material using a private waste hauler than to simply have disposed of it using the dumpsters that were already available. For example, the average cost to provide and empty a standard 6-cubic-yard dumpster was $36 per week. When you consider that it cost $32 per week to recycle what could have been disposed of in the dumpsters for $5.12 (16 percent of price based on volume of recylables collected), it becomes obvious that although recycling is the environmentally preferred disposal method, it may not be cost-effective in certain installations.

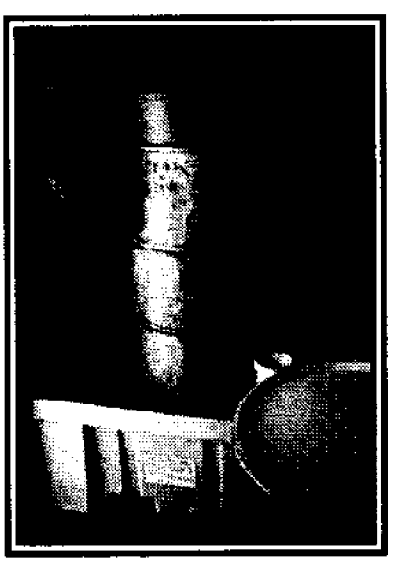
Lessons Learned/Recommendations

- Recycling is the environmentally preferred disposal method for reusable materials.
- Check to see if your municipality will provide the service at no cost or at a reduced fee. If not, try tackling the task in-house.
- Although the practice has proven environmentally effective, due to the fact that private service providers tend to be costly in the provision and emptying of recycling facilities, this method is economically inefficient.
- Recycling of tin, glass, and plastics can be economically efficient if its cost can be made compatible with the fee for standard disposal.
- Sufficient receptacles can be privately purchased and properly labeled for a nominal fee.
- Of the survey respondents not recycling, 50 percent felt that the process took up too much space onboard their vessels and was too time consuming; therefore, try to simplify the procedure by providing commingled collection bins.
- Recyclables can then be disposed of at no charge by either bringing them to municipal collection sites or by encouraging local "scrapers" to collect the metals.

Liquid Waste Best Management Practices

Providing Separate Disposal Containers

Description



A major component in minimizing nonpoint source pollution is in providing proper liquid waste collection and disposal facilities. When people cannot easily access such facilities, they tend to dispose of wastes, such as oil, antifreeze, and solvents, in improper ways. In addition to preventing pollutants from being improperly disposed, having separate containers for the collection of differing liquid wastes can save on disposal costs. For example, it can cost anywhere from two to three times the amount to dispose of a 55-gallon drum of oil that has been contaminated with antifreeze ($400-$550) than it would to dispose of an uncontaminated drum ($150) of pure waste oil (Kailer, personal communication).

Implementation

Reconditioned 55-gallon drums with lids were purchased from a local supplier identified through the yellow pages. These drums then served as the primary containers for the separate collection of diesel fuel and antifreeze. In order to ease the collection process, specially designed funnels that screw into the drums and provide sufficient room for the draining of portable containers and oil filters were purchased from the Oil Dri Corporation (for your local distributor call 1-800-Oil-Drip). All of the separate disposal containers were then supplied with labels detailing what they were designed to accept. The labels were produced in 4-inch white vinyl by a local sign maker identified through the yellow pages.

Once acquired, the drums were labeled, affixed with a funnel, and placed atop the two-drum secondary spill containment pallets (see the following case study). Signs were posted at the marinas directing patrons how to properly dispose of harmful materials. Educational fact sheets were also distributed (please see the educational BMP case studies for more detail on these processes). The final step in implementing this practice involved establishing an evaluation scheme. Marina operators decided to simply record the volume (in gallons) of material collected over the course of the boating season.

Evaluation

Cost: Drum-$14.95, funnel-$35, average label-$8, average installation time - four person-hours

Pollutants Collected: Two participating marinas averaged approximately 40 gallons of antifreeze, 350 gallons of diesel plus 17 gallons of gasoline, and 10 gallons of solvents with pre-existing equipment. Two other participating facilities also implemented this practice for diesel and antifreeze but no pollutants were collected. To put this in proper perspective, a few points must be emphasized: First, antifreeze is predominantly produced as a waste product during the early spring when people are de-winterizing or commissioning their vessels for summer use; and second, these facilities were not operational until after this period.

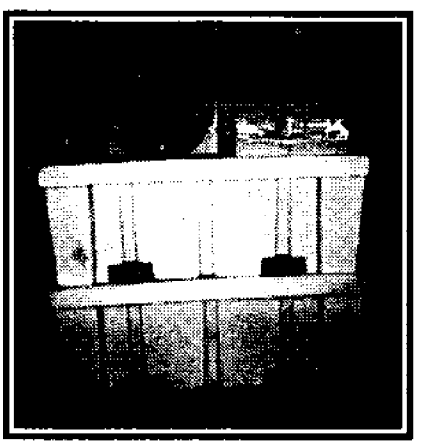
Cost-effectiveness: If one considers the volumes collected at the two participating marinas that had the pre-existing facilities, and the increased cost to dispose of contaminated wastes, one can conclude that a minimal investment in separate collection containers for disposal of liquid wastes can increase the amount of materials properly disposed and decrease the actual disposal cost over the long run.

Lessons Learned/Recommendations

- Carefully assess your needs for separate collection facilities. Full-service marinas will generally produce more waste streams then those who cater primarily to hauling and storage.
- At a minimum consider providing separate facilities for the disposal of waste oil, diesel, gasoline, antifreeze, solvents, and contaminated petroleum products (i.e., oils mixed with such things as antifreeze and/or water).
- Remember, if it costs $60 to install a separate container for the collection and disposal of waste oil that has been contaminated, but it takes two to three years to fill the drum, you still may be achieving a savings in disposal costs of between $200 and $300.
- The cost to provide separate disposal containers can be drastically reduced by reusing drums that you may already have on-site. Labels do not necessarily have to be purchased, they can simply be painted on and although a snug fitting funnel for draining temporary containers is a plus, it is not the only alternative.
- Design collection facilities so that they are easy to access. Over 57 percent of the survey respondents indicated that they did not use the provided facilities because it was easier to dispose of their wastes elsewhere. If possible, try to keep them open throughout the season and always make sure that sufficient capacity exists.
- If it not possible to keep them open or unlocked, consider providing a "drop-off booth" at some convenient point within the marina.

- Publicity, education, and proper instruction is the key. In order to reduce improper disposal practices by your staff and tenants, they must be aware of the facilities available to them and know how to use them correctly. Post signs in the collection area describing disposal methods. Distribute flyers and label containers appropriately. See the educational BMP case studies for additional details.
- Check with local regulatory officials on specific design criteria for hazardous materials storage areas.

Installing Secondary Containment



Description

All containers used to store waste oils and other such potentially harmful liquids should have a form of secondary containment. The primary purpose is to provide additional storage capacity for any materials that may leak due to the failure, overfilling, or improper draining of the primary storage container. Generally speaking, secondary containment should equal 110 percent of the capacity of the primary container and is usually provided by placing a non-leaching berm with an impervious bottom under or around the primary container.

Implementation

In providing secondary containment to the liquid storage facilities at the participating marinas, the decision was made to purchase commercially available products rather then constructing such facilities in-house. In all instances the product purchased was the Oil Dri Corporation of America's two drum spill pallet (product # 90525). Constructed to provide secondary containment for any two standard 55-gallon drums, these units can be easily transported in case of emergency and have been outfitted with spickets so that they may be drained of their contents when necessary. For your local Oil Dri Distributor call 1-800-Oil-Drip.

Implementation of the secondary containment units was accomplished by first placing them in their designated storage locations. The primary containers (55-gallon drums) were then placed on top of the pallets and opened for use. No specific educational activities were undertaken. This BMP was evaluated by checking the amount of liquids that had collected in the bottom of the secondary containment units at the end of the boating season.

Evaluation

Cost: $241 each with minimal time for installation.

Pollutants Collected: One quart of liquid waste was collected by one of the units. In this instance the leak was due to an improper filling of the primary storage container. If not for the presence of secondary containment, this leaked material would have been released directly into the ground.

Cost-effectiveness: These two drum spill pallets represent a very cost-effective means for providing secondary containment. In terms of pollutants collected, although only 1 quart of liquid waste was captured this season, we are confident that these units would be capable of containing a complete failure of the primary storage containers placed upon them. In terms of economics, it is felt that the initial purchase cost for these high-quality units is either equal to, or less than, the cost to produce a similar product in-house. It is also important to recognize several benefits inherent in the spill pallets' design — they are durable, easily transported, and equipped for draining.

Lessons Learned/Recommendations

- Proper secondary containment facilities are effective in controlling both small leaks or spills, as well as larger failures of primary storage containers.
- Secondary containment facilities should be regularly drained of any collected material so that their capacity at any point in time is equal to 110 percent of the primary storage containers.
- When standard 55-gallon drums are used as the primary storage containers, it may be cheaper to purchase commercially available containment units rather than trying to construct such facilities in-house.
- If larger storage containers, such as home heating fuel tanks, are used to store liquid waste, it may become more difficult to provide secondary containment. In these instances, consider removing the larger tanks and replacing them with a series of standard 55-gallon drums and spill pallets.
- As another alternative to replacing large tanks, consider the construction of a central collection site. A particular method worth noting is the use of septic tanks cut in half and enclosed. This approach can provide secondary containment for large quantities of liquid waste. Remember that in many states any storage facility that has the capacity to hold more than 500 gallons of petroleum products must be permitted (check with your department of environmental management).
- When constructing such facilities in-house, be sure to consider design elements such as overall capacity in comparison to the capacity of the primary containers, their permeability, and their ability to be transported and drained.
- Spill pallets capable of holding four 55-gallon drums are commercially available. With the capacity for four drums, these pallets can either be used for different types of liquid waste (i.e. one drum for oil, one for antifreeze, one for solvents, etc.) or to replace a larger container used for a single waste product.

Supplying Emergency Spill Response Equipment

Description

Oil spills resulting from marina-related activities pose a real threat to coastal environments and can impose considerable financial liability on individual marina owners and operators. Recognizing this, the ability to quickly contain and absorb such spills then becomes crucial in mitigating these potential negative impacts. In order to contain and absorb such spills, a certain amount of specialized equipment is recommended to be kept on-site. At a minimum, this equipment should include a sufficient length of boom (approximately 3 feet of boom to every foot of the largest vessel serviced) capable of containing spills and a sufficient quantity of materials capable of absorbing oil in a liquid environment (Amaral, Lee, and Rhodes, 1996).

Implementation

In this instance the spill response equipment decided upon was the Oil Dri 95-Gallon Oil Only Spill Kit (# 90943). Containing 130 feet of boom, 60 smart pads, 10 disposal bags, and an emergency response guidebook, this kit has the ability to absorb 164 gallons of fuel. For your local Oil Dri Distributor call 1-800-Oil-Drip.

Once acquired, the emergency spill response kit was permanently installed at the marina's fuel dock. After consideration, the marina manager decided to leave the storage container unlocked so that the equipment could be accessed at all times by marina tenants. In order to raise awareness of the above equipment, a sign detailing the basics of oil spill response was created and posted at the fuel dock (see Appendix H). Evaluation was accomplished by tracking the number of products actually used. In addition, any used products were to be collected and drained to determine the amount of oil that had been prevented from entering the open environment. In the event that a large spill occurred, the response kit was to be evaluated as to its effectiveness at containing the spill.

Evaluation

Cost: $496

Pollutants Collected: No instances arose at the participating marina where the deployment of the emergency spill response equipment was warranted. Therefore, no actual volumes could be collected or measured.

Cost-Effectiveness: Although the equipment was never actually used by the participating marina, it is felt that this kit is fully capable of absorbing the 164 gallons of oil that the manufacturer claims. Assuming that this is true, when compared with the high costs associated with having a private company respond to a 100-gallon oil spill one can see that the purchase cost of an emergency spill response kit of this caliber is well worth the initial investment.

Lessons Learned/Recommendations

- An ounce of prevention is worth a pound of cure. Look at your marina with a critical eye. Try to identify and correct potential spill sources before they occur.
- If the cost for the purchase of a complete emergency spill response kit seems too high, consider buying booms and absorbents separately and constructing a storage container on your own.
- Equipment does not necessarily have to be purchased all at once. Small sections of boom and bales of absorbents can be purchased individually over time.
- Spill response equipment is not helpful if it is locked up during a spill where people cannot access it. Therefore, before deciding on locking the storage container, experiment with leaving it open so that tenants can access the equipment at any time.
- Consider leaving the storage container unlocked just on weekends and holidays when there is more activity and therefore more potential for spills.

- Both staff and tenants need to be educated on the use and disposal of emergency spill response equipment. Use signs, educational literature, and workshops to instruct them on the proper use of the equipment.
- Develop and maintain a spill response plan.

Developing Spill Response Plans

Description

Simply having the proper equipment available for responding to oil spills is not enough to ensure proper oil spill response and cleanup efforts. An Oil Spill Response Plan clearly identifies the who, what, when, where, and how of spill response for a particular marina. In its most basic sense, the oil spill response plan is simply a proactive safety device which outlines a set of procedures for correctly responding to such an emergency.

Implementation

If proper oil spill response equipment is already available, there is almost no need for additional capital outlays in the development of a spill response plan. We used the *Environmental Guide for Marinas* model oil spill response plan as the reference source in completing the individual spill response plans. Two meetings were held with marina managers to identify potential spill threats, agree on spill response tactics, designate specific personnel with specific roles, and identify contacts for additional spill response equipment (See Appendix F).

Evaluation

Cost: Approximately four person-hours to research and develop the plan with an additional two person-hours for staff review and instruction.

Pollutants Collected: No actual events occurred to allow the spill response plans to be implemented. Therefore, we cannot estimate the amount of pollutants collected, or in this case, prevented from reaching the open environment as a result of having developed a spill response plan.

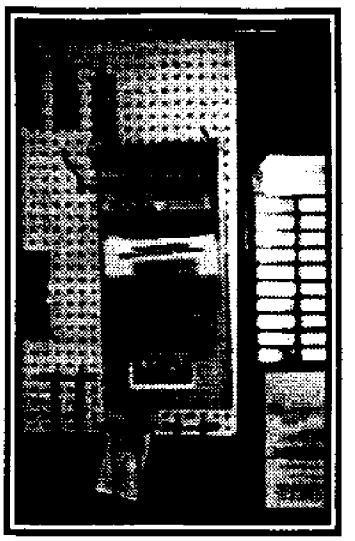
Cost-effectiveness: The implementation cost for this BMP is extremely low, and the development of spill response plans can be very cost-effective. The primary benefit is that the appropriate individuals can then respond to the potential threats identified, become more aware of the procedures to follow in the event of a spill, know where and how to access the necessary response equipment, and better respond to actual emergencies.

Lessons Learned/Recommendations

- The development of spill response plans is straightforward, inexpensive, and can be easily accomplished by marina staff without the assistance of costly private consultants.
- The *Environmental Guide for Marinas* serves as an excellent resource for the development of spill response plans.
- The process of developing the plan with staff is an educational experience, but training in actual spill response is most helpful.
- Properly informed actions on the part of marina representatives in the early phase of spill response has the potential to reduce cleanup costs and marina liabilities.

Educational Best Management Practices

Distributing Literature



Description

Distributing educational literature is often cited as a primary means for informing boaters on nonpoint source pollution controls for marinas. In most instances undertaking this approach depends on three primary factors: what types of literature to use, where to acquire it, and how to distribute it. In regards to the information types, flyers, posters, short booklets, and fact sheets are commonly cited. Although these can be produced in-house on a case-by-case basis, the most likely source of these materials is from governmental and nongovernmental environmental organizations and through industry-related trade associations.

Implementation

The first task was to acquire good source materials that were widely applicable, accurate, appealing, and concise. Once these materials were found, they were adapted to suit particular needs. This was done by CRC/Sea Grant and the NBEP, who then coordinated the production and publication of a Boater Fact Sheet Series that covers the topics of sanding and painting, solid waste disposal, vessel sewage, bilges, fueling, and spill response; vessel cleaning and fish waste; and routine engine maintenance (see Appendix G).

Two different distribution methods were then implemented. The first method used standard literature display racks that were set up at convenient locations within three of the participating marinas. The racks were stocked with materials and monitored as to how many individual fact sheets were taken each month by the marina customers. The second method involved including one of the fact sheets in each of the five marinas' monthly billings over the course of six months. The content of the fact sheets coincided with the activities of boaters during different times of the season. For example, we mailed the sanding and painting fact sheet at the end of April, solid waste disposal in May, vessel sewage in June, and so on. After completing the six-month distribution process, this method was then evaluated through the use of a survey that asked the marina customers if they had been reading the fact sheets, and if they were now using any BMPs that they had learned from reading them.

Evaluation

Cost: The costs associated with the display rack averaged $52.80 per marina ($45 to purchase the rack and $7.80 to stock it with 20 copies of each fact sheet). The cost for the monthly mailings averaged $37.36 per marina ($7.56 for copying per month times six months).

Educational Value: Educational value refers to the ability to persuade the audience to use new BMPs. Through the survey, we identified that distributing literature ranked second among the customers' follow-up choice for best method of informing them. Additionally,

75 percent of those who received the fact sheets actually read them, and of that 75 percent, 91 percent have since begun to use BMPs that they learned by reading the materials.

Cost-effectiveness: Distributing literature has proven very effective in its ability to get boaters to use BMPs. In addition, there was not much difference in cost for the two distribution methods used. The mailing method proved more cost-effective because marinas were able to mail an average of 126 copies per month per marina, whereas the use of the literature display rack averaged only five copies per month per marina.

Lessons Learned/Recommendations

- Distributing literature ranked second among the boaters choices for best method of informing them and had the highest effectiveness rating of the three educational BMPs addressed. The use of this approach is highly recommended.
- Distributing literature through monthly mailings was far more cost-effective in reaching the target audience than simply using display racks, since participating marinas were paying for the postage regardless of the inclusion of individual fact sheets.
- If the use of monthly mailings is not applicable in a specific instance, consider sending mailings with the seasonal contracts or placing copies directly on the individual vessels stored at the marina at different points in the boating season.
- Perhaps the most important lesson learned about this approach was that you cannot expect customers to take information. For this approach to be truly effective, marina operators must put the materials directly in their hands.
- Rhode Island Sea Grant now has a series of six boater fact sheets available that are widely applicable, accurate, appealing, and concise.

Posting Signs

Description

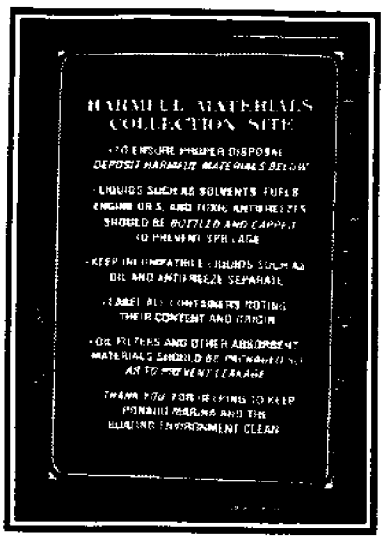
The use of signs has long been recognized as a means for informing people. In this instance they were used to educate boaters on specific BMPs that they can use to help reduce nonpoint sources of pollution from marinas.

Implementation

The first task involved categorizing and compiling materials into logical topics that would be appropriate for posting at different locations within the facility. We identified several consistent priority topics for signs, including solid waste disposal tips, harmful materials, or liquid disposal tips, and instructions for responding to spills and the operation of pumpout stations.

With the topics decided, the specific language was developed (see Appendix H) and the production of the signs was contracted out to a local sign maker. Constructed of steel with vinyl backgrounds and lettering, the 36-by-24-inch signs were then posted in appropriate places. For example, solid waste disposal signs were placed near facility dumpsters, and spill response instructions were placed next to facility spill response equipment.

After completing the installation of the signs, this approach was then evaluated through a survey that asked the marina customers whether they had learned new waste disposal BMPs through reading the signs, and whether they were now using the practices that they had learned.



Evaluation

Cost: $105 per sign, with minimal installation time.

Educational Value:. Through the survey, we identified that the posting of signs ranked first among the customers' choice for best method of informing them. Additionally, 72 percent of those who read the signs learned new practices, and of that 72 percent, 79 percent have since begun to use the BMPs that they learned.

Cost-effectiveness: The cost of the signs initially appears high when compared to the costs associated with distributing literature. However, when one recognizes that the literature distributed will usually only serve a one-time benefit, whereas the signs will continue to spread the word to people over the course of years, one can see that posting signs can be quite cost-effective, especially if the signs can be produced in-house or at a cheaper rate.

Lessons Learned/Recommendations

- Posting signs was ranked first by boaters as the best method for informing them. It ranked second in terms of its effectiveness in getting boaters to use BMPs.
- Priority topics for the posting of educational signs include solid waste disposal, liquid waste disposal, pumpout station operation, and spill response instructions.
- Developing the specific language for educational signs does not have to be difficult (see Appendix H).
- Although signs need to be durable, legible, and eye-catching, they do not necessarily have to cost a lot. In many instances, they can be made inexpensively with some wood and a little paint.
- In order to be effective, signs need to be visible, even if that means making several copies of the same sign and posting them in different locations.
- Make sure signs are of an appropriate size and post them in suitable locations.

Conducting Workshops

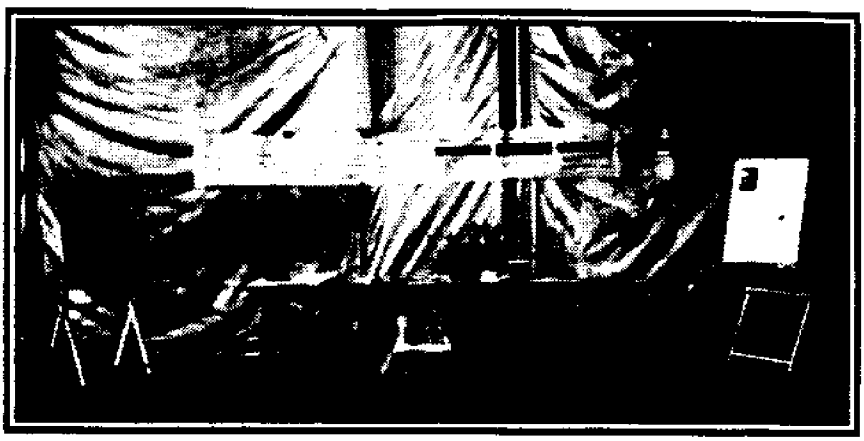
Description

The *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters* (EPA, 1993) states that "meetings/presentations at local marinas or other locations are a good way to discuss [nonpoint source pollution issues] with boaters." To this end, we conducted several such events/workshops and assessed their value.

Implementation

Preparation involved cataloging and categorizing the materials to be presented. Once this task was complete, three different formats were selected for use. The question-and-answer forum, slide show presentation, and facility walking tour (see Appendix I). In addition to using three different formats, several different venues were selected: the facility walking tour was conducted at the marinas. The question-and-answer forums also took place at the

marinas, although one event was incorporated into an existing function traditionally well-attended by marina customers. The first slide show presentation was scheduled for a large local boating supply store, and the second was held at an adjoining restaurant, with appetizers and refreshments provided by the marina operator.



With the actual content, organization, and location of the events finalized, the planning then shifted to publicizing the various events. Although the approaches used varied slightly among marinas, publicity flyers (see Appendix I) were the primary advertising vehicle. They were posted throughout the participating facilities and mailed, on two occasions, to marina tenants. The one exception was the slide show presentation held at the local boating supply store. For this event, an additional 200 flyers were given to the store to be handed out over the two-week period preceding the event.

Once preparations were completed, the actual events were conducted in accordance with the individual session plans. Events/workshops were evaluated through a survey that asked marina tenants the following questions: 1) Were you aware of the workshops? 2) Did you attend? 3) If you did attend, are now using the BMPs discussed? 4) If you did not attend, what would have encouraged your participation?

Evaluation

Cost: With the exception of publicity efforts (which averaged $16 per facility) and the slide show presentation conducted at the restaurant, there were no large costs associated with purchasing needed equipment or materials for the individual workshops. On the other hand, one must recognize that it takes a *considerable investment of time* to plan and conduct a successful formal workshop. On average, 10 hours were needed to plan and publicize the events, two hours to gather any needed materials, three hours to advise any additional speakers, two hours to do a preliminary dry run, and an additional three hours to set up, conduct, and clean up after the actual event.

Educational Value: Conducting workshops ranked last among customers' choice for best method of informing them. Additionally, of the 26 percent who were aware of the workshops, only 9 percent chose to attend. It is important to note that the low percentage of survey respondents aware of the workshops might not be representative, as the events were conducted one year prior to the administration of the survey, and therefore, respondents could have forgotten of their notification. Of those who were clearly aware of the events and attended, only 31 percent have started to use BMPs learned at the events.

Cost-effectiveness: When comparing the average investment of time and resources for preparing and conducting formal workshops with the 9 percent attendance rate observed and the associated 31 percent effectiveness at getting participants to use BMPs, the cost-effectiveness is very low compared to the other educational approaches presented.

Lessons Learned/Recommendations

- Conducting workshops ranked last among methods to inform boaters and had the worst effectiveness rating of the three educational approaches tested.
- If conducting workshops is the chosen approach, focus on traditional publicity methods, such as word of mouth and the posting and mailing of flyers, and more importantly, try to schedule the event into an existing marina function that is traditionally well-attended by tenants. This will give you a large audience with minimal effort.
- To increase attendance, try offering incentives, such as door prizes, discounts, free product samples, or even a small social event following the workshop.
- In terms of workshop formats, the facility walking tour appeared to be the best method, as it allowed participants to gain hands-on experience in the benefits and use of BMPs through actual on-site demonstration of products and procedures.
- The slide show presentation appeared less effective than the walking tour, but more effective then the question-and-answer forum, in that it engaged the participants and allowed the opportunity for the presentation and discussion of appropriate BMPs.
- The question-and-answer format proved least effective in that it was difficult to engage the tenants.
- Finally, the conducting of successful formal workshops requires a considerable investment of time and resources. If sufficient time and resources are not available, it is better to reconsider that approach, rather than conduct an event that may set negative tones for future BMP implementation, evaluation, and education efforts.

SUMMARY OF OTHER PROJECT OUTPUTS AND IMPACTS

This section highlights associated project impacts that are not directly referenced in the preceding BMP case studies. These include pollutants collected, amounts of educational literature distributed, positive behavioral changes measured, and tools developed for marina operators.

Pollutants Captured

Although the total ramifications of this project in terms of pollutants prevented from reaching the open environment cannot be reasonably estimated, the collection and proper disposal of 171 pounds of bottom paint debris, 22.12 cubic yards of recyclables, and 1 quart of waste oil can be directly attributed to this project.

Educational Literature Distributed

A total of 85,204 (see Table 4) individual pieces of educational literature were distributed to boaters and marina operators over the course of this project. This number is bolstered by the fact that four of the six Boater Fact Sheets used in the second season (see Appendix J) were published by *Rhode Island Boating Magazine* (see Appendix G), which, as quoted by its publisher, has a monthly circulation of approximately 20,000 copies (Miner, personal communication).

Several major events were also attended by CRC/NBEP representatives for the purpose of disseminating this information. These events included the 1996 Greenwich Bay Day Celebration, The Watershed '96 video downlink held in the city of Warwick, and the 1996 Rhode Island Department of Environmental Management (RIDEM) Pollution Prevention Conference held at the Rhode Island Convention Center. An additional 1,200 copies of the Boater Fact Sheet series have been set aside for distribution at the upcoming 1997 Rhode Island Indoor Boat Show. These are not accounted for in Table 4.

Table 4. Educational Literature Distributed by Method

Material	Boater Workshops	Mailings & Distribution Racks	Public Events & Magazines	Total
First Season				
Project Description	122	15	38	175
Boaters Guide	120			120
MARPOL Placard	128		17	145
Cleaning Article	119			119
Pumpout Map	121	5	35	161
Coastal Features	114			114
Second Season				
EQ/IQ		4	49	53
Fact Sheet 1		635	20,043	20,678
Fact Sheet 2		900	20,039	20,939
Fact Sheet 3		637	24	661
Fact Sheet 4		644	24	668
Fact Sheet 5		642	20,044	20,686
Fact Sheet 6		641	20,044	20,685
Total	724	4123	80,357	**85,204**

Positive Behavioral Changes Measured

According to the survey conducted, an average of 73.5 percent of the boaters from the participating marinas noticed, received, and/or read the educational fact sheets distributed and signs posted. Of those who learned new practices from these approaches, an average of 85 percent of them are now using BMPs. Using these figures, we can then estimate that 706 individuals have made some type of positive change toward reducing nonpoint source pollution in their boating behaviors. Additionally, 31 percent of the 38 individuals who attended the educational workshops have made an effort to control nonpoint source pollution in their boating behaviors. If we apply the same statistics as used above to the Boater Fact Sheets distributed via *Rhode Island Boating Magazine*, we can assume that an additional 13,650 individuals have made some type of positive change. Overall it is estimated that as a direct result of this project, a total of 14,368 individuals have made positive changes regarding nonpoint source pollution reduction in their boating behaviors.

Tools Developed for Marina Operators

Through this project, a group of previously unavailable tools have been developed for marina operators. These include educational materials, such as detailed instructions for conducting boater workshops, sample language for the posting of educational signs, and a Boater Fact Sheet series widely suitable for distribution across this state and perhaps beyond. In addition to these educational materials, elements such as rental agreements and operating instructions for the use of vacuum sanders, have also been made available, along with a demographic and social profile of the Rhode Island marina customer base (see Appendix C).

Transferring the Experience

These final outputs, impacts, and lessons learned must now be transferred to coastal regulators and marina operators within this and other coastal states. To accomplish this, several efforts have and will be undertaken. First, the case studies included in this document will be formatted into one-page documents and posted on the Marina Net World Wide Web site. At the present time, CRC Sea Grant and the NBEP are trying to locate additional funding for the professional publication of a "glossy" document that would highlight the lessons learned and experiences gained through this project.

Outside of the written realm, CRC Sea Grant will continue to actively transfer the experiences gained via formal and informal public speaking/technical assistance events. CRC/Sea Grant representatives recently unveiled the project's preliminary findings to Rhode Island's marina operators and coastal regulators at the R.I. DEM 1997 Pollution Prevention Conference. In addition, two project-related abstracts have been submitted for the International Marina Institute's Fourth National Marine Research Conference to be held in Dallas-Fort Worth on March 8, 1997.

Appendix A

Participating Marinas

The following is a list of the Greenwich Bay Marinas who have participated in this project.

Participating Marinas

1) **Apponaug Harbor Marina**
17 Arnold's Neck Drive
Warwick, RI 02886
Owner Operator - Mr. John Dickerson
(401) 739-5005

2) **Brewers Yacht Yard at Cowesett**
100 Folly Landing
Warwick, RI 02886
Owner - Mr. Jack Brewer
Operator - Mr. Chris Ruhling
(401) 884-0544

3) **C-Lark Marina**
252 Second Point Road
Warwick, RI 02886
Owner Operator - Mr. Gunther Vildbig
(401) 739-3871

4) **Ponaug Marina**
Arnold's Neck Drive
Warwick, RI 02886
Owner Operator - Mr. Ray Chase
(401) 884-1976

5) **Wharf Marina**
138 Wharf Road
Warwick, RI 02889
Owner Operator - Mr. Peter Vassilopolous
(401) 737-2233

Appendix B

BMP Implementation Plans

The following includes a letter approving the planned BMP activities and a summary of the BMP implementation Plans developed for the participating Marinas. In order to reduce the overlap between marinas you will simply find a single plan provided for each BMP addressed. Refer to Table 2 for a listing of BMPs by Marinas.

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

Department of Environmental Management
DIVISION OF WATER RESOURCES
Narragansett Bay Project
291 Promenade Street
Providence, R.I. 02908 - 5767
(401) 277 - 3165

NARRAGANSETT BAY PROJECT

April 4, 1996

Jared Rhodes
Coastal Resources Center
Graduate School of Oceanography
University of R.I.
Narragansett, RI
02882

Dear Mr. Rhodes,

The RIDEM Narragansett Bay Estuary Program appreciates the fact that you have provided Marina BMP project materials (URI Contract #9495-0335) to us for review on a timely basis and has found the work completed to date by Coastal Resources Center to be very high quality. After review of the project materials and planning documents provided to us dated March 21, 1996, the NBEP approves the complete implementation plan including the planned signage and factsheets component.

If you need any further information, please contact me at (401) 277-3165 ext. 7271.

Sincerely,

Richard C. Ribb

Richard C. Ribb, AICP
Project Co-director

Vacuum Sander

Description
This technology targets sandings and paint chips produced through hull maintenance activities by capturing or containing them before they can reach the open environment. As opposed to traditional sanding equipment, the machine's sanding surface is ventilated to allow the attachment of a vacuum device which automatically collects the debris as it is removed. Once installed, the equipment will be publicized and made available to staff and tenants of the marina. The intent being that they will use the new technology instead of traditional methods, and therefore pollutant contributions and total suspended solids emitted from hull maintenance areas will decrease.

Installation
Equipment will be managed by the marina operator on a first come first serve basis. Tenants will be required to pay a nominal rental fee ($3.00/day) to use the equipment. The fee will be put into a fund used for the purchase of filter bags as needed. Tenants will need to supply their own sanding disks.

Product Information
The equipment to be purchased is the Fein Dust Free Basic Sanding System. This high quality system includes: Msf 636-1 Random Orbit Sander; Low Profile Dust Extractor with Auto Start; 16' Hose and Fittings; and a 5 pack of 1 micron sealable filter bags. The equipment comes with a full one year warranty and a support plan which allows the owner to return the equipment every six months to the factory where it will be cleaned and overhauled at no charge (parts or labor).
Cost: $1,357.45
Distributor: Tim Walter, Martin Walter Co., Inc. 1-800 356-6926

Evaluation
The effectiveness of this equipment at preventing such debris from entering the open environment will be evaluated by determining the number of times the equipment is used, the task performed (the length of the vessel if bottom sanding is performed), and the volume of debris collected by the machine. This data will be collected through the use of a log book which details this use data and by keeping a running total of volumes collected (the sanding unit will only be emptied and cleaned by staff).

Schedule
We would like to have the equipment available at the facility for April 1, 1996, which means that purchasing procedures need to begin immediately. Evaluation would then follow September 1, 1996 at which time a case study on vacuum sander use would be produced.

Recycling of Tin, Glass, and Plastic

Description
Like homes, vessels produce many recyclable residential waste streams, but unlike most municipal neighborhoods, marinas generally do not recycle these products. The aim of this Best Management Practice, is to implement the recycling of standard recyclables at the model marina. The materials to be addressed are tin, glass and plastic containers.

Installation
Installation should be relatively simple since most people understand the process simply upon recognizing the receptacles. Receptacles, signage, and disposal services will be provided by the marina's current waste hauler. Use of the recycling facilities will be promoted through our educational efforts.

Product Information
Three sets of standard 96 gallon totes will be provided for the collection of tin, plastics, and glass. These will be placed in the general facility of the waste dumpsters already on-site and will be emptied weekly by the facility's current waste hauler.
Cost : *Awaiting Estimate*
Service Provider: Waste Management of Rhode Island 1 800 972-4545

Evaluation
Evaluation of this Best Management Practice will be accomplished by totaling the amount of materials collected for recycling. With the result being that this total represents materials which would have been land-filled under the previous conditions. Measurements will be made by logging the amount of material in the totes on the day before their scheduled emptying.

Schedule
The totes will be in plane by May 1, 1996 and evaluation will follow through September 1, 1996. At this point a case study on marina recycling will be prepared.

Separate Container for the Disposal of Liquid Wastes

Description
A major component in minimizing nonpoint source pollution is in providing proper waste collection and disposal facilities. When people can not easily access such facilities, they tend to dispose of them in discrete and improper manners. Presently the marina has no disposal facilities for waste oil. The intent of this Best Management Practice is to provide such facilities

Installation
One container will be installed in the marina's work shed. A funnel and secondary containment will be provide to prevent spillage.

Product Information
One standard 55 Gallon drums will be used as the container, and a screw in funnel will be provided.
Cost: Drum $14.95, Funnel, 35.00 (total - $49.95).
Contact: Drums - Collins and Sons (401) 722-0775, Funnels - Universal Gold (401) 431-0990

Evaluation
Evaluation will be accomplished by tracking the quantity (in gallons) of oil collected. Logs will be kept which record the necessary information before the containers are emptied.

Schedule
This container will be provided by June 1, 1996. Evaluation will follow though September 1, 1996, at which time a case study will be developed.

Upgrade to Secondary Containment

Description
All containers used to store waste oils and other such products should have a form of secondary containment. In most cases, this secondary containment must equal 110 percent of the capacity of the primary container. Generally, this backup is provided by placing a non-leaching berm with an impervious bottom around the containers. Currently, this marina operates without secondary containment.

Installation
Secondary containment will be provided for the marina's waste oil drum. Installation of the method chosen will raise the drum off the floor, and provide the necessary containment capacity.

Product Information
The product to be purchased is the Oil Dri Corporation of America's two drum spill pallet. (# 90525). The pallet raises the drums off the ground, has a draining spicket, and allows for easy loading and transportation.
Cost: $241.00
Local Distributor: Universal Gold, Inc. (401) 431-0990

Evaluation
This equipment will be evaluated at the end of the season by removing the drain plug and measuring the volume of waste product collected.

Schedule
Secondary containment will be installed by May 1, 1996 and evaluation will take place at the end of August beginning of September

Drop-Off Booth for Liquid Wastes

Description
Currently the marina has a superb storage and disposal facility for liquid wastes. But due to the need to keep it locked, tenants do not always have access and as a result often leave their waste oils, filters, antifreeze etc. scattered around the marina where they then become highly susceptible to accidental spillage. To resolve this problem a covered drop-off booth will be provided.

Installation
This drop-off booth will be placed adjacent to the main storage and disposal facility and be accompanied by proper signage.

Product Information
The booth will be constructed at the marina and have the capacity to hold six five gallon buckets. It will also be impermeable, lined with replaceable absorbents, and have a petcock valve in case there is a spill in it, and it needs to be drained.
Cost: $200.00
Distributor: manufactured on-site.

Evaluation
A log will be placed in the main storage and disposal facility. Whenever the marina staff empties the collection booth they will record the date and the amounts of material collected. At the end of the season this log will be totaled to give the amount and type of materials which were properly disposed of by tenants. Going further, last season's total for the whole marina can then be subtracted from this season's total to potentially show an overall increase. If that increase is similar in number to the amount of materials collected by the drop off booth, then we can possibly draw the connection between the provision of the drop-off both and increased proper disposal practices in tenants.

Schedule
The marina is currently constructing the booth. We hope to begin collecting data by May 1, 1996 and continue through September 1, 1996. At this point a case study will be developed.

Emergency Spill Response Equipment

Description
Although this kit could be used to respond to spills anywhere within the marina, its primary target would be for spills occurring at the in-water fueling station. Of course the presence of the kit would not in and of itself prevent spills, but it would mitigate potential impacts by providing the capability to prevent the fuels from reaching the open environment.

Installation
As mentioned above the equipment will be permanently installed at the in water fueling station. It will be kept in a Although having the equipment locked is not the optimum situation, it is necessary due to potential vandalism and/or thievery.

Product Information
The spill response equipment to be purchased is the Oil Dri 95 Gallon Oil Only Spill Kit (# 90943). The kit has the ability to absorb 164 gallons of fuel and contains 130' of boom, 60 smart pads, 10 disposal bags, and an Emergency Response Guidebook..
Cost: $496.00
Distributor: Universal Gold, Inc. (Local Oil Dri Representative) (401) 431-0990

Evaluation
This equipment will be evaluated by keeping track of the number of products actually used. A log book will be placed inside of the dock locker and the people with the keys will be instructed to check out any materials which they use. Additionally, any products that are used will be collected by the marina and drained to determine the amount of oil which has been prevented from entering the open environment. In the event that a large spill occurs the response kit will then be evaluated as to its effectiveness at containing the spill.

Schedule
The spill response Kit is expected to be installed by May 30, 1996. Evaluation will be carried through September at which time a case study will be developed.

Oil Spill Response Plan

Description
An Oil Spill Response Plan clearly identifies the who, what, when, where, and how of spill response for a particular marina. It is basically a proactive safety device which outlines a set of procedures for correctly responding to such an emergency.

Installation
The oil spill response plan will work in concert with the emergency response kit discussed above, and will be based on the format included in the *Environmental Guide for Marinas*.

Product Information
The marina operator and CRC staff will work together to develop the necessary plan.
Cost: In-house
Contact: In-house

Evaluation
The plan will be evaluated if the opportunity arises (and hopefully it will not). If we do not have a chance to evaluate the response to a real spill, then we will run a drill.

Schedule
The plan will be completed by the time that the spill response kit is installed, so that the employees can be simultaneously briefed on response procedures.

Signage at Disposal/Pumpout Facilities

Description
Interpretive and instructional signs placed at marinas are a key method of disseminating information The signs provided as part of this effort will highlight BMPs used by the marina to control nonpoint source pollution. It is hoped that these signs will increase the use of BMPs and therefore reduce the nonpoint source pollutants at the marina.

Installation
All signs will be installed by the marina. There will be a total of Five. One will cover liquid waste disposal (to be placed at the collection facility), three will cover solid waste disposal (to be placed in the vicinity of the dumpsters), and the final one will cover the disposal of vessel sewage (to be placed at the pumpout station).

Product Information
All signs will be installed outside, constructed form an 8 gauge metal, lettered in vinyl, and clear coated for added durability.
Cost: $70.00 each (total $350.00).
Distributor: Gannon Signs (401) 732-3627

Evaluation
Evaluating the effectiveness of signs will be difficult due to the lack of baseline data and the number of outside influences which could affect BMP use. Recognizing this, we plan to do a season end survey of marina tenants asking thing such things as: did they recognize the new signs at the facility, what do they say, did they provide you with new information, and did they influence your behavior.

Schedule
The content of the signs will be finalized by March 30, 1996. They will then be physically produced by Gannon Sign during the month of April and installation will be complete by May 31, 1996. Evaluation will occur during September through a mail out boater survey.

Continue Educational Efforts

1. Educational efforts for the upcoming boating season will be bolstered by a series of nonpoint source pollution fact sheets for boaters. The series will be organized, produced, and distributed around the primary topics of concern at different times in the boating season. The preliminary content and scheduling for these fact sheets are as follows.

1.	April	Sanding and Painting
2.	May	Waste Disposal
3.	June	Bilges and Fueling
4.	July	Vessel Sewage
5.	August	Vessel Cleaning and Fish Waste
6.	Septem.	Routine Engine Maintenance/Winterization

Once complete these one page documents will be distributed through various means: They will be posted at areas where they are applicable; they will be mailed out in the marinas monthly billings; and they will be kept in the literature distribution racks in the marinas office.

Appendix C

Survey Technical Report

The following is the technical report compiled for the survey undertaken to evaluate the educational best management practices implemented at the five participating marinas

Survey Technical Report:
Nonpoint Source Pollution Abatement for Recreational Boating Facilities:
Applying Innovative Best Management Practices

Compiled By:

Jason Marino,
Jared Rhodes and
Mark Amaral

Of The:

University of Rhode Island
Coastal Resources Center/RI Sea Grant Marine Advisory Service
Graduate School of Oceanography
Narragansett Bay Campus

December, 1996

Outline

Introduction

Methodology

- Format Selected
- Questionnaire Development
- Pre-Test
- Cover Letter
- Sample Population
- Distribution and Response Rate

Analysis and Findings

- Educational Highlights
  - *Posting Signs*
  - *Distributing Literature*
  - *Conducting Workshops*
- Solid Waste Highlights
  - *Vacuum Sander*
  - *Recycling of Tin, Glass, and Plastics*
- Liquid Waste Highlights
  - *Liquid Waste Disposal*
  - *Vessel Sewage*
- Background Information
- BMP Use Highlights
- Willingness to Pay Highlights
- Constraints and Weaknesses

Output Tables and Questionnaire

References

Introduction

The survey discussed within this report is part of a larger project titled, *Nonpoint Source Pollution Abatement For Recreational Boating Facilities: Applying Innovative Best Management Practices* conducted by the University of Rhode Island's Coastal Resources Center/RI Sea Grant Marine Advisory Service with funding provided by the Rhode Island Department of Environmental Management Narragansett Bay Estuary Program, the purpose of the survey has been to evaluate the effectiveness of Best Management Practices for controlling nonpoint source pollution in terms of their use and perception by the participating marina's customers. This report first discusses the methodology used in conducting the survey, then presents the findings reached, and concludes with the final data output tables and the actual survey.

Methodology

Format Selected

The mail out survey format was selected in this instance due to the fact that the personal interview method is generally more expensive and would have taken much longer to administer (Moser and Kalton, 257). Another deciding factor in this selection concerned the issue of anonymity. According to Kalton and Moser respondents are more willing to answer questions of an embarrassing or personal nature with a greater degree of accuracy through the mail out type format than with personal communication strategies such as the interview (Moser and Kalton, 258). In addition, Babbie states that respondents are sometimes reluctant to report controversial or deviant attitudes or behaviors in interviews but are more willing to accurately respond to an anonymous self-administered questionnaire. Recognizing these concerns, the mail-out method was selected so that the validity of responses could be bolstered while also saving time and resources.

Questionnaire Development

The following guidelines were used in developing the actual questionnaire: (1) ask questions that would result in our evaluating boaters' attitudes towards and willingness to use BMPs; (2) present these questions in a consistent, orderly manner thus avoiding respondent confusion; (3) provide answers to these questions that were easy to understand and relevant to the question topics so as to avoid respondents writing in their own vague and ambiguous response; (4)
confine the questionnaire to one double sided page; and, (5) provide postage paid envelopes thus encouraging respondents to return surveys.

With these guidelines established the first task was to compile a list of all the possible, relevant questions targeting boaters' attitudes and willingness to use BMPs. Once this list was developed we were able to distinguish the most applicable questions, and eliminate overlap. This selection process had three iterations.

After testing these questions among coworkers, they were formatted so as to avoid confusion and improve response rate and accuracy of potential findings. The format followed three standards, as stated by Fowler (101): (1) Will all respondents interpret the question in the same manner? (2) Are respondents going to be able to answer the question? (3) Will the respondents be willing to answer the question? To avoid the common error of asking too general a question when desiring a specific issue, a great deal of effort was spent combining and dissecting questions to target the most specific issues pertinent to the BMP evaluation process.

The following criteria were used in developing a question order that would enhance respondent comprehension and ease of completion: (1) use of broad questions to specific issues within a topic, a method Kahn and Cannell refer to as the funnel sequence of questions (Kalton and Moser 346); (2) grouping questions relating to the same topic together; establishing cognitive ties so as to foster a sense of flow and continuity throughout the questionnaire (Dillman 124); and, (3) the placement of the demographic or background section at the end of the questionnaire.

In using the funnel sequence we were then able to start each section of the questionnaire with a rather broad but crucial question. Examples of this can be seen with the style of "yes" and "no" questions that initiate many of the sections. By asking general questions such as "Were you aware of the signs?" or "Have you been reading the Fact Sheets we were accomplishing two goals: The first is the acquisition of significant information which will aid in the evaluation process and the second goal is to allow for a smooth transition to the more specific issues surrounding the subject.

The various questions in the survey all fell within distinct topics (e.g. Signs, Fact Sheets Workshops, etc.) so, by ordering the questions within these categories, respondents were then able to follow a sequential process throughout the survey. Another advantage to ordering the questions in this manner was that it allowed respondents to focus on one set of questions at a time and to easily recognize the transitions between topics.

Pre-Test

Fowler recommends that "Every questionnaire should be pre-tested, no matter how skilled the researcher" (Fowler, 103). The process of pre-testing this questionnaire entailed several steps. First among these was establishing some sort of framework by which we could measure the questionnaire's overall effectiveness in terms of respondent's opinions. Examples of the questions used to evaluate how effective our survey was were as follows:

- Are the questions in the survey resulting in the kind of information we are seeking?
- Are respondents understanding and comprehending the grammatical structure of the questions (e.g. wording, sentence structure)?
- Are respondents satisfied with the answer sets or do they wish for additional responses?
- Are the questions being consistently interpreted?
- Are all the questions being correctly answered?
- Does the questionnaire consume too much of the respondents time?

Once the evaluation framework was established, a total of twenty surveys were taken to the participating marinas for field testing. The questionnaires were then given to random boaters who completed and returned the surveys to the testers who were at the facility on that day. The feedback from the pre-test was then discussed among colleagues and appropriate changes were implemented. The pre-test was valuable for reconditioning the pilot survey in terms of question specifics and all other aspects thereby enhancing our final product.

Cover Letter

A final step in the production of the questionnaire was the development of a cover letter and set of instructions. The purpose being to: (1) provide the proper guidance for completing the survey; (2) convince the respondent that the study is useful and that they are critical to the success of the project; (3) assure respondents complete anonymity; and, (4) provide respondents with the proper contact information if any uncertainty arises. The cover letter

was designed to be short, "snappy" and attractive with every sentence serving a distinct purpose, it was believed that by providing this kind of format, the respondent would be more motivated to proceed with the questionnaire.

Sample Population

The five marinas, where the BMPs were being implemented constituted the sample population of our study. Specifically, the sample population included the customers of Apponaug, Wharf and Ponaug marinas who received a monthly billing from the marina operator during the month of July. C-Lark Marina chose not to distribute the surveys given to them while Brewer's distributed their surveys but received no responses. Therefore, C-Lark and Brewer's were not tallied as part of the final sample population.

Distribution and Response Rate

320 questionnaires were originally distributed with an initial response rate of only 16%. Reminders were then mailed to those who had received the survey asking them to please fill in their responses and return the questionnaire in the postage paid envelope. At this point, individuals were also informed that additional questionnaires and return envelopes were available at the participating marinas. As a result of providing reminders and additional survey materials, the final response rate reached 21.3%. Keeping in mind that there is no agreed-upon standard for a minimum acceptable response rate (Fowler 48), we feel confident that our findings reflect the attitudes and opinions of those boaters included in the sample population of our study. At this point, the focus of this report now shifts to the analysis and results produced.

Analysis and Findings

As the surveys were returned, the data was recorded in two methods; the responses to the questions of the survey were entered into a Filemaker Pro database and the respondent comments were typed and stored on a word processor application for further analysis. A cut off date was established and once reached, the collected data was then processed with the complete results being displayed in the final output tables. An analysis was then completed. The highlights of the analysis process are divided into seven parts:

1. Educational highlights including such BMPs as the posting of signs, distribution of literature, conducting of workshops, and overall findings
2. Solid Waste highlights including such BMPs as vacuum sanders and recycling
3. Liquid Waste highlights
4. Vessel Sewage highlights
5. Background Information
6. BMP Use
7. Highlights regarding boater's willingness to pay for a cleaner boating environment

Educational Highlights

Posting Signs

- 72% of the survey respondents were informed of new best management practices(BMPs) as a result of reading the signs, and of that, 79% are now using the newly learned BMPs.

Distributing Literature

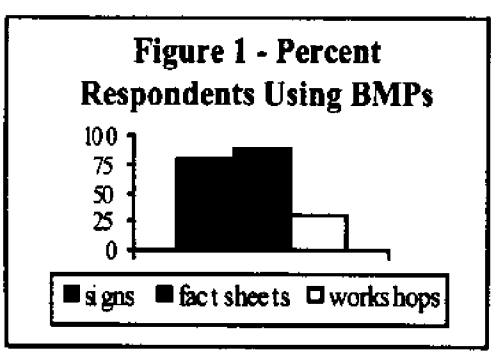
- 75% of those boaters who received the fact sheets reportedly read them and learned of new BMPs
- Of that 75%, 91% of the respondents are now using the newly learned BMPs.

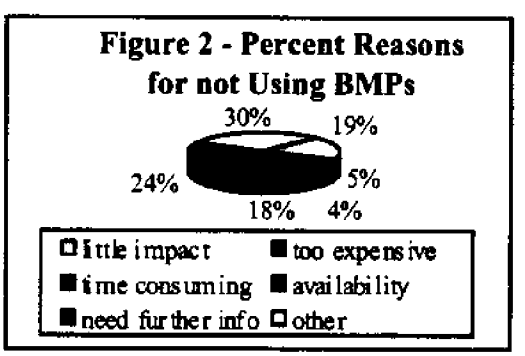
Conducting Workshops

- Only 26% of the respondents were aware of the boater workshops, and of that, only 9% attended.
- Of the 9% who attended, only 31% are now using the BMPs discussed. However, it is important to note that the low percentage of boaters aware of the workshops could be due to boaters leaving the facility and the fact that the workshops took place two seasons ago.

Overall Results

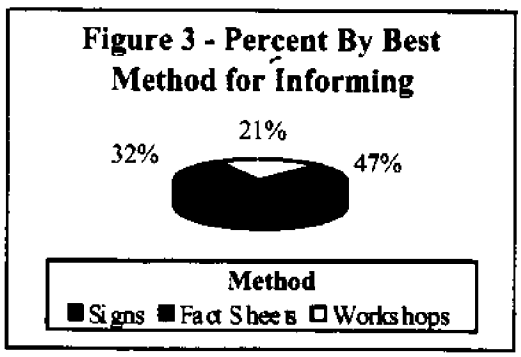
- When one rates the three educational efforts in terms of their effectiveness at getting boaters to engage in environmentally sound practices, survey results show fact sheets have proven most effective, followed by signage and workshops (see Figure 1).
- Therefore marina operators should focus their efforts on the posting of signs and the distribution of literature to motivate boaters to use BMPs for controlling nonpoint sources of pollution.
- Of those who were involved with the educational efforts, people chose not to use them because: the equipment wasn't available (18%); the BMPs would have little impact (19%); they lacked the necessary information (24%) and reasons referred to as "other" (30%) (see Figure 2).
- Of the 30% who responded "other", the following respondent comments were notable: "Use other facilities", "Empty at home", and "Have not seen any signs."
- These comments shed light on another aspect marina operators should explore, accessibility. Are the signs in clear view and are there enough of them around the facility? Are all marina tenants receiving literature?

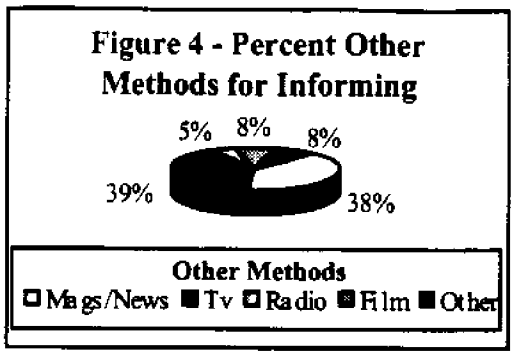




- 43% responded that more publicity was necessary to improve workshop participation; 24% favored weekdays as an appropriate time to conduct workshops; 13% responded that holding the sessions on weekends would improve participation while 15% responded other.
- Of the 15% who responded "other", the following respondent comments were noted: "Location of workshops is important-Mass resident", and "No time".
- At first glance it seems that from the respondent comments as well as the high percentage of respondents suggesting increased publicity, marina operators should focus on publicizing techniques to increase boater participation, realizing that they may still only achieve a relatively low attendance rate.

- The statistics also suggest that weekends as opposed to weekdays are the preferable time slot for the workshops to be held.
- 47% respondents selected signs, 32% selected fact sheets, and 21% selected workshops as their choice for best methods for informing boaters; cross comparing the methods selected by respondent characteristics turned up no significant relationships between the various factors (see Figure 3).
- 58% respondents selected magazines/newspapers, 39% selected television, and 1.5% on-line computer resources as the best other methods for informing boaters: Cross comparing the methods selected by respondent characteristics also turned up no significant relationships between the various factors (see Figure 4).





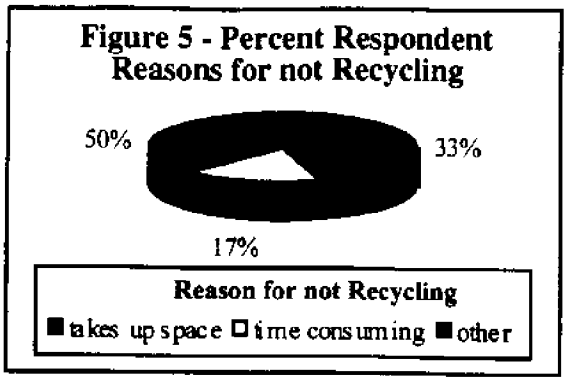
Solid Waste Highlights

Vacuum Sander

- 49% of the respondents were aware that a vacuum sander was available for their use, and of that, 50% didn't use it because they didn't sand their hull this year.
- Because almost none of the respondents were aware that a vacuum sander exists at their marina we can assert that our publicity efforts in the form of word of mouth, the mailing and posting of flyers throughout the marinas was successful.

Recycling of Glass, Tin, and Plastics

- 44% of the respondents used the marina's recycling facilities while 29% put recyclables in the marina's dumpsters and 27% of the respondents brought their recyclable items home.
- 50% responded "other" with the following notable comments regarding why they chose not to use the marina's recycling facility: "Easier to take home, Just found out and Don't know if marina has one."
- From the survey results it seems the underlying theme regarding reasons for marina tenants choosing not to recycle is that it is both too time and space consuming as well as too difficult when compared to the other conventional methods of discarding recyclables with other trash or simply taking them home.
- Of those recycling, 53% have switched to this practice within the last two seasons. For a percentage breakdown on respondent reasons for not using this BMP, (see Figure 5).



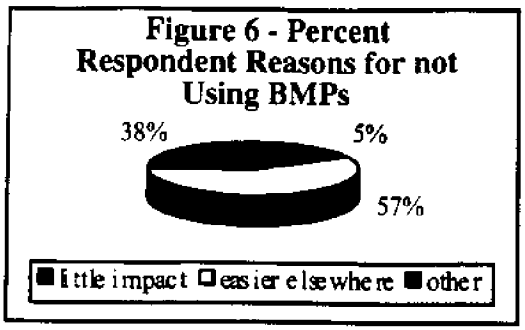
Liquid Waste Highlights

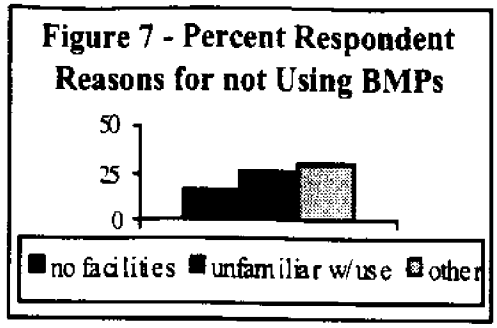
Liquid Waste Disposal

- 26% of the respondents disposed of their liquid wastes such as oil, gas and antifreeze at the marina's liquid waste disposal facility.
- Of those not using the marina's facility, 35% bring their wastes home with them; 25% have their maintenance done by others while 8% dispose of their liquid wastes in the marina's dumpsters.
- 72% of the respondents now using proper disposal practices have switched to them within the past two years.
- For a percentage breakdown regarding reasons for respondents not using this BMP, (see Figure 6).
- Although only 26% of the respondents are using the marina's liquid waste disposal facility, one cannot assume that those who aren't using it are disposing of their wastes in an improper manner. Evidence of this can be derived from the following boater comments regarding where they dispose of their wastes: "City collection site", "Dispose of it at gas station", and "Have access to disposal at work."
- 58% of the respondents feel that using the marina's liquid waste disposal facility is too difficult when compared to other methods.

Vessel Sewage

- 43% of the respondents are using pumpout stations to dispose of vessel sewage.
- Of those not using this BMP, 26% take their wastes home; 16% do not produce sewage aboard their vessels; 10% pump/dump their wastes overboard while 4% have no holding tank or porta-potty.
- 59% of the respondents using pumpout stations have switched to this BMP within the past two years.
- For a percentage breakdown regarding reasons for respondents not using this BMP, (see Figure 7).
- 26% are unfamiliar with the use of the pump-out facilities. This figure suggests that marina operators may wish to provide more assistance/direction regarding the use of pump-out facilities. Publicize the ease of using this equipment to address the respondent comments: "Easier to take home."
- 17% of the respondents have no holding tank/porta-potty aboard their vessels, marina operators should encourage the installation of this equipment through the distribution of literature explaining the how's, where's and why's of obtaining holding tanks and porta-potties.

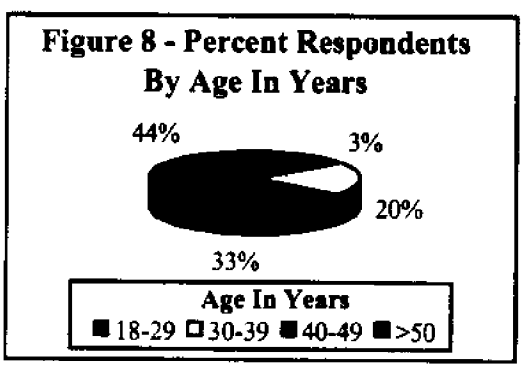


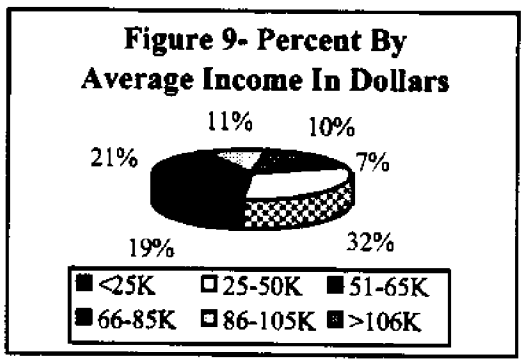


Background Highlights

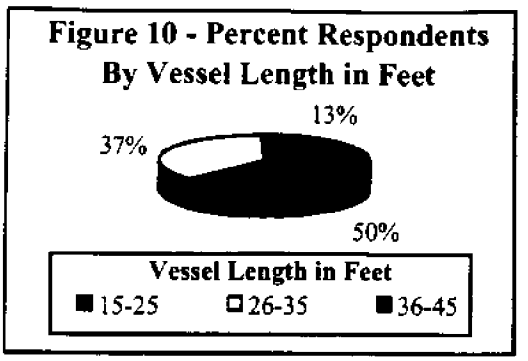
Findings

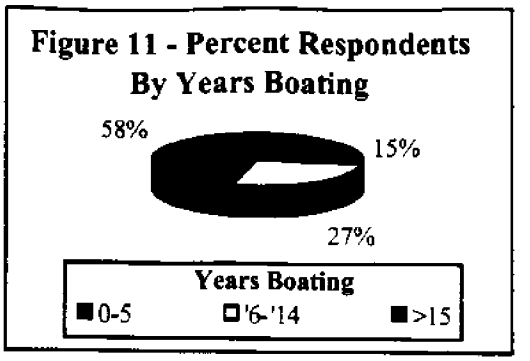
- 94% of the respondents were male, with the overall percentage breakdown by age being: 44% 50 years and older; 33% between 49 and 40 years; and the remanding 23% being 39 years or younger (see Figure 8).
- 16% of the respondents were retired with the overall percentage breakdown by annual household income being: 21% earning greater than $85,000; 40% earning between $85,000 and 51,000; 32% earning between $50,000 and $25,000 with the remaining 7% earning less than $25,000 (see Figure 9).





- 60% of the respondents owned powerboats. The overall percentage breakdown by vessel length in feet was: 13% equal to or greater than 36 feet in length; 37% being between 26 and 35 feet in length; and the remaining 50 % being between 15 and 25 feet in length (see Figure 10).
- 59% of the respondents have been boating for more than 15 years; 27% have been boating between 14 and six years, and the remaining 14.5% have just started boating within the past 5 years (see Figure 11).
- 41% of the respondents make 20 or more trips per season; 25% make between 11 and 15 trips per season; 10% make between 6 and 10 trips per season; and the remaining 6% make 5 or less trips per season (see Figure 12).



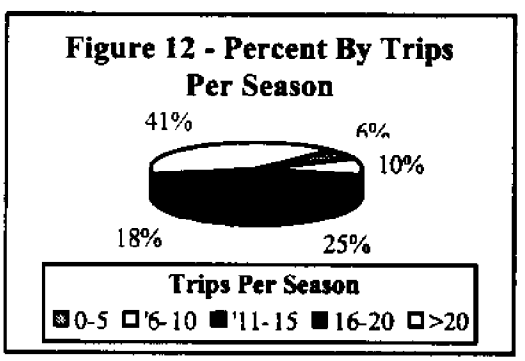


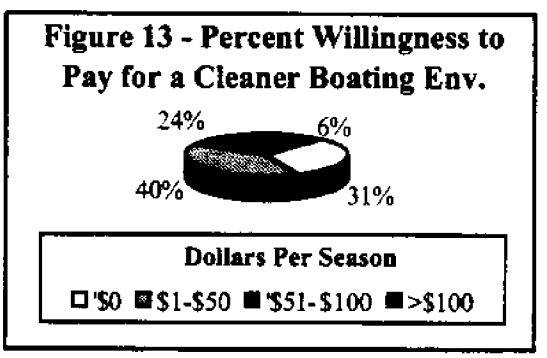
BMP Use Highlights

- 67% of the overall respondents used BMPs but no significant relationships between BMP use and respondent gender, age, annual household income, occupation, vessel type, vessel length, years boating and trips per season were identifiable.

Willingness To Pay Highlights

- Overall, 31% of the respondents were not willing to pay for a cleaner boating environment, but 40% were willing to pay between $1 and $50, 24% were willing to pay between $51 and $100 , and only 6% were willing to pay more than $100 (see Figure 13).

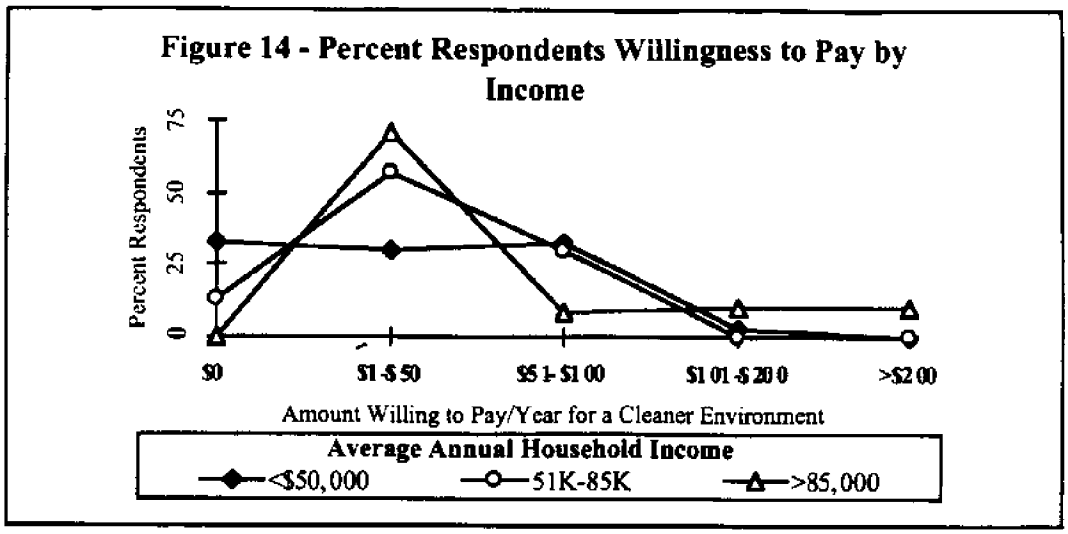




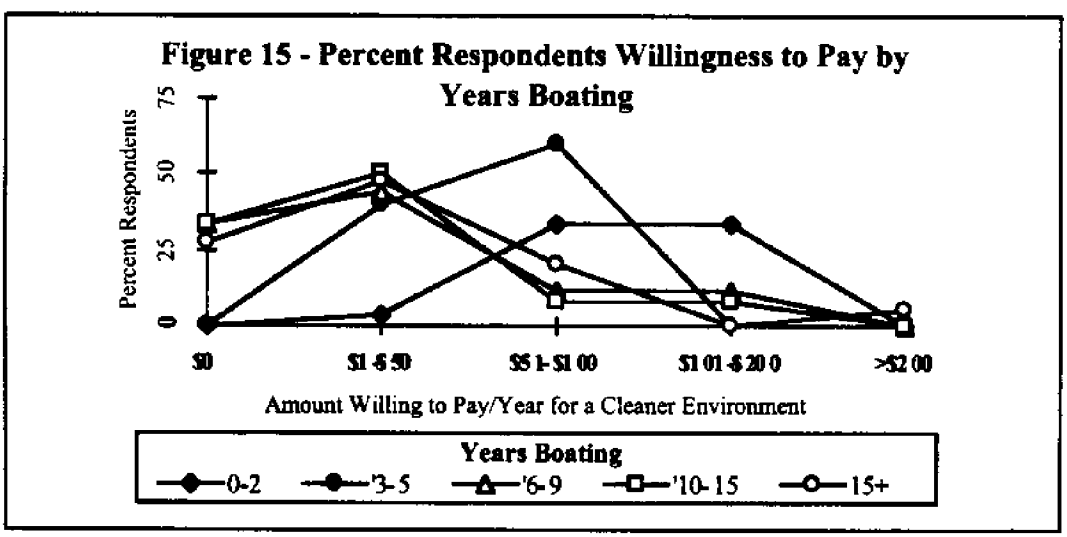
- When cross compared, respondent gender, occupation, vessel type, and trips per season appeared to have no relationship with the respondents willingness to pay for a cleaner environment. On the other hand, respondent age in years, average annual household income, years boating and length of vessel did appear to have some relation to the respondents willingness to pay for a cleaner environment and these are summarized as follows:

1. *"Those who earn more are more willing to pay for a cleaner boating environment"* - Those who earn more than $85,000 per year are the least willing to pay between $51 and $100, they are the most willing to pay between $1 and $50, the most likely to be willing to pay upwards of $100, and least likely not willing to pay at all. Those who earn less then $50,000 per year are the most likely not to be willing to pay at all, the

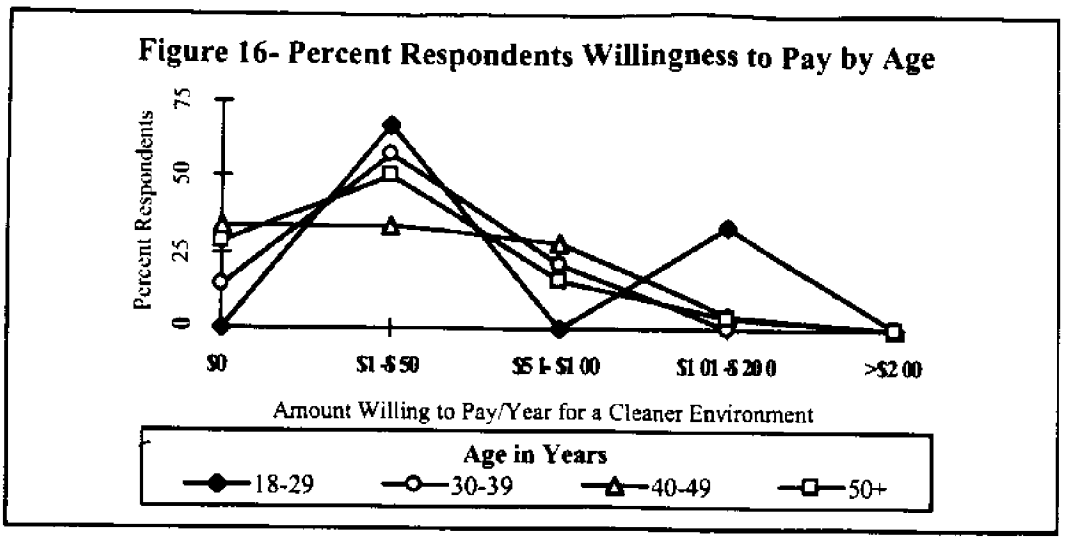
least likely to be willing to pay between $1 and $50, and one of the least likely willing to pay upwards of $100 (see Figure 14).



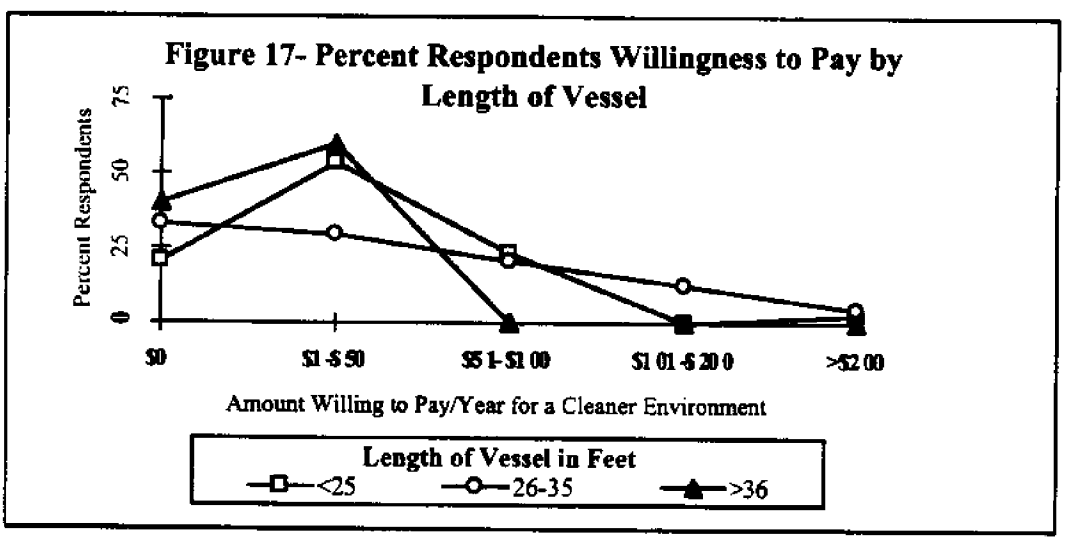
2. *'Those who have been boating longer are less willing to pay for a cleaner boating environment'* -Those who have been boating for more than 6 years are most likely not to be willing to pay; and those who have been boating for between 5 and 3 years are willing to pay between $1 and $50 but are not willing to pay between $51 and $100; those who have been boating for less than 3 years are the least likely not to be willing to pay and the most likely to be willing to pay between $1 and $100 (see Figure 15).



3. "Younger respondents are most likely to be willing to pay for a cleaner boating environment" - Although the youngest group is the least likely to be willing to spend between $51 and $100 they are the most likely to spend between $1 and $50 and upwards of $100; while also being the least likely group not to be willing to pay at all (see Figure 16).



4. *"Willingness to pay for a cleaner boating environment decreases with increasing vessel size"* - Whereas the owners of the smallest vessels are the least likely to not be willing to pay for a cleaner boating environment; they are also the second most willing to pay between $1 and $50 and the most likely to be willing to pay between $51 and $100. The medium size vessel owners then round out the pack by falling below the average willing to spend less $100 and above the average willing to spend more then $200 (see Figure 17).



Constraints/Weaknesses

As with any type of research, there are limitations and constraints to the findings applicability and accuracy. Understanding the fact that it is merely impossible to discern whether respondents are answering in the most "truthful" manner, we feel confident that our results accurately reflect those opinions and perceptions of the boasters included in our sample due to the fact that we guaranteed anonymity and used the mail out type format which, according to Moser and Kalton generates a greater degree of accuracy. However, the results of our survey are limited in that they are regionally based. We cannot assume that our findings are indicative of those boaters outside of our sample study. Another

weakness we faced was motivating the marina operators to distribute the surveys. As mentioned above, our sample study initially included five marinas with one of those marinas not receiving any responses and another choosing not to distribute the surveys leaving three marinas from which to work with.

Output Tables and Questionnaire

This section concludes the report by first detailing the complete data set compiled through conducting the survey (see the list of tables below for more information); and by providing an example of the actual questionnaire distributed.

List of Tables

Survey Sign Section

1. Percent Respondents Informed of New Waste Disposal Practices
2. Percent Respondents Using New Waste Disposal Practices
3. Percent Respondent Reasons For Not Using New Waste Disposal Practices

Survey Fact Sheet Section

4. Percent Respondents Who Have Read Boater Fact Sheets
5. Percent Respondents Using the Pollution Prevention Practices Discussed
6. Percent Respondent Reasons For Not Using the Practices Discussed

Survey Workshop Section

7. Percent Respondents That Were Aware of Workshops and Attended
8. Percent Respondents Using The Pollution Prevention Approaches Discussed
9. Percent Respondent Methods For Improving Participation of Workshops

Survey Miscellaneous Section

10. Percent Respondent Methods For Best Informing Boaters
11. Percent Respondent Choices For Other Methods To Best Inform Boaters
12. Percent Respondents Amount Willing To Pay For A Cleaner Boating Environment

Survey Vacuum Sander Section

13. Percent Respondents Aware Machine Is Available For Their Use
14. Percent Respondent Reasons For Not Using Machine

Survey Liquid Waste Disposal Section

15. Percent Respondent Methods For Disposing of Liquid Wastes
16. Percent Respondents Who Have Switched To BMPs Within The Past Two Years
17. Percent Respondent Reasons For Not Using Liquid Waste Disposal Facility

Survey Recycling Section

18. Percent Respondent Methods For Disposing Recyclable Items
19. Percent Respondents Who Have Switched To BMPs Within The Past Two Years
20. Percent Respondent Reasons For Not Recycling

Survey Vessel Sewage Section

21. Percent Respondent Methods For Disposing of Vessel Sewage
22. Percent Respondents Who Have Switched To BMPs Within The Past Two Years
23. Percent Respondent Reasons For Not Using Pump Out Facility

Survey Background Information Section

24. Percent Respondents By Gender
25. Percent Respondents By Age
26. Percent Respondents By Occupation
27. Percent Respondents By Household Income
28. Percent Respondents By Type of Vessel
29. Percent Respondents By Length of Vessel
30. Percent Respondents By Boating Trips Per Year
31. Percent Respondents By Years Boating

32. Survey Response Rate

Survey Cross Comparison and Sorting Information

33. Percent Respondents Using BMPs as a Result of Educational Efforts Sorted By Background Information
34. Percent Respondents Methods for Best Informing Boaters Sorted by Background Information
35. Percent Respondents Choices For Other Methods To Best Inform Boaters Sorted By Background Information
36. Percent Respondents Amount Willing To Pay for a Cleaner Boating Environment Sorted By Background Information
37. Percent Respondents Who Have Switched To BMPs Within The Past Two Years Sorted By Background Information

Table #1

Signs Question 1

Percent Respondents Informed of New Waste Disposal Practices

Marina	rubbish disposal	liquid waste disposal	pump-out facility	Overall
Ponaug	80.00	70.83	54.60	**68.50**
Wharf	92.90	61.54	71.40	**75.30**
Overall	**86.45**	**66.20**	**63.00**	**71.90**

Table #2

Signs Question 2

Percent Respondents Using New Waste Disposal Practices

Marina	rubbish disposal	liquid waste disposal	pump-out facility	Overall
Ponaug	95.00	84.20	64.70	**81.30**
Wharf	90.91	81.80	54.60	**75.70**
Overall	**93.00**	**83.00**	**59.70**	**78.50**

Table #3

Signs Question 3

Percent Respondent Reasons For Not Using New Waste Disposal Practices

Marina	will have little impact	too expensive	too time consuming	equipment not available	need further information	other
Ponaug	0.00	0.00	0.00	30.00	40.00	30.00
Wharf	60.00	0.00	20.00	0.00	0.00	20.00
Overall	**30.00**	**0.00**	**10.00**	**15.00**	**20.00**	**25.00**

Table #4

Fact Sheets Question 1

Percent Respondents Who Have Read Boater Fact Sheets

Marina	rubbish disposal	sanding and painting	bilges, fuel & spills	vessel sewage	Overall
Apponaug	52.20	50.00	54.60	66.70	**55.90**
Ponaug	75.00	73.90	82.60	79.20	**77.70**
Wharf	90.90	90.90	100.00	83.30	**91.30**
Overall	**72.70**	**71.60**	**79.10**	**76.40**	**75.00**

Table #5

Fact Sheets Question 2

Percent Respondents Using the Pollution Prevention Practices Discussed

Marina	rubbish disposal	sanding and painting	bilges, fuel & spills	vessel sewage	Overall
Apponaug	100.00	100.00	100.00	100.00	**100.00**
Ponaug	95.00	84.20	94.70	66.70	**85.20**
Wharf	100.00	81.80	92.30	81.80	**89.00**
Overall	**98.30**	**88.70**	**95.70**	**82.80**	**91.40**

Table #6

Fact Sheets Question 3

Percent Respondent Reasons For Not Using the Practices Discussed

Marina	will have little impact	too expensive	too time consuming	equipment not available	need further information	other
Apponaug	0.00	0.00	0.00	0.00	0.00	**0.00**
Ponaug	0.00	0.00	0.00	12.50	37.50	**50.00**
Wharf	20.00	20.00	0.00	40.00	0.00	**20.00**
Overall	**7.00**	**7.00**	**0.00**	**17.50**	**12.50**	**23.30**

Table #7

Workshops Question 1

Percent Respondents That Were Aware of Workshops and Attended

Marina	aware	attended
Apponaug	5.10	0.00
Ponaug	50.00	28.00
Wharf	23.10	0.00
Overall	**26.10**	**9.30**

Table #8

Workshops Question 2

Percent Respondents Using The Pollution Prevention Approaches Discussed

Marina	rubbish disposal	liquid waste disposal	vessel cleaning	fish waste	Overall
Apponaug	50.00	0.00	0.00	0.00	**12.50**
Ponaug	87.50	75.00	85.70	71.40	**79.90**
Wharf	0.00	0.00	0.00	23.00	**0.00**
Overall	**45.80**	**25.00**	**28.60**	**23.80**	**30.80**

Table #9

Workshops Question 3

Percent Respondent Methods For Improving Participation of Workshops

Marina	hold on weekends	hold on weekdays	different content	more publicity	other
Apponaug	16.10	9.70	0.00	54.80	19.40
Ponaug	21.40	21.40	0.00	42.90	14.30
Wharf	0.00	40.00	20.00	30.00	10.00
Overall	**12.50**	**23.70**	**6.70**	**42.60**	**14.60**

Table #10

Miscellaneous Question 1

Percent Respondent Methods For Best Informing Boaters

Marina	signs	fact sheets	workshops
Apponaug	45.70	42.90	11.40
Ponaug	52.20	17.40	30.40
Wharf	42.90	35.70	21.40
Overall	**46.90**	**32.00**	**21.10**

Table #11

Miscellaneous Question 2

Percent Respondent Choices For Other Methods To Best Inform Boaters

Marina	film	TV	radio	on-line	magazines newspapers	other
Apponaug	0.00	51.40	0.00	0.00	37.80	10.80
Ponaug	9.10	59.10	0.00	4.60	22.70	4.60
Wharf	15.40	7.70	15.40	0.00	53.90	7.70
Overall	**8.20**	**39.40**	**5.10**	**1.50**	**38.10**	**7.70**

Table #12

Miscellaneous Question 3

Percent Respondents Amount Willing To Pay For A Cleaner Boating Environment

Marina	$0	$1-$50	$51-$100	$101-$200	$201-$300	$301+
Apponaug	14.30	60.00	17.10	8.60	0.00	0.00
Ponaug	37.50	41.70	12.50	0.00	0.00	8.30
Wharf	41.70	16.70	41.70	0.00	0.00	0.00
Overall	**31.20**	**39.40**	**23.80**	**2.90**	**0.00**	**2.80**

Table #13

Dustless Vacuum Sander Question 1

Percent Respondents Aware Machine Is Available For Their Use

Marina	Aware
Ponaug	33.30
Wharf	63.60
Overall	**48.50**

Table #14

Dustless Vacuum Sander Question 2

Percent Respondent Reasons For Not Using Machine ·

Marina	will have little impact	didn't sand hull this year	marina does maintenance	not enough machines	machine is inefficient	other
Ponaug	0.00	40.00	40.00	10.00	0.00	10.00
Wharf	20.00	60.00	0.00	0.00	0.00	20.00
Overall	**10.00**	**50.00**	**20.00**	**5.00**	**0.00**	**15.00**

Table #15

Liquid Waste Disposal Question 1
Percent Respondent Methods For Disposing of Liquid Wastes

Marina	put in marina's dumpster	take wastes home	dump wastes in water	maintenance done by others	use marina's disposal facility	other
Apponaug	15.00	40.00	0.00	27.50	5.00	12.50
Wharf	0.00	30.80	0.00	23.10	46.20	0.00
Overall	**7.50**	**35.40**	**0.00**	**25.30**	**25.60**	**6.30**

Table #16

Liquid Waste Disposal Question 2
Percent Respondents Who Have Switched To Liquid Waste Disposal BMPs
Within The Past Two Years

Marina	Using
Apponaug	88.60
Wharf	54.60
Overall	**71.60**

Table #17

Liquid Waste Disposal Question 3
Percent Respondent Reasons For Not Using Liquid Waste Disposal Facility

Marina	too costly	always full	too time consuming	will have little impact	easier elsewhere	other
Apponaug	0.00	0.00	0.00	10.00	65.00	25.00
Wharf	0.00	0.00	0.00	0.00	50.00	50.00
Overall	**0.00**	**0.00**	**0.00**	**5.00**	**57.50**	**37.50**

Table #18

Recycling Question 1

Percent Apponaug Respondent Methods For Disposing Recyclable Items

Marina	put in marina's dumpster	take them home	throw them in the water	use recycling facility	other
Overall	**29.30**	**26.80**	**0.00**	**43.90**	**0.00**

Table #19

Recycling Question 2

Percent Respondents Who Have Switched To Recycling BMPs Within The Past Two Years

Marina	using
Overall	**52.60**

Table #20

Recycling Question 3

Percent Apponaug Respondent Reasons For Not Recycling

Marina	too much space	too time consuming	too costly	will have little impact	other
Overall	**33.30**	**16.70**	**0.00**	**0.00**	**50.00**

Table #21

Vessel Sewage Question 1
Percent Respondent Methods For Disposing of Vessel Sewage

Marina	dump/pump wastes overboard	take sewage wastes home	do not produce on vessel	no holding tank/porta-potty	use marine pump-out station	other
Apponaug	10.00	27.50	20.00	2.50	40.00	0.00
Ponaug	13.00	26.10	13.00	8.70	34.80	4.40
Wharf	7.70	23.10	15.40	0.00	53.90	0.00
Overall	**10.20**	**25.60**	**16.10**	**3.70**	**42.90**	**1.50**

Table #22

Vessel Sewage Question 2
Percent Respondents Who Have Switched To Vessel Sewage BMPs
Within The Past Two Years

Marina	using
Apponaug	76.00
Ponaug	60.00
Wharf	40.00
Overall	**58.70**

Table # 23

Vessel Sewage Question 3
Percent Respondent Reasons For Not Using Pump Out Facility

Marina	will have little impact	too time consuming	too costly	no holding tank/porta-potty	unfamiliar with use of machine	other
Apponaug	0.00	16.70	16.70	8.30	16.70	41.70
Ponaug	0.00	0.00	14.30	42.90	28.60	14.30
Wharf	33.30	0.00	0.00	0.00	33.30	33.30
Overall	**11.10**	**5.60**	**10.30**	**17.10**	**26.20**	**29.80**

Table #24

Background Question 1
Percent Respondents By Gender

Marina	male	female
Apponaug	100.00	0.00
Ponaug	96.20	3.90
Wharf	84.60	15.40
Overall	**93.60**	**6.40**

Table #25

Background Question 2
Percent Respondents By Age

Marina	17 & under	18-29	30-39	40-49	50+
Apponaug	0.00	2.50	15.00	30.00	52.50
Ponaug	0.00	7.70	23.10	38.50	34.60
Wharf	0.00	0.00	23.10	30.80	46.20
Overall	**0.00**	**3.40**	**20.40**	**33.10**	**44.40**

Table #26

Background Question 3
Percent Respondents By Occupation

Marina	professional	technical skill	sales	administrative	retired
Apponaug	40.00	17.50	5.00	10.00	27.50
Ponaug	32.00	28.00	12.00	16.00	12.00
Wharf	30.80	53.90	0.00	7.70	7.70
Overall	**34.30**	**33.10**	**5.70**	**11.20**	**15.70**

Table #27

Background Question 4
Percent Respondents By Household Income

Marina	under $25K	$25K-$50K	$51K-$65K	$66K-$85K	$86K-$105K	$106K+
Apponaug	2.90	28.60	20.00	22.90	11.40	14.30
Ponaug	10.00	45.00	20.00	10.00	15.00	0.00
Wharf	7.70	23.10	15.40	30.80	7.70	15.40
Overall	**6.90**	**32.20**	**18.50**	**21.20**	**11.40**	**9.90**

Table #28

Background Question 5
Percent Respondents By Type of Vessel

Marina	sail	power	motorsailer
Apponaug	57.50	40.00	2.50
Ponaug	0.00	100.00	0.00
Wharf	61.50	38.50	0.00
Overall	**39.70**	**59.50**	**0.83**

Table #29

Background Question 6
Percent Respondents By Length of Vessel

Marina	under 15 feet	15-25	26-35	36-45	over 45 feet
Apponaug	0.00	61.50	38.50	0.00	0.00
Ponaug	0.00	57.70	34.60	7.70	0.00
Wharf	0.00	30.80	38.50	30.80	0.00
Overall	**0.00**	**50.00**	**37.20**	**12.80**	**0.00**

Table #30

Background Question 7
Percent Respondents By Boating Trips Per Year

Marina	0-5	6-10	11-15	16-20	over 20 trips
Apponaug	10.50	7.90	23.70	26.30	31.60
Ponaug	0.00	15.40	11.50	11.50	61.50
Wharf	7.70	7.70	38.50	15.40	30.80
Overall	**6.10**	**10.30**	**24.60**	**17.70**	**41.30**

Table #31

Background Question 8
Percent Respondents By Years Boating

Marina	0-2	3-5	6-9	10-15	15+
Apponaug	5.00	0.00	17.50	17.50	60.00
Ponaug	0.00	15.40	3.90	19.20	61.50
Wharf	15.40	7.70	7.70	15.40	53.90
Overall	**6.80**	**7.70**	**9.70**	**17.40**	**58.50**

Table #32

Survey Response Rate By Marina
Survey Response Rate

Marina	sent	returned	Response Rate
Apponaug	200.00	41.00	20.50
Ponaug	96.00	26.00	27.10
Wharf	85.00	14.00	16.50
Overall	**381.00**	**81.00**	**21.30**

Table #33

Sorting Question 1
Percent Respondents Using BMPs as a Result of Educational Efforts
Sorted by Background Information

Method	rubbish	liquid waste	vessel	sanding &	bilges &	vessel	fish waste	Overall
Age								
17 & under	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
18-29	100.00	100.00	66.67	100.00	100.00	0.00	0.00	**66.67**
30-39	80.00	57.14	53.33	77.77	88.88	0.00	0.00	**51.02**
40-49	92.86	84.62	62.96	80.00	93.33	100.00	100.00	**87.68**
50+	97.37	82.35	86.21	100.00	100.00	80.00	75.00	**88.70**
Occupation								
professional	100.00	91.67	80.95	100.00	100.00	100.00	100.00	**96.09**
technical skill	85.19	71.43	56.00	71.42	93.33	50.00	50.00	**68.20**
sales	100.00	100.00	100.00	100.00	100.00	100.00	100.00	**100.00**
administrative	66.67	0.00	57.14	75.00	80.00	0.00	0.00	**39.83**
retired	92.86	75.00	100.00	100.00	100.00	100.00	0.00	**81.12**
Income								
under $25K	100.00	66.67	100.00	100.00	100.00	0.00	0.00	**66.67**
$25K-$50K	86.21	71.43	59.09	75.00	92.85	75.00	75.00	**76.37**
$51K-$65K	90.91	75.00	87.50	75.00	83.33	100.00	100.00	**87.39**
$66K-$85K	100.00	100.00	60.00	100.00	100.00	0.00	0.00	**65.71**
$86K-$105K	100.00	75.00	80.00	100.00	100.00	100.00	100.00	**93.57**
$106K+	66.67	50.00	100.00	100.00	100.00	0.00	0.00	**59.52**
Vessel Type								
sail	90.00	71.43	91.30	87.50	100.00	0.00	0.00	**62.89**
power	93.44	80.00	65.96	86.20	93.10	85.71	83.33	**83.96**
motorsailer	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
Vessel Length								
under 15 feet	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
15-25	90.00	83.33	82.35	88.25	89.47	75.00	75.00	**83.34**
26-35	94.29	75.00	60.00	81.25	100.00	66.66	66.66	**77.69**
36-45	100.00	75.00	100.00	100.00	100.00	100.00	0.00	**82.14**
over 45 feet	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
# Trips/Year								
0-5	100.00	0.00	100.00	100.00	100.00	0.00	0.00	**57.14**
6-10	81.82	60.00	86.36	83.33	85.71	100.00	100.00	**85.32**
11-15	94.12	75.00	78.57	88.88	100.00	50.00	0.00	**69.51**
16-20	89.47	60.00	58.33	60.00	100.00	0.00	0.00	**52.54**
over 20 trips	97.44	90.00	43.55	93.75	94.44	100.00	100.00	**88.45**
Years Boating								
0-2	100.00	100.00	75.00	100.00	100.00	0.00	0.00	**67.86**
3-5	100.00	100.00	71.43	80.00	80.00	0.00	0.00	**61.63**
6-9	100.00	100.00	83.33	100.00	100.00	0.00	0.00	**69.05**
10-15	100.00	33.33	46.67	71.42	87.50	0.00	0.00	**48.42**
15+	100.00	91.67	85.00	89.47	100.00	100.00	100.00	**95.16**

Table 34

Sorting Question 2
Percent Respondents Methods for Best Informing Boaters:
Sorted By Background Information

Gender	Signs	Fact Sheets	Workshops
male	48.48	34.85	16.67
female	33.33	0.00	66.67
Age			
17 & under	0.00	0.00	0.00
18-29	66.67	33.33	0.00
30-39	53.85	15.38	30.77
40-49	50.00	37.50	12.50
50+	38.71	41.94	19.35
Occupation			
professional	39.13	34.78	26.09
technical skill	57.14	28.57	14.29
sales	80.00	20.00	0.00
administrative	66.67	11.11	22.22
retired	9.09	72.73	18.18
Income			
under $25K	33.33	66.67	0.00
$25K-$50K	42.86	28.57	28.57
$51K-$65K	57.14	14.29	28.57
$66K-$85K	50.00	30.00	20.00
$86K-$105K	57.14	28.57	14.29
$106K+	85.71	14.29	0.00
Vessel Type			
sail	42.31	53.85	3.85
power	50.00	23.81	26.19
motorsailer	0.00	0.00	100.00
Vessel Length			
under 15 feet	0.00	0.00	0.00
15-25	52.63	31.58	15.79
26-35	36.00	40.00	24.00
36-45	66.67	16.67	16.67
over 45 feet	0.00	0.00	0.00
# Trips/Year			
0-5	60.00	40.00	0.00
6-10	42.86	42.86	14.29
11-15	47.06	47.06	5.88
16-20	41.67	50.00	8.33
over 20 trips	51.85	14.81	33.33
Years Boating			
0-2	75.00	0.00	25.00
3-5	40.00	40.00	20.00
6-9	66.67	33.33	0.00
10-15	50.00	33.33	16.67
15+	40.00	37.50	22.50

Table 35

Sorting Question 3
Percent Respondents Choices For Other Methods To Best Inform Boaters:
Sorted By Background Information

Gender	Film	TV	Radio	On-Line	Magazines	Other
male	4.55	46.97	3.03	1.52	36.36	7.58
female	33.33	33.33	0.00	0.00	33.33	0.00
Age						
17 & under	0.00	0.00	0.00	0.00	0.00	0.00
18-29	0.00	0.00	0.00	50.00	0.00	50.00
30-39	7.69	61.54	0.00	0.00	15.38	15.38
40-49	9.09	40.91	0.00	0.00	40.91	9.09
50+	2.94	44.12	5.88	0.00	41.18	5.88
Occupation						
professional	4.17	50.00	8.33	0.00	33.33	4.17
technical skill	15.79	36.84	0.00	0.00	31.58	15.79
sales	0.00	40.00	0.00	20.00	40.00	0.00
administrative	0.00	62.50	0.00	0.00	37.50	0.00
retired	0.00	42.86	0.00	0.00	42.86	14.29
Income						
under $25K	0.00	0.00	0.00	25.00	75.00	0.00
$25K-$50K	15.79	47.37	0.00	0.00	21.05	15.79
$51K-$65K	0.00	45.45	0.00	0.00	45.45	9.09
$66K-$85K	8.33	41.67	8.33	0.00	33.33	8.33
$86K-$105K	0.00	42.86	0.00	0.00	57.14	0.00
$106K+	0.00	42.86	14.29	0.00	28.57	14.29
Vessel Type						
sail	0.00	38.46	7.69	0.00	42.31	11.54
power	9.30	51.16	0.00	2.63	30.23	6.98
motorsailer	0.00	0.00	0.00	0.00	100.00	0.00
Vessel Length						
under 15 feet	0.00	0.00	0.00	0.00	0.00	0.00
15-25	5.26	52.63	0.00	2.63	26.32	13.16
26-35	3.85	42.31	3.85	0.00	46.15	3.85
36-45	20.00	20.00	20.00	0.00	40.00	0.00
over 45 feet	0.00	0.00	0.00	0.00	0.00	0.00
# Trips/Year						
0-5	20.00	40.00	0.00	0.00	40.00	0.00
6-10	12.50	37.50	12.50	0.00	37.50	0.00
11-15	0.00	50.00	6.25	0.00	31.25	12.50
16-20	0.00	64.29	7.14	0.00	28.57	0.00
over 20 trips	7.69	38.46	0.00	3.85	38.46	11.54
Years Boating						
0-2	33.33	3.33	0.00	0.00	33.33	0.00
3-5	20.00	20.00	0.00	0.00	20.00	40.00
6-9	0.00	44.44	0.00	0.00	55.56	0.00
10-15	7.14	42.86	7.14	7.14	28.57	7.14
15+	4.76	47.62	2.38	0.00	38.10	7.14

Table 36

Sorting Question 4
Percent Respondents Amount Willing To Pay for a Cleaner Boating Environment:
Sorted By Background Information

Gender	$0	$1-$50	$51-$100	$101-$200	$201-$300	$301+
male	27.27	45.45	19.70	4.55	0.00	3.03
female	0.00	50.00	50.00	0.00	0.00	0.00
Age						
17 & under	0.00	0.00	0.00	0.00	0.00	0.00
18-29	0.00	66.67	0.00	33.33	0.00	0.00
30-39	14.29	57.14	21.43	0.00	0.00	7.14
40-49	33.33	33.33	28.57	4.76	0.00	0.00
50+	28.18	50.00	15.63	3.13	0.00	3.13
Occupation						
professional	13.64	40.91	22.73	13.64	0.00	9.09
technical skill	35.00	40.00	25.00	0.00	0.00	0.00
sales	25.00	75.00	0.00	0.00	0.00	0.00
administrative	11.11	66.67	22.22	0.00	0.00	0.00
retired	38.46	46.15	15.38	0.00	0.00	0.00
Income						
under $25K	25.00	25.00	50.00	0.00	0.00	0.00
$25K-$50K	40.00	35.00	15.00	5.00	0.00	5.00
$51K-$65K	7.69	69.23	23.08	0.00	0.00	0.00
$66K-$85K	18.18	45.45	36.36	0.00	0.00	0.00
$86K-$105K	0.00	60.00	0.00	20.00	0.00	20.00
$106K+	0.00	83.33	16.67	0.00	0.00	0.00
Vessel Type						
sail	29.17	37.50	25.00	8.33	0.00	0.00
power	25.00	50.00	18.18	2.27	0.00	4.55
motorsailer	0.00	100.00	0.00	0.00	0.00	0.00
Vessel Length						
under 15 feet	0.00	0.00	0.00	0.00	0.00	0.00
15-25	20.51	53.85	23.08	0.00	0.00	2.56
26-35	33.33	29.17	20.83	12.50	0.00	4.17
36-45	40.00	60.00	0.00	0.00	0.00	0.00
over 45 feet	0.00	0.00	0.00	0.00	0.00	0.00
# Trips/Year						
0-5	40.00	60.00	0.00	0.00	0.00	0.00
6-10	14.29	57.14	14.29	14.29	0.00	0.00
11-15	31.25	43.75	18.75	6.25	0.00	0.00
16-20	18.18	54.55	27.27	0.00	0.00	0.00
over 20 trips	25.00	39.29	25.00	3.57	0.00	7.14
Years Boating						
0-2	0.00	3.33	33.33	33.33	0.00	0.00
3-5	0.00	40.00	60.00	0.00	0.00	0.00
6-9	33.33	44.44	11.11	11.11	0.00	0.00
10-15	33.33	50.00	8.33	8.33	0.00	0.00
15+	27.50	47.50	20.00	0.00	0.00	5.00

Table 37

Sorting Question 5
Percent Respondents Who Have Switched To BMPs Within The Past Two Years:
Sorted By Background Information

Gender	liquid waste	recycling	vessel sewage	Overall
male	87.50	95.00	51.72	**78.07**
female	0.00	0.00	100.00	**33.33**
Age				
17 & under	0.00	0.00	0.00	**0.00**
18-29	100.00	100.00	50.00	**83.33**
30-39	100.00	100.00	75.00	**91.67**
40-49	75.00	100.00	50.00	**75.00**
50+	66.67	91.67	54.55	**70.96**
Occupation				
professional	100.00	85.71	20.00	**68.57**
technical skill	66.67	100.00	80.00	**82.22**
sales	0.00	100.00	66.67	**55.56**
administrative	0.00	100.00	0.00	**33.33**
retired	100.00	100.00	80.00	**93.33**
Income				
under $25K	100.00	0.00	100.00	**66.67**
$25K-$50K	75.00	100.00	77.78	**84.26**
$51K-$65K	50.00	66.67	50.00	**55.56**
$66K-$85K	100.00	100.00	42.86	**80.95**
$86K-$105K	0.00	100.00	40.00	**46.67**
$106K+	0.00	100.00	0.00	**33.33**
Vessel Type				
sail	80.00	100.00	35.71	**71.90**
power	75.00	88.90	68.75	**77.55**
motorsailer	0.00	0.00	0.00	**0.00**
Vessel Length				
under 15 feet	0.00	0.00	0.00	**0.00**
15-25	66.67	100.00	72.73	**79.80**
26-35	100.00	88.89	43.75	**77.55**
36-45	50.00	0.00	33.33	**27.78**
over 45 feet	0.00	0.00	0.00	**0.00**
# Trips/Year				
0-5	0.00	66.67	0.00	**22.22**
6-10	0.00	100.00	66.67	**55.56**
11-15	75.00	100.00	50.00	**75.00**
16-20	0.00	100.00	0.00	**33.33**
over 20 trips	100.00	100.00	61.54	**87.18**
Years Boating				
0-2	100.00	100.00	0.00	**66.67**
3-5	0.00	0.00	0.00	**0.00**
6-9	100.00	100.00	40.00	**80.00**
10-15	0.00	100.00	71.43	**57.14**
15+	83.33	9.67	56.25	**49.75**
Overall	**51.41**	**72.03**	**42.74**	**55.40**

Boater Questionnaire

(originally printed on one double side sheet of legal paper)

Please circle or check the most appropriate response to each of the following questions on both sides of this sheet. Where applicable, please feel free to fill in a response of your own. Please return your completed questionnaire in the self addressed, postage paid, envelope which has been provided.

Signs

1. Did the environmental signs posted at the marina inform you of new waste disposal practices?

	Yes	*No*
a) rubbish disposal(i.e. trash, garbage, etc.):	___	___
b) liquid waste disposal(i.e. gas, oil, antifreeze):	___	___
c) pump-out facility:	___	___

2. If you learned new waste disposal practices from the signs, are you now using them?

	Yes	*No*
a) rubbish disposal(i.e. trash, garbage, etc.):	___	___
b) liquid waste disposal(i.e. gas, oil, antifreeze):	___	___
c) pump-out facility:	___	___

3. If you haven't used these new practices, please tell us why not?

a) will have little impact
b) too expensive
c) too time consuming
d) equipment not available
e) need further information
f) other _____

Fact Sheets

1. Have you been reading the Boater Fact Sheets included with our monthly mailings?

	Yes	*No*
a) rubbish disposal:	___	___
b) sanding and painting:	___	___
c) bilges, fueling and spill response:	___	___
d) vessel sewage:	___	___

2. If you did read the Fact Sheets, are you now using the pollution prevention practices discussed?

	Yes	*No*
a) rubbish disposal:	___	___
b) sanding and painting:	___	___
c) bilges, fueling and spill response:	___	___
d) vessel sewage:	___	___

3. If you haven't used these pollution prevention practices, please tell us why not.

a) will have little impact
b) too expensive
c) too time consuming
d) equipment not available
e) need further information
f) other _____

Workshops

1. Last season, we held environmental workshops for our customers.

	Yes	*No*
a) Were you aware of these workshops?	___	___
b) Did you attend these workshops?	___	___

2. If you attended, are you now using the pollution prevention approaches discussed?

	Yes	*No*
a) rubbish disposal:	___	___
b) liquid waste disposal:	___	___
c) vessel cleaning:	___	___
d) fish waste:	___	___

3. If you did not attend the boater workshops, what would have encouraged your participation?

a) have workshops held on weekends
b) have workshops held on weekdays
c) different workshop content
d) more publicity
e) other _____

Miscellaneous

1. Which method is best for informing people of environmentally friendly boating practices?
a) signs b) fact sheets c) environmental workshops

2. What other methods should be used to best inform boaters?
a) film b) TV c) radio d) on-line e) boating magazines/newspapers f) other_____

3. How much would you be willing to pay, per season, for a cleaner boating environment?
a) $0 b) $1-$50 c) $51-$100 d) $101-$200 e) $201-$300 f) $301+

Dustless Vacuum Sander

1. Is there a dustless vacuum sander available for your use at the marina?
a) yes b) no c) not sure

2. If the equipment is available but you haven't used it, please tell us why.

a) will have little impact
b) did not sand hull this year
c) marina does boat maintenance
d) not enough machines available
e) machine is inefficient
f) other _____

Liquid Waste Disposal

1. How do you dispose of liquid wastes such as oil, gas and antifreeze?

a) put them in the marina's dumpster
b) take wastes home
c) dump wastes in water
d) engine maintenance done by others
e) use marina's liquids disposal facility
f) other _____

2. Were you using this same practice two seasons ago? *yes* *no*

3. If your marina does collect liquid wastes but you dispose of your materials elsewhere, please tell us why.

a) too costly
b) always full
c) too time consuming
d) will have little impact
e) easier to discard wastes elsewhere
f) other _____

Recycling

1. How do you dispose of recyclable items such as aluminum cans, plastic and glass?

a) put them in the marina's dumpster
b) take them home
c) throw them in the water
d) use marina's recycling facility
e) easier to discard recyclables elsewhere
f) other _____

2. Were you using this same practice two seasons ago? *yes* *no*

3. If there is a recycling facility at your marina but you do not use it, please tell us

why.

a) sorting consume too much space on-board
b) too time consuming
c) too costly
d) will have little impact
e) other _____

Vessel Sewage

1. How do you dispose of your vessel sewage?

a) dump/pump wastes overboard
b) take sewage wastes home
c) do not produce sewage aboard vessel
d) do not have a holding tank/porta-potty
e) use marine pump-out station
f) other _____

2. Were you using this same practice two seasons ago? *yes* *no*

3. If there is a pump-out station in your area but you don't use it, please tell us why.

a) will have little impact
b) too time consuming
c) too costly
d) do not have a holding tank/porta-potty
e) unfamiliar with operation of machine
f) other _____

BACKGROUND INFORMATION

Although we are requesting the following information, please note that we ask for nothing which could connect this questionnaire with you. Your name is not required and therefore your answers are confidential.

1. Sex: a) male b) female

2. Age: a) 17 & under b) 18-29 c) 30-39 d) 40-49 e) 50+

3. Occupation: a) professional b) technical skill c) sales d) administrative e) retired

4. What is your total household income?

a) under $25K b) $25K-$50K c) $51K-$65K d) $66K-$85K e) $86K-$105K
f) $106K+

5. Type of Vessel: a) *sail* b) *power* c) *motorsailer*

6. Length of Vessel: a) under 15 feet b) 15-25 c) 26-35 d) 36-45 e) over 45 feet

7. Approximately how many boating trips do you make each year?

a) 0-5 b) 6-10 c) 11-15 d) 16-20 e) over 20 trips

8. How many years have you been boating? a) 0-2 b) 3-5 c) 6-9 d) 10-15 e) 15+

References

Babbie, Earl. 1992. *The Practice of Social Research*. Wadsworth, Inc, Belmont, CA.

Dillman, Don A. 1978. *Mail and Telephone Surveys*. John Wiley & Sons, New York.

Fowler, Floyd J. Jr. 1984. *Survey Research Methods*. Sage Publications, Newbury Park, CA.

Kalton, G. and Moser, C.A. 1971. *Survey Methods in Social Investigation*. Heinemann Educational Books Ltd, London.

Appendix D

Vacuum Sander Materials

The following materials contain the instructions given to marina operators and boaters upon their use of the vacuum sander, a sample log book sheet and a flyer used to publicize its availability.

Instructions for Marina Operators

If renters want to reserve a set time, there is a calendar included at the back of this manual in which you may schedule reservations.

When Renting the Equipment

- Check to see if the filter bag needs changing.
- Check to make sure that the equipment is working properly.
- Have them fill out the rental agreement.
- Demonstrate the equipment.
- Hand them an instruction sheet and then review it with them. *(Instruction sheets are included at the back of this document)*
- Emphasize that they are not to open the canister, or to empty or change the filter bags.
- Set them up with the proper sanding discs.
- When the renter returns the equipment, check to make sure that the equipment has not been damaged.

General

- The project's funders have required a rental fee of not more than $2:00 per hour for the first season. These funds are to be used for purchasing new filter bags and for shipping fees.

- It is very important that renters be instructed not to empty the filter bag.

- When it becomes necessary for marina staff to change the bags, they must be bagged, dated, and stored so that CRC/Sea Grant can evaluate the collected material.

- Along these lines it is also important that we keep detailed records about who rented the unit, and more importantly what the job performed was and length of the boat.

INSTRUCTIONS FOR VACUUM SANDER USE

PLEASE READ AND UNDERSTAND THESE INSTRUCTIONS IN ORDER TO SAFELY USE THE FEIN DUSTLESS SANDER

The equipment you are about to use has been provided to this marina as part of a nonpoint source pollution prevention for marinas within Greenwich Bay. The project is being conducted by the University of Rhode Island Coastal Resources Center/RI Sea Grant, M.A.S. with funding provided by the Rhode Island Department of Environmental Management, Narragansett Bay Project, through a grant issued by the USEPA under the Clean Water Act.

If you have any questions, now is the time to ask so as not to waste any time during your sanding operation. Following the instructions will provide you with the information you need to sand your hull efficiently for a fresh coat of bottom paint.

You will need to purchase and attach the proper sanding disc. (80 grit in most cases) by placing the disc on the pad so that the vacuum holes are all aligned. Plug into a socket. To activate the sander and vacuum, slide the switch on the sander forward, both will start. Slide the switch back to shut off the sander, the vacuum will shut down a moment later.

The following list of Do's and Don'ts Must be adhered to! NO EXCEPTIONS!
You are liable for any repair or replacement required on this expensive tool!
You are also responsible for your own safely.

DO

- Use common sense.
- Quit when you get tired.
- Keep a proper footing at all times.
- Make sure scaffolding, ladders, etc. are secure.
- Keep sander flat against the surface being sanded.
- Keep sander away from sharp curves, such as where keel meets the keel boss.

DON'T

- Drop sander.
- Drag vacuum across the gravel.
- Open canister, see marina management if you feel that the bag needs to be replaced.
- Remove liquids with the vacuum it is not your standard shop vac.
- Allow children to use sander.
- Overextend yourself.
- Allow sander to get wet! If it starts to rain- stop and unplug.
- Touch sanding pad or disc while sander is on.
- Use sander as an edge grinder.
- Hesitate to call a yard employee if tool begins to heat up, blow dust etc.
- Leave tool unattended

A few other tips to remember regarding personal health and safety. Although this is a *Dustless Sander*, respiratory protection is suggested- cover mouth and nose with a respirator or at least a dust mask. Eye protection is also recommended. Like most tools, this one makes considerable amount of noise; ear plugs or muffs can be the best bet to protect your hearing. You could wear gloves to reduce discomfort from vibration and keep hands clean but under no circumstances should you eat or smoke until you've washed your hands after sanding. Avoid wearing loose clothing and tie back long hair.

VACUUM SANDER USE AGREEMENT

This vacuum sander is rented on the following conditions:

1. Unit may be reserved but rental is subject to availability.
2. Unit will be in working order at time of rental and accompanied by instructions
3. Rental charge will be used to purchase the necessary filters and for repairs.
4. Sanding discs will need to be purchased separately.
5. Unit must be used as indicated on instruction sheet.
6. Unit must be returned at agreed time.
7. Additional time available subject to availability.
8. Users will be held responsible for any damages to the unit.
9. Unit may not be left unattended or operated by person under the age of 18.
10. Unit may not be used outside of the marina premises.

Name: _____

Address: _____

Boat Name: _____

Date Rented: _____

Time Checked Out: _____

Checked Out by: _____

Time Checked In: _____

Checked In By: _____

Task Performed (bottom sanding, finish work, etc.): _____

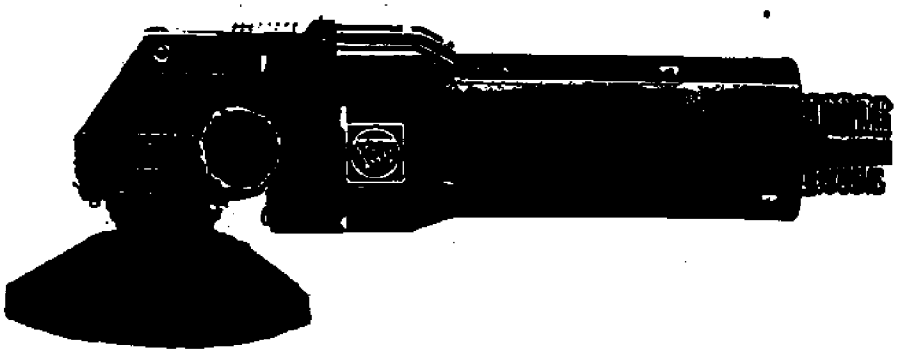
Boat Length: _____

Signature: _____

PLANNING ON SANDING YOUR BOTTOM THIS YEAR?

- Would you like to improve your efficiency while doing a better job?
- Are you aware of the health and environmental concerns associated with bottom paints?
- Do you lack the proper sanding equipment?

"WE HAVE THE SOLUTION"



- Wharf Marina now has a professional *Fein* dust-free vacuum sander available for your use.

This piece of equipment combines a powerful six inch random orbit sanding surface with an integrated low profile dust extractor to ease your most difficult sanding tasks while also protecting your health and the environment by automatically cleaning up behind you.

Contact the marina office to reserve the equipment for your use, but please plan ahead. We have only one machine and demand is bound to be high.

Appendix E

Recycling Publicity Flyer

The following publicity flyer for the recycling of glass, tin, and plastics was supplied by the commercial service provider who hauls the facilities waste.

Waste Management Inc.

401-463-6215 1-800-972-4545

Recycling

Check it Out

✔ **Recycling conserves valuable resources.**

Recycling **one** ton of paper saves **204** trees and **8190** gallons of oil per year.

Making paper from recycled materials results in **74%** less air pollution and **35%** less water pollution.

Recycling **one** ton of paper keeps almost **60** pounds of air pollution out of the atmosphere that would have been produced if the paper has been manufactured from virgin resources.

✔ **Recycling saves landfill space.**

Why bury cans, bottles and papers in the ground when we can recycle them and use the materials to make new products?

✔ **Recycling is mandatory in Massachusetts & Rhode Island.**

It is illegal to dispose of recyclable material at disposal sites.

✔ **Reduce/Reuse.**

Avoid products with excess packaging.
Eliminate unnecessary bags when shopping.
Reuse things whenever possible.

✔ **Buy Recycled Products!**

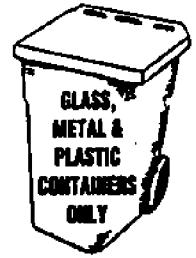
Close the recycle loop by buying recycled products whenever possible.

Waste Management Inc.

Recycling Program

The following will outline your new recycling program with the use of Recycle Carts for NEWSPAPER, GLASS & METAL and PLASTICS.

NEWSPAPER includes all newspapers & inserts.



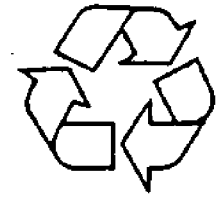
GLASS, METAL & PLASTIC CONTAINERS ONLY includes all colored container glass & tin cans (also aluminum cans). No Pyrex, ceramics or mirrors, please. No plates, cups, crystal, light bulbs or broken glass. Plastic includes plastic soda bottles & milk bottles labeled ◇1◇ & ◇2◇ on the bottom. (Liquor & detergent bottles acceptable in Massachusetts only).

Helpful Hints:

Getting your recyclable items to the recycle cart:

When using **bags to take recyclables to the cart, place materials into the cart then put bag into trash container.**

RINSE containers with water, labels can remain. **THROW AWAY ALL CAPS & LIDS.**



Please Help and Do Your Part

If you have any questions call

401-463-6215

1-800-972-4545

Appendix F

Spill Response Plans

The following are the exact emergency spill response plans developed for Brewers Yacht Yard at Cowesett and Ponaug Marina.

Brewer's Yacht Yard at Cowesett
Oil Spill Response Plan

EMERGENCY RESPONSE ACTION:

Reaction

- Identify the source of the spill if possible.
- Attempt to secure the source of the spill.
- Make a preliminary assessment as to what the spill material is and approximately how much has entered the waterway. This information will dictate what equipment needs to be deployed
- Advise facility manger or spill response manager if necessary

Reporting

- All spills that result in a sheen on the water require that the Coast Guard and RI DEM be contacted and provided with pertinent information. See phone list.

Response

Small gasoline spill (five gallons or less):

- Allow natural weathering to reduce and eliminate spill.
- No smoking during any spill.
- Do not contain or collect gasoline because confined gasoline may create a risk of explosion and fire.

Large gasoline spill (more then five gallons):

- Implement the previous steps.
- Secure all electricity.
- Make sure everyone is away from the affected area.
- Do not allow anyone to enter the affected area.
- Use water hoses to wash spill away to protect docks and boats.
- Contact the fire department and harbormaster

Other oil spills (crude and refined residual oils, diesel, and kerosene)

- Contain oil spill using boom to prevent spreading. When possible, completely surround source.
- If oil was spilled in an upland area, use sorbant boom and pads to contain material and prevent it from entering water body.
- If more oil than can be contained by the boom has been spilled, contact: 1. Warwick Fire Department. 2. Brewer's Wickford Cove, 3. Brewer's Cove Haven.
- Once spill is contained, use sorbant material to collect oil. Absorbent pads can be placed within boomed area, retrieved, wrung out, and placed back in boomed area.
- If spreading is occurring too rapidly or other conditions prevent the containment of the oil, employ the boom to deflect the oil from critical or sensitive areas.

PERSONNEL

Spill Manager:

- Chris Ruhling (Facility Manager)

Other Qualified Staff:

- Rob Straight (Hazwoper Certified)

Marina spokesperson:

- Chris Ruhling/Jack Brewer

Contact for Professional Assistance:

- Clean Harbors *(requested by spill response manager only)*

THREATS

Maximum threat

Vessel spill

- Under a worst-case scenario, the largest on-board fuel tank is aboard a 50-foot power boat which carries approximately 400 gallons of diesel fuel and 40 gallons of crankcase oil. This poses a maximum threat if this vessel were to sink within the marina perimeter.

Minimum threat

Spill from collection facility

- On site there is a petroleum collection and storage facility. Located 50 yards from the coastal edge, the facility is fully enclosed, lockable, and constructed so as to retain 110 percent of the receptacle's contents.

SPILL RESPONSE EQUIPMENT

Available on-site resources

150-foot harbor curtain boom (3 x length of vessel with largest fuel tank)

Operational characteristics: serves to deflect and contain oil in the water. Curtain boom is susceptible to wind, waves, and current. These factors can cause oil to escape over the top and under the bottom of the boom.

Deployment: Can be attached to a fixed structure or to an anchor. Place downstream of oil spill. If surface current is moving greater then .7 knots, the boom will not contain oil acting at a right angle to it. Boom angle will need to be adjusted to decreasing angles as the speed of the current increases.

Disposal: Boom, if maintained properly, can be used multiple times. The average life span for the boom is approximately five to ten years, depending on the use it receives.
Maintenance: Rinse with fresh water thoroughly. Be sure to collect with sorbants any remaining oil on the boom. Store out of sunlight in a manner that allows quick deployment.

80 feet of 5-inch sorbant boom (37.5 cu ft; 84 lbs.)

Operational characteristics: Boom has little inherent strength and may need extra floatation to keep from sinking when laden with oil. Use sorbants only in low current velocity situations.
Deployment: Place boom around spilled oil. Recovery efficiency decreases rapidly once outer layer is oil soaked.
Disposal: May be wrung out and re-used. At the end of the sorbant's useful life, wring out and store in a sealed container. The container will be disposed of by contracted waste hauler.
Maintenance: When possible, wring out and dry after use. Otherwise, material will be disposed of properly.

400 individual sorbant pads (3/8 in. x 18 in. x 18 in.)

Operational characteristics: Use sorbants only in low current velocity situations.
Deployment: Place sorbants on spilled oil. Recovery efficiency decreases rapidly once outer layer is oil soaked.
Disposal: May be wrung out and reuse. At the end of the sorbant's useful life, wring out and store in a sealed container. The container will be disposed of by contracted waste hauler.
Maintenance: When possible, wring out and dry after use. Otherwise, material will be disposed of properly.

Location/Additional Equipment

- The spill response equipment is stored in the spill response locker located adjacent to the maintenance shed. The combination for opening the locker is 302.
- In the event that additional spill response equipment is needed contact the following (see Emergency Phone List for numbers): 1. Warwick Fire Department, 2. Brewer's Wickford Cove, 3. Brewer's Cove Haven, or 4. Clean Harbors.
- Coast Guard oil spill response trailer is also available as a first-aid measure.

NOTES

- Do not use dispersants on oil/fuel spills. Dispersants include products manufactured specifically for that purpose and more common products such as detergent. This simply forces the oil into the water column where it may be more harmful. Dispersants may only be used with the approval of the Coast Guard federal on-scene coordinator.

- This response plan will be tested once a year, with at least one test occurring at the beginning of the boating season. All of the spill response equipment will be inspected at the time of the tests.
- This plan was last updated on August 7, 1996 by Chris Ruhling

RECORDS

Emergency Phone List

• United States Coast Guard, MSO:	435-2300 1-800-424-8802
• RI Department of Environmental Management:	277-3070
• Local Harbormaster Department:	737-2000 ext. 6521
• Local Police Department:	737-2244
• Local Fire Department:	737-8896
• Brewer's Wickford Cove,	294-1540
• Brewer's Cove Haven	246-1600
• Clean Harbors	461-1300

Drills

Date	Drill Simulation	Who participated	Supervisor
		0	

Inspections

Date	Inspected by:	Condition/Notes

Oil Spill Response Plan

Ponaug Marina

EMERGENCY RESPONSE ACTION:

Reaction

- Identify the source of the spill if possible.
- Attempt to secure the source of the spill.
- If spill is observed at fueling dock, immediately cease all fueling activities.
- Make a preliminary assessment as to what the spill material is and approximately how much has entered the waterway. This information will dictate what equipment needs to be deployed
- Advise facility manger or spill response manager if necessary

Reporting

- All spills that result in a sheen on the water require that the Coast Guard and RI DEM be contacted and provided with pertinent information (see emergency phone list).

Response

Small gasoline spill (five gallons or less):

- Allow natural weathering to reduce and eliminate spill.
- No smoking during any spill.
- Do not contain or collect gasoline because confined gasoline may create a risk of explosion and fire.

Large gasoline spill (more then five gallons):

- Implement the previous steps.
- Secure all electricity.
- Make sure everyone is away from the affected area.
- Do not allow anyone to enter the affected area.
- Use water hoses to wash spill away to protect docks and boats.
- Contact the fire department and harbormaster

Other oil spills (crude and refined residual oils, diesel, and kerosene)

- Contain oil spill using curtain boom to prevent spreading. When possible, completely surround source.
- If oil was spilled in an upland area, use sorbant boom and pads to contain material and prevent it from entering water body.
- If more oil than can be contained by the boom has been spilled, contact the Warwick Fire Department or Apponaug Harbor Marina(see emergency phone list for numbers).
- Once spill is contained, use sorbant material to collect oil. Absorbent pads can be placed within boomed area, retrieved, wrung out, and placed back in boomed area.

PERSONNEL

Spill Manager

- Mr. Ray Chase

Other Qualified Staff

- Kenny Ferrara (Operator of Ray's Bait and Ponaug Fuel Dock)

Marina spokesperson

- Mr. Ray Chase

Contact for professional assistance

- Clean Harbors (assistance may only be requested by the spill manager)

THREATS

- Overfilling of gasoline during fueling, creating explosion hazard: The most common spill occurrence will result from overfilling of gasoline tanks at the fueling dock.
- Vessel spill: Under a worst-case scenario, the largest on-board fuel tank is aboard a 40-foot power boat which carries approximately 300 gallons of diesel fuel and 20 gallons of crankcase oil..
- Spill from fuel storage tank or connections to pumping station: On site there is a 2,000 gallon in-ground storage tank which is connected to the fuel pumping station by a series of flexible and rigid hoses. A fuel spill could result from the failure of one of the connections. A spill could also result when the fuel tank is being filled.

SPILL RESPONSE EQUIPMENT

Available on-site resources

<u>130 feet of 4-inch sorbant boom</u>

Operational characteristics: serves to absorb and contain oil in the water. Boom is susceptible to wind, waves, and current. These factors can cause oil to escape over the top and under the bottom of the boom.

Deployment: Can be attached to a fixed structure or to an anchor. Place downstream of oil spill. Recovery efficiency decreases rapidly once outer layer is oil soaked.

Disposal: May be wrung out and reused. At the end of the boom's useful life, wring out and store in a sealed container. The container will be disposed of by a state certified waste hauler.

Maintenance: When possible, wring out and dry after use. Otherwise, material will be disposed of properly.

60 individual sorbant pads
Operational characteristics: Use sorbants only in low current velocity situations.
Deployment: Place sorbants on spilled oil. Recovery efficiency decreases rapidly once outer layer is oil soaked.
Disposal: May be wrung out and . At the end of the sorbants useful life, wring out and store in a sealed container. The container will be disposed of by contracted waste hauler.
Maintenance: When possible, wring out and dry after use. Otherwise, material will be disposed of properly.

95 Gallon Over Pack for storage and disposal
10 Temporary Disposal Bags
Emergency Response Guide Book

Location/Additional Equipment

- The spill response equipment is stored on the fuel dock.
- If the rapid deployment of additional resources is necessary, contact either the Warwick Fire Department or Apponaug Harbor Marina (see emergency phone list for numbers).
- Coast Guard oil spill response trailer is also available as a first-aid measure.

NOTES

- Do not use dispersants on oil/fuel spills. Dispersants include products manufactured specifically for that purpose and more common products such as detergent. This simply forces the oil into the water column where it may be more harmful. Dispersants may only be used with the approval of the Coast Guard federal on-scene coordinator.
- This response plan will be tested twice a year, with at least one test occurring at the beginning of the boating season. All of the spill response equipment will be inspected at the time of the tests.
- This Spill Response Plan was last updated on August 5, 1996, by Mr. Ray Chase.

RECORDS

Drills

Date	Drill Simulation	Who participated	Supervisor

Inspection

Date	Inspected by:	Condition/Notes

Emergency Phone List

- United States Coast Guard, MSO: 435-2300 1-800-424-8802
- RI Department of Environmental Management: 277-3070
- Local Harbormaster Department: 737-2000 ext. 6521
- Local Police Department: 737-2244
- Local Fire Department: 737-8896
- Apponaug Harbor Marina 739-5005
- Clean Harbors 461-1300

Appendix G

Boater Fact Sheets

The following are the exact fact sheets developed and distributed to the customers of the participating marinas for the purpose of educating them on nonpoint source pollution controls. In addition to these first six you will also find copies from their subsequent printing in Rhode Island Boating.

Sea Grant Rhode Island

BOATER FACT SHEET

Rhode Island Sea Grant, University of Rhode Island Bay Campus, Narragansett, Rhode Island 02882-1197 (401) 874-6842

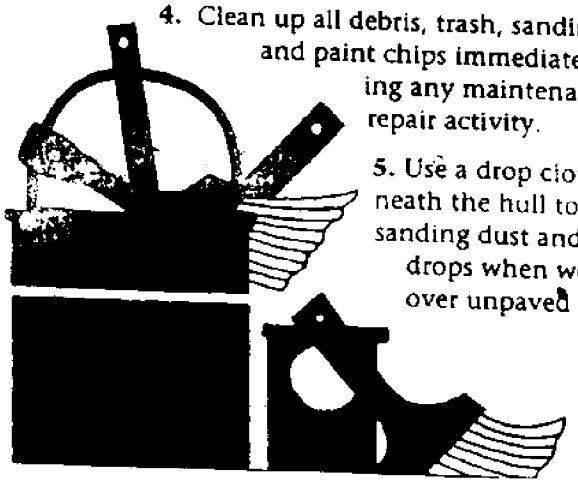
Sanding and Painting

Sanding and painting can be messy tasks. And if certain precautions are not taken, these tasks can also create a mess for the environment. Most of these paints are made with toxic chemicals designed to leach out and prevent bottom growth on the hull. When concentrated amounts of these materials are allowed to escape from hull maintenance and repair areas, there is a potential for environmental harm. Materials, such as solvents, thinners, and brush cleaners, often used in sanding and painting, can also harm the environment if improperly handled. These materials contain cancer-causing agents and have a tendency to sink in the water column, compromising water quality and damaging marine life and the marine environment.

You can play an important role in protecting water quality while sanding or painting your vessel by following the simple tips listed below.

Boater Tips:

1. When working in marinas, use designated sanding and painting areas. Check with the marina manager for the location and proper use of these areas.
2. Work indoors or under cover whenever wind can potentially blow dust and paint into the open air.
3. Use environmentally friendly tools, such as vacuum sanders and grinders, to collect and trap dust. Some marinas have this equipment for rent, check with the manager.
4. Clean up all debris, trash, sanding dust, and paint chips immediately following any maintenance or repair activity.
5. Use a drop cloth beneath the hull to catch sanding dust and paint drops when working over unpaved surfaces.



6. When sanding or grinding hulls over a paved surface, vacuuming or sweeping loose paint particles is the preferred cleanup method. Do not hose the debris away.
7. Buy paints, varnishes, solvents, and thinners in sizes that can be used within one year to avoid having to dispose of stale products.
8. When possible, use water-based paints and solvents.
9. Switch to longer lasting, harder, or non-toxic antifouling paint at your next haul out.
10. Paints, solvents, and reducers should be mixed far from the water's edge and transferred to work areas in tightly covered containers of 1 gallon or less.
11. Keep in mind that solvents and thinners can be used more than once by allowing the solids to settle out and draining the clean product off the top.
12. Let *small* quantities of unusable solvents evaporate by brushing them onto an old board.
13. Thoroughly dry all paint cans before disposing of them in the trash.
14. When in doubt about proper disposal practices, check with your marina or local municipality.

The boater fact sheet series is produced by the Rhode Island Sea Grant Marine Advisory Service with funding from the R.I. Department of Environmental Management Narragansett Bay Project, through a grant issued by the U.S. Environmental Protection Agency under the Clean Water Act.

UNIVERSITY OF RHODE ISLAND

EPA

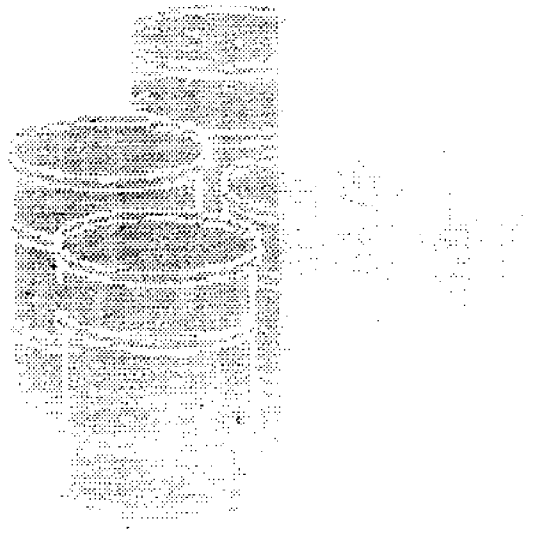
Sea Grant Rhode Island

BOATER FACT SHEET

Rhode Island Sea Grant, University of Rhode Island Bay Campus, Narragansett, Rhode Island 02882-1197 (401) 874-6842

Solid Waste Disposal

Each piece of trash and litter that enters Rhode Island's waters adds to a problem that can be easily recognized and prevented. Materials such as bottles, bags, cans, cups, six-pack rings, disposable diapers, cigarette butts, food stuffs, and fishing line not only degrade the natural beauty of boating waters, but they can also injure or kill aquatic life. Birds and fish often fatally mistake garbage for food and get tangled in plastic. Furthermore, many overheated engines and disabled sets of running gear can be attributed to improperly disposed of solid wastes.



Boater Tips:

1. Trash should never be discarded overboard. If there was room on board to bring it out, there is room to bring it back.
2. Carry a trash receptacle on board your vessel, and always empty it into a proper onshore facility. Most marinas have trash disposal and recycling areas—make use of them.
3. Try to reduce the amount of disposable litter on board by carrying less plastics, removing unnecessary wrappings and packaging, and using reusable containers for food and refreshments.
4. If trash accidentally falls overboard, go back and retrieve it.
5. When possible, retrieve any trash or debris found in the water or on the shore.
6. Never discard cigarette butts, diapers, or fishing line overboard.
7. Do not dispose of fats, solvents, oils, emulsifiers, disinfectants, paints, poisons, phosphates, and other similar products in Marine Sanitation Devices.
8. Whenever possible, use land-based rest rooms rather than onboard ones to reduce the amount of waste that must be pumped out.
9. Remember, law requires all boats 25 feet and more in length to have a sign regarding federal trash disposal regulations posted and visible where garbage is stored (these signs are available at most marine supply stores).
10. Inform and educate your family, friends, and neighbors on proper waste disposal practices.

The boater fact sheet series is produced by the Rhode Island Sea Grant Marine Advisory Service with funding from the R.I. Department of Environmental Management Narragansett Bay Project, through a grant issued by the U.S. Environmental Protection Agency under the Clean Water Act.

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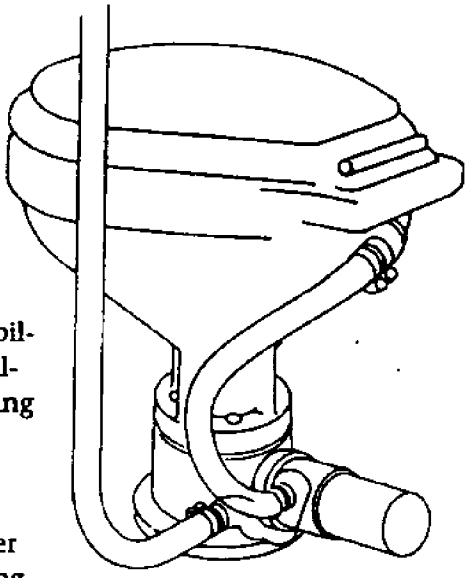
Vessel Sewage



Vessel sewage is a problem when discharged into the water without proper pretreatment. Pathogens in untreated sewage increase the potential for human illness and the possibility of additional shellfish bed and swimming area closures. Added nutrients can also accelerate oxygen depletion in the water column by stimulating uncontrolled plant growth, called eutrophication, which can contribute to algal blooms, foul odors, and fish kills. This problem becomes more significant in enclosed harbors where boaters concentrate to anchor, swim, and fish.

You can play an important role in protecting water quality by following the simple tips listed below.

Boater Tips:

1. Always remember that it is illegal to discharge raw sewage from a vessel into U.S. waters.
2. In Rhode Island, it is illegal to operate or moor a boat that is equipped with a marine toilet that is not approved, not in proper working condition, or that is not properly sealed in declared no-discharge areas.
3. Pumpout facilities should be used to dispose of stored waste whenever possible. They are fast, clean, and inexpensive. New navigation charts and cruising guides now list the locations of operating pumpout stations.
4. Marine sanitation devices (MSDs) must be maintained to operate properly. Keep your disinfectant tank full, use biodegradable treatment chemicals, and follow the manufacturer's suggested maintenance program.
5. Do not dispose of fats, solvents, oils, emulsifiers, disinfectants, paints, poisons, phosphates, diapers, and other similar products in MSDs.
6. Whenever possible, use land-based rest rooms rather than onboard ones.

The boater fact sheet series is produced by the Rhode Island Sea Grant Marine Advisory Service with funding from the R.I. Department of Environmental Management Narragansett Bay Project, through a grant issued by the U.S. Environmental Protection Agency under the Clean Water Act.

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Sea Grant Rhode Island

BOATER FACT SHEET

Rhode Island Sea Grant, University of Rhode Island Bay Campus, Narragansett, Rhode Island 02882-1197 (401) 874-6842

Bilges, Fueling, and Spill Response

It is not uncommon to see a small fuel sheen on the water surface near boats. Although it may only be a tiny amount from some boats, the cumulative impacts can be damaging. Once in the marine environment, oils and fuels have a tendency to accumulate in bottom sediments and concentrate in marine organisms. These harmful substances commonly enter the marine environment through bilge pumping, fueling, and improper response to spills.

You can play an important role in protecting water quality by following the simple tips listed below.

Boater Tips:

1. Bilge Pumping

- Prior to pumping, inspect the bilge to ensure that no fuel or oil has been spilled.
- Do not discharge bilge water if there is a sheen to it.
- The best technique for dealing with oil in the bilge is to continually check and fix all leaks.
- Petroleum absorbent materials, such as bilge pillows and engine pan pads, are very effective at removing oils from bilge water.
- As a further preventative measure, oil/water separators can be installed in bilge pump discharge lines.
- If dirty bilge water cannot be sufficiently cleaned to allow legal discharge, make arrangements with a marina capable of properly disposing of tainted water.

2. Fueling

- Prevent fuel from falling into the water during fueling.
- Don't just top off the tanks, know the capacities of your fuel tanks *prior* to filling.
- Place an absorbent pad or container over the fuel fill or under the fuel vent to collect accidental overflow.
- Listen to the filler pipe to anticipate when the tank is full and to avoid back-splash.
- Stop pumping at the first sign of fuel escape.
- To prevent spillage from tank vents, install a fuel/air separator or an air whistle in your tank's vent line.

3. Spill Response

- Stop the source of the spill first.
- Then focus on containing it, preferably with booms.
- When a spill does occur, it should be reported immediately—federal law requires it.
- Do not use emulsifiers or dispersants (soaps) to treat a spill; this is prohibited by federal law.
- For small spill cleanup, cover the spill with absorbent materials.
- When clean up is complete, properly dispose of used spill response materials.

The boater fact sheet series is produced by the Rhode Island Sea Grant Marine Advisory Service with funding from the R.I. Department of Environmental Management Narragansett Bay Project, through a grant issued by the U.S. Environmental Protection Agency under the Clean Water Act.

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Sea Grant Rhode Island

BOATER FACT SHEET

Rhode Island Sea Grant, University of Rhode Island Bay Campus, Narragansett, Rhode Island 02882-1197 (401) 874-6842

Vessel Cleaning and Fish Wastes

Many cleaning products are toxic, nonbiodegradable, and contain chemicals that can harm marine organisms. In addition, many cleaners are phosphate-based, and may therefore contribute to algal blooms, low dissolved oxygen levels, foul odors, and even fish kills.

As opposed to many cleaning products, fish wastes are absolutely biodegradable and can be eaten by other fish, birds, and marine animals. But when many fish are cleaned and the waste discarded into the same water area on the same day, such as at fishing tournaments, there can be a real disposal problem. Too much deteriorating fish waste in a small area of water is unsightly and can also result in extremely foul odors and decreased dissolved oxygen levels in the water column.

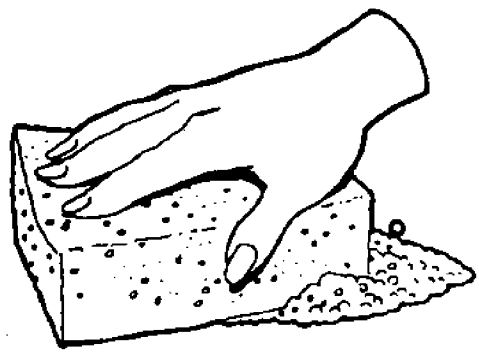
You can play an important role in protecting water quality while cleaning your vessel and/or disposing of fish wastes by following the simple tips listed below.

Boater Tips:

1. Vessel Cleaning

- Minimize the use of soaps and detergents by washing your vessel more frequently with plain water.
- Do not use cleaners that contain ammonia, sodium, chlorinated solvents, petroleum distillates, or lye.
- Buy and use only nontoxic, phosphate-free, biodegradable cleaners.
- Substitute chemical cleansers with natural ones, such as vinegar, citric juices, borax, and baking soda.
- Use hose nozzles that shut off when released to conserve water and reduce the runoff from boat washing.
- Do not clean the bottom of your vessel by scraping or scrubbing it while it is still in the water.

2. Fish Wastes



- Fish wastes should be disposed in unrestricted open waters.
- Clean fish as they are caught offshore or on the way back in.
- Do not dispose of fish wastes in marina basins.
- Many marinas have designated fish-cleaning stations with cutting tables, wash down basins, and covered trash containers or composting programs. Check with your marina.
- Reuse fish wastes as bait and/or chum on your next fishing trip.
- When no such options exist, bag fish waste and dispose of it in the trash.

The boater fact sheet series is produced by the Rhode Island Sea Grant Marine Advisory Service with funding from the R.I. Department of Environmental Management Narragansett Bay Project, through a grant issued by the U.S. Environmental Protection Agency under the Clean Water Act.

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Printed on recycled paper

Sea Grant Rhode Island

BOATER FACT SHEET

Rhode Island Sea Grant, University of Rhode Island Bay Campus, Narragansett, Rhode Island 02882-1197 (401) 874-6842

Engine Maintenance

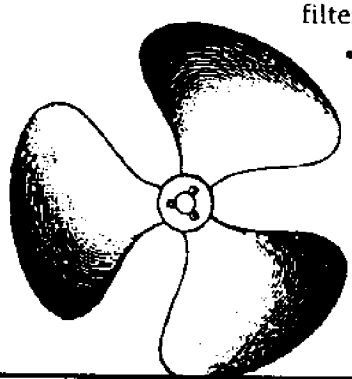
It is not infrequently that we see a small fuel sheen on the water surface near boats. Although it may be only a tiny amount from some boats, the cumulative impacts can be damaging. Once in the marine environment, oils and fuels have a tendency to accumulate in bottom sediments and concentrate in marine organisms. These harmful substances commonly enter the marine environment through improper engine maintenance techniques and waste fluids disposal practices.

You can play an important role in protecting water quality while performing routine engine maintenance by following the simple tips listed below.

Boater Tips:

1. Routine Engine Maintenance

- Keep engines properly tuned for efficient fuel consumption, clean exhaust, and economy.
- Keep your engine clean. It makes it easier to spot and correct small leaks before they become big problems.
- Keep an oil absorption pad in the bilge or below the engine to collect spilled products.
- When undertaking maintenance, wipe up spills so that they do not get pumped overboard with bilge water.
- For spill-proof oil changes, use non-spill pump systems that remove crankcase oils through the dipstick tube. Many marinas have these systems available for your use; check with them.
- In order to catch the oil traditionally spilled during filter removal, slip a plastic bag over the filter and then remove it.



- Keep the use of engine cleaners to a minimum. Parts cleaning should not be done in the bilge or over open ground. It should be done in a container or parts washer where the dirty fluids can be collected and recycled.
- Use the orange-pink colored propylene antifreeze, which is nontoxic, rather than the blue-green colored ethylene glycol, which is toxic and can kill animals that ingest it.
- Keep fuel tanks full during winter storage to reduce condensation buildup.
- Consider adding a fuel stabilizer so that you will not have problems disposing of stale fuel in the spring.
- Do not discharge oil into the water—it is prohibited by law. All boats 25 feet or longer are required to have a sign regarding oil pollution control regulations posted in the engine compartment. These signs are available at most marine supply stores.

2. Waste Disposal

- Never dump waste oils and engine coolants on the ground or into storm drains, dumpsters, and/or open waters.
- Most marinas and towns have specific disposal facilities for waste oils and associated byproducts, such as filters and absorptive materials. Ask about them, and use them.
- When disposing of petroleum-based products, such as fuels and engine oils, keep them separate from each other and from other substances, such as antifreezes, solvents, and water. This lowers the disposal cost charged to your collection facility for contaminated wastes.

The boater fact sheet series is produced by the Rhode Island Sea Grant Marine Advisory Service with funding from the R.I. Department of Environmental Management Narragansett Bay Project, through a grant issued by the U.S. Environmental Protection Agency under the Clean Water Act.

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From: *Rhode Island Boating Monthly Magazine* June 1996 page 16.

Easy-to-use tips you can use to protect your boating environment

Rhode Island boaters are getting into the swing for real these days preparing their vessels for yet another season of fun and recreation on Narragansett Bay and neighboring waters. And there is a very serious consideration for boat owners as they get their craft ready.

Two chores near the top of every Rhode Island boater's fitting out list are sanding and painting. Hulls, decks, compartments, bulkheads all are likely targets of eager sanders and painters.

Surely these are messy jobs under the best of situations. But there are some very real environmental considerations that need to be considered.

Take for example, bottom paints that contain toxic chemicals designed to leach out and prevent bottom growth on the hull during the boating season. When concentrated amounts of these materials are allowed to escape from hull maintenance and repair areas, there is a potential for significant environmental harm.

Materials such as solvents, thinners and brush cleaners, often used in sanding and painting, also can harm the environment if not used correctly. These materials have a tendency to sink in the water, compromising water quality and damaging marine life.

The Rhode Island Sea Grant Marine Advisory Service has come up with some really practical and quite simple tips for protecting the water quality as boaters put a brand new look on their vessel for the season:

1 — When working in marinas, use designated sanding and painting areas. Check with marina manager for the location and proper use of the area.

2 — Work indoors or under cover whenever wind can blow dust and paint into the open air.

3 — Use environmentally friendly tools, such as vacuum sanders and grinders, to collect and trap dust.

4 — Clean up all debris, trash, sanding dust and paint chips immediately after any maintenance job.

5 — Use a drop cloth beneath the hull to catch sanding dust and paint drops when working over unpaved surfaces.

6 — When sanding or grinding hulls over a paved surface, vacuuming or sweeping loose paint particles is the preferred cleanup method. Do not hose the debris away.

7 — Buy paints, thinners and solvents in sizes that can be used within one year to avoid having to throw away stale products.

From: *Rhode Island Boating Monthly Magazine* July 1996 page 16.

Suggestions for solid waste disposal for boaters in Bay

Each piece of trash and litter that gets into Rhode Island's waters adds to a problem that can be solved. Boaters can be a major part of the solution.

Materials such as bottles, bags (paper or plastic), cans, cups, six-pack rings, disposable diapers, cigarette butts, food and fishing line not only degrade the natural beauty of our state boating waters, but also injure or kill aquatic life.

Birds and fish often fatally mistake garbage for food and get tangled in plastic and fishing line. Furthermore, many overheated engines and disabled sets of running gear can be attributed to improperly disposed solid wastes.

The Rhode Island Sea Grant Marine Advisory Service suggests ways boaters can be a positive influence in reducing solid waste:

1 — Trash should never be thrown overboard. If there was room on board to bring it out, there is room to take it back.

2 — Carry a trash receptacle on board the boat, and always empty it into a proper onshore facility. Most marinas have trash disposal and recycling facilities — make use of them.

3 — Try to reduce the amount of disposable litter on board by carrying less plastics, removing unnecessary wrappings and packaging, and using reusable containers for food and refreshments.

4 — If trash accidentally falls overboard, go back and pick it up.

5 — Whenever possible, pick up any trash or debris found in the water or on the shore.

6 — Never throw cigarette butts, diapers or fishing line overboard.

7 — Do not dispose of fats, solvents, oils, emulsifiers, disinfectants, paints, poisons, phosphates or other similar products into marine heads.

8 — Whenever possible, use land-based rest rooms rather than onboard ones to reduce the amount of waste that must be pumped out.

9 — Remember, law requires all boats 25 feet or longer to have a sign regarding federal trash disposal regulations posted and visible where garbage is stored (these signs are available at most marine supply stores).

10 — Inform and educate family, friends and dock neighbors on proper waste disposal.

Appendix H

Sample Sign Language

The following is the actual language used for the signs regarding Solid Waste Disposal Tips, Liquid Harmful Materials Collection, Pumpout Station Operation and Spill Response.

Solid Waste Disposal Tips

- Trash should *never be discarded overboard.* If there is room to bring it out, there is room to bring it back.
- *Sort wastes for standard recyclabes* and dispose of accordingly.
- *Always cleanup* after maintenance work.
- Bring harmful materials such as *solvents, used engine fluids, and filters* to the collection site at the rear of the facility.
- *Use pump-out facilities* to dispose of sanitary wastes.
- When in doubt, check with management.
- *Thank you* for helping to keep this Marina and the boating environment clean.

Harmful Materials Collection

- *No Smoking*
- Keep incompatible liquids such as oil and antifreeze or gas and diesel separate.
- Be sure to match the material that you are disposing of with the appropriate receptacle.
- Oil filters should be left in the collection funnel to drain.
- Check with management for disposal of batteries
- *Thank you* for helping to keep this Marina and the boating environment clean.

From: *Rhode Island Boating Monthly Magazine* September 1996 page 16.

Keeping our boating waters clean, watch cleaning products and fish

Some boat cleaning products being used on Narragansett Bay are toxic, not biodegradable and contain chemicals that can harm marine organisms. In addition, many cleaners are phosphate-based and may contribute to algal blooms, low dissolved oxygen levels, foul odors and even fish kills.

However, when a lot of fish are cleaned and the waste thrown overboard into the same waters on the same day — such as during a fishing tournament — there can be some real problems. Too much deteriorating fish waste in a small area is not only unsightly, but it also can result in extremely foul odors and decreased dissolved oxygen levels in the water column.

Rhode Island boaters can play an important role in protecting water quality while cleaning their vessels and/or disposing of fish waste by adhering to some simple tips proposed by Rhode Island Sea Grant at the University of Rhode Island:

Vessel Cleaning

• Minimize use of soaps and detergents by washing your vessel more frequently with plain water.

• Do not use cleaners that contain ammonia, sodium, chlorinated solvents, petroleum distillates or lye.

• Buy and use only nontoxic, phosphate-free, biodegradable cleaners.

• Substitute chemical cleaners with natural ones — vinegar, citric juices, borax and baking soda.

• Use hose nozzles that shut off when released to conserve water and reduce runoff from boat washing.

• Do not clean the bottom of your boat by scraping or scrubbing it while it is in the water.

Fish Wastes

• Fish wastes should be disposed in unrestricted open waters.

• Clean fish as they are caught offshore or on the way back to the dock — this tends to spread out the disposed material.

• Do not dispose of fish waste in marina basins.

• Many marinas have designated fish-cleaning stations with [illegible] wash-down basins and covered [illegible] containers or composting [illegible]. Check with your marina.

• Reuse fish wastes as bait and [illegible] chum on your next fishing trip.

From: *Rhode Island Boating Monthly Magazine* October 1996 page 12.

Good, regular engine maintenance keeps oil sediments off bottom

It is not infrequent that we notice light fuel sheen on the water in boating areas. Although it may be only a tiny amount from some boat, says a Rhode Island Sea Grant Boater Fact Sheet, the cumulative impact can mount up to be damaging.

Improper engine maintenance and sloppy waste fluids disposal may be one activity that can help reduce pollution.

Here are some tips which may help you in the individual's fight to keep our Narragansett Bay waters as clean as we can make them:

Engine Maintenance —

• Keep engines properly tuned for efficient fuel consumption and clean exhaust.

• By keeping engine clean you can easily spot and correct small leaks.

• Keep oil absorption pads or pillows in the bilge or below the engine to collect any spilled petroleum products.

• When doing maintenance, wipe up spills so they don't get into the bilge and then pumped overboard.

• For spill-proof oil changes, use non-spill pump systems that remove crankcase oils through the dipstick tube. Many marinas have these systems available for your use, check with them.

• Keep fuel tanks full during winte layup to reduce condensation buildup.

• Consider adding a fuel stabilize so you will not have problems disposin of stale fuel in the spring.

• Use the orange-pink colore propylene anti-freeze, which is nor toxic, rather than the blue-green ethylen glycol, which is toxic and can kill an mals that ingest it.

• In order to catch oil traditionall spilled during filter removal, slip a pla tic bag over the filter and then remove i

Waste Disposal —

• Never dump waste oils and engin coolants on the ground or into storr sewers, dumpsters and/or open waters.

• Most marinas and towns have spe cific disposal facilities for waste oils an associated byproducts, such as filter and absorptive materials. Ask abou them and use them.

• When disposing of petroleum based products, such as fuels and engin oils, keep them separate from each othe and from other substances, such a antifreezes, solvents and water. Th lowers the disposal cost charged to you collection facility for contaminate wastes.

Pumpout Operation

- Summer Hours: 8:00 AM - 6:00 PM;

- Fee: $5.00, tokens are available in the Ship's Store

- Instructions:

1. Insert token and verify that the machine is on.
2. Position the toggle switch on auto cycling mode.
3. Close valve in suction hose.
4. Insert the proper deck fitting into your boats waste outlet.
5. Connect the suction hose to the deck fitting using the hose's coupler.
6. Slowly open the valve on the hose
7. When the boat is empty, close the valve, remove the coupler and deck fitting.
8. When finished move the toggle switch to the off position.

Fuel Dock Hours
Responding to Spills

- Operating Hours: 6:00 AM - 7:00 PM.

- In the event of a fuel spill:

1. Identify the source of the spill
2. Attempt to stop it.
3. Notify the fuel station attendant.
4. Follow the plan contained in the response kit.

- No Smoking Allowed.

Appendix I

Boater Workshop Materials

The following materials contain session plans that detail the conducting of the slide show format and walking tour boater workshop alternatives, plus an example publicity flyer which was used to publicize the events.

Boater Workshop Session Plan
Slide Show Presentation

Trainers: Manager _____, Staff Members _____,

Time Required: One hour and 15 minutes

Objective: To raise participant awareness of:

- The pollutants contributed to Greenwich Bay from recreational boating.
- The practices and products which boaters can use to reduce these contributions.

Location: _____

Needed Materials:

Equipment	Products	Educational Handouts
Slide Projector	Cleaners	Boater Fact Sheets
Screen	Head Chemicals	Pumpout Map
Spare Bulb	Antifreezes	Cleaning Article
Stand	Bottom Paints	Project Description
Extension Cord	Absorbents	GBI Progress Report
Display Tables	Fuel Conditioners	MARPOL Placard
Chairs	Fuel/Air Separator	Coastal Features

Contact CRC for Slides (italics denotes a photo, whereas everything else is text)

1. *Marina Photo*	9. BMPs	17. *Oil Change*
2. *Marine Debris*	10. *Fueling*	18. *Disposal facility*
3. BMPs	11. Spill Response BMPs	19. BMPs
4. *Recycling Can*	12. *Bilge pumping*	20. *Bottom Sanding*
5. *Head*	13. BMPs	21. BMPs
6. BMPs	14. *Bilge pillow*	22. *Cst Grd Vessel*
7. *Pumpout Sign*	15. *Engine*	23 *Vessel Cleaning*
8. *Gas Dock*	16. BMPs	24. BMPs

Content and Activity Plan:

6:00 PM **Welcoming:** 3 minutes

- Ex. - "In trying to better serve our customers and in being environmentally responsible, _____ Marina is proud to bring you this event

6:05 PM **Introduction:** 7 minutes

- Boating as a Source of Pollutants
- Brief Project Description, Including Sponsors
- Purpose and Format

6:10 PM **Vessel Operation:** 30 minutes

This discussion is based on four issues and facilitated by the use of a slide show and product examples. For each issue, a picture will be shown, a question posed, and then the problem discussed. Another question will then be posed which leads to a further discussion on the possible solutions to the problem. Once the solutions have been discussed, applicable product examples and additional slides will be shown.

Issues
- Marine Debris and Litter: Slides 2-4 with no product examples.
- Vessel Sewage: Slides 5-7 and head chemicals as product examples.
- Fueling: Slides 8-10 with fuel/air separators and conditioners as product examples.
- Spill Response: BMPs only, slide 11
- Bilge Pumping: Slides 12-14 with absorbents and bilge cleaners as product examples.

Rather than set aside pre-established times, participants will be encouraged to ask questions throughout the session. Once the material has been sufficiently covered an introduction will be provided for the next speaker.

6:40 PM **Vessel Repair and Maintenance** 30 minutes

This discussion is based on three issues and is also facilitated by the use of a slide show and product examples. As with vessel operation, for each issue a picture will be shown, a question posed, and then the problem discussed. Another question will then be posed which leads to a further discussion on the possible solutions to the problem. Once the solutions have been discussed, applicable product examples and additional slides will be shown.

Issues
- Engine Repair and Maintenance: Slides 15-17 with absorbents, and antifreezes as product examples.
- Waste Oil Disposal: Slides 18-19
- Sanding and Painting: Slides 20-22 with paints, solvents, and tarps as product examples.
- Vessel Cleaning: Slides 23-24 with environmentally compatible cleaners as product examples.

Rather than set aside pre-established times, participants will be encouraged to ask questions throughout the session.

7:10 PM **Conclusion:** 5 minutes

- The Incremental Pollution Concept.
- Everyone is Part of the Solution.
- Be a Good Example and Inform Your Friends .
- Thank You.

Boater Workshop Session Plan
Walking Tour Format

Trainers: Manager _____, Staff Members _____,

Time Required: Two hours.

Objective: To raise participant awareness of :

- the pollutant contributions associated with recreational boating; and
- the practices and products which boaters can use to reduce these contributions.

Location:_____

Preparation Schedule Used

9/28/95	First Mailing - Project Description.
10/10/95	Session Plan Review Meeting -
10/20/95	Second Mailing and Post Flyers.
10/24/95	Dry Run - (all trainers).
10/28/95	Workshop.

Needed Materials

Educational Handouts	Products	Equipment
Boater Fact Sheets	Cleaners	Sea Grant Banner
Pumpout Map	Head Chemicals	2 Portable Table
Cleaning Article	Antifreezes	Flip Charts
Project Description	Bottom Paints	2 Portable Easels
MARPOL Placard	Absorbents	
GBI Progress Report	Fuel Conditioner	
Coastal Features		

Content and Activity Plan:

Format - A facility tour approach will be used with the participants visiting a total of six stations. A different topic will be covered at each station. The facility manager will lead the participants between stations and will discuss, and if possible demonstrate, the relevant practices with the help of his staff. A flip chart of shortened boater tips will be posted at each station. These will serve as talking points for management and staff. In addition, relevant products will be displayed on a portable table at each station.

10:00 AM **Introduction:** 10 minutes, at office (Manager)
- Thank You for Coming
- Project Description
- Boating as a Source of Pollution
- Training Session Purpose/Format
- Introduce Next Speaker

10:10 AM **Engine Maintenance** 25 minutes, at mechanic shop (Manager and Staff)
Key Content: (Routine Maintenance Fact Sheet)
1. Potential Problem
2. Boater Tips (examples)
   - Keeping Engines Tuned and Clean - discuss
   - Spill Proof Oil Changes - discuss and show examples
   - Use of Absorbents/Bilge Pumping - discuss and show examples
   - Fueling - discuss
3. Winterization (examples)
   - How To - discuss
   - Toxic and Non-Toxic Antifreezes - discuss and show examples
   - Fuel Conditioning - discuss and show examples

10:35 AM **Liquid Waste Disposal:** 10 minutes, at disposal facility (Manager)
Key Content: (Routine Engine Maintenance Fact)
1. Potential Problem
2. Boater Tips (examples)
   - Keeping Products Separate - discuss
   - Waste Oils and Filter Disposal - demonstrate where and how

10:45 AM **Vessel Sewage:** 20 minutes, pumpout station (Manager and Staff)
Key Content: (disposal regulation and procedures - Vessel Sewage Fact Sheet)
1. Potential Problem
2. Boater Tips (examples)
   - Discharging Overboard - discuss legalities
   - Pumpout Procedure - demonstrate and discuss
   - Acceptable Treatment Chemicals - discuss and show examples

11:05 AM **Solid Waste Disposal:** 10 minutes, dumpster (Manager)
Key Content: (Marine Debris and Litter section, cleaning up after maintenance activities - Solid Waste Fact Sheet)
1. Potential Problem
2. Boater Tips (examples)
   - Vessel operation - discussion "what goes out must come back"
   - What Goes in Dumpsters and What Does Not - discuss
   - Batteries - discussion "where and how to dispose"

11:15 AM **Vessel Cleaning:** 10 minutes, at a boat being cleaned (Manager and Staff)

Key Content: (phosphate free and biodegradable cleaners/water conservation - Vessel Cleaning and Fish Waste Fact Sheet)
1. Potential Problem
2. Boater Tips (examples)
   - Choose the Right Products - discuss and show examples
   - Use Proper Techniques - discuss

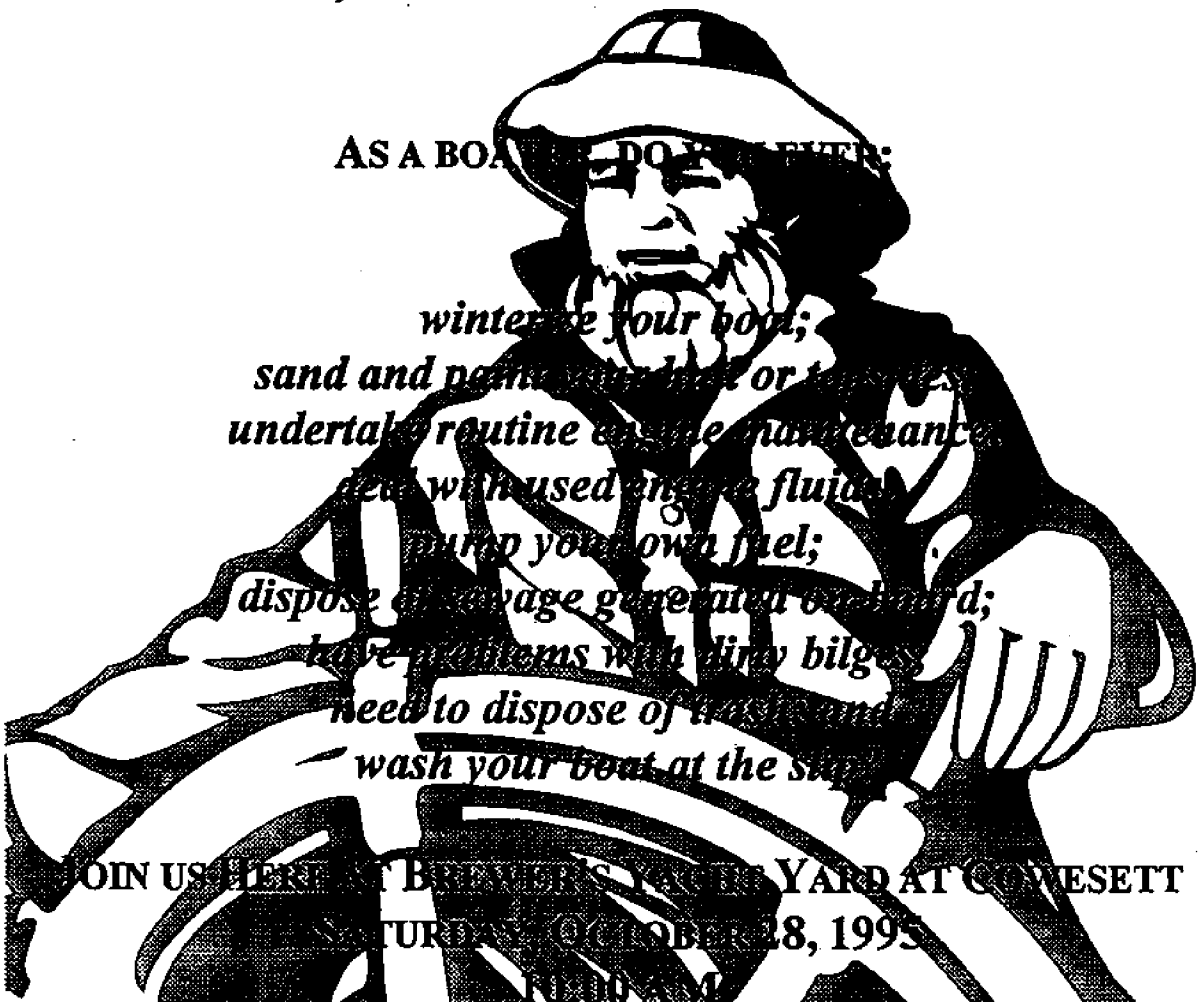
11:25 AM **Sanding and Painting:** 25 minutes, at paint shop (Manager and Staff)
Key Content: (Product selection, cleanup and disposal - Sanding and Painting Fact Sheet)
1. Potential Problem
2. Boater Tips (examples)

   - Preparation /Cleanup - discuss and/or demonstrate

- Selecting Paints and Solvents - discuss and show product examples
- Handling Paints and Solvents - discuss
- Disposing of Paints, Solvents, and Sandings - discussion

11:50 AM **Conclusion :** 10 minutes, at last station (Manager)
- The Incremental Pollution Concept
- Everyone is Part of the Solution
- Be a Good Example and Inform Your Friends
- When in Doubt Ask
- Thank You

LOOKING FOR VESSEL OPERATION, REPAIR, & MAINTENANCE TIPS?



AS A BOA[illegible] DO [illegible]:

winterize your boat;
sand and paint your hull or [illegible];
undertake routine engine maintenance;
deal with used engine fluids;
pump your own fuel;
dispose of sewage generated overboard;
have problems with dirty bilges;
need to dispose of trash and [illegible];
wash your boat at the slip?

JOIN US HERE AT BRIGGS MARINA YARD AT COWESETT
SATURDAY, OCTOBER 28, 1995
10:00 A.M. [illegible]

Where marina staff and boating specialists from the Coastal Resources Center/Rhode Island Sea Grant will be here to discuss tips on environmentally responsible vessel operation, repair, and maintenance, display applicable products and practices; and assist you with any questions or concerns that you might have.

100 Folly Landing, Warwick, RI.
(401) 884-0544

Appendix J

First Season Educational Materials

The following educational are those used prior to the development of the Boater Fact Sheets Series. These materials include:

1. *Environmental Guidance for Boaters: Common Sense Solutions for Pollution Prevention;*
2. *Pumpout Station Map;*
3. *Environmentally Safe Boat Cleaning Article;*
4. *US Coast Guard Garbage Placard;*
5. *Coastal Features - RI's Coastal Nonpoint Pollution Control Program;*
6. *Greenwich Bay Project Report;*
7. *Bring Back Greenwich Bay; and*
8. *Marina Outreach and Best Management Practice Implementation Project Description.*

Environmental Guidance for Boaters: Common Sense Solutions for Pollution Prevention

Imagine a great day of boating with family and good friends, enjoying a warm sunny day with a gentle breeze, a cooling spray on the face, natural scenery passing by, fine food to eat, and lighthearted conversation. Picture fishing, sailing, water skiing, or just cruising to a quiet harbor. That is the fun image of an ideal boating trip. **Stop**! Now visualize that same trip on dirty brown water, with drifting oil-soaked debris, a foul odor, and a shoreline littered with semi-submerged junk and old tires.

The first image has now changed to an uncomfortable displeasure. Clean water is the foundation of enjoyable boating, and you can play an important role in protecting water quality by making simple changes to the way you operate your vessel and undertake routine maintenance. The following sections highlight the potential pollution problems associated with boating and also offer tips which you can use to protect the boating environment.

Litter and Debris

Litter and debris comes in all kinds, colors, and sizes including bottles, bags, cans, cups, six-pack rings, diapers, cigarette butts, fishing line etc. Each piece of trash and litter adds to a problem that can be easily recognized and prevented. Plastic and litter not only degrade the natural beauty of boating waters they can also injure or kill aquatic life.

Boater Tips:

- Trash should never be discarded overboard. If there was room to bring it out, there is room to bring it back.
- Carry a trash receptacle aboard your vessel, and always empty it into a proper on-shore facility. Most marinas have trash disposal and recycling areas, make use of them.
- Try reducing the amount of disposable litter onboard by carrying less plastics, removing unnecessary wrappings and packaging, and using reusable containers for food and refreshments.
- If trash accidentally goes overboard, go back and get it.
- When possible, retrieve any trash or debris found in the water or on the shore.
- Never discard cigarette butts or fishing line overboard.
- Remember, law requires all boats 25 feet and more in length to have a sign regarding federal trash disposal regulations posted and visible where garbage is stored (these signs are available at most marine supply stores).

Vessel Sewage

Vessel sewage is a problem when discharged overboard without proper pretreatment. Pathogens in untreated sewage increase the potential for illness in humans, and the possibility of additional shellfish beds and swimming areas being closed to our use. The added nutrients can also accelerate oxygen depletion in the water column and potentially contribute to algae blooms, foul odors, and fish kills. This problem becomes more significant in enclosed harbors where boaters concentrate to anchor, swim, and fish.

Boater Tips:

- Always keep in mind that it is illegal to discharge raw sewage from a vessel into U.S. waters.
- In Rhode Island, it is illegal to operate or moor a boat that is equipped with a marine toilet that is not approved, not in proper working condition or that is not properly sealed in declared no-discharge areas.
- Pumpout facilities should be used to dispose of stored waste whenever possible. They are fast, clean, and inexpensive. New navigation charts and cruising guides are adding the locations of operating pumpout stations.

- Marine Sanitation Devices (MSDs) must be maintained to operate properly. Keep your disinfectant tank full, use biodegradable based treatment chemicals, and follow the manufactures suggested maintenance program.
- Do not dispose of fats, solvents, oils, emulsifiers, disinfectants, paints, poisons, phosphates, diapers, and other similar products in MSDs.
- Whenever possible, use land based rest rooms rather than on-board ones.

Engine Fluids and Routine Maintenance

It is not infrequent that we see a small fuel sheen on the water surface near boats. Although it may only be a tiny amount from some boats, the cumulative impacts can be damaging. Once in the marine environment, oils and fuels have a tendency to build up in bottom sediments and accumulate in fish. Furthermore, certain fluids and coolants can be highly toxic and even carcinogenic. These substances can enter the marine environment during routine engine maintenance, through improper disposal practices, bilge pumping, fueling, and improper spill response.

Boater Tips:

Routine Engine Maintenance

- Engines should be kept properly tuned for efficient fuel consumption, clean exhaust and economy.
- Keep your engine clean. It makes it easier to spot and correct small leaks before they become big problems.
- Keep an oil absorption pad in the bilge or below the engine to collect spilt products.
- When undertaking maintenance, wipe up spills so that they do not get pumped overboard with bilge water.
- For spill proof oil changes, use non-spill pump systems that remove crank case oils through the dipstick tube. Many marinas have these systems available for your use, check with them.
- To catch the oil traditionally spilt during filter removal, slip a plastic bag over the filter and then remove it.
- Keep the use of engine cleaners to a minimum. Parts cleaning should not be done in the bilge or over open ground. It should be done in a container or parts washer where the dirty fluids can be collected and recycled..
- Use the orange/pink colored propylene antifreeze which is non-toxic, rather than the blue/green colored ethylene glycol which is toxic and can kill animals which ingest it.
- The discharge of oil is prohibited by law and all boats 25 feet and more in length are required to have a sign regarding oil pollution control regulations posted in the engine compartment (these signs are available at most marine supply stores).

Waste Disposal

- Never dump waste oils and engine coolants on the ground, into storm drains, dumpsters, and/or open waters.
- Most marinas and towns have specific disposal facilities for waste oils and associated by-products such as filters and absorption materials. Ask about them, and use them.
- When disposing of petroleum based products such as fuels and engine oils, keep them separate from each other and from other substances such as antifreezes, solvents, and water. This lowers the disposal cost charged to your collection facility for contaminated wastes.

Bilge Pumping

- Prior to pumping, inspect the bilge to ensure that no fuel or oil has been spilled.
- Do not discharge bilge water if there is a sheen to it.
- The best technique for dealing with oil in the bilge is to continually check and fix those small leaks.
- Petroleum absorbent materials such as bilge pillows and engine pan pads are very effective at removing oils from bilge water.
- As a further preventative measure, oil/water separators can be installed in bilge pump discharge lines.
- If dirty bilge water can not be sufficiently cleaned to allow legal discharge, make arrangements with a

marina capable of properly disposing of this tainted water.

Fuel and Fueling

- During fueling prevent fuel from falling into the water.
- Do not just top off the tanks, know the capacities of your fuel tanks prior to filling.
- Place an absorbent pad or container over the fill or under the fuel vent to collect accidental overflow.
- Listen to the filler pipe to anticipate when the tank is full and to avoid back-splash.
- Stop pumping at the first sign of fuel escape.
- To prevent spillage from tank vents, install a fuel/air separator or an air whistle in your tank's vent line.
- Keep your tanks full during winter storage to reduce the build of condensation.
- Consider adding a fuel stabilizer so that you will not have problems disposing of stale fuel in the spring.

Spill Response

- Stop the source of the spill first.
- Then focus on containing it, preferably with booms.
- When a spill does occur it should be reported immediately, federal law requires it.
- Do not use emulsifiers or dispersants (soaps) to treat a spill, this is prohibited by federal law.
- For small spill clean up, cover the spill with absorbent materials.
- When clean up is complete, properly dispose of used spill response materials.

Sanding and Painting

When sanding and painting vessels, often a messy job, dust and paint can fall onto the ground or into the water. Antifouling paints for example are made with toxic chemicals designed to leach out and prevent bottom growth. When concentrated amounts of these materials are allowed to escape from hull maintenance and repair areas, there is a potential for environmental harm. Materials such as solvents, thinners, and brush cleaners which are often used when sanding and painting, can also pose an environmental harm if improperly handled. These materials are often known carcinogens and have a tendency to sink in the water column until they reach the habitats of fish.

Boater Tips:

- When working in marinas, use dedicated sanding and painting areas. Check with the manager on the location and proper use of these areas.
- Work indoors or under cover whenever wind can potentially blow dust and paint into the open environment.
- Use environmentally friendly tools like vacuum sanders and grinders which automatically collect and store dust. Some marinas have them for rent, check with the manager.
- Clean debris, trash, sandings paint chips etc. immediately after any maintenance or repair activity.
- Use a drop cloth beneath the hull to catch paint sandings and drops when working over unpaved surfaces.
- When sanding or grinding hulls over a paved surface, vacuuming or sweeping loose paint particles is the preferred clean up method. Do not hose the debris away.
- Buy paints, varnishes, solvents, and thinners in sizes which you can use within one year. This way you will not have to dispose of stale products.
- When possible, use water-based paints and solvents.
- Switch to longer lasting, harder, or non-toxic antifouling paint at your next haul out.
- Paints, solvents, and reducers should be mixed away from the water's edge and transferred to work areas in tightly covered containers of one gallon or less.
- Keep in mind that solvents and thinners can be used more than once by allowing the solids to settle out and draining the clean product off the top.
- For small quantities of unusable solvents let them evaporate by brushing them onto an old board.
- Thoroughly dry paint cans before disposing of them in the trash.

- When in doubt about proper disposal practices, check with your marina or local municipality.

Vessel Cleaning

Many cleaning products are toxic, non-biodegradable, and contain chemicals which can harm plankton and fish. These products can introduce toxins which find their way into the food chain or instantly kill aquatic life. In addition, many cleaners are based on phosphates which can contribute to algae blooms, low dissolved oxygen counts, foul odors, and possibly even fish kills.

Boater Tips:

- Minimize the use of soaps and detergents, wash your vessel frequently with plain water only.
- Do not use cleaners which contain ammonia, sodium, chlorinated solvents, petroleum distillates, or lye.
- Buy and use only non-toxic, phosphate-free, and biodegradable cleaners.
- Substitute chemical cleansers with natural ones such as vinegar, citric juices, borax, and baking soda.
- Use hose nozzles which shut off when released to conserve water and reduce the runoff from boat washing.
- Do not clean the bottom of your vessel by scrapping or scrubbing it, while it is still in the water.

Fish Wastes

Fish wastes are absolutely biodegradable and can be eaten by other fish, birds and marine animals. But when many fish are cleaned and the waste discarded into the same water area on the same day, such as at fishing tournaments, there can be a real disposal problem. Too much fish waste in the same water is unsightly and by rotting can result in extremely foul odors and decreased dissolved oxygen levels in the water column.

Boater Tips:

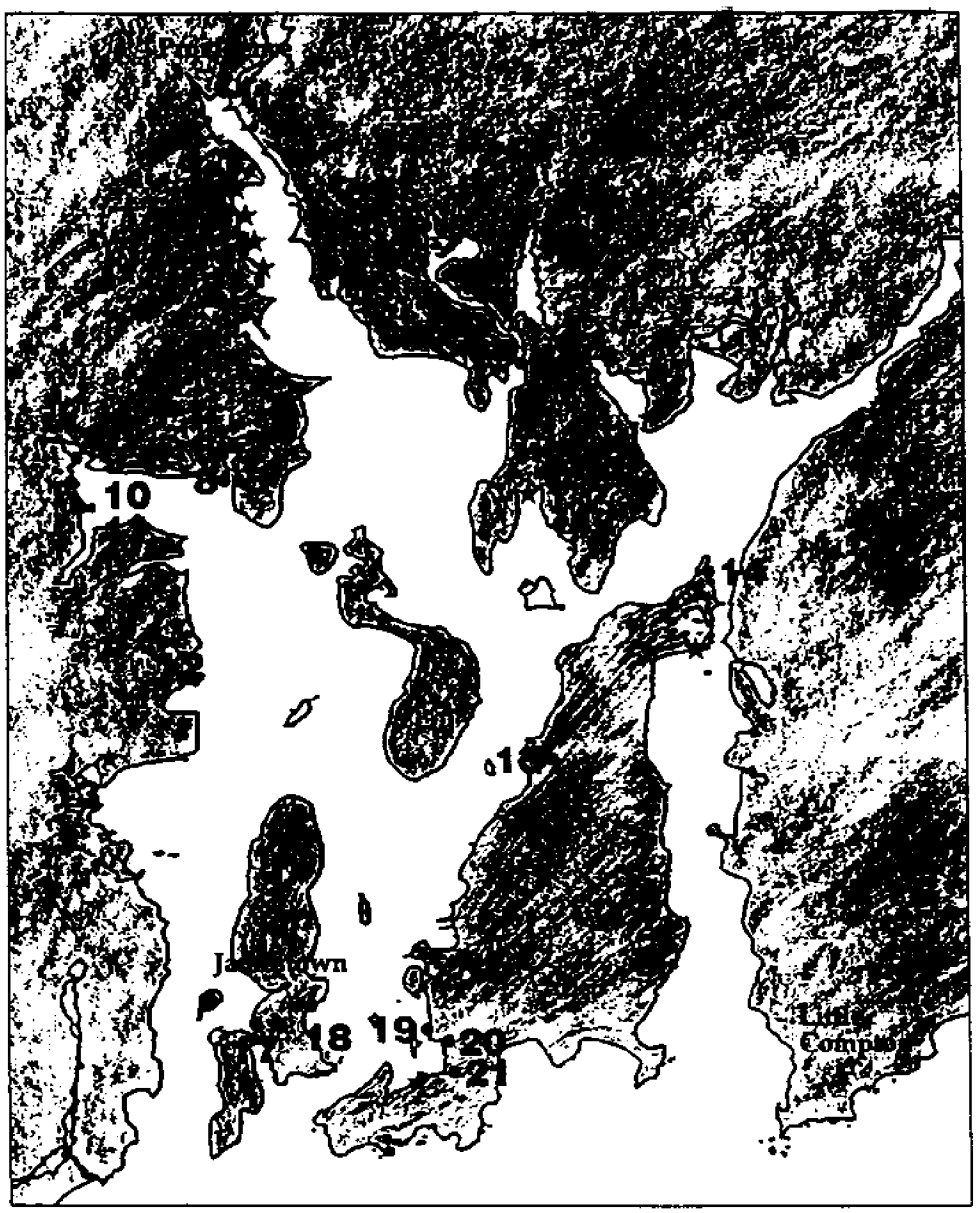
- Fish wastes should be disposed of in unrestricted open waters.
- Clean fish as they are caught offshore, or on the way back in.
- Do not dispose of fish wastes in marina basins.
- Many marinas have designated fish-cleaning stations with cutting tables, wash down basins, and covered trash containers or composting programs. Check with your marina.
- Reuse fish wastes as bait and/or chum on your next fishing trip.
- When no such options exist, bag fish waste and dispose of them in the trash.

You Can Make A Difference

We all need to actively protect our coastal areas so that we may continue to enjoy their full value. In this case, clean water starts with each boater. Go aboard your vessel and take a careful look around, decide what to change, and do it. When guests come aboard, tell them what the boat's new clean boating rules are. Set a good example and inform your friends and family. By being aware and responsible you can help eliminate sources of pollution from boating. Remember, every little bit does hurt, and every boater can be part of the solution.

Note: This document is based on a fact sheet series originally prepared by the International Marina Institute in 1993, by Amaral and Ross, as a public information flyer under a grant from the United States Environmental Protection Agency (USEPA). This version has been revised by Jared Rhodes, Mark Amaral, and Virginia Lee of the University of Rhode Island, Coastal Resources Center/Rhode Island Sea Grant, Marine Advisory Service. Funding for production and distribution of this document has been provided by the Rhode Island Department of Environmental Management, Narragansett Bay Project, through a grant issued by the USEPA under the Clean Water Act.

Narragansett Bay Marine Pump-Out Facilities



(As of January ,1996)

● = Pump-out facilities open and ready for use
★ = Future pump-out facilities

Compliments of Rhode Island Department of Environmental Management, Save The Bay and United States Fish & Wildlife Service.

D·E·M

SAVE THE BAY

R.I. Dept. of Environmental Management
291 Promenade St., Providence, RI 02908
(401)277-3961

434 Smith Street, Providence, RI 02908
RI (401)272-3540 • FAX (401)273-7153
BayKeeper Pollution Hotline: 1-800-NARR BAY

1996 Narragansett BayMarine Pump-Out Facilities

Location:	Contact:	Hours:	Cost:
Providence			
1. India Point Marina (Shooters Waterfront Cafe)	401-273-2555	10 - 9:30 Fri - Sun, 10 - 8 Mon - Thurs	no fee
East Providence			
2. Cove Haven Marina	401-246-1600	24 hours	no fee
Warren			
3. Warren Town Dock	401-245-7340	24 hours	$2 token system *(purchase at Warren & Barrington Town Halls)*
Bristol			
4. Rockwell Pier	401-253-1700	Wed. 3 - 6 p.m., Sat. & Sun. 10 - 1	$5
Warwick			
5. Warwick Bay Marina	401-739-6435	call	call
6. Carlson's Marina	401-738-4278	8 - 4:30 daily	$5
7. Wharf Marina	401-737-2233	24 hours	$5, token system
8. Harbor Light Marina	401-737-6353	8 am - 9 pm	$5, free w/ 50 fill-up or for patrons
9. Apponaug Harbor Marina	401-739-5005	Mon-Fri 9 - 4, Sat 12 - 4	$5
10. Brewer's Yacht Club (at Cowesset)	401-884-0544	Mon - Sat 8 - 4:30	$5
11. Greenwich Bay Marina Club	401-884-1810	24 hours	$5
North Kingstown			
12. Allen Harbor Marina (Town of North Kingstown)	401-294-1212	call	call
13. Brewer's Marina	401-884-7014	8-6 daily	$5, free for patrons
Portsmouth			
14. Brewer's Sakonnet Marina	401-683-3551, Ch. 9	8-4 daily	$5
15. East Passage Yachting Center	401-683-4000, Ch. 9	7 - 7 daily	$7 Public, no fee for patrons
16. Alden Yachts	401-683-4200	call	call
Jamestown			
17. West Ferry Wharf (Dutch Harbor)	401-423-1556, Ch. 9 & 71	24 hours	no fee
18. East Ferry Town Dock	401-423-7282, Ch. 11, 16	8 - 8 daily	no fee
Newport			
19. Goat Island Marina	401-849-5655, Ch. 9 & 16	7:30 - 8 daily	$5
20. Long Wharf Mobile Pump-Out Boat	401-849-2210, Ch. 9	8 - 6 daily	$5 for first 30 gallons
21. Newport Yachting Center **(Not On Map)**	401-846-1600, Ch. 9 & 11	8 - 7:30 daily	$5
Pawcatuck			
Avondale Boatyard	401-348-8187	8 - 5 Sun - Thurs, 8 - 7 Fri - Sat	< 40 ft. - $5, > 40 ft. - $10
South Kingstown			
Ram Point Marina	401-783-4535, Ch. 1 & 9	8 - 4:30 daily	no fee
Block Island, New Harbor			
Block Island Harbors Dept.	401-466-3204, Ch. 12	7 - 5 daily	no fee
• Old Harbor Town Dock Mobile Cart (call for assistance)			
• Additional Harbor Pump-Out boat			
Block Island Boat Basin	401-466-2631, Ch. 16	7 - 7 daily	$13.50 public, no fee for guests
Champlins Marina	401-466-2641, Ch. 68	7 - 9 daily	no fee
Payne's New Harbor Dock	401-466-5572	7 - 6 daily	$10

Future Pump-out Facilities

(Pending construction and/or pending state non-governmental/Clean Vessel Act grant funding) For up-to-date information on completed pump-outs, call 401-277-3961, ext. 7274

Location:	Contact:	Location:	Contact:
Cranston		**Narragansett**	
Edgewood Yacht Club	401-461-1000, ext. 3245	Galilee State Pier (Proposed)	
Pawtuxet Cove Marina	401-461-1000, ext. 3245	**Warwick**	
Port Edgewood Marina	401-461-1000, ext. 3245	Warwick Cove Marina	401-737-2446
Rhode Island Yacht Club	401-461-1000, ext. 3245	**Newport**	
Westerly		Newport Yacht Club	401-846-1600
Watch Hill Pump Out Vessel		**East Greenwich**	
		East Greenwich Yacht Club	401-884-7700

BOATING

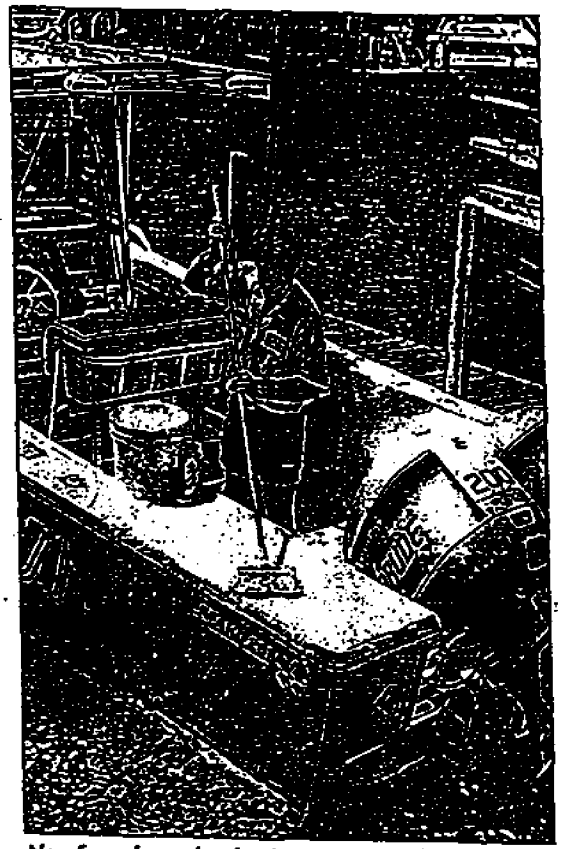
George Poveromo

Environmentally Safe Boat-Cleaning Products

I never feel guilty about cleaning my boat after a day of fishing. Since I trailer, most of the rinse water is contained in my driveway. On occasion, I even bleach the deck to keep it spotless. At the conclusion of the project the driveway is thoroughly rinsed and the water is absorbed by the ground (there are no drain gutters).

It's a different story at a marina. While I use cleaners liberally on land, I never give my boat the full treatment at a slip. Just a little mild soap and water and a lot of scrubbing — that's my dockside formula.

Granted, the washings from one boat won't destroy the environment, but consider all the boats docked at marinas and behind waterfront homes. The fact is that a lot of harmful chemicals enter our waters as a result of everyday boat maintenance. These pollutants, in quantity, can have a detrimental impact on marine life. What's worse, many marinas and homes are located near sensitive wetland areas that serve as nurseries for major forage species and game fish.



New formulas and technology have made it possible for companies to create boat-cleaning products that are not only less harmful to the marine environment, they work just as well as, if not better than, the old products.

Phosphates Mean Algae

Problems associated with cleaners usually revolve around phosphates. As with phosphate-containing household cleaners, experts have shown that these chemicals are basically food for algae. When enough phosphates enter the water, oxygen-consuming algae (and even some toxin producers) thrive, choking off other marine organisms.

Other potentially harmful chemicals acid found in some hull cleaners. Although some of these cleaners are designed to help remove barnacles, they can also harm the boat's gelcoat and your skin. Furthermore, when enough of these strong acids enter the environment they can alter the water's pH level.

Bilge cleaners are another big concern. Many contain emulsifiers, which break up oil and make it soluble in water. If any cleaner is accidentally pumped overboard, the emulsion breaks down, leaving just the oil floating along it's illegal to discharge oil or fuel into the water, no matter how insignificant the amount.

New Products to the Rescue

The above are just a few of the problems that can be caused by boating products. Fortunately, manufacturers are working diligently to create products that are more friendly to the marine environment. One such company, Star brite, has taken the lead by introducing an entire line of environmentally sound maintenance products. A publicly owned corporation, Star brite is the leading producer of marine cleaning, maintenance, and repair products. Its new Sea Safe line includes a Boat Wash, Boat Wash & Wax, Teak Cleaner, Teak Brightener, Bilge Cleaner, Deck Cleaner, and Hull Cleaner.

According to Star brite's vice president, Jeff Tieger, who's also a chemist, the progression towards environmentally sensitive boating products began approximately four years ago. "Because most boaters and anglers care about the environment, we started looking into these products," Tieger says. "A lot of other companies quickly jumped into the market by introducing products that didn't work or weren't as environmentally sensitive as they originally had thought. We decided to take a long-range view before introducing our products. We diligently tested different formulas, seeing how each performed under various conditions. By taking the time to study and test them, we were able to come out with products that worked as well as, and in many

with less active ingredients."

Bilge Cleaner

As mentioned, it is illegal to pump oil or fuel into the environment, no matter how insignificant the amount. Some older bilge cleaners contained emulsifiers that mixed oil with water. If that solution was pumped overboard, the emulsion would break down immediately in the water and leave an oily slick. Because of stricter regulations, modern bilge cleaners contain emulsions that hold together a lot better.

"If there was an accidental discharge, these new bilge cleaners won't wind up as a slick," reports Tieger. "The emulsifiers will stay together much longer, taking the oil to the bottom, where it'll eventually biodegrade. We now have bilge absorbers based on a special paper that repels water, yet absorbs oil like a sponge. When these products are added to your bilge along with our cleaner, the paper absorbs the oil as it is broken up. What's left is a basically oil-free solution that's approximately 83 percent biodegradable within 28 days. Simply remove the oil-soaked papers and discard them properly on shore. Our Bilge Cleaner has a much safer emulsifier. It's not acidic or harsh, and it contains no phosphates. It's friendlier on the environment and on wiring."

Teak Cleaner and Brightener

Unlike older, two-part teak cleaners that use an acid-based cleaner to eat away hard, dead wood, and a follow-up alkaline system to neutralize the acid's effect, Star brite's Sea Safe Teak Cleaner and Brightener isn't really a two-part process. Their Cleaner is composed of surfactants and wetting agents that clean the old wood. Since there's no acid to neutralize, the Teak Brightener is optional. If dark teak is preferred, forget about the brightener, which lightens the wood's color and enhances its grain. The benefit of this product, according to Tieger, is that any residue from boat washings or rain runoff won't contain acid. The biodegradable formula is better for the wood, humans, and the environment.

Star brite and other companies offering products that are less detrimental to our environment deserve special recognition. And with our attention sharply focused on the bigger picture of fisheries conservation and cleaning up our environment, it's easy to overlook the little things like cleaning agents. But after all, little things can add up to big problems. It's something to think about the next time you clean your boat.

Star brite Products

Star brite products, including their new Sea Safe line, are available through quality marine stores, tackle shops, and mail-type retailers. If you can't locate Star brite, call (800) 327-8583 for the retailer nearest to you.

It is illegal for any vessel to dump plastic trash anywhere in the ocean or navigable waters of the United States. Annex V of the MARPOL TREATY is a new International Law for a cleaner, safer marine environment. Each violation of these requirements may result in civil penalty up to $25,000, a fine up to $50,000, and imprisonment up to 5 years.

U.S. Lakes, Rivers, Bays, Sounds and 3 miles from shore

ILLEGAL TO DUMP

Plastic & Garbage
Paper Metal
Rags Crockery
Glass Dunnage
Food

3 to 12 miles

ILLEGAL TO DUMP

Plastic
Dunnage (lining & packing materials that float) also if not ground to less than one inch:
Paper Crockery
Rags Metal
Glass Food

12 to 25 miles

ILLEGAL TO DUMP

Plastic
Dunnage (lining & packing materials that float)

Outside 25 miles

ILLEGAL TO DUMP

Plastic

State and local regulations may further restrict the disposal of garbage.

WORKING TOGETHER, WE CAN ALL MAKE A DIFFERENCE!

Report any violation to the local U.S. Coast Guard Captain of the Port

Designed by the CENTER FOR MARINE CONSERVATION, Washington, DC

Coastal Features

INFORMATION ABOUT THE RHODE ISLAND COASTAL RESOURCES MANAGEMENT PROGRAM

SUMMER 1994 VOLUME II, NO. 3

PROGRESS REPORT

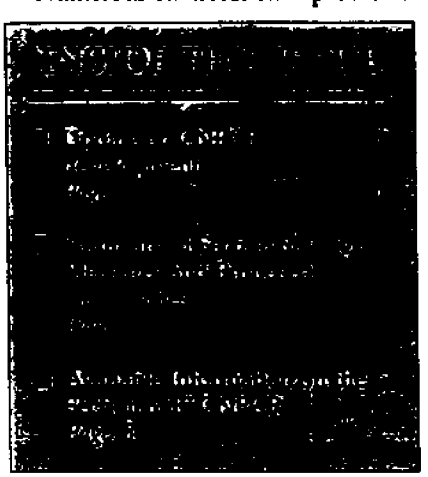
Rhode Island's Coastal Nonpoint Pollution Control Program

Last summer, the Coastal Resources Management Council (CRMC) devoted an entire issue of *Coastal Features* to the subject of nonpoint source pollution and the new federal mandates designed to control and minimize the introduction of this type of pollution into our coastal waters. Over the past year, the cooperative efforts of the CRMC, the Rhode Island Department of Environmental Management (RIDEM) and the Rhode Island Department of Administration, Division of Planning (RIDOP), with the assistance of several advisory committees, have led to significant progress in the development of Rhode Island's Coastal Nonpoint Pollution Control Program (CNPCP). To keep you informed of this progress, we are again publishing a special edition of *Coastal Features*. The purpose of this issue is to provide a general review of the federal requirements for nonpoint source pollution control contained in the Coastal Zone Act Reauthorization Amendments of 1990 and an update on the progress that has been made to date towards meeting those requirements.

An Overview of Nonpoint Source Pollution in Coastal Waters

Simply defined, nonpoint source pollution is polluted runoff. Nonpoint pollution is caused by rainfall or snowmelt moving over and through the ground. As the runoff moves, it picks up and carries away both natural pollutants and pollutants resulting from human activities. These pollutants include sediments, nutrients, pesticides, pathogens, viruses and toxic materials such as hydrocarbons and heavy metals. Eventually, these pollutants are deposited in [illegible] wetlands, coastal waters, and ground waters.

Numerous environmental problems



are associated with nonpoint pollution. Among those problems which are of particular concern to Rhode Islanders are eutrophication and bacterial contamination. Eutrophication is the enrichment of a waterbody with nutrients, typically nitrogen or phosphorous. While nutrients are necessary to the functioning of any healthy ecosystem, excessive concentrations of nutrients can devastate waterbodies, particularly poorly flushed estuaries such as Rhode Island's Salt Ponds and the Narrow River. An overabundance of nutrients, from sources such as fertilizers, human and animal wastes, and detergents, may result in algal blooms which cause waters to become depleted of oxygen, leading to the suffocation of marine life. Bacterial contamination from sources such as failed septic systems, runoff from animal operations, and sewage discharged from boats can pose serious threats to human health. Exposure to bacterial contamination either through direct contact (e.g. swimming) or consumption of contaminated shellfish can lead to hepatitis, gastroenteritis, and other illnesses. Further problems associated with nonpoint pollution include: excessive sedimentation which results in habitat losses and marine life mortality; contamination of drinking water supplies; and, the closure of shellfish beds.

In a 1992 report on the status of polluted runoff problems and state programs, the Environmental Protection Agency (EPA) reported that at least 1.2 million acres of coastal waters were impaired or threatened by polluted runoff. The sources of this runoff are varied and, at times, difficult to trace. Nonetheless, certain activities and land uses have been identified by EPA and the National Atmospheric and Oceanic Administration (NOAA) as having the most significant impacts on coastal water quality nationally and, as a result, in need of greater regulation.

Section 6217 of the Coastal Zone Act Reauthorization Amendments of 1990

In order to address the problems associated with nonpoint sources of pollution, Congress adopted Section 6217 of the Coastal Zone Act Reauthorization Amendments of 1990. Section 6217, entitled "Protecting Coastal Waters", requires each coastal state participating in the federal coastal management program to develop a Coastal Nonpoint Pollution Control Program (CNPCP) to be approved jointly by the EPA and the NOAA. Once approved, Rhode Island's CNPCP will be implemented through changes to existing programs administered by the CRMC, RIDEM, RIDOP,

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Section 6217 of the Coastal Zone Act Reauthorization Amendments of 1990

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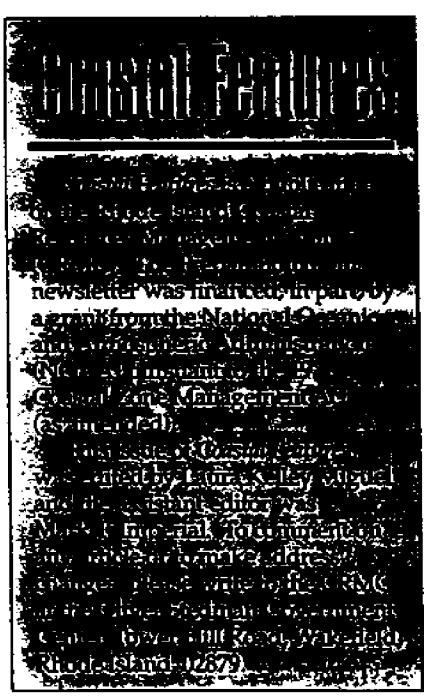
and local governments. Failure to develop an approved CNPCP by July of 1995 will result in fiscal penalties on both the RIDEM's Nonpoint Source Management Program, developed in accordance with requirements contained in Section 319 of the Clean Water Act, and the CRMC's Coastal Resources Management Program (CRMP).

The central purpose of Section 6217 is to enhance state and local efforts to manage land use activities that degrade coastal waters and coastal habitats. Section 6217 will, for the first time, bring together the authorities and expertise of state water quality (e.g., RIDEM) and state coastal zone management (e.g., CRMC) agencies to jointly address the problem of nonpoint pollution of coastal waters. In addition, the development of Rhode Island's CNPCP will require coordinating a wide range of regulatory and nonregulatory nonpoint source management programs as well as technical assistance and monitoring efforts. Accordingly, it is clear that broad participation in the development and implementation of R.I.'s CNPCP will be necessary.

Essentially, Section 6217 is a two tiered program. The first tier involves the broad implementation of technology-based management measures within a specified management area of each coastal state. In Rhode Island, this area encompasses almost the entire state. These measures, commonly referred to as the (g) measures, can be classified into three categories: measures that establish performance standards, such as an 80% removal of total suspended solids from stormwater; measures that establish a procedure for reducing polluted runoff, such as the implementation of nutrient management plans for agricultural operations; and, general pollution prevention measures, such as a requirement for educational programs for recreational boaters. Each (g) measure is accompanied by a series of recommended best management practices (BMPs) which either individually or in combination achieve the (g) measure. These (g) measures and recommended BMPs are contained in the federal guidance document, *Guidance Specifying Management Measures for Nonpoint Pollution in Coastal Waters* (EPA, 1993). The *Guidance* is divided into chapters, each containing a series of (g) measures, which address specific sources that NOAA and EPA have determined to be the leading contributors of nonpoint pollution to coastal waters nationally. These sources include agricultural activities; silvicultural (forestry) activities; urban land uses and development activities; hydromodifications; and marinas and recreational boating. A final chapter contains management measures for wetlands and riparian areas which, when properly protected and maintained, can serve important nonpoint pollution abatement functions.



In accordance with the statute, states must: implement the prescribed (g) measures; *or*, implement measures which are at least as effective as the (g) measures; *or*, demonstrate that the measures are unnecessary either because the nonpoint source is not present nor reasonably anticipated in the management area, or that the source poses no significant threat, actual or reasonably anticipated, to human health or living coastal resources.

The second tier of Section 6217 involves a more water quality-based approach to address known nonpoint source water quality problems which are either not addressed in the *Guidance* or which, due to the severity or localized nature of the problem, require more stringent or intensive regulation than that which is required by the (g) measures. This second tier requires the development of additional management measures to protect and improve threatened and impaired coastal waters and critical areas. While the additional management measures and critical areas are important components of the CNPCP, the efforts of the past year have focused on the first four of the specific CNPCP requirements.

Specific CNPCP Requirements

- Coordination with existing state programs
- Determination of the Section 6217 management area
- Public participation
- Identification of management measures to be implemented in conformance with the (g) measures
- Identification of additional management measures necessary to protect impaired or threatened waters
- Technical and other assistance to local governments and the public to implement additional management measures

A unique component of this program which differentiates it from prior nonpoint pollution control programs is that the (g) measures and the additional management measures must be implemented through enforceable policies and mechanisms. Enforceable policies include such things as constitutional provisions, laws, regulations, land use plans, ordinances, or judicial or administrative decisions that enable a state to exert control over both private and public land and water uses and natural resources.

In January of 1993, when NOAA and EPA jointly issued the *Guidance* (EPA, 1993) and the companion document, *Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance* (EPA and NOAA, 1993), the clock began ticking for each coastal state to develop and have approved a CNPCP by July of 1995. Since that time, and indeed prior to the issuance of these documents, the CRMC, RIDEM and RIDOP have been working together, utilizing a series of advisory committees, to develop an approvable CNPCP for Rhode Island.

Program Development

Rhode Island is faced with two separate, but related challenges for controlling nonpoint pollution, which stem from different federal mandates. The first of these, and the subject of this newsletter, is the development, approval and implementation of the CNPCP as required by Section 6217; the second is the update of *Rhode Island's Nonpoint Source Management Plan*. With regard to the latter, in accordance with Clean Water Act requirements, each state must identify control measures and management approaches for categories of nonpoint pollutants identified in the state's nonpoint source assessment report as impacting or threatening water quality. The *Plan* outlines a framework for state and local coordination, as well as specific nonpoint source management objectives of the RIDEM. Funds made available by EPA under the provisions of Section 319 of the Clean Water Act may be allocated to implement the *Plan*'s recommendations.

The CRMC and the RIDEM, as the state's nonpoint source management agency designated under section 319, have "a dual and co-equal role and responsibility in developing and implementing the coastal nonpoint program". Accordingly, the CRMC and the RIDEM, in conjunction with the RIDOP, have been focusing their efforts on a coordinated approach for developing Rhode Island's CNPCP and updating the *Nonpoint Source Management Plan*.

As noted, a primary distinction between a state's CNPCP and a state's *Nonpoint Source Management Plan* is the requirement that the CNPCP be implemented through enforceable policies. In contrast, implementation of the state's *Nonpoint Source Management Plan* relies on demonstration projects and voluntary participation with financial assistance as an incentive for participation. While this voluntary approach has been the primary means for *Plan* implementation in the past, in an effort to coordinate the Section 6217 and the Section 319 programs, the updated *Plan* is expected to be adopted as an element of the *State Guide Plan* administered by the RIDOP. Once adopted, municipalities will be required to be consistent with it when making land use decisions and incorporate its policies into municipal comprehensive plans. Therefore, policies contained in *Rhode Island's Nonpoint Source Management Plan* will become enforceable.

Progress to Date

In the year leading up to the publication of *Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance* (EPA and NOAA 1993) and the *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters* (EPA 1993), the CRMC held numerous informal meetings with the RIDEM and the RIDOP to discuss issues related to the development of Rhode Island's CNPCP and the update of *Rhode Island's Nonpoint Source Management Plan*. The CRMC and the RIDEM also co-sponsored, in conjunction with the RIDOP, Soil Conservation Service (SCS), Rhode Island Sea Grant, University of Rhode Island Coastal Resources Center (CRC), and the Rhode Island Cooperative Extension (CE), a statewide conference on nonpoint source pollution which focused on the requirements of Section 6217 and the development of the CNPCP.

When the *Guidance* was published in January 1993, the CRMC and the RIDEM created a steering committee which included representatives of the CRMC, RIDEM, RIDOP, SCS, CE and CRC. In April of 1993, the RIDEM sponsored an interagency workshop where all relevant federal and state agencies were represented. At this workshop it was agreed that the steering committee would be responsible for creating an advisory committee framework which could be used to both develop the CNPCP and update the Rhode Island Nonpoint Source Management Plan (e.g., develop the *Nonpoint Source State Guide Plan Element*). It was also agreed that strong public involvement, education, and outreach during the development of the CNPCP was a high priority.

As a result of the steering committee's efforts, the Interagency Nonpoint Source Advisory Committee (INSAC) was created. The INSAC is co-chaired by the CRMC, RIDEM, and RIDOP. The INSAC reports to the CRMC and the State Planning Council and coordinates the efforts of the technical advisory subcommittees. It was determined that the vast majority of the work would be done by the subcommittees and all final work products would be brought before the INSAC for review. These work products will include: the updated *Rhode Island's Nonpoint Source Management Plan*, draft regulation changes, Section 6217 threshold review documents, and the CNPCP which will be submitted to the NOAA and EPA for approval in July 1995.

Technical Advisory Subcommittees

Since there are many sources of nonpoint pollution and an equally diverse range of agencies and organizations involved in nonpoint source issues, the RIDEM, CRMC, and RIDOP chose to utilize a series of technical advisory subcommittees. The subcommittees are organized around particular nonpoint sources (e.g., agriculture, forestry, ISDS, stormwater and erosion and sediment control, land use, and marinas) and additional federal requirements for Section 6217 and Section 319 (e.g., watershed prioritization, public outreach, and monitoring). The subcommittees are comprised of key officials from federal, state, and local levels of government as well as members of nongovernmental organizations and the general public. The steering committee made a concerted effort to identify appropriate groups for representation on the various subcommittees. While the initial membership of the subcommittees was reviewed and approved by the INSAC, it was agreed that the subcommittees would have the flexibility to expand their membership as needed. Generally, subcommittee

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management measures — economically achievable measures for the control of the addition of pollutants from existing and new categories and classes of nonpoint sources of pollution, which reflect the greatest degree of pollutant reduction achievable through the application of the best available nonpoint pollution control practices, technologies, processes, siting criteria, operating methods, or other alternatives.

Summary of the Section 6217 (g) Management Measures and Proposed Approaches

The following is a brief summary of the requirements contained in the *Guidance Specifying Management Measures for Sources of Nonpoint Pollution to Coastal Waters* and the general approach proposed for meeting those requirements. These approaches have been developed by consensus, primarily at the subcommittee level. In many cases, particularly with regard to the measures for urban areas, the approaches, out of necessity, network and propose amendments to existing programs. Given the structure of local and state government in Rhode Island, the proposed approaches were determined by the subcommittees to be the most efficient and practical for meeting the requirements of Section 6217. These proposed approaches will be reviewed by federal officials during Rhode Island's threshold review scheduled for late August, 1994. Comments received from federal officials based on the threshold review may require some of the proposed approaches to be modified. In addition, these approaches will be subject to further public review and comment prior to July of 1995, when Rhode Island's final CNPCP must be submitted to NOAA and EPA.

I. Agriculture

Primary sources of agricultural nonpoint source pollution are nutrients, sediment, animal wastes, salts, and pesticides. There are six management measures associated with agricultural activities. They focus on: erosion and sediment control; management of confined animal facilities (there are separate measures for large and small facilities); nutrient management; pesticide management; grazing management; and, irrigation management.

The Agriculture and Forestry Subcommittee has determined that agriculture does not and is not reasonably expected to, individually or cumulatively, present significant adverse effects to living coastal resources or human health. This is the second scenario under which a state may request an exclusion from a particular category or subcategory of nonpoint pollutants. As a result, an exclusion from the management measures related to agriculture will be requested at the threshold review in August.

II. Forestry

Forestry (or silvicultural) activities may impact water quality by accelerating erosion, and by increasing nutrient and chemical runoff, the amount of organic matter in adjacent waters, water temperatures, and streamflows. Ten management measures provided under this source category include requirements for preharvesting plans, road management and revegetation of disturbed areas. The management measures apply generally on lands where forestry operations are planned or conducted.

While a significant amount of land area is forested in Rhode Island (approximately 50%), there is very little commercial forestry activity. The Agriculture and Forestry subcommittee has determined that forestry is not a significant contributor to nonpoint source pollution to Rhode Island's coastal waters. Therefore, the State will request an exclusion from the forestry management measures based on the second scenario under which an exclusion may be allowed; that is, forestry does not and is not reasonably expected to, individually or cumulatively, present significant adverse effects to living coastal resources or human health.

III. Urban Runoff

Urban runoff is one of the major nonpoint sources of pollution to Rhode Island's coastal waters, as Rhode Island is the most densely populated state in the U.S. Conversion of open space, and agricultural and forested lands to urban land uses results in more impervious surfaces, greater runoff volumes, and increases in pollutant loadings. Major pollutants associated with urban nonpoint source pollution are sediment, nutrients, road salts, heavy metals, petroleum hydrocarbons, pathogenic bacteria, and viruses. These pollutants generally enter coastal waters through stormwater runoff and onsite sewage disposal systems.

Fifteen management measures address this category of nonpoint source pollutants. Recognizing that once an area becomes urbanized it is often difficult and extremely expensive to install systems to control nonpoint pollution, the *Guidance* provides separate measures for existing and new urban development. Measures for existing development emphasize reducing nonpoint pollution resulting from ongoing activities, while those for new development focus on preventing new contributions of nonpoint pollution by providing siting and design, construction, and post-development standards. The *Guidance* also contains specific measures for new and existing roads highways and bridges.

Management measures for new development

- *New development* – For new development and redevelopment, as well as new and relocated roads, highways and bridges, runoff must be managed so as to reduce the average annual total suspended solids (TSS) loading by 80%. The management measure also requires that, to the maximum extent practicable, the post development peak runoff rate and average volume are maintained at a level similar to the predevelopment level.
- *Site development* – This management measure requires development activities to be sited in a manner which avoids areas susceptible to erosion, limits increases in impervious surfaces, and minimizes land disturbances. The measure applies to all site development

enforceable policies — state policies which are legally binding through constitutional provisions, laws, regulations, land use plans, ordinances, or judicial or administrative decisions, by which a State exerts control over private and public land and water uses and natural resources in the coastal zone.

activities including those associated with roads, highways and bridges.

• *Erosion and sediment control* – This management measure requires the preparation and implementation of erosion and sediment control plans for construction sites. The measure applies to all construction activities on sites less than five acres. It does not apply to construction of single family homes on sites larger than 1/2 acre or to construction projects that do not disturb over 5,000 sq. ft. of land.

• *Chemical control* – This management measure is designed to limit the application, generation and migration of toxic substances (pesticides, fertilizers, petro-chemicals and wastes), and to ensure proper storage and disposal of toxic substances through the implementation of recommended practices. The measure applies to those construction activities included under the erosion and sediment control management measure.

• *Watershed protection* – This management measure requires the development of a comprehensive watershed protection program which avoids development on areas particularly susceptible to erosion, preserves sensitive areas, and minimizes the impacts of development on waterbodies and drainage systems.

• *New On-site Sewage Disposal Systems (OSDSs)* – New systems are to be sited, designed, installed, operated, and maintained so as to minimize their impacts to ground and surface waters.

Management measures for existing development

• *Existing Development* – For previously developed areas watershed management programs are required to be developed and implemented. Opportunities for nonpoint source pollutant reduction must be identified, a schedule for implementing appropriate controls developed, and disturbances of natural conveyance systems minimized. The measure also calls for the preservation, enhancement and establishment of buffers.

• *Existing On-site Sewage Disposal Systems (OSDSs)* – Policies for operation, inspection and maintenance of existing OSDSs must be developed and implemented. In cases where coastal waters or ground waters are significantly affected by nitrogen loadings from existing OSDSs, the installation of an OSDS which reduces nitrogen loading by 50% is required.

Marinas, recreational boating activities and runoff from paved surfaces can be major sources of nonpoint pollution.

• *Pollution prevention* – Rhode Island must implement pollution prevention and educational programs to better inform the general public on routine activities which cause nonpoint source pollution and ways in which sources can be reduced. Activities and sources to be addressed include: hazardous household chemicals, lawn and garden activities, turf management, the discharge of pollutants into storm drains, and commercial activities not currently regulated under the federal point source pollution control program (NPDES program).

Management measures for roads, highways, and bridges (new and existing)

Six management measures require that roads, highways and bridges be planned, sited and designed so as to protect sensitive areas, limit land disturbances, and minimize runoff and erosion. The measures also require that operation and maintenance plans include pollution prevention procedures.

These management measures will be the most difficult to achieve and require an approach which networks the State Guide Plan; RIDEM freshwater wetlands, ISDS and RIPDES regulations; the Coastal Resources Management Program (CRMP); and, the local comprehensive land use and harbor management planning processes. The CRMC will fully implement the measures related to urban areas within its jurisdiction and the RIDEM will continue to implement those measures currently implemented by its regulatory programs. In accordance with subcommittee recommendations, remaining management measures are proposed to be met by incorporating requirements into the State Guide Plan, and as additional elements to be addressed in the community comprehensive land use plans. These programs are administered by the RIDOP.

IV. Marinas and Recreational Boating

Nonpoint source pollution associated with marinas and recreational boating activities can result in increased water toxicity, elevated pollutant levels in aquatic organisms,

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Program Development

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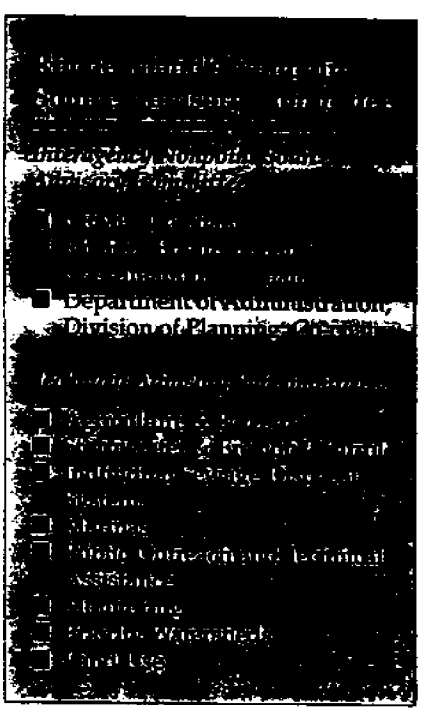
membership is open to any interested person or organization. Accordingly, the subcommittee memberships have expanded to include additional representatives.

The role of each subcommittee is to provide technical assistance and guidance to the CRMC, RIDEM and the RIDOP during the development of the CNPCP. The subcommittees also coordinate existing nonpoint source pollution control efforts throughout the State. The roles of each subcommittee differ depending on a number of factors which include:

- The nature of the particular pollution source or nonpoint source issue the subcommittee has been formed to address;
- The extent to which the §319 and §6217 requirements have been addressed;
- The need for new policies, regulations or recommendations; and,
- The complexity of statutory requirements.

In all cases, the subcommittees review and advise on relevant sections of the CNPCP and *the* updated *Nonpoint Source Management Plan* as they are developed. Each technical advisory subcommittee also identifies public outreach and education needs, as they become evident, for the Public Outreach and Education Subcommittee to address. Essentially, each subcommittee addresses the relevant management issues, comments on draft work products, and makes recommendations to the RIDEM, CRMC, and RIDOP.



In general, the subcommittees began their efforts early in 1994 by evaluating the actual and potential water quality problems associated with a particular source of nonpoint pollution in order to determine if the source presents a significant nonpoint pollution problem to Rhode Island's coastal waters. In cases where the subcommittees determined that a coastal water quality problem does exist as a result of a particular nonpoint source of pollution, the subcommittees focused their efforts on reviewing individual management measures and identifying the extent to which existing programs currently implement individual management measures through enforceable policies. This process led to the identification of areas where action was needed in order to conform with (g) measure requirements. The subcommittees then considered options for addressing (g) measures not currently addressed statewide through enforceable policies. In each case, consensus was developed as to the best approach for implementing those measures through enforceable policies.

In cases where it was determined that a particular source does not present an actual or potential threat to coastal waters, the subcommittees focused there efforts on crafting solid arguments for exclusion from the measures, based on water quality and land use data. Finally, threshold review documents and related proposed regulation changes developed by the CRMC and RIDEM were brought to individual subcommittees for review. This entire process was greatly facilitated by the participation of subcommittee members from the private sector as well as the regulatory community who brought with them expertise in specific nonpoint source problems and existing regulatory and nonregulatory programs.

Threshold Review

On August 24th and 25th, the CRMC, RIDEM, and the RIDOP are scheduled to meet with representatives from EPA and NOAA for an informal threshold review of components of Rhode Island's proposed CNPCP. The purpose of this meeting is to provide EPA and NOAA with an initial review of proposed approaches to meeting specific requirements of the CNPCP in order to determine where future efforts need to be focused. At this time, proposed approaches for meeting program requirements related to: public participation; agriculture; forestry; urban land uses and development activities; marinas and recreational boating; wetlands and riparian areas; and, hydromodifications will be discussed. In general, these approaches have been reviewed and approved by relevant subcommittees. Proposed new or amended regulations and policies will also be presented in order to solicit feedback on the appropriateness of the mechanism and the adequacy of the approach in implementing specific management measures.

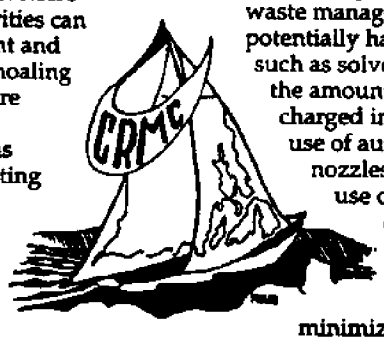
Following the threshold review, the CRMC, RIDEM and RIDOP, with the assistance of the technical advisory subcommittees, will continue to work on the development of Rhode Island's CNPCP and the update of *Rhode Island's Nonpoint Source Management Plan*. The focus of the agencies' cooperative efforts will largely depend on EPA and NOAA comments on proposed program implementation approaches contained in threshold review documents. In addition, CNPCP elements not addressed during the threshold review, such as the monitoring, public education, and technical assistance components, and the additional management measures, will be developed. The subcommittees will continue to meet as these additional programmatic requirements are addressed and as approaches currently proposed are modified in response to EPA and NOAA comments. Rhode Island's final CNPCP will be submitted for approval to NOAA and EPA by July of 1995.

Once Rhode Island's CNPCP has been approved, the State has until January of 1999 to fully implement the (g) measures and until January of 2004 to fully implement all additional management measures. However, it is expected that many of the (g) measures and additional management measures not currently implemented will be implemented prior to these deadlines.

Summary of Section 6217 (g)

(continued from page 5)

and contamination of water quality as a result of pathogens. Recreational boating activities can also disrupt sediment and habitat, and cause shoaling and erosion. There are fifteen management measures for marinas and recreational boating activities contained in the Section 6217 (g) guidance. These management measures are grouped under two broad categories: siting and design; and operation and maintenance.



Siting and design

Section 6217 requires that seven management measures be applied when reviewing the siting and design of new marinas. These management measures require that: marina sites allow for regular flushing of surrounding waters; water quality assessments be performed as part of marina siting and design; marinas be sited and designed in a manner which protects important habitats; the shoreline be stabilized when erosion is a problem; runoff control strategies including an 80% TSS removal rate from hull maintenance areas be implemented; fueling stations be designed to allow for ease of spill cleanup; and, the installation of pumpout, dump station and restroom facilities when necessary.

Marina and boat operation and maintenance

The Section 6217 (g) guidance also includes eight management measures focusing on routine activities, and locations in marinas which can be sources of nonpoint source pollution. In general, these measures require: proper disposal of solid wastes; fish waste management; management of potentially harmful liquid materials such as solvents and paints; reducing the amount of fuel and oil discharged into the water through the use of automatic shut-off fuel nozzles and by promoting the use of fuel/air separators and oil absorbing materials in bilge areas; the implementation of boat cleaning practices which minimize the release of harmful cleaners, solvents, and paints; proper maintenance and encouraged use of sewage pumpout facilities; and, restrictions on boating to protect shallow water habitats and decrease turbidity. The measures also require the implementation of education programs for the boating public and marina operators to prevent improper disposal of pollutants.

These measures will be implemented through minor changes to the CRMC's Coastal Resources Management Program (CRMP) and amendments to the Harbor Management program.

V. Hydromodifications

Hydromodifications include channelization and channel modification, dams, and streambank and shoreline erosion. Hydromodifications contribute to nonpoint source pollution by disrupting habitats, sedimentation patterns, erosion rates, and water flows. The Section 6217 (g) guidance contains six management measures for hydromodifications designed to address problems associated with the alteration of the physical characteristics of surface waters and the resulting impacts on instream and riparian habitats. Generally, the measures require impacts associated with these sources be minimized through operation and maintenance practices as well as the protection of water quality and instream and riparian habitats.

Although a definitive approach to meeting these measures has not yet been determined, it is expected that these measures will be implemented through amendments to the CRMP.

VI. Wetlands, Riparian Areas, and Vegetated Treatment Systems

The Section 6217 (g) guidance contains three management measures which do not address a specific source of nonpoint source pollution, but rather, promote the protection and restoration of wetlands and riparian areas as well as the use of vegetated treatment systems to control and minimize nonpoint source pollution. These management measures require states to protect wetlands and riparian areas which serve a nonpoint source abatement function, promote the use of vegetative filter strips and buffer zones, and to restore degraded wetlands and riparian areas.

These measures are, for the most part, currently implemented by the CRMC and the RIDEM's Freshwater Wetlands programs.

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- ❑ Add my name to the CMRC's nonpoint pollution mailing list
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- ❑ Delete my name from the *Coast Features* Mailing List
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Available Information on the Section 6217 CNPCP

The following are available at no charge from the Environmental Protection Agency:

- *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters*
- *Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance*

To obtain a copy of these documents please contact Ann Beier, Assessment and Watershed Protection Division, Nonpoint Source Control Branch (WH-553), U.S. EPA, 401 M Street, SW, Washington, DC 20460. Phone: (202) 260-7085. Fax: (202) 260-7024.

To obtain a copy of *Upstream Solutions to Downstream Pollution, a Citizens' Guide to Protecting Seacoasts and Great Lakes by Cleaning Up Polluted Runoff* (Natural Resources Defense Council and Coast Alliance, 1993) please contact Sarah Chasis, Natural Resources Defense Council, 40 West 20th St., NY, NY 10011. Phone (212)727-4424; or, Beth Milleman, Coast Alliance, 235 Pennsylvania Ave., SE, Washington, D.C. 20003. Phone (202)546-9554. There is a charge for this publication.

To obtain copies of fact sheets, the CRMC's previous special issue newsletter and other public outreach materials related to Rhode Island's CNPCP, or to be added to the CNPCP mailing list, please contact either Laura Kelley Miguel or Mark T. Imperial at the CRMC (401) 277-2476.

Coastal Features

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GREENWICH BAY PROGRESS REPORT

PUBLISHED BY THE CITY OF WARWICK, PLANNING DEPARTMENT • LINCOLN CHAFEE, MAYOR

Greenwich Bay was closed to shellfishing in December, 1992. For forty years the City of Warwick allowed intensive development in the Bay's watershed without enough consideration for the environmental consequences to the Bay's ecosystem. As a result, today the Bay has unsafe levels of fecal coliform contamination, resulting from improperly treated human waste.

Not only is this an environmental problem, it is an economic disaster for Warwick. The shellfishing industry generated $4--6 million **in Warwick** alone. Now shellfishermen are relegated to part-time "conditional re-openings", which allow them only a fraction of their critical winter harvest.

The value of Greenwich Bay Management Area, where shellfish from polluted waters have been brought during the winter months to cleanse themselves, has been lost. Further unchecked contamination could lead to beach closings within Greenwich Bay due to unsafe health risks.

EPA Regional Administrator John DeVillers, U.S. Senator John Chafee, Warwick Mayor Lincoln Chafee, RI Governor Bruce Sundlun and RIDEM Director Michael Annarumo at a press conference this June at Sardo's Restaurant to announce $1 million in Federal grants for Narragansett Bay. DeVillers called the Greenwich Bay Initiative "a great example of the watershed approach in action."

Since January of 1993, Mayor Lincoln Chafee has made the unconditional re-opening of Greenwich Bay to shellfishing a top priority.

The City of Warwick helped organize the Greenwich Bay Initiative, a new association of government and private agencies dedicated to working together to clean up the Bay. In addition to eight City of Warwick departments, members include RIDEM, Save the Bay, EPA, URI, RI Shellfisherman's Association and U.S. Soil Conservation Service.

While only in its second year, the Greenwich Bay Initiative is already making progress. Now, the citizens of Warwick are pitching in and making a real difference in this battle to "Bring Back the Bay".

This June, Warwick voters approved the "Bay Bond" referendum by 70%. This program reserves $5 million for clean water projects to help the Bay.

Coordination and cooperation between organizations and agencies now exists. Bond funding and government grants are being carefully invested in meeting the Bay's contamination problems head-on.

We are off to a great start.

The goal of the City of Warwick is to restore shellfishing, unconditionally within three years. With hard work and determination, this ambitious objective will be achieved.

This brochure reports to you the status of each Bay projects now underway. Please feel free to call the Warwick Planning Dept. at 738-2000, ext. 6289, if you have any questions or would like to know how you can get involved.

Preventing Pollution At The Source

Septic System Inspections

To date, RIDEM has conducted 1250 septic system inspections in coastal areas around Greenwich Bay. Approximately 10% (about 120 systems) have been deemed inadequate so far, and the owners have been notified.

Homeowners' Septic Failure Grant/Loan Program

Warwick homeowners whose backyard septic systems fail to meet city or state health standards can reach out for financial help. For those who qualify, this program will provide a 40% grant and 60% loan (up to $4000 limit) for replacing or upgrading your failing septic system.

This Grant/Loan Program recently received an additional $1 million from the "Bay Bond" to help homeowners reduce contamination from getting into the Bay.

Anyone interested in this program should call Craig Onorato at the Warwick Sewer Authority, 739-4949.

High-Tech Septic Systems

A new generation of systems using special filters and efficient aeration are providing a powerful level of pollutant removal.

The Warwick Sewer Authority is seeking homeowners living in environmentally-sensitive areas around Greenwich Bay to participate in a voluntary program which will install and keep track of the performance of each system.

Sewer-Line Extensions

The Warwick "Bay Bond" dedicates $2.5 million to install a sewer line along Post Road in Cowesett.

Warwick will be saving over $1 million by designing and installing this line in conjunction with the RIDOT reconstruction of Post Road scheduled to begin in 1997.

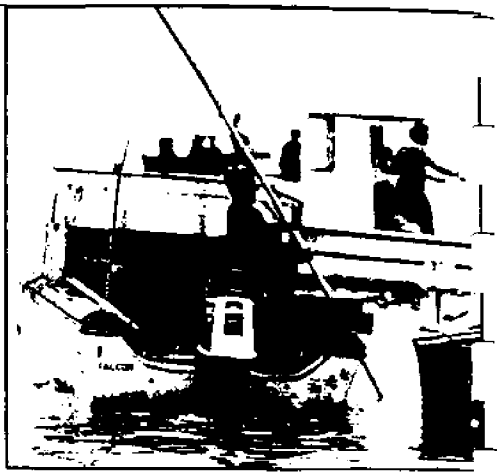
This project will service almost 1000 condo and apartment units tightly concentrated on Greenwich Bay's western shore.

Oakland Beach Sewer Tie-In's

The City and RIDEM, are preparing a grant/loan program to help qualifying homeowners in Oakland Beach connect to existing sewer lines. Presently, only 42% of these homes have tied into the sewer line. Call 738-2000, ext. 6289 for more information.

Water Conservation

The Warwick Water Department is offering water conservation kits to reduce the amount of water being treated or running off into the Bay. Call 738-2000, ext. 6604 for more information.



Shellfishermen took advantage of this summer's conditional opening. However, the economic hardship will continue until Greenwich Bay is opened permenately.

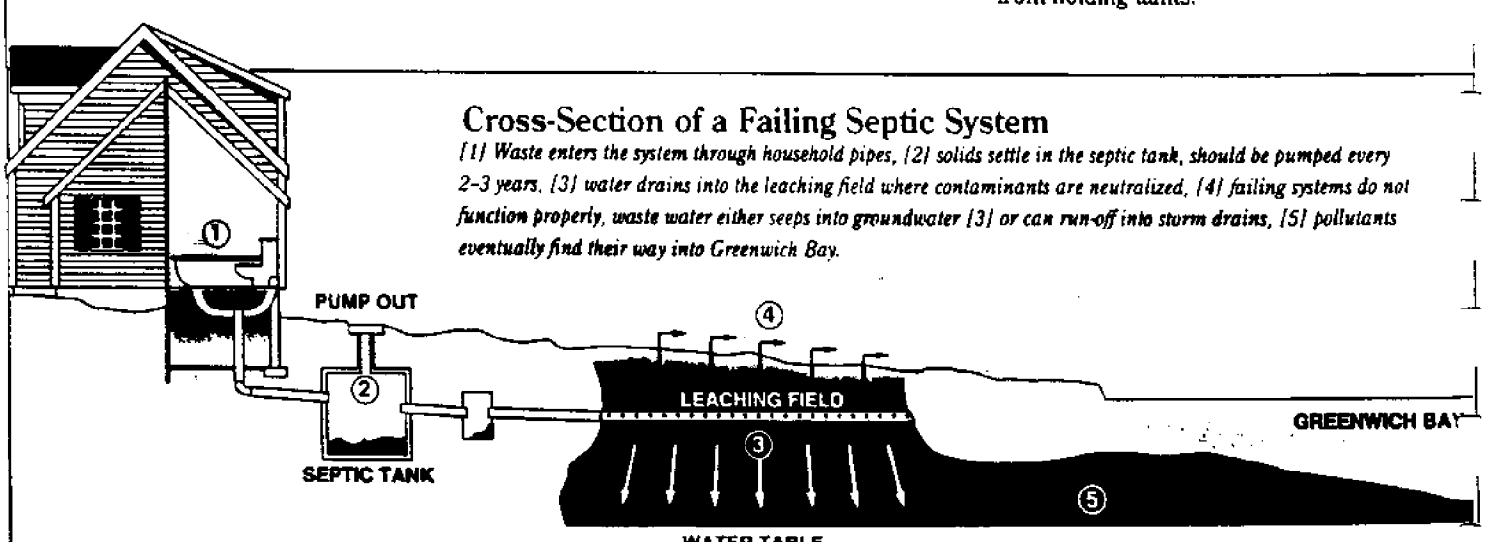
Protecting Coastal Areas

Purchase of Sensitive Coastal Lands.

This March, the City of Warwick purchased the 10-acre Chepiwanoxet Island for $475,000, with $175,000 coming from the private Champlin Foundations and the Nature Conservancy. At one time, 52 condos and a large marina had been approved for this fragile site.

Marine Pump-Out Stations.

By the spring of 1995, Warwick will have seven new pump-out stations. Marina owners have each received $20,000 in federal and state grants to install these stations. Boat owners will be able to pump sewage from holding tanks.



Cross-Section of a Failing Septic System

[1] Waste enters the system through household pipes, [2] solids settle in the septic tank, should be pumped every 2-3 years, [3] water drains into the leaching field where contaminants are neutralized, [4] failing systems do not function properly, waste water either seeps into groundwater [3] or can run-off into storm drains, [5] pollutants eventually find their way into Greenwich Bay.

Preventing Polluted Water From Reaching The Bay

RIDOT Stormwater Pollution Mitigation Projects.

The RI Department of Transportation is currently designing five road construction projects in the Greenwich Bay Watershed. Devices which filter out pollution from rain water running off the road have now become a standard component in the following construction projects: portions of Post Road, Bald Hill Road, Centerville Road, and the new Apponaug Historic Village By-Pass.

EPA Stormwater Grant.

The City of Warwick and the Southern Rhode Island Conservation District have applied for a $79,000 EPA grant to construct a stormwater pollution prevention project in the Hardig Brook Watershed.

This project would help filter out fecal contamination now entering Apponaug Cove and running into Greenwich Bay.

Stormwater Regulations & Overlay Districts.

Warwick has a newly-revised Zoning Ordinance which reserves sections for a Stormwater pollution ordinance and a "Watershed Protection Overlay District" to help protect Greenwich Bay. Persistent toxic pollution problems may require the City to consider additional land use requirements based on the direct impact of development on the health of the Bay.

Researching The Source Of Pollution

The testing of the water quality of area streams and groundwater will help us track down specific pollution sources.

Hardig Brook, which feeds into Apponaug Cove, has been found to be the single most significant contributor of contamination according to the U.S. Food and Drug Administration report on Greenwich Bay.

Warwick, RIDEM and EPA are investing $194,000 to pinpoint pollution sources in the watersheds of Hardig Brook in the Apponaug area; Tuscatucket Brook and Brush Neck Cove in Buttonwoods; and Baker's Creek in Nausauket.

These studies are being done by the URI Department of Engineering over the next several months. These scientists have already conducted similar projects in the Blackstone and Pawtuxet River watersheds.

The goal of this research is to root out specific sources of contamination. The City can then carefully determine how to best use $1 million in "Bay Bond" stormwater mitigation funding to install pollution prevention and filtration devices most effective in keeping pollution out of the Bay.

URI Sea Grant Scientific Research Proposal.

Scientists at the University of Rhode Island are preparing a two-year, $500,000 Federal Sea Grant proposal which would significantly broaden our knowledge of the Greenwich Bay ecosystem.

In addition to the stormwater and groundwater research previously mentioned, scientists would also study how flushing and current patterns in Greenwich Bay transport and dissipate contamination.

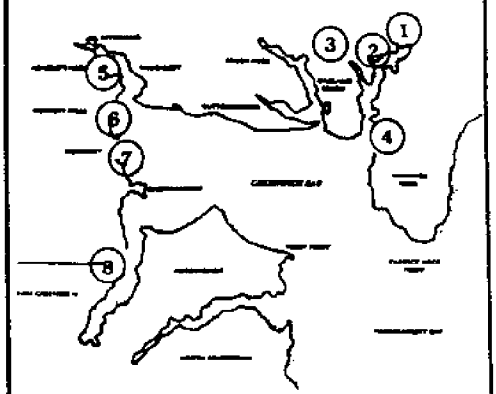
Aquafund Grant for Computer Mapping.

Warwick has been awarded an $8000 grant from the Narragansett Bay Commission to prepare specifications for a Greenwich Bay computer mapping system.

Shellfish Research.

The RIDEM Division of Fish & Wildlife is conducting ongoing research on the health of Greenwich Bay marine habitat, as well as the shellfish species living there.

Marine Pump-out Stations for Greenwich Bay



1. Carlson's Marina
2. Wharf Marina, Inc.
3. Bay Marina, Inc
4. Harbor Light Marina
5. Dilkeraan's Marina (Apponaug Harbor Marina)
6. Greenwich Bay Marina Club
7. Bruce & Johnsons Brainard Marina (Brown Yacht Yard)
8. East Greenwich Yacht Club (privately funded)

Warwick Residents Get Involved

This spring about 500 residents came to "Bring Back Greenwich Bay Day" at the City Park which was sponsored by the RIDEM Narragansett Bay Project, Save the Bay, and Warwick's Department of Parks & Recreation. There were scientific demonstrations, information booths, plenty of seafood and a puppet show for the children.

Last May, the City of Warwick hosted two **Greenwich Bay Forums** at City Hall. Scientists, shellfisherman and city and state officials answered questions about the health of the Bay.

The City has produced and distributed **"Bring Back The Bay"** bumper stickers and brochures to increase public awareness.

Save the Bay **"Baywatchers"** are monitoring water quality at ten sites around Greenwich Bay's coves. They are also sponsoring an **"Explore the Bay"** program to help educate our students about Greenwich Bay's fragile ecosystem.

Greenwich Bay Progress Report

How Can You Help Bring Back Greenwich Bay?

Stream Teams: The City is looking for social or educational groups and individuals to "adopt a stream" in the Greenwich Bay Watershed. Streams include: Hardig Brook and Mill Brook, both near Apponaug; Baker's Creek in Nausauket; and Tuskatucket Brook, in Buttonwoods. Call 738-2000, ext. 6289 for more information.

Water Pollution Teach-In's: An educational program for the young people in Warwick public schools is being developed by the Southern RI Conservation District and Save the Bay.

Citizen Monitoring: Save the Bay has been working with volunteers to monitor several sites along Hardig and Mill Brooks, as well as all the coves in Greenwich Bay. Their task is to take water samples for testing levels of bacterial pollution.

If you want to help, please call one of the Greenwich Bay Task Force members listed below. It will take the efforts of everyone who lives in the Greenwich Bay Watershed to "Bring Back The Bay."

City of Warwick Planning Department
3275 Post Road
Warwick, RI 02886

Greenwich Bay Initiative Directory

The City of Warwick — Tel: 738-2000
(extensions are listed below)

Planning Department — Ext. 6289
Sewer Authority — Ext. 6370, or 739-4949
Public Works — Ext. 6701
Recycling Facility — Ext. 6513
Building Department— Ext. 6293
Parks & Recreation — Ext. 6807
Water Department— Ext. 6604
Warwick School Department — 737-3300

RI Coastal Resources Managment Council— 277-2476

RI Dept.of Environmental Management
Narragansett Bay Project — 277-3961
Groundwater & ISDS — 277-2306
Division of Wildlife — 738-2304
24- Hour Hot Line — 1-800-498-1336

RIDOT Design Division — 277-2023

RI Shellfisherman's Assoc. — 886-4265

Save The Bay — 272-3540

Southern Rhode Island Conservation District— 539-7767

University of Rhode Island
Coastal Resources Center — 792-6224
Engineering Department— 792-2785
Graduate Planning Department — 792-2248
Department of Marine Affairs— 792-2596

Town of East Greenwich — 886-8600

U.S. Geological Survey — 331-9050

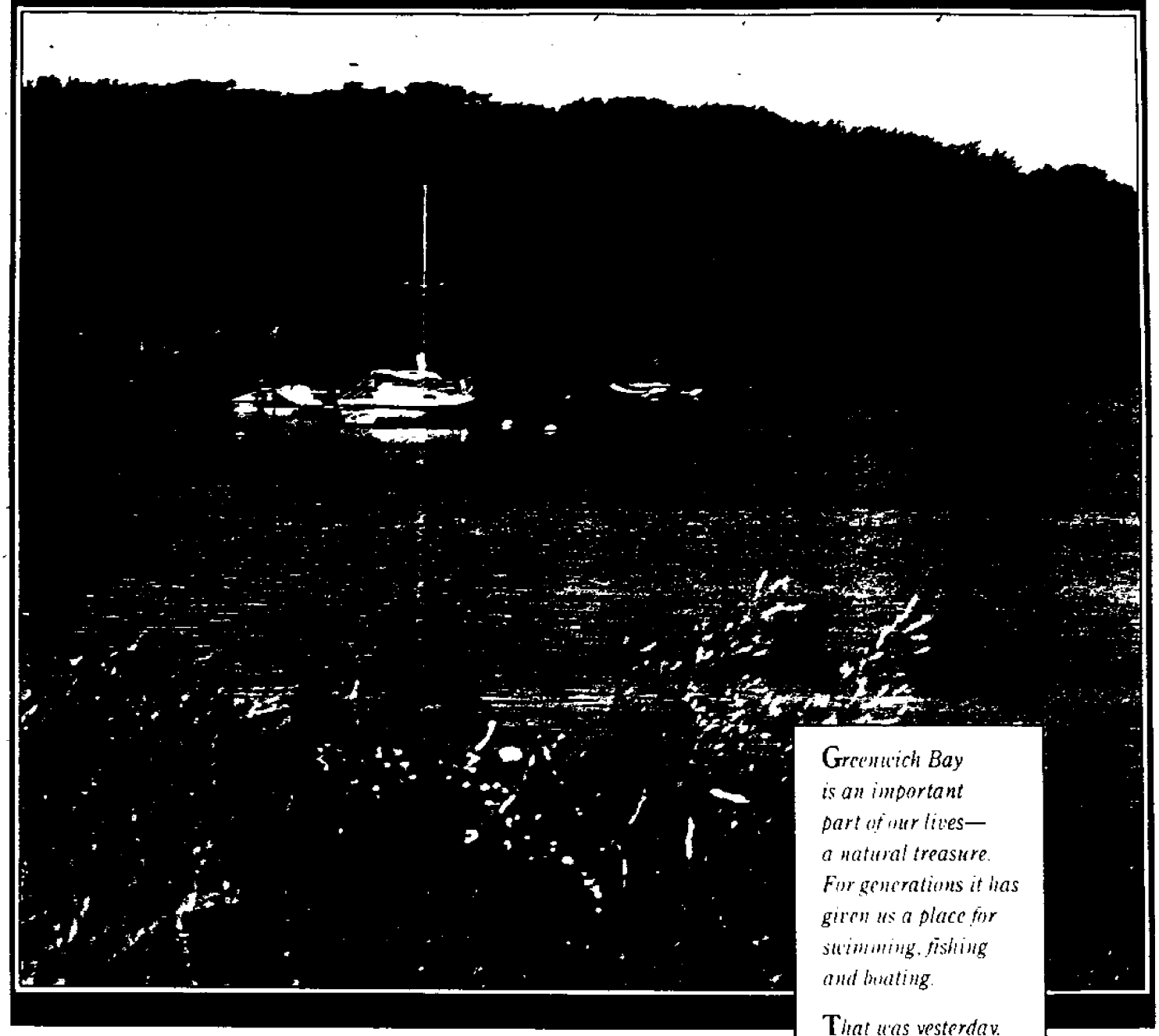
U.S. Soil Conservation Service — 828-1300

U.S. EPA Regional Office — (617) 565-3420

All telephone numbers have a 401 area code, unless noted.

Published by the Warwick Departments of Planning & Economic Development • Lincoln Chafee, Mayor • Paid for at an expense to taxpayers 15M/10-94

BRING BACK GREENWICH BAY



Greenwich Bay is an important part of our lives—a natural treasure. For generations it has given us a place for swimming, fishing and boating.

That was yesterday. Since December, 1992 the Bay has been closed to shellfishing. The warning signs cannot be ignored any longer.

Once we understand our place in this network of life, then we can begin to heal the damage and bring back the Bay.

THE GREENWICH BAY INITIATIVE

CITY OF WARWICK

COASTAL RESOURCES MANAGEMENT COUNCIL

NARRAGANSETT BAY PROJECT

RI DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

RI DEPARTMENT OF TRANSPORTATION

RI SHELLFISHERMAN'S ASSOCIATION

SAVE THE BAY

URI COOPERATIVE EXTENSION

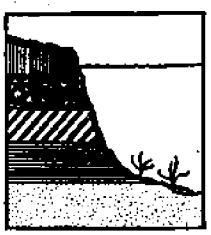
Reviewing the Economic & Environmental Impact of Greenwich Bay.

The Bay's Natural Defenses.

Greenwich Bay is a fragile body of water even without the pressures that society has placed upon it. The Bay is surprisingly shallow, an average of only 9 feet deep. Until recently, tidal flushing naturally kept the Bay clean. But today, only 3/4 of an inch of rainfall can wash enough pollutants into the Bay in 6 hours, that it will take 3 to 4 days of tidal flushing to remove them.

Density of Population.

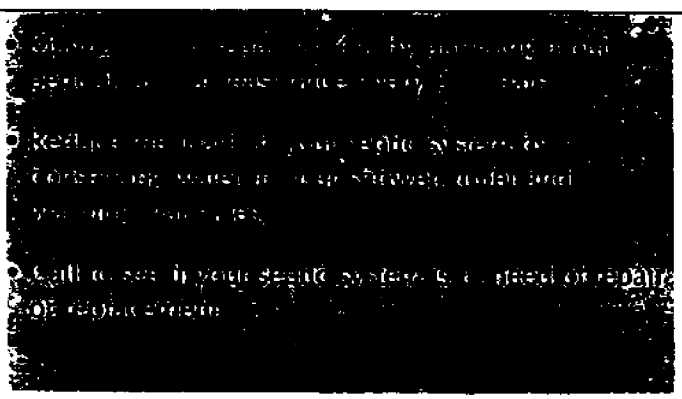
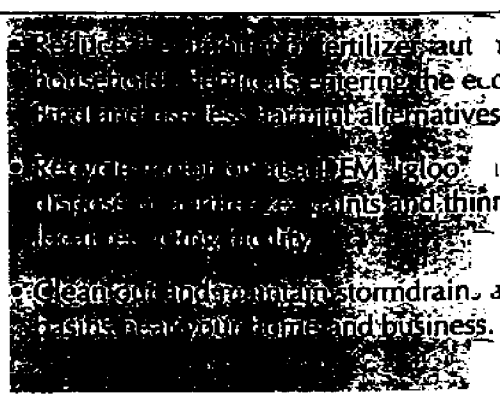
A higher density in population has increased the amount of pollutants entering the Bay. Most homes along the shore have outdated septic systems, ill-equipped to handle the disposal of waste. And not all apartments and condos are connected to public sewers, even when they are available.Those with septic systems are frequently stressed. Every drop of water and household waste that is not properly treated before entering the Bay contributes to the problem.



Soil Structure.

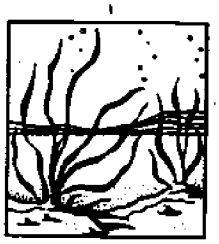
There are two types of soil drainage which play a major role in the health of the Bay. Highly porous, sandy soils can allow drainage from septic systems to leach into the Bay. While in fine, compacted soil, wastewater can rise to the surface and be carried off by rainwater. Either way, once harmful wastewater finds its way into Greenwich Bay, the effect can be profound.

haugs and soft became the lion dollar try. Today bac too high for E and the Bay ing. Closing sents 90% of ed from Na ter. More im for those who the Bay.

	WASTEWATER	STORMWATER RU
Contributing Factors to Greenwich Bay's Problems.	• A high percentage of shoreline homes have outdated, inefficient and overburdened septic systems. • Few homes on public sewer lines are connected in areas where they are available. • Nutrients and bacteria from septic systems leach into the Bay in areas with poor soil or high numbers of septic systems.	• Paved areas and roads contribute large contaminated runoff into the Bay. • Chemicals, fertilizers, motor oil, ant other harmful wastes are carried by st runoff into stormdrains. • Nutrients, sediments and litter from ru algal blooms, cloudy water and an un shoreline.
Long & Short Term Solutions to Bring Back the Bay.	• Consider new technology for individual waste disposal systems in existing homes with lots too small or soil unsuitable for standard septic systems. • Provide opportunities for homeowners and businesses to connect to municipal sewer lines. • Provide financial assistance for homeowners to correct septic or cesspool problems.	• Reduce the amount of household, law ness waste products that wash into and impact the environment. • Repair and maintain stormdrains an that may be aged. • Stencil stormdrains with pollution a messages.
What Can You Do to Help Promote a Healthier Bay.		

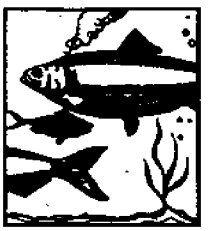
Shellfishing.

For generations, until the 1950's, Greenwich Bay supported scallops and oysters. Harvesting quahell clams later ıstay of a $4 milshellfishing indusıd counts remain ıral food standards, limits to shellfishıwich Bay reprequahaugs harvest sett Bay each winıtly, it's a disaster ake their living on



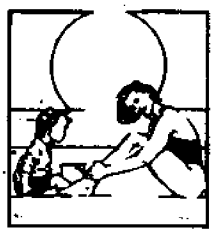
Ecosystems.

The balance of nature is easily thrown off by pollutants and untreated wastewater. An increase in nutrients from runoff and sewage accelerates the growth of sea lettuce and other algae resulting in oxygen stress, cloudy water, and reduced sunlight penetration. The environmentally sensitive native eelgrass, so important as a refuge for young fish, crabs and scallops, has disappeared— a sure sign of an ecosystem in trouble.



Vital Habitat.

Within the 15 square miles of Greenwich Bay are some of the most productive quahaug beds in the world. For years, the Bay has supported commercial and recreational fishing. But today we are seeing a serious effect on marine species such as winter and summer flounder, striped bass, tautog, scup, and bluefish. Even oysters and scallops cannot tolerate the imbalances we have created in this prime spawning sanctuary.



The Turning Point.

The signs of deterioration have been evident for some time. By 1990, 4 of 5 coves were off-limits to shellfishing, and in December 1992 all of Greenwich Bay was closed. We have reached a turning point that will determine if we can begin to correct the problems that have drastically impacted Greenwich Bay. The only way for this to happen is for each of us to take responsibility and understand our relationship with this beautiful and sensitive Bay.

MARINE RECREATION

- No marine sewage pump-out facilities are available for the 4200 boats docked or moored in Greenwich Bay.
- The large concentration of boating activity multiplies the effects of small oil and gas spills.
- Trash or plastics tossed into the Bay can harm or kill birds, fish and other wildlife, and can create hazards to boaters and swimmers.

LAND-USE & ZONING

- Loss of wetlands and buffer zones limit the amount of runoff that can be filtered before entering Greenwich Bay.
- Ever-expanding paved areas increase the amount of stormwater runoff, which carries sediment, bacteria, nutrients and other contaminants to the Bay.
- Excessively small lot sizes and poor soil types hamper the effectiveness of conventional septic systems.

- Build easy-to-use and accessible marine sewage pump-out stations throughout Greenwich Bay.
- Enforce Harbor Master regulations for sewage disposal, mooring densities and locations.
- Promote public awareness through educational campaigns and shoreline clean-up programs.

- Protect remaining open space. Promote buffer zones around coastal areas and tributary streams.
- Identify critical areas around Greenwich Bay that require special considerations for their impact on sensitive waters.
- Initiate the Greenwich Bay Strategic Plan for the reclamation of the Bay.

City of Warwick
3275 Post Road
Warwick, Rhode Island 02886

VOTE IN THE BOND REFERENDUM ON JUNE 7, 1994.

We have reached the turning point that will determine if this Bay will recover from the impact that each of us have placed upon it. The only way for Greenwich Bay to once again become healthy is if ALL public agencies and private citizens to begin working together so we can understand our relationship with this vital resource.

The City of Warwick — Tel: 738-2000
(extensions are listed below)

Planning Department — Ext. 6289
The Department has developed the Plan for the Reclamation of Greenwich Bay. It is the central city coordinating agency.

Sewer Authority — Ext. 6370, or 739-4949
Administers a 60/40 loan-grant program to assist Warwick homeowners upgrade or repair their septic systems. Contact for information or applications.

Public Works — Ext. 6701
The department responsible of maintaining stormdrains and catch basins. Call if you notice a problem.

Recycling Facility — Ext. 6513
Used motor oils can be dispose of at the recycling "igloo," which is located behind the Mickey Stevens Sports Complex, off Sandy Lane.

Parks & Recreation — Ext. 6806
For boating and marine information, as well as mooring permits. They also patrol and maintain the 7 beaches in Warwick.

Narragansett Bay Project — Tel: 277-4913
Coordinating DEM's restoration efforts.

RI Department of Environmental Management

Water Resources — Tel: 277-3961
Monitoring water quality, illegal discharges, fish kills, and marine pump-out facilities.

Groundwater & ISDS — Tel. 277-2306
For septic system permits and inspections.

Coastal Fisheries Laboratory — Tel. 783-2304
Managing quahaug beds and fisheries throughout the Bay.

Non-Point Pollution Program — Tel. 277-3961

24- Hour Hot Line — Tel. 1-800-498-1336

SAVE THE BAY

Save The Bay — Tel: 272-3540
A leading agency for public awareness and legislative actions. They offer a number of programs for individuals to become involved with cleaning up our Bays.

Published by the Warwick's Economic Development and Planning Departments. Lincoln Chafee, Mayor.
Written in cooperation with Narragansett Bay Project, Save The Bay and the Coastal Fisheries Laboratory.

The Marina Outreach and Best Management Practice Implementation Project

- Project Description, Summer 1995 -

Local water quality continues to suffer from nonpoint source pollution. This type of pollution is referred to as "incremental pollution" which means, the pollutants enter the environment "a little here and a little there," rather than in large doses from easily pinpointed sources. According to the United States Environmental Protection Agency (USEPA), boating in general, and more specifically vessel repair and maintenance activities, contribute to this water quality problem. As one of five "model marinas" in Greenwich Bay addressing nonpoint source pollution, this facility is now undertaking a pollution prevention project conducted by the University of Rhode Island, Coastal Resources Center (CRC)/Rhode Island Sea Grant, Marine Advisory Service.

Objectives

This project is 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. This project will:

1. demonstrate and evaluate the ease of pollution control as prescribed in the State's new *Environmental Guide for Marinas;*
2. educate boaters on the nature of the problem and the common sense solutions that can be applied; and
3. share the lessons learned with the marina industry and regulatory community at the state and national level.

By the end of the project, boaters, the marina industry, and relevant regulatory agencies will have a better understanding of the need for and proper implementation of economically achievable nonpoint source pollution controls.

General Plan

Phase One (1995 Season) - By 1999, each marina in Rhode Island will be required to have an approved Operations and Maintenance Program (OMPs). This phase of the project will test this new program by developing OMPs for the participating marinas. Based on the lessons learned from this test, the program will then be revised before it becomes mandatory. This process seeks to improve the programs efficiency from both the industry and state perspectives. In addition to developing OMPs, several outreach approaches will be utilized to educate boaters and the industry on nonpoint source pollution controls and the OMP development process. These efforts will consist of conducting a boater training session at each facility and two statewide workshops for the industry.

Phase Two (1995/1996 Off-Season) - To share the valuable experiences gained during the OMP aspect, a report will be completed and circulated to people in this and other states. Following the completion of this report, the boater training sessions will then be evaluated and revised for the second round of sessions. In addition, priority Best Management Practices (BMPs) or pollution control methods, will be implemented and a process to evaluate their effectiveness installed.

Phase Three (1996 Season) - Boater education will continue during this phase with the second round of training sessions. During this phase, the implementation and use of BMPs will also be monitored and evaluated for their overall cost effectiveness and environmental compatibility. This information will then be incorporated into a final written report which summarizes the knowledge gained during the BMP implementation aspect of the project. As with the first report, this one will also serve as a mechanism for sharing valuable information with others in this state and across the country.

Funding

This project is being jointly funded by the participating marina facilities and the Rhode Island Department of Environmental Management (RIDEM), Office of Environmental Coordination (OEC), and Narragansett Bay Project (NBP). Both RIDEM sources originate from USEPA approved grants written under Sections 319 and 320 of The Clean Water Act. For further information, please contact the University of Rhode Island, Coastal Resources Center at (401) 792-6224.

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