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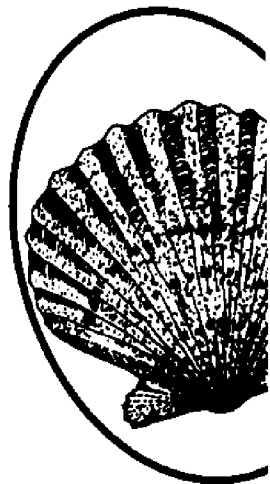
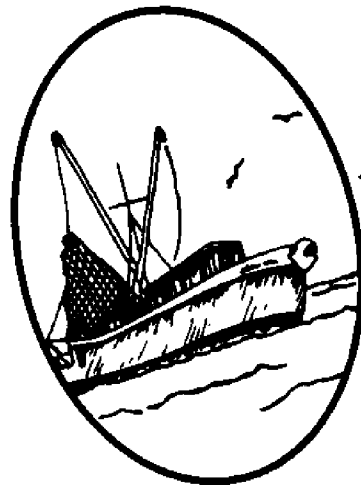
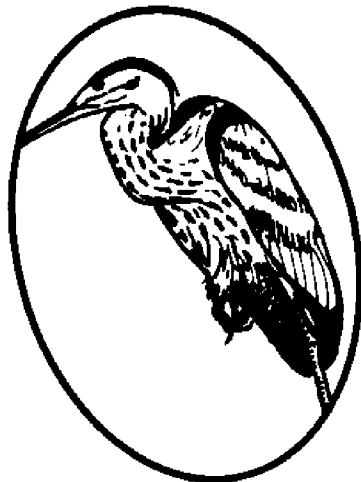
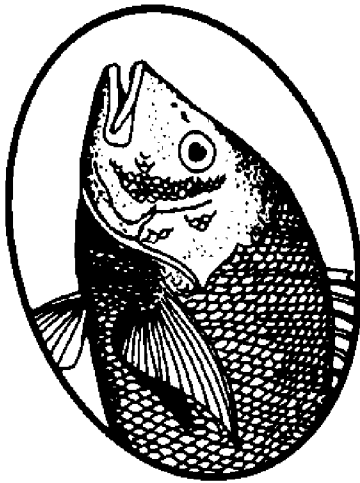
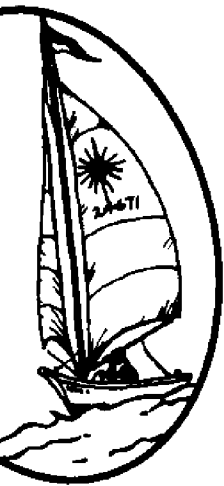
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Availability and Use Of Pumpout Facilities In North Carolina:

A Survey of Marinas

Spencer M. Rogers, Jr. and Leon E. Abbas



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AVAILABILITY AND USE
OF PUMPOUT FACILITIES
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INTRODUCTION

In recent years a variety of federal and state regulations have been discussed and implemented relating to waste treatment and discharge aboard recreational boats as well as the availability of marina pumpout facilities for boat holding tanks. The appropriateness and actual impact of these regulations have been vigorously debated by those concerned. To date, most discussions have been based on personal opinions. In order to assess the actual level of use of one alternative method of waste handling the UNC Sea Grant Marine Advisory Service undertook in the summer of 1981 a survey of marina holding tank pumpout facilities in North Carolina.

HISTORY

The Federal Water Pollution Control Act of 1970 and later amendments directed that the Environmental Protection Agency (EPA) eliminate the discharge of untreated sewage from boats into waters of the U.S. The Coast Guard was authorized to enforce the regulations and certify the design and manufacture of various treatment devices. Since then the actual regulations and effective dates have undergone a variety of changes, postponements, wavers and reevaluations relating to most recreational boats. As it now stands, boats have several alternatives for compliance including no toilets, locked toilets in waters where discharge of untreated waste is not allowed, a portable toilet or three types of Coast Guard certified waste treatment devices. Type I discharges after a minimum of chemical or biological treatment. Type II discharges after a level of treatment comparable to a municipal treatment plant. Type III allows no discharge by burning, recirculating or the most commonly used system, a holding tank. All boats were to have complied by January 30, 1980; for new boats the compliance deadline was three years earlier. Untreated discharge is prohibited in the lakes, rivers, bays, sounds and any ocean area less than three miles offshore. Discharges may legally take place more than three miles offshore. States may request that EPA declare no-discharge areas where only Type III is allowed. Discharge of the treated waste from Type I and Type II systems are not allowed in those areas. No-discharge areas have been authorized mostly on freshwater lakes and several California harbors. They have been proposed in the Great Lakes and a number of saltwater areas, including all of Virginia.

Boater compliance is generally agreed to be relatively low. Little effort has been made by the Coast Guard or others to enforce the regulations. The regulations are again being reviewed in Washington and further changes would not be unexpected.

THE SURVEY

A mailed survey was sent out in July, 1981 to all of the known marinas in coastal North Carolina. Follow-up interviews were conducted by phone or in person of all marinas having holding tank pumpout facilities. Responses were received from 51 marinas or 20 percent of the total number mailed out. That level of response is considered acceptable in light of the large number of small boat yards, boat ramps, gas docks and boat shops included in the marina listings and due to responses from most of the larger, full service marinas in the state.

The 54 responses represent approximately 4800 slips (3000 wet/1800 dry storage) and a much larger percentage of the commercial boat moorage facilities in the coastal area.

RESULTS

The most obvious finding of the survey is that two-thirds of the marinas do not have available and have not had requests for boat holding tank pumpout facilities over the last three years (1979-81). The respondents most often reported that the reason for their response was determined by the boat types using the marina. Those marinas with boat ramps and dry stack storage facilities catering to small, trailerable boats have few, if any, boats with marine toilets. Of those few boats which carry toilets, most owners choose portable toilets, Type I treatment devices or non-compliance over holding tanks. State boating registration statistics reinforce this finding, indicating that the overwhelming majority of registered boats are smaller than the size likely to have a marine toilet. Those marinas reporting actual use or requests for holding tank pumpouts all cater, in total or in part, to larger boats.

Nine marinas reported they operate some type of pumpout facility. A listing is attached at the end of the report. All nine specialize in service to larger, non-trailerable recreational boats generally 25 feet and longer. In the last three years boat holding tanks have been emptied an estimated 339 times, a low number considering the 3000 wet slips surveyed. The number of pumpouts has gradually increased each year. A large jump in use that might have been expected after the regulations took effect in 1980 was not apparent. The number of uses is not evenly distributed among the marinas. Roughly half the pumpouts have been in the Town of Beaufort and one fifth in Wrightsville Beach over the last three years. The four least used facilities have been used an average of once per year.

Interviews with marina operators are in general agreement that the major users of the holding tank pumpout facilities are sailboats ranging in length from 25 to 35 feet. Users are most likely to be transients passing through the state in spring or fall, particularly for marinas located on the ICW, 85 percent of the use has been from these three marinas. Though not on the ICW, the other six marinas all have substantial business from transient and non-local boats. The smaller boats usually do not have toilets or use portable toilets. Sailboats longer than 35 feet and larger powerboats are most likely to install a Type I flow-through treatment device when they are converted. The medium size sailboats often lack the space and electric power needed to install Type I's and therefore the owners decide on holding tanks. The second most common users of pumpout facilities are live-aboards moored in the marina or nearby.

Ten of the remaining 42 marinas responding to the survey reported they had received requests for pumpouts during the last three years. Most of those marinas averaged approximately one request per year. One marina had ten requests last year and another had six. A total of forty-five requests were counted over three years.

Ten of the marinas responding to the survey indicated that they were at least casually considering installing some form of pumpout facility. Three or four of those appear likely to be in operation during the next two years.

TYPES OF PUMPOUT SYSTEMS

Several system designs are presently in use to empty holding tanks. Five marinas used fixed installations with at least one electric diaphragm pump. Two systems built by the National Park Service at Ocracoke and Oregon Inlet use two pumps in series. Both systems have not been working for a number of years due to maintenance problems. The Oregon Inlet facility has been recently repaired. The other three systems were purchased from a manufacturer who specializes in the equipment. Waste is pumped directly from the boat to a suitable treatment system on land. No problems were reported other than the normal maintenance requirements for pumps near saltwater.

Two of the other four portable systems use a commercially available, high rpm impeller pump discharging into a 20 to 30 gallon tank rolled over the dock on a hand truck. The tank is rolled back to land and emptied into a suitable treatment system. These systems have worked successfully with light use. A supply of spare pump impellers was recommended. Another marina uses a portable holding tank with an inexpensive hand-powered diaphragm pump. The system has not been used due to the lack of an acceptable disposal method on land. The 20- to 30-gallon transfer tanks were considered to be large enough to empty and rinse the boat holding tanks that had been pumped. Larger capacity tanks are either not in use or get emptied before completely filled. Probably the most ingenious yet simplest system is a sewer connection provided by the marina and located near a bulkhead or short dock. The boat owner must then provide a pump and enough hose to reach from the boat to the sewer connection.

Four of the pumpout facilities discharge the wastes into available municipal waste treatment systems. Four others empty into previously existing septic tanks used jointly to treat the rest of the waste water of the marina. Another marina discharges into a collection tank where a submersible sump pump automatically transports the waste to a septic tank exclusively for boat wastes. See the last section of this report for more details on waste treatment methods, problems and possible solutions.

COSTS

Charges for pumpouts varied from free to \$15 per use. Four marinas provided pumpouts for free, reasoning that boaters would be encouraged to use it and keep the marina waters that much cleaner. The higher-priced marinas reasoned that the high level of aesthetic unpleasantness associated with the job called for a high price.

The \$15 system had never been used. A system charging \$7.50 had been used lightly. The three marinas with charges between \$2 and \$5 received about 85 percent of the use.

An alternative mentioned by one marina and considered in the discussions leading to this survey is the use of septic tank pumpout tank trucks to empty boat holding tanks. Such companies in the Wilmington area were contacted by phone to check for availability to pump from boats. Only one company contacted had ever worked on a boat and that was several years earlier. Several companies

said they would be willing to try. While it was clear that the boat holding tank would be roughly 20 gallons, all of the companies priced a boat pumpout similar to a 1000-gallon home septic tank at \$40 to \$65. It was also apparent that the companies lacked the standard fittings necessary to connect to a boat tank. Most of the companies requested advance notice for the work to be done. Under those limits it seems unlikely that such companies can be considered a very realistic alternative for emptying boat holding tanks.

HOW TO FIND THE NEAREST FACILITY

There have been reports that boaters have had difficulties in finding pumpout facilities when needed. The surveys and interviews indicate relatively good knowledge of where other facilities are located. Several marinas stated they responded to requests by referring boaters to nearby facilities. However, some areas lack any facilities and referrals were not possible.

Transient boats traveling the ICW primarily in the spring and fall are the major users of pumpout facilities. Since holding tanks need to be emptied only on roughly a weekly basis, and if these boaters know the location of facilities in advance, it is easy to plan to empty the tank as they pass or moor overnight near a known facility. The most commonly used directory along the ICW is the Waterway Guide which is updated annually. The Guide lists the services of many of the marinas in the state and includes a notation if holding tank pumpout facilities are available. The 1981 Mid-Atlantic Edition of the Waterway Guide correctly lists all of the pumpout facilities in North Carolina at the time of its publication that were found by the survey. It apparently incorrectly lists two marinas where facilities could not be found. It appears the Guide is an adequate listing for transient boaters to plan their pumpouts.

A second directory is Salt Water Sport Fishing and Boating in North Carolina. It is more frequently used by fishermen and small boaters who are less likely to use a holding tank. The 1981 edition correctly lists only 2 of the 9 pumpout facilities. In addition, it lists 15 other marinas as having pumpouts where none were reported or apparent.

CONCLUSIONS

Nine marinas in North Carolina have facilities to pumpout boat waste holding tanks. Ten of the other marinas have received at least one request for a pumpout in the last three years. The demand for pumpouts has been remarkably low. There have been less than 400 uses and requests for use in three years. Most marinas have not had requests for pumpouts in the past because most marinas cater to small boats. Of the 194,000 boat registered or documented in the state, 54 percent are less than 16 feet in length and 98 percent are less than 26 feet in length. Even with increased boater compliance and strict enforcement of marine sanitation laws most marinas in the state will have no demand for holding tank pumpouts since they specialize in boats too small to have a marine toilet and therefore even less likely to have a holding tank.

Those marinas catering to larger recreational boats can expect a small but gradually increasing demand for pumpouts. It appears that none of the existing facilities are showing a profit from their existing installations. Commercially available motorized pumping systems are the most convenient to use but list for around \$3000 plus \$1500 for installation and connection to an existing treatment system. Even the most heavily used systems have been unable to achieve a reasonable payback period of the original investment.

While there is little economic incentive, there are a variety of other reasons for marina operators to consider some form of pumpout facility. For aesthetic concerns as well as to help avoid water pollution problems it seems advisable to encourage boaters not to discharge either treated or untreated wastes into the marina. The actual degree of pollution hazard created by boat discharge is highly site specific and subject to heated debate. However, a common sense approach leads to the conclusion that pumping the waste ashore must provide at least a minimal improvement in water quality. In order to make their operation more attractive to users and renters, marinas often provide a variety of free services such as on-land restrooms, running water and trash collection. The availability of pumpout facilities should make the marina more attractive to those boaters with holding tanks that are looking for either transient and permanent moorings or fuel services in competitive markets. It could be a particular advantage in areas where no other pumpout facilities are available such as Roanoke Island or Brunswick County.

A final reason to consider pumpout facilities is to avoid future efforts to require them by regulations. The State of North Carolina recently repealed a regulation requiring pumpout facilities at all new marinas or additions to existing marinas regardless of size or type of boating use. Present regulations require only a listing of the closest pumpouts. However, Virginia now requires that all marinas, both new and existing, provide pumpout facilities. If the North Carolina marina industry and consumer demand provide at least one facility at most local boating areas then there is no longer a need to require them at all marinas statewide.

While the commercial, motorized systems will be desirable if heavier demand develops, the portable and hand-operated pumpouts may be very useful for the present light duty use. Sea Grant has designed and constructed a 30-gallon portable transfer tank operating with a hand pump for about \$250, using new materials. If a sewer connection is located close to a fuel dock, a workable system can be assembled with only a hand pump and enough hose to reach from the connection to the boat. The cost of such a system would be approximately one half or \$125. Costs can be further reduced by using frequently available scrap materials. The portable pumps, both electric and hand-powered, offer the marina the additional advantage of providing a spare bilge pump when needed.

WASTE TREATMENT OF DISCHARGES FROM BOAT HOLDING TANKS

One particular problem became apparent during the evaluation of this survey. There is a general lack of understanding by the marina industry and the various regulatory agencies on how best to treat holding tank wastes. The problem stems from the normal practice of chemically treating holding tanks to reduce odors. Formaldehyde, chlorine and other chemicals are frequently used. Similar chemical

treatments are used in Type I and II flow-through systems. Many methods of waste treatment rely totally or in part on biological breakdown of the wastes. In certain circumstances the odor-reducing chemicals may retard or stop the desired biological treatment. The best solution is to connect to a municipal waste water treatment system. Neither the wastes nor the chemicals are particularly concentrated and would be well diluted in even the smallest municipal systems. Even heavy, frequent pumpout use is not judged to be a significant problem for municipal treatment systems. Unfortunately, such systems are not available at many marinas.

A septic tank and drain field are likely to be a common method of treatment. It is conceivable that a septic system heavily dosed with holding tank wastes could be significantly affected by the added chemicals and the degree of treatment reduced. In such a case the most likely effect would be a reduced breakdown of solids in the tank, an increased buildup of sediments filling the tank until the drain field becomes clogged with solids and the treatment system fails. Failure could be avoided by pumpout of the septic tank as needed to prevent any excessive buildup of solids. If septic tank pumpouts are necessary on a frequent basis or if heavy boat pumpout use is anticipated one solution is to use two septic tanks in series for both boat and other marina wastes. Solids will be segregated in the first tank and the chance of drain field clogging is reduced. Retention time in the tanks will also be increased allowing a more complete decomposition of the solids.

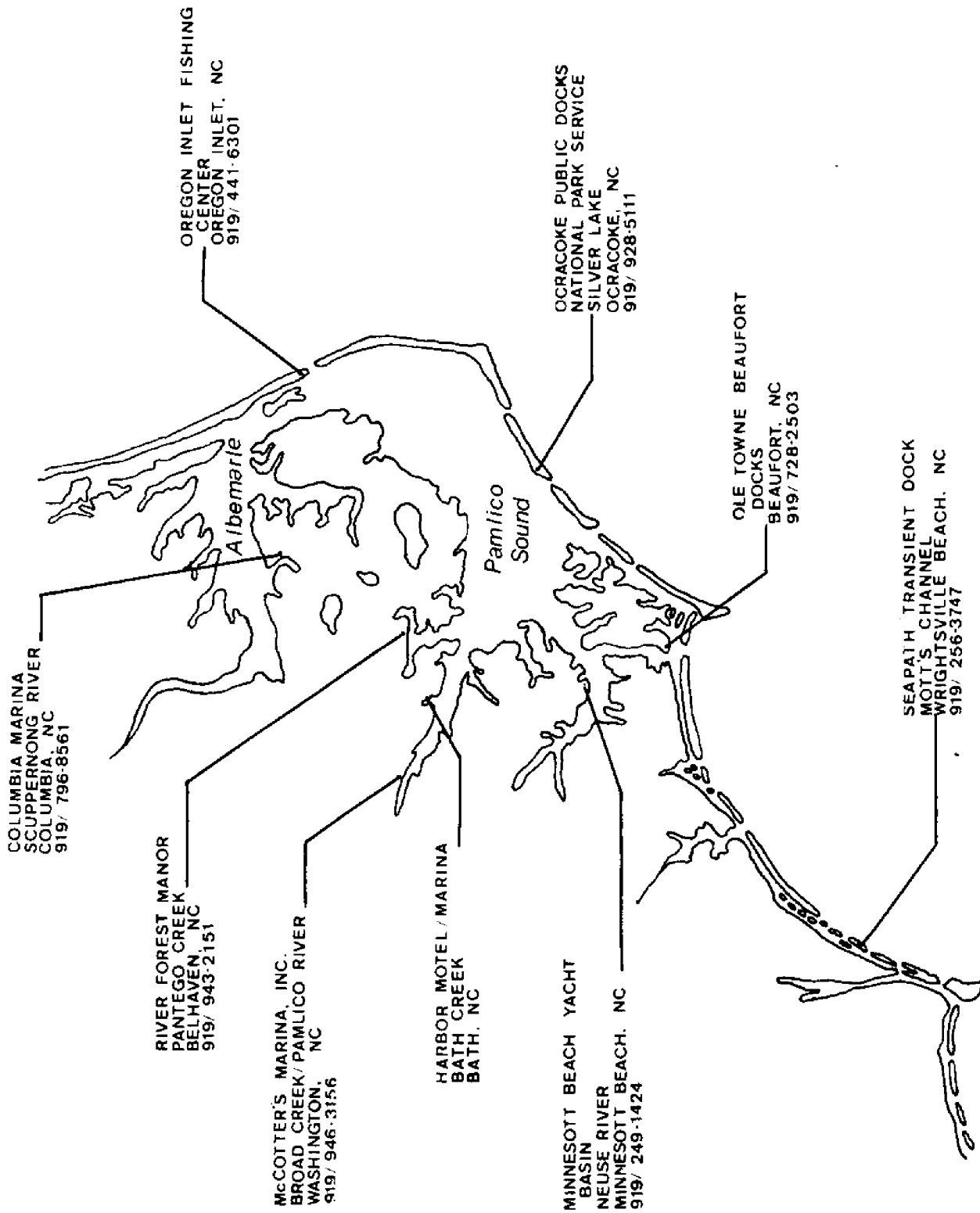
Most existing marina septic tank systems are capable of handling several normally treated holding tank loads per day. The boat discharge will be sufficiently diluted by other marina discharges from restrooms and other drainage to prevent a significant impact on the treatment system. Little research on the problem has been found but it has been estimated that with 3 or 4 pumpouts per day the effectiveness of the septic system may be slightly reduced. Even the heaviest pumpout use found in the state is less than once in every three days. A more likely level of use under present levels of demand might be a couple of times per week during the busy seasons. With normal anticipated pumpout loads found in the survey there should be no significant impact on the quality of treatment if attached to existing marina septic tank.

A third disposal alternative is a separate septic system for holding tank wastes. Here is where the potential problems are the greatest. Without dilution from other sources and with the low volume of flow from light pumpout use this type of system is by far the most likely not to work effectively. Failure of the system is most likely to cause a more rapid filling of the septic tank with sediment as with the earlier example, but at a much higher rate due to the stronger treatment chemical concentrations. No septic tank failure due to boat holding tank wastes has ever been documented. Campgrounds often use septic tanks to treat similar wastes from recreational vehicles exclusively, with few problems. However, specialists contacted who were familiar with waste treatment methods and the usual chemical additives found in holding tank wastes recommended against separate septic systems exclusively for boat pumpouts with the light level of use found in the survey. Considering the light loads expected from boat holding tanks, a connection to properly designed and constructed septic tanks already existing at the marina was recommended when municipal connections were not available.

Technical assistance on topics discussed in this report is available from Spencer M. Rogers, Jr., Marine Advisory Services, North Carolina Marine Resources Center, Kure Beach, NC 28449, (919) 458-5780; Leon E. Abbas, Marine Advisory Services, 105 1911 Building, North Carolina State University, Raleigh, NC 27650, (919) 737-2454 or by contacting Craig Cogger, Department of Soil Science, North Carolina State University, Raleigh, NC 27650.

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