REPORT OF THE VIRGINIA DEPARTMENT
OF HEALTH ON

FEASIBILITY OF ESTABLISHING SEWAGE NO-DISCHARGE ZONES FOR BOATS

TO THE GOVERNOR AND
THE GENERAL ASSEMBLY OF VIRGINIA

HOUSE DOCUMENT NO. 58

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TO: The Honorable George Allen

and

The General Assembly of Virginia

The report contained herein is pursuant to House Joint Resolution 448, agreed to by the 1995 General Assembly.

This report constitutes the response of the Department of Health to study both the effect of boat sewage discharges on the waters of the Commonwealth, with special regard to seasonal shellfish harvesting restrictions, and the ability of the Commonwealth to meet current United States Environmental Protection Agency standards for establishment of No-Discharge Zones.

Respectfully Submitted,

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EXECUTIVE SUMMARY

House Joint Resolution 448 charges the Virginia Department of Health (VDH) to: (1) study the effect of boat discharges on the waters of the Commonwealth; (2) determine the ability of the Commonwealth to meet current United States Environmental Protection Agency (USEPA) standards for establishment of No Discharge Zones (NDZ); (3) examine data regarding the extent of pollution loadings and the sensitivity of affected waters with particular attention to the existence of productive or potentially productive shellfish areas, and the availability of operational pump-out facilities; (4) evaluate compliance with existing regulations; and (5) examine the feasibility of requesting additional federal monies through the Clean Vessel Act (CVA). Each of the charges is addressed below.

Study the Effect of Boat Discharges on the Waters of the Commonwealth

The discharge of boat sewage, whether treated or not is a substantial threat to the health and water quality of the Commonwealth's waters. Boat sewage possesses many characteristics unique to the boating community, the most important of which is that this sewage is very concentrated. Holding tank waste ranges from 15 to 100 times higher in organic load than does typical domestic sewage and this strength represents a significant threat to water quality. This concentrated boat sewage characteristic is significant because of the tremendous amount of water necessary to dilute these pollutant discharges down to levels that pose no risk to public health or will not violate water quality standards. With multiple raw sewage discharges, particularly in one specific area, the dilution rate becomes extremely slow and ineffective, and a great threat to water quality and human health exists. In addition, the level of sewage treatment provided by recreational boat Marine Sanitation Devices (MSD) is much inferior to the level of sewage treatment provided by on-shore sewage treatment works as Type I and Type III MSD's are typically installed on such boats, due to an existing federal waiver. Thus, the potential amount and strength of sewage discharged in places where these boats congregate can have a significant impact on water quality.

Determine the Ability of the Commonwealth to Meet Current USEPA Standards for Establishment of No Discharge Zones

Based on the USEPA publication entitled "Protecting Coastal Waters from Vessel and Marina Discharges: A Guide for State and Local Officials..." the Division of Wastewater Engineering (DWE) determined the number of required pump-out facilities and dump stations in the river basins that are affected by shellfish seasonal condemnations. The USEPA guidelines indicate that the number of existing facilities located at marina establishments in these four river basins should meet or exceed USEPA

guidelines for suggested numbers of pump-out facilities and dump stations. However, these guidelines do not include specific criteria to evaluate availability. Previous communications with USEPA staff indicated that designation of NDZs could be approved for reasonable travel distances around existing pump-out and dump station facilities considered to be available in accordance with the VDH ***Sanitary Regulations For Marinas and Boat Moorings***. A reasonable travel distance, or time of travel, has been established as three miles, or thirty minutes travel time.

Examine Data Regarding the Extent of Pollution Loadings and the Sensitivity of Affected Waters with Particular Attention to the Existence of Productive or Potentially Productive Shellfish Areas, and the Availability of Operational Pump-out Facilities

Currently, there are a total of 2,681 acres of seasonally condemned shellfish areas that surround 155 marinas and other places where boats are moored (OPWBAM) in Virginia. Seasonally condemned areas are areas that are condemned solely due to boating activity in accordance with the requirements of the National Shellfish Sanitation Program as implemented by VDH. These areas are established by using an analytical time-transit dispersion model designed by the Virginia Institute of Marine Sciences (VIMS) for use by the VDH staff. In order to study the potential impact of the declaration of NDZs on the size of seasonally condemned shellfish growing areas on a year round basis, analytical model predictions were developed. The results obtained from these analyses suggest that there is no relationship between marina locations and the size of seasonally condemned productive or potentially productive shellfish grounds. The lack of correlation is primarily the result of the location of current shellfish harvesting areas which are not located in the same general vicinity of marinas and other places where boats congregate.

Evaluate Compliance with Existing Regulations

VDH estimates that approximately 65% of regulated marina facilities are in compliance with the 1990 VDH ***Sanitary Regulations for Marinas and Boat Moorings***. While this number is numerically sufficient for NDZ concerns, the locations of these pump-outs do not currently provide enough coverage for all boats to safely and conveniently dispose of their sewage. VDH has determined through annual inspections, that these pump-out installations are sufficient for NDZ designation around the boat mooring facilities for a reasonable travel distance of three miles.

Examine the Feasibility of Requesting Additional Federal Monies through the Clean Vessel Act (CVA).

VDH estimates that complete overall compliance with the marina regulations for pump-out facilities at marinas and OPWBAMs, with strategic placement, would require installation of nearly 200 additional pump-out stations and dump stations which could almost double the area of service available to boaters for use of on-shore sewage receiving facilities. While this is currently only a goal, CVA grant funds available to marina owners and operators could make this an achievable goal. The State requests for CVA grant funds will provide for sufficient sewage receiving equipment to serve approximately three quarters of a million acres of State coastal waters. Thus this total area of State waters could then be eligible for NDZ designation. CVA funding in Virginia has increased from $122,663 in 1993/1994 to $163,300 in 1995, and VDH has requested an additional $813,750 for 1996. CVA grants at the federal level are funded through 1997 and VDH feels confident in its ability to obtain these grants along with the successful distribution of them for new/renovated sewage handling facilities, maintenance of those facilities and educational programs.

INTRODUCTION

Overview and Purpose

House Joint Resolution 448 requests the Virginia Department of Health (VDH) to study the feasibility of establishing No Discharge Zones (NDZs) for boats. NDZs forbid boats equipped with installed or portable toilets from releasing toilet waste into the surrounding waters (see Attachment L).

The resolution directs VDH to study the effect of boat discharge on the waters of the Commonwealth with particular attention to the impacts on shellfish and shellfish growing waters and the ability of the Commonwealth to meet current United States Environmental Protection Agency (USEPA) standards for the establishment of NDZs by:

1. examining data regarding the extent of pollution loadings;

2. considering sensitivity of affected waters with particular attention to the existence of productive or potentially productive shellfish areas, and;

3. determining availability of operational pump-out facilities.

The Department is also directed to evaluate compliance with existing regulations and the feasibility of requesting additional federal moneys through the Clean Vessel Act (CVA). CVA grants provide funds for boat sewage receiving equipment and educational efforts to encourage the use of this equipment in Virginia. CVA funds provide seventy-five percent reimbursement to the marina owner for the installation of approved pump-out and dump station equipment. The Virginia marina owners must provide for the other twenty-five percent of the purchase and installation cost.

Currently, it is legal to discharge treated waste from certain Marine Sanitation Devices (MSDs) that provide treatment of sewage (Types 1 and 2). MSDs are an arrangement of piping and tanks that handle sewage on boats for which specific functional standards have been promulgated by the U.S. Coast Guard (USCG). Type 3 MSDs are holding tanks and must be pumped out at appropriate facilities throughout the state. MSDs include any equipment for installation on a vessel which is adequately designed to receive, retain, treat and safely discharge sewage. It is illegal to discharge any raw, untreated sewage overboard into any state bodies of water, and such discharge can only be done when boaters are three miles offshore or more in the territorial sea.

NDZs have far-reaching, positive implications. Through the establishment of NDZs, boaters would be required to safely dispose of their sewage waste in marine pump-out facilities or dump stations. No discharges of boat sewage waste, whether treated or untreated, would be allowed in these designated areas. The establishment of NDZs would improve overall water quality in Virginia which, in turn, would have positive results for the citizens of Virginia.

These benefits include:

- reduced potential incidence of illness due to recreational activities (swimming, etc.) in contaminated waters;
- reduced potential incidence of illness due to raw shellfish consumption;
- reopening of some portions of seasonally condemned shellfish areas, thus allowing the direct harvest of shellfish.

Should NDZs be established, an extensive educational effort would be necessary to make boaters aware of the need for no-discharge in those areas along with making them aware of the services available to protect the waters from sewage contamination.

Background/History

In 1967, a Marine Resources Commission Study found that Virginia had a serious and growing problem from boat and marina type pollution. This Commission concluded that water quality problems resulting from recreational boats using open waters were negligible, but serious water quality problems resulted from the activities associated with boats at marinas and Other Places Where Boats are Moored (OPWBAM). The Commission's recommendations included development of laws or regulations relative to the installation or operation of marine toilets on vessels. Other sources of sewage and pollutants associated with the use of boats could originate due to inadequate on-shore sewage facilities at marinas. Such requirements were to be similar to the laws or regulations used by other states along the Atlantic seaboard. Subsequently, the Virginia State Water Control Board (SWCB), now part of the Department of Environmental Quality (DEQ), was charged with controlling boat pollution with specific and permissive legislative authority to control by regulation the discharge of sewage and other wastes from both documented and undocumented boats and vessels on all waters of the State. The SWCB adopted these requirements as Regulation Number Five (5). The Study Commission recommended that VDH should adopt by regulation the minimum requirements for sewerage facilities adequate to serve the number of boats and people for

which the marina or mooring facility was designed to accommodate. The marina rules and regulations were subsequently adopted by the State Board of Health to provide standards for on-shore sanitary facilities at marinas and other places where boats are moored. Thus, the State of Virginia has established regulations that provide for NDZ designations.

The current SWCB Regulation Number 5 provides that:

1. No human excrement shall be discharged from a vessel into State waters.

2. All vessels with an installed toilet which are regularly moored in State shellfish growing waters shall be equipped with a holding tank.

3. All waste from sewage holding tanks and self-contained toilets shall be pumped or carried ashore for treatment in facilities which are approved.

However, this regulation becomes effective for all vessels on a body of water in the State only after United States Environmental Protection Agency (USEPA) has declared that body of water as a no-discharge area. The requirements imposed on states in order to obtain approval for NDZ designation are described in Section 312 of the Federal Clean Water Act (CWA) (see attachment K). The CWA provides that a state may petition the USEPA for a body of water to be designated as a no-discharge area if adequate boat sewage holding tank pump-out facilities are provided. The SWCB and the VDH petitioned the USEPA to declare a portion of the Rappahannock River as a no-discharge area in 1979. Subsequent to this petition, the VDH, SWCB and USEPA received letters of opposition from representatives of marine trades and special interest groups which expressed concern that a precedent would be set and all vessels would be required to use sewage holding tanks. USEPA delayed ruling on the petition until completion of a study it had initiated on MSD federal requirements. Following completion of that study in 1984, USEPA requested that Virginia resubmit a new no-discharge petition in order to update information on the availability of holding tank pump-out equipment located in the petition area. This request included USEPA recommendations to decrease the scope of the petition by limiting the NDZ area requested. No action was taken on these recommendations as broader water quality concerns were being expressed for the entire Chesapeake Bay area at the time. Such concerns established other initiatives with a relatively higher priority than NDZ designation.

Extensive studies initiated by the USEPA and completed in 1985 documented a decline in water quality and a loss of natural resources for Chesapeake Bay waters. These reports sparked renewed public interest in the control of all pollution sources in the Chesapeake Bay area. Priorities were established by Federal and State agreements to investigate these concerns including the water quality impacts from boat usage. The VDH was requested to develop an educational program aimed at the boater and marina operator on the importance of properly protecting the waters of the Chesapeake from sewage contamination. Some of the concerns raised in the studies were addressed by making revisions to the marina regulations but others required that additional studies be conducted before the need for NDZs could be clearly established.

A two-phase study of the factors important to the consideration for designation of an area as NDZ was initiated using funds obtained from the National Oceanic and Atmospheric Administration (NOAA) through Virginia's Coastal Resources Management Program. The first phase of the study conducted by the Virginia Institute of Marine Science (VIMS) focused primarily on identification of significant aquatic resource areas. A review of other NDZ programs in various states was also completed. A full digitizing of environmental sensitivity index maps was needed to more easily locate and prioritize potential NDZ areas; this effort was not completed due to incompatible information sources. The second phase of the project developed through SWCB-DEQ involved the work of a multi-agency committee to develop recommendations for NDZ priorities. The committee reviewed the environmental sensitivity index information, marina locations, boating data, location of existing pump-outs and dump stations during 1994, but deferred any final recommendations on NDZ designations until more extensive boat pollution educational efforts could be initiated.

Recently, the City of Virginia Beach inquired about the possibility of establishing a NDZ for Rudee Inlet and Lynnhaven. Although DEQ staff prepared a final report concerning the issue of NDZ environmental factors, the technical difficulties with the mapping information prevented development of positive recommendations for NDZ development. Thus, no action was taken on the Virginia Beach request.

During the revision of the marina regulations in 1987, the majority of marina operators voiced objections to several issues during the public hearings and in written comments to VDH. Operators opposed pump-out installations, expressing concern that the odor retardants used in boat sewage holding tanks would be detrimental to the operation of the on-site sewage disposal system, as well as sewage treatment systems. They also objected to the buffer zone criteria that VDH utilizes to condemn shellfish beds around marinas for the taking of shellfish for human consumption. Various marina operators challenged the requirements to install pump-out facilities on the basis that boaters would not request to use the facility. To evaluate these objections, the Department initiated studies to address these areas of concern. As a result of study on educational needs, public information and boater educational material were subsequently

published and distributed. In addition, a time transport hydraulic dispersion analytical model was developed by VIMS to establish buffer zones around marinas in a more scientific manner. A study of the effect of holding tank chemical additives was completed by the Virginia Water Resources Research Center; this study established that there was a relatively limited impact by holding tank chemicals when discharged to sewage treatment and disposal systems.

Over the past ten (10) years, VDH, working with VIMS, has developed public information material concerning the protection of waters around marinas. This effort initially focused on the proper use of installed toilets and MSDs on boats. Previous water quality studies verified that pollution in marina waters increased significantly during periods of boating activity. However, the elimination of overboard discharges of sewage by boaters will require that adequate on-shore sanitary facilities be provided. Also necessary is a commitment to protect water quality by both the marina management and the boating public. Thus, the Virginia public education program for promoting voluntary "no sewage discharge," included an encouragement for marina owners to provide reasonably available boat sewage pump-out equipment to serve the boating public.

To address both the issues of education and availability of pump-out service, VDH conducted a summer educational program in the Lynnhaven Bay system in 1994. Field service agents were placed in this system 10 hours daily on Fridays, Saturdays and Sundays throughout the boating season from Memorial Day to Labor Day. Using brochures, informational talks and portable pump-out facilities, the field agents informed boaters and marina operators of the need to properly protect water quality. The field agents demonstrated the use of pump-out equipment by offering free pump-out service. Two portable pump-out units were used to persuade boaters to use proper pump-out equipment instead of overboard disposal. It is estimated that more than several thousand gallons of raw sewage were prevented from entering the Lynnhaven system during that boating season. It has been proposed to continue this highly effective educational effort in combination with the development of more comprehensive information sources to promote the proper on-shore disposal of boat sewage and other wastes.

Virginia's approach to the development of a more comprehensive educational program involves use of the Virginia CVA Coordinating Committee as the framers of the major themes and concepts for voluntary no-discharge promotion. The final production of educational materials such as brochures has been privatized and placed in the hands of professional advertising or promotional agencies. A new brochure was developed through the CVA Educational Program using the brochure developed for the Lynnhaven Bay project. This new brochure has been mailed to all boaters with Virginia addresses. Additionally, available information will be distributed to promote the use of sewage receiving equipment and emphasize the need for maintenance. This information will

emphasize the facts that sewage receiving equipment is readily available and will not be a burdensome expense to the marina owner. This information will assure utility personnel that boat sewage can be safely handled and treated. This material will be distributed to all marinas and public utilities to encourage use and interaction between marina owners, utilities and boaters.

Today, more than 300,000 boats and vessels use the Chesapeake Bay and other Virginia waterways, and that number is growing rapidly each year. In fact, studies of population growth in the Chesapeake Bay area predict a thirty-five (35) percent increase in population along some portions of the Virginia-Maryland coastline by the year 2020. This additional shoreline development will put added pressure on coastal zone resources.

As vessel traffic continues to increase in volume, potentially harmful discharges of human sewage from these boats also increase proportionately in importance relative to water quality issues. Even individual discharges can significantly affect water quality and contaminate shellfish populations which in turn can have deleterious effects on human health and the shellfish industry. A 1991 report developed for the Chesapeake Bay Program regarding this growing problem made this statement:

> "Perhaps more than any other boat-generated pollutant, discharges of human wastes from boats have the potential threat to degrade water quality. For the most part, vessel discharges pose the greatest threat to water quality in places where boats tend to congregate. These marinas, recreational boating centers, and raft-up sites are often located in quiet, protected waters. Unfortunately, these waters are also often ecologically fragile areas with restricted circulation, which are slow to flush themselves of pollutants. They are common locations for oyster beds, fish spawning and nursery habitats, and large beds of submerged aquatic vegetation." (1)

In addition, the degradation of critical environmental habitats is accelerated by the introduction of human waste, which in turn threatens the ecological, aesthetic, and commercial values of Virginia's waters. The primary mechanism for addressing this issue is through the implementation of NDZs where the overboard disposal of human waste from boats would be prohibited.

An advisory committee was formed consisting of representatives from various state agencies and private organizations including the following: Chesapeake Bay Foundation, Virginia Department of Game and Inland Fisheries (VDGIF), Virginia Association of Marine Industries, VIMS, Virginia Marine Resources Commission (VMRC), Chesapeake Bay Commission, DEQ, and VDH's Divisions of Wastewater Engineering and Shellfish Sanitation. A meeting of the advisory committee was conducted on May 25, 1995, to discuss initial ideas, anticipated content of the final report, and concerns. A second and final meeting to discuss progress and new concerns was held on September 7, 1995. Various members of the advisory committee attended and assisted VDH with the analyses provided in this section.

Effect of Boat Discharges on the Waters of the Commonwealth

In analyzing potential NDZ locations, VDH has identified priority areas (Attachment A) and the ability of the Commonwealth to meet current USEPA standards for NDZ designation (Attachment F). In determining Virginia's ability to meet USEPA standards (Attachment K), the following information has been collected from the annual marina and OPWBAM inspections: pump-out facility locations, hours of operation, vessel draft requirements, vessel population and number of boaters. Actual counts of moored boats were used to project estimates of pollution sources. These inspections and other observations made over the past 20 years were then utilized to establish a peak contributing population in accordance with vessel size and use. Estimates of the numbers of people using boats were used to compute the amount of sewage released into the waters by recreational vessels and workboats.

VDH developed the boat pollution analysis by estimating both the numbers of boats (and boaters) within state river basins, and the makeup and content of human waste contained in both holding tanks and porta-potties. The potential impact of the release of the sewage from recreational boats to public health and water quality was subsequently established.

The VDH-Division of Wastewater Engineering (DWE) Marina Program performs annual marina inspections to gather information. These inspections include all known marinas, OPWBAM and places under surveillance. These inspections determine total slip capability, both wet and dry, of the establishment along with taking a count of the boats that are present during the inspection, paying particular interest to the size and numbers of these boats. Analysis of available data from the most recent (1994 - 1995) annual DWE Marina Program surveys indicate that a large percentage of the boats 26 ft. in length and greater are berthed or stored at marinas whereas boats less than 26 feet in length are more portable and are more likely to be transported around on trailers or stored at private facilities. According to VDGIF records, 5,850 registered boats ranging from 26 to over 65 feet in length are owned by Virginia residents. The majority of these larger boats are between 26 to 39 feet in length. In the four river basins that are affected by Virginia seasonal condemnations, marina surveys identified 5,167 boats in the 26 foot to less than 40 foot range. This accounts for the majority of large boats registered in the state. The USCG also documents large boats, 5 net tons and larger, and estimates that 8,760 boats of this classification are registered to Virginia owners. The USCG documented boats are in addition to the boats registered with the VDGIF. DWE marina surveys identified 1,344 boats of 40 foot in length or greater moored at marina establishments located in these same four river basins.

The USEPA estimates that in Virginia 25% of the recreational boats 26 to 40 feet in length have holding tanks and assumes that all boats greater than 40 feet in length possess holding tanks. These large boats (26 feet and longer) are of particular significance to boat pollution because they can account for the majority of the potential discharge of waste. Such boats are large enough to carry many passengers and carry them for longer periods of time than smaller vessels. Larger numbers of people and the extended time on a boat increases the likelihood that they will be using the toilet facilities on the boat and thus larger boats will have to dispose of such waste volumes within a limited time span resulting in a potential discharge. The USEPA also assumes in Virginia that 37% of boats 16 to 26 feet in length have portable toilets which require dump stations to properly dispose of waste. In order to determine required pump-out facilities and dump stations to service these numbers of boats, the USEPA estimates a peak occupancy rate for the marina at 40%. This peak occupancy rate is based on a peak usage such as a holiday weekend when a large percentage of boaters would most likely be using their boats.

The discharge of boat sewage, whether treated or not, is a substantial threat to the health and water quality of the Commonwealth's waters. Boat sewage possesses many characteristics unique to the boating community, the most important of which is that this sewage is very concentrated. Vessel sewage is more concentrated than domestic sewage with respect to most of the standard parameters used to measure the quality of waste water, such as suspended solids and organic content. Holding tank waste ranges from 15 to 100 times higher in organic load than does typical domestic sewage and this strength represents a significant threat to water quality. This concentrated boat sewage characteristic is significant because of the tremendous amount of water necessary to dilute it down to levels that pose no risk. With multiple raw sewage discharges, particularly in one specific area, the dilution rate becomes extremely slow and ineffective, and a great threat to water quality and human health exists.

However, the greatest threat to human health and safety is the release of microorganisms from sewage discharges from boats, whether treated or not. Treatment refers to the process that occurs when sewage is processed by certain devices or onboard MSDs. Adequate processes to treat sewage must accomplish a level of disinfection that will lower the bacterial level down to an acceptable standard, though viruses are only minimally affected. Sewage treatment could be provided by a permanently installed device connected to the boat's toilet. Three types of MSDs, Types I, II, and III devices have been approved by the USCG for use on recreational boats.

Type I MSDs are a flow-through type system using mechanical cutting of solids followed by introduction of chlorine disinfectant and then direct discharge. A Type I MSD is required to produce an effluent having a fecal coliform bacteria count no greater than 1,000 per 100 milliliters with no visible floating solids. It accomplishes this by maceration and limited disinfection of the boat waste before discharge into the water. This type of MSD is typically found on boats less than 65 feet in length.

Type II MSDs are also flow-through type devices. Type II MSDs are required to produce an effluent having a fecal coliform bacteria count no greater than 200 per 100 milliliters and suspended solids no greater than 150 milligrams per liter. The Type II MSD is very similar to the Type I MSD except that a higher level of operating energy is required and increased detention of treated waste prior to discharge is provided. These MSDs are usually found on boats greater than 65 feet in length.

Type III MSDs are designed to prevent the overboard discharge of treated or untreated sewage. These type MSDs are basically what is referred to as holding tanks. They are nothing more than a tank designed to hold sewage that has been flushed from the marine toilet. The holding tank can contain deodorizers and other non-treatment chemicals to mask the scent of the raw sewage. The contents of these tanks are stored until the boater properly disposes of them at pump-out facilities. These type devices are commonly used on boats between 16 feet and 26 feet in length.

Type I and II MSDs require periodic maintenance, attention and the addition of chemicals such as disinfectants to keep the MSD in top performing order. In addition, Type II MSDs have higher power and space requirements which make it generally unsuitable for smaller boats, therefore limiting the use of these types of devices to boats of significant size (30 feet or more in length). However, boats capable of operating Type II MSDs may be reluctant to do so if they can avoid the operating costs by discharging outside the U.S. territorial waters. With inadequate treatment and/or overboard discharge of raw sewage, the potential for human health impacts are significantly greater.

Nearly all MSDs are also provided with by-pass 'Y' valves that allow the overboard discharge of raw sewage. Such discharges are illegal in U.S. territorial waters. However, 'Y' valves are often left open in coastal waters.

A fourth type of device used by boaters is the portable toilet commonly referred to as the 'porta-potty'. This is a version of the Type III MSD except that it is portable and is generally used on boats under 26 feet in length. This type of device can be moved on and off the boat in order to empty the contents at appropriate dump stations.

Interviews with boaters, marine equipment manufacturers, and suppliers indicate a lack of understanding concerning the use, maintenance, installation, and requirements of MSDs. There does not appear to be any standardization among manufacturers and dealers regarding the terminology and federal standards for MSDs. VDH believes that this lack of standardization has resulted in inconsistent use of MSDs among boaters and marine industries. This lack of understanding can only be reversed with an aggressive education program emphasizing the many aspects and effects of boat sewage.

Interviews with boaters suggest that Types I and III MSDs are the most numerous and widely used discharge devices for recreational vessels of less than 65 feet in length. The problem is that they are not always used as they were designed. Since boats are equipped with a 'Y' valve between the actual onboard marine toilet and the MSD, boaters may intentionally bypass the MSD and directly discharge the waste overboard without treatment. Such discharges are permissible only outside U.S. territorial waters, or three miles from shore. However, the lack of use of pump-out facilities suggest that the 'Y' valve is almost permanently left in the bypass position regardless of the boat's location, allowing overboard discharge of untreated sewage. Also, the Type I device requires maintenance that is essential to proper operation. Such maintenance is often neglected. Routine misuse of the 'Y' valve results from a lack of enforcement and a lack of boater education on water pollution issues. To compound the problem, the USCG has not developed consistent regulations. The USCG requires that any vessel constructed after 30 January 1980, with an installed toilet, be equipped with a certified MSD. However, according to a 1991 report developed for the Chesapeake Bay Program, confusion about MSD standards exists among boaters, manufacturers, and enforcement agencies partly due to a waiver provision that permits installation of Type I devices until such time that a satisfactory Type II MSD can be developed for installation on boats of 65 foot or less in length.

Compliance with current USEPA Standards for NDZs

Based on the USEPA publication describing requirements for establishing NDZs (2), DWE determined the number of required pump-out facilities and dump stations in the river basins that are affected by shellfish seasonal condemnations. These four river basins possessed two-thirds of the total boats found at all of the marinas in the state during the most recent annual marina surveys (1994 - 1995) amounting to a substantial portion of the total potential discharge of waste by boats (See Attachment F). Correspondingly, two-thirds of the approximately 200 pump-out and 200 dump stations located throughout the entire state are all located within these river basins. The USEPA models reveal that the number of existing facilities located at marina establishments in these four basins meet or exceed USEPA guidelines for suggested numbers of pump-out facilities and dump stations.

However, while there are sufficient numbers of sewage receiving facilities, their use or potential use must be determined by using a myriad of factors that pertain to the needs and practices of the boating community. The most important factor to be considered is the location of these waste receiving facilities. Location and accessibility of these facilities determines their use to a large extent. Other factors to be considered are the costs of using the facilities, the distances from routes of travel or from the home port, likely waiting time once at the facility, and the actual boat use patterns in that area. Of course, boat use is correlated with good weather, weekends and holidays.

VDH has categorized proposed NDZ locations into three groups: (1) those that currently conform to USEPA standards for NDZs (2) those that are close to conforming and may qualify for financial aid from the federal government through CVA grants and (3) those areas that fall significantly short of NDZ standards. The pump-out equipment currently located at marinas and OPWBAM conforms to USEPA requirements for NDZ designation within a service area as defined by the availability of pump-out. If boats can be serviced within reasonable time periods, at an acceptable fee, then the pump-out service is considered to be available to those boats. If pump-out or dump station service is not available to boats located within certain areas then those areas cannot be designated as NDZs.

Impact of Pollution Loadings on Sensitive Waters and Shellfish Harvesting

There are a total of 2,681 acres of seasonally condemned shellfish areas that surround 155 marinas and other places where boats are moored in Virginia (See Attachments A and B). Seasonally condemned areas are areas that are condemned solely due to boating activity in accordance with the requirements of the National Shellfish Sanitation Program (NSSP) administered by the U.S. Food and Drug Administration and implemented by VDH. The NSSP requires at least a minimal seasonal closure around all marinas, whether NDZs are in effect or not. Condemnation areas are placed around all marinas in estuarine waters, regardless of whether shellfish exist in commercial quantities in the area or not. These areas are established by using an analytical time-transit dispersion model designed by VIMS for use by VDH-Division of Shellfish Sanitation (DSS). The analytical computer model predicts the hydraulic dispersion of fecal coliform bacteria (as required by the NSSP) that develop from a waste discharge. These predictions are a function of input data including several variables which must be quantified. One model input factor, referred to as the discharge rate, significantly affects model predictions. The discharge rate is established from consideration of all of the factors that may contribute to the discharge of untreated sewage.

The implementation of NDZs could justify a reduction in the current discharge rate calculation which uses fifteen percent of the number of boats maximally expected to be present in the marina at any point in time. Accordingly, DSS would likely reduce this discharge rate in its modelling of seasonal condemnations if the boating public accepted and abided by the requirements of NDZs. Additional acreage of shellfish growing areas currently seasonally condemned could be opened as a result of a lower level of microorganisms predicted by the model. In order to study the possibility of reopening seasonally condemned shellfish growing areas on a year round basis, analytical model predictions were developed using a discharge rate based on ten percent, considered appropriate if: (1) NDZs were implemented, (2) voluntary no-discharge was accepted by the boating public and (3) pump-out facilities were more widely available and used.

The information on marina facilities and shellfish growing/harvesting areas was mapped to locate and identify the marinas and coastal waters which are classified as seasonally condemned shellfish growing areas. VMRC identified and mapped the productive and potentially productive shellfish growing areas throughout the state, including those that are presently seasonally condemned (See Attachment C). During this stage of analysis, VMRC also determined whether any productive or potentially productive shellfish areas existed around any marinas, congregations of marinas or OPWBM. For locations with such characteristics, the possible establishment of NDZs would open up more acreage for possible shellfish harvesting. The two maps were then compared to illustrate whether marina locations resulted in large seasonal condemnations of productive or potentially productive areas. However, only two areas could be identified that seemed to possess such characteristics. One location was identified in Northhampton County, near the town of Cape Charles at the intersection of Kings Creek and Cherrystone Inlet (See Attachment D). A second area was located at Messick Point on the north shore of the Back River in the city of Poquoson (See Attachment E). These two areas are currently productive shellfish areas with Kings Creek featuring a large clam aquaculture operation and Messick Point used as a clam relay area. Both areas operate successfully just outside seasonally condemned areas. These two areas possess the desired characteristics, but also present distinct problems.

Messick Point, which has a condemnation area of 70 acres, is unique due to its geographical limitations so that if a NDZ were implemented in that area, there would be no significant decrease in seasonal condemnation acreage for shellfish harvesting. The present seasonal closure is the minimum size that can be legally described and enforced by VMRC and still provide an adequate offshore buffer zone for the facilities on the East shore of Messick Point.

Currently, clam aquaculture operations are located at the intersection of Kings Creek and Cherrystone Inlet in the vicinity of a marina and its seasonal condemnation. The seasonally condemned area consists of 78 acres and surrounds Kings Creek Marina, which currently has a boat slip capacity of 110. However, Kings Creek Marina is in the process of a major expansion that will enlarge its boat slip capacity to 250 slips. Therefore, the establishment of a NDZ would not appear to alter any present seasonal condemnations.

VDH has concluded that neither the Kings Creek or Messick Point locations would represent locations where the establishment of NDZs would result in enlarging and increasing approved shellfish harvesting areas. However, establishment of a NDZ in these two areas would add another degree of public health protection, and possibly clam aquaculture protection in Kings Creek.

The results of this analysis suggest that there is no correlation between marina locations and the size of seasonally condemned potentially productive shellfish grounds. The lack of correlation is primarily the result of shellfish harvesting areas not being located in the same general vicinity of marinas and other places where boats congregate. Naturally productive areas tend to be areas with more current and less silt than protected coves typically used for harborages. The aquaculture of shellfish requires an area that is safe and productive for shellfish. As such, aquaculturists tend not to set up operations in the vicinity of marinas. Aquaculturists are also concerned about the possible damage to the shellfish product either from potential pollution problems from marinas, or boats, and the potential damage from boat wake that can damage the small, young seed clams. In addition, aquaculture equipment is expensive so aquaculturists tend to try to avoid heavily travelled areas to prevent damage from boat traffic and possible theft. These factors would most likely explain the absence of aquaculture of shellfish around marinas.

Seasonal condemnations established with the aforementioned computer model are a direct function of the microbiological input parameters and adjacent waterway hydraulics. A five percent drop in the discharge rate could result in a potential reduction in condemnation sizes from a few percent up to fifty percent of the seasonally restricted acreage with an estimated average value of approximately fifteen percent. However, while those site specific numbers may appear impressive, the total reductions would likely add up to a small overall total number of acres of the restricted areas because of the practical need to delineate the boundaries of the restricted areas in many places using prominent land marks. Thus, establishment of NDZs for marina locations would have little significant impact on current restrictions of actual or potential shellfish harvesting areas.

Analysis of available data indicates that little productive or potentially productive shellfish areas would be opened due to the establishment of NDZs. Despite the findings of this analysis, an extensive literature review conducted by VDH confirms that overboard discharge of waste, whether treated or not, remains a major potential threat to water quality and human health through consumption of contaminated shellfish and/or recreation in contaminated waters. These potential threats represent significant impacts to the economy and public health of the Commonwealth. Any significant decline in water quality can exert fiscal impacts through many avenues. The Commonwealth has a thriving marine and recreational industry that relies heavily upon the high quality of Virginia waters. According to the VDGIF, currently there are a total of 222,136 registered boats, including jet skis, in the state. Boating and recreation add significantly to the Commonwealth's economy and therefore must be protected. Maintaining water quality for the Commonwealth's resources is a duty and function of public health.

Water quality and the need for the protection from boat waste is also critical for the shellfish industry. Shellfish are of particular concern due to their ability to harbor viruses and other microorganisms from sewage discharges. Viruses are the main pathogen associated with shellfish borne disease. One discharge near active shellfish beds can infect shellfish and pose a serious threat to public health through consumption. There have been recent traceable outbreaks of shellfish borne viral disease in other states such as Florida and Louisiana that illustrate this point. This threat is not only a public health concern, but is also potentially damaging to the shellfish industry through adverse publicity, loss of reputation and loss of public confidence in Virginia shellfish products. One illegal boat discharge of untreated waste can severely impact the image of a safe product necessary for the industry. Boat sewage represents a potential threat to human health and safety and the State's economy. The need to prevent such potential damage from occurring strongly suggests that NDZ designations should be considered regardless of the relationship between marina locations and seasonally condemned shellfish areas.

The current MSD requirements or standards may not provide for adequate treatment of toilet waste to protect either the public health and welfare or the protection of shellfish from contamination. Using data from the most recent DWE marina inspections, VDH determined the potential amount and strength of boat sewage created on any given peak weekend (See Attachment G). These volumes and strengths were determined by using typical sewage characteristics for estimating the discharge from toilet facilities, as typically conveyed to sewage collection and treatment facilities. Through this analysis, VDH determined that the characteristics of raw sewage discharges may not be significantly different in total characteristics than the discharge from Type I MSDs due to the limited treatment provided by Type I MSDs. In fact, Type I MSDs cannot possibly achieve adequate disinfection, even when used properly, due to the strength of boat sewage and the limited detention provided. Type I MSDs merely attempt to bring

the microorganism count down by injecting the boat sewage with a type of disinfectant before the sewage is macerated and discharged into the surrounding waters. The VDH staff maintains that the level of disinfection provided by discharging MSDs does not provide adequate protection from potential pathogenic microorganisms and their associated risks. In order for the Type I MSD to reduce the microorganism count down to an acceptable health level, it would require a reduction in microorganism count by four logs or by almost 10,000. Only the most efficient onshore sewage treatment plants can achieve this level of microbial reduction. Further, Type I MSDs cannot significantly reduce Biochemical Oxygen Demand (BOD) or Total Suspended Solids (TSS) counts. An onshore discharge permit will significantly limit effluent levels of such pollutants by imposing standards that the onshore sewage treatment facilities must meet. The Type I MSD may macerate the solid waste but this only serves to break apart the solids, not imparting any type of actual reduction. This lack of organic reduction results in higher BOD levels in coastal waters that may seriously deplete the water's dissolved oxygen content. Lower dissolved oxygen can result in the reduction in the numbers of shellfish, fish, and other aquatic life forms whose existence relies upon adequate levels of oxygen. These findings are particularly troubling considering Type I MSDs are reported to be the most widely available device for treating sewage in boats over 26 feet in length.

Additionally, it was concluded that the potential amount and strength of sewage being discharged on a peak weekend represented a substantial potential impact on water quality. Specifically it was determined that the sewage discharge of every person on a boat would have the equivalent strength of a sewage discharge originating from ten or more people served by an onshore sewage treatment facility because onshore facilities handle sewage containing large amounts of bath and laundry water as well as toilet dilution water. Total contributions of various pollutants from boating activity within river basins affected by shellfish seasonal condemnations were generated to illustrate this point. Estimates of potential discharge amounts and their respective waste water characteristics were developed to determine the potential impact of boat sewage on any given peak period. These numbers show that the BOD, TSS, Total Kjeldahl Nitrogen (TKN), and Phosphorous (P) counts could be significant if sewage generated by the boating population is compared to the point discharges resulting from a similar population onshore utilizing sewage treatment facilities. Both BOD and TSS totals represented organic loadings that are up to ten times more concentrated than the sewage discharges from treatment systems serving larger onshore populations. The TKN and P numbers represent boat sewage generated nutrient loadings that are even more concentrated, up to 100 times permitted discharge levels for similar flow volumes. In addition, the allowable discharge levels of microorganisms, specified for sewage treatment works, cannot be achieved by a Type I MSD. The importance of microbial reduction on public health and safety is illustrated by the large volumes of dilution (10 million gallons or more) required to prevent public contact with a potentially infective dose of pathogenic microorganisms contained in boat

sewage. Humans can be infected either from initial contact while engaging in recreational activities or by the consumption of contaminated shellfish.

VDH maintains that even one person can discharge enough waste to contaminate shellfish beds with later consumption of unprocessed harvested stock resulting in illness. This was the case with a recent 1993 outbreak in Louisiana. This particular outbreak resulted from the overboard discharge of raw sewage into shellfish harvesting grounds by a few oyster harvesters. Over seventy people in five states became ill from this single outbreak and necessitated the closure of shellfish harvesting grounds until the investigation was completed. The Louisiana shellfish industry was severely hurt during the Thanksgiving season due to the scare resulting from the outbreak. There have been other recent shellfish-related outbreaks traceable to the improper overboard disposal of raw sewage. Also any person coming in direct recreational contact with such contaminated waters could become ill, especially if their immune system is compromised.

The discharge of raw sewage caused by one person at a sensitive location can have deleterious health effects, but on any peak boating weekend there exists the potential of raw sewage discharges originating from hundreds of boaters. Thus, significant public health concerns would exist at locations at which boats congregate and discharges of sewage from multiple boats occurs. On peak boating weekends, boaters are on the water for extended periods of time and may congregate in rafting areas conducive to their entertainment. Boat sewage discharges in areas where they congregate have the potential to degrade the water quality and endanger the health of others using the waters for recreational purposes. A similar scenario occurred in 1981 when, due to a coal strike, coal colliers began mooring in the Southern end of the Chesapeake Bay between Norfolk and Hampton. The coal colliers were anchored waiting to load, due to the coal strike and thus began congregating in the lower Chesapeake Bay. There were 150 to 160 coal colliers with crews up to 24 members that were moored outside Norfolk for an average of 80 days. These colliers began discharging their waste, while moored, resulting in high bacterial counts that required closing of the bathing beaches at the resort city of Virginia Beach. This closing of the beaches in mid-summer resulted in serious financial damages to the local economy of Virginia Beach and also to that of the State's tourism. Since then, these colliers have been required to either utilize complete containment, or onshore sanitary hook-ups, or use their MSDs while in territorial waters. Although newer facilities will now minimize the amount of time that coal colliers are moored, thus reducing the opportunity for colliers to congregate, mobile floating pump-out service will be available if needed.

Compliance with Existing Regulations for On-shore Sanitary Facilities

Other than the factor of seasonal condemnations, the expected usage of installed boat sewage receiving equipment, is a major consideration for establishing priorities for CVA grant funding. Several factors contribute to high pump-out and dump station use, including location, convenience and cost, with location as the key variable. Pump-out locations are critical to the establishment of NDZs. As mentioned earlier, there are currently about 200 available pump-outs located at marinas and OPWBAM throughout Virginia. Available pump-out and dump station equipment has resulted in compliance with those requirements contained in the 1990 *Sanitary Regulations for Marinas and Boat Moorings*, for approximately 65% of the regulated facilities. While this number is numerically sufficient for NDZ concerns, the locations of these pump-outs do not currently provide enough coverage for all boats to safely and conveniently dispose of their sewage. VDH has determined through annual inspections that these pump-out installations are sufficient for NDZ designation around the boat mooring facilities. Pump-out service areas should be limited to a distance of three miles in all directions around that location allowing for a thirty minute/three mile maximum travel distance for boats. If travel time exceeds thirty minutes to reach the location of services, the boater would likely consider that location inconvenient and may not utilize those services. In addition, some owners of pump-out equipment charge excessive fees to operate the equipment and thus inhibit use of the equipment. Based on a three mile radius service area, nearly 400,000 acres of coastal waters are currently provided with pump-out service (See Attachment H). This same acreage could also be eligible for NDZ designation. Nearly 700,000 acres of Coastal Waters are estimated as potentially available for Shellfish production.

CVA Grant Funding for Boat Sewage Receiving Facilities

VDH estimates that complete overall compliance with the marina regulations for pump-out facilities at marinas and OPWBAMs, with strategic placement, would require installation of nearly 200 additional pump-out stations and dump stations which could almost double the area of service available to boaters for use of onshore sewage receiving facilities (See Attachment I). While this is currently only a goal, the CVA grant funds available to marina owners and operators could make this an achievable goal. The CVA grant of 75% reimbursement to marina owners and operators will encourage compliance with requirements to install or upgrade sewage receiving facilities as part of an approved plan for sanitary facilities. In addition, use of CVA grants limits the amount that can be charged to use the sewage receiving equipment thereby increasing availability. These CVA funds can also be used to pay marina owners and operators a yearly fee for operation and maintenance of the sewage receiving equipment, once it is installed and approved. Such incentives are strong tools for the establishment of modern, convenient,

cost effective sewage receiving facilities throughout the state. The State requests for CVA grant funds will provide for sufficient sewage receiving equipment to serve approximately three-quarters of a million acres of State coastal waters. Thus, this total area of State waters would then be eligible for NDZ designation. CVA funding in Virginia has increased from $122,663 in 1993/1994 to $163,300 in 1995 and VDH has requested an additional $813,750 for 1996. CVA grants at the federal level are funded through 1997 and VDH feels confident in its ability to obtain these grants along with the successful distribution of them for new/renovated sewage handling facilities, maintenance of those facilities and educational programs (See Attachment J).

CONCLUSIONS

The findings of this study can be summarized as follows:

1. The level of sewage treatment provided by recreational boat MSD's is much inferior to the level of sewage treatment provided by on-shore sewage treatment works as Type I and Type III MSD's are typically installed on such boats, due to the existing federal waiver. Thus, the potential amount and strength of sewage discharged in places where these boats congregate can have a significant impact on water quality.

2. Currently, the Commonwealth is not able to declare all of its coastal waters a NDZ according to the USEPA standards. However, certain portions of the Chesapeake Bay, including some portions of entire river systems, do currently qualify for NDZ designation.

3. Since productive shellfish areas are not generally located in the vicinity of marinas, NDZs would allow negligible additional productive acreage to be made available for use.

4. Currently, nearly two-thirds of the State's marinas and OPWBAM are in compliance with the existing marina rules and regulations requirements for on-shore sanitary facilities that are available for use by boaters.

5. CVA grant funds are currently available at a level that would provide for complete compliance with the 1990 *Sanitary Regulations for Marinas and Boat Moorings*. Requests for these grant funds have been forwarded to the U.S. Fish and Wildlife Service.

References Cited

(1) Recreational Boat Pollution and the Chesapeake Bay. The Implementation Committee of the Chesapeake Bay Program, 1991. A Report to the Chesapeake Executive Council.

(2) Protecting Coastal Waters from Vessel and Marina Discharges. USEPA, Office of Water, August 1994.

SEASONAL CLOSURES AROUND MARINAS

Growing Area # County/City	Facility Designation	Name/Waterway	Approx. Acreage
4 - West.	M - 206	Stratford Harbor Boat Club Currioman Bay	20
6 - West.	M - 208	Ragged Point Harbor Potomac R.	123
7 - West.	M - 203	Yeocomico Marina & CG W. Yeocomico R.	18
	M - 205 SP	Sandy Pt. Marina	9
	M - 205 W	White Pt. Marina	32
	M - 205 SB	Shannon Branch Marine RW NW Yeocomico R.	16
7 - N'humb.	M - 161 B	Krentz Marina Wilkins RW The Fishing Center	34
	M - 161 A	Olverson's Marina S. Yeocomico R.	11
	M - 162	Bon Harbour Assoc. Cornish Cr.	5
- N'humb.	M - 164	Lewisetta Marina Kingscote Cr.	6
	M - 165	Lake Frances Marina Kingscote Cr.	5
10 - N'humb.	M - 166	J. D. Krentz Marina Little Wicomico R.	19
	M - 168	Leroy's Marina Smith Pt. Marina Reedville KOA Campground Slough Cr.	26
13 - N'humb.	M - 169	Great Wicomico Marina Great Wicomico R.	12
	M - 172	Tiffany Yacht Co. Great Wicomico R.	8
	M - 176	Ernest Delano S. F. Oginz Cranes Cr.	6
	M - 177	A. C. Fisher Cranes Cr.	5
14 - N'humb.	M - 171	Ingram Bay Marina Towles Cr.	13

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Growing Area # County/City	Facility Designation	Name/Waterway	Approx. Acreage
16 - N'humb.	M - 174	Indian Creek YCC Indian Cr.	10
17 - Lanc.	M - 74	Cully's RW Meredith Robbins Antipoison Cr.	12
	M - 75	Charles Marchetti Antipoison Cr.	2
18 - Lanc.	M - 63	Hoffman Harbor Mosquito Cr.	24
21 - Lanc.	M - 71	Yankee Pt. Marina Myer Cr.	17
23 - Rich. Co.	M - 191	Whelan Marina & CG Rappahannock R.	10
24 - Rich. Co.	M - 192	Sharps Community Assoc. Rappahannock R.	3
26 - Essex	M - 271	Garrett's Marina Rappahannock R.	17
28 - Mdsx.	M - 111	Burrells Marina Robinson Cr.	13
	M - 112	Bethpage Family CG Robinson Cr.	32
	M - 121	Remlik Marine Service Lagrange Cr.	40
31 - Mdsx.	M - 113	Locklies Marina County Dock Regent Point Marina Locklies Cr.	70
33 - Mdsx.	M - 116	Walden Bros. Marina Broad Cr.	13
34 - Mdsx.	M - 118	Club on Porpoise Cove Piankatank R.	27
	M - 119	Ruark's Marina Deagle's Marine RW Club on Fishing Bay Fishing Bay	58
34 - Math.	M - 82	Ginney Point Marina Cobbs Creek	10

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›wing Area # unty/City	Facility Designation	Name/Waterway	Approx. Acreage
36 - Math.	M - 83	Narrows Marina Milford Haven	21
	M - 87	Klingle RW & Repairs Pulley's Marina Milford Haven	15
37 - Math.	M - 88	Queens Creek Marina Queens Creek	23
	M - 89	Mathews Yacht Club Stutts Cr.	17
	M - 95	Ann Condrey Stutts Cr.	12
	M - 103	Fleetwood Properties Stutts Cr.	9
	M - 104	Beauregard Turner Stoakes Cr.	2
38 - Math.	M - 101	Winter Harbor Haven Marina Winter Harbor	17
39 - Math.	M - 90	Horn Harbor Marina Horn Harbor	38
	M - 97	New Point Family CG Jacks Cr.	12
41 - Math.	M - 91	Mobjack Marina East R.	12
	M - 102	East River Boat Yard East R.	3
42 - Math.	M - 98	Mobjack Bay Marina Greenmansion Cove	34
44 - Glouc.	M - 33	Holiday Marina Severn R.	39
46 - Glouc.	M - 34	York River Yacht Haven Sarah Cr.	90
53 - York	M - 212	Thomas Marina Wildey Marina Chisman Cr.	34
53 - Poq.	M - 213	Poquoson Marina York Haven Marina Bennett Cr.	21

Growing Area # County/City	Facility Designation	Name/Waterway	Approx. Acreage
54 - Poq.	M - 217	Bill Forrest Seafood Bills Fish Dock Diggs Seafood Poquoson Yacht Club Public Boat Dockage Public Ramp & Docking W. Haywood Forrest Seafood Front Cove (Messick Pt.)	70
54 - Hamp.	M - 231	Marina Cove Boat Basin Back R.	25
	M - 232	Dandy Haven Marina B. J. Wallace Marina Bell Isle Marina Wallace Marina & Seafood Back R.	17
55 - Hamp.	M - 236	Salt Ponds on the Bay Southall Landing Chesapeake Bay	25
80 - Acc.	M - 1	Russell's Marina Parkers Cr.	8
84 - Acc.	M - 16	R. P. Melson Occohannock Cr.	22
85 - N'hamp.	M - 142	Bayford Oyster Co. Nassawadox Cr.	12
88 - N'hamp.	M - 141	Kings Creek Marina Kings Cr.	78
96 - Acc.	M - 3	Quinby Public Harbor Upshur Bay	51
	M - 21	Virginia Landing Corp. Machipongo R.	9
97 - Acc.	M - 11	Wachapreague Waterfront Wachapreague Ch./Finney Creek	53
101 - Acc.	M - 19	Curtis Merritt Harbor of Refuge The Canal	5

Growing Area # / County/City	Name/Waterway	Approx. Acreage
2 - West.	Berkley Beach	
	Colonial Beach Yacht Center	
	Ebb Tide Beach	
	Harbor View Marina	
	Henry T. Goode, Jr.	
	Hops Marine	
	Monroe Bay Boat Club	
	Monroe Bay Campground	
	Monroe Bay Landing Restaurant	
	Monroes Landing	
	Nightingale Marina & Motel	
	Parkers Marina	
	Potomac Shores Residents Assoc.	
	Springfield Farm (Campground), Inc.	
	Stanford's Marine Railway	
	Westmoreland Potomac Shores Civic Assoc.	
	Winkledoodle Point Marina	
	Monroe Bay	425
20 - Lanc.	Abbott Bros Oyster Plant	
	Abbott Brothers Inc. Crab Plant	
	Ampro Shipyard, Inc.	
	Barrack & Reynolds Seafood	
	Carters Cove Boat Haven	
	Chandler Luckham	
	Crockett's Landing	
	Custom Yacht Service, Inc.	
	Dixie Co.	
	Gangplank Pier	
	Gaskins	
	Irvington Marina	
	Irvington Packing Co.	
	J. Henry Talbott	
	Marion Reynolds Pier	
	Mrs. Walter Abbott & Wayne O. Abbott	
	Rappahannock River Yacht Club	
	Rappahannock Yachts Inc.	
	Southern Chesapeake Yacht Service	
	Stingray Point Oyster Co.	
	Sunset Cove Boat House	
	The Highlands	
	Tides Inn	
	Tides Lodge	
	W. Ellery Kellum Inc. Sfd.	
	W. F. Morgan & Son Incorporated	
	Walter and Helen Babb	
	Carter Cr.	297

Growing Area # County/City	Name/Waterway	Approx. Acreage
33 - Mdsx.	Club on Jackson Creek	
	Commonwealth of Virginia	
	Fishing Bay Yacht Club	
	Harbour House	
	Jackson Creek Harbour Condominium	
	Thomas E. Ruark	
	Walter Harrow	
	Jackson Cr.	124
36 - Math.	Edwards Marine Railway	
	Powell's Boat Yard	
	Public Boat Dock (Edwards Creek)	
	Edwards Cr.	32
40 - Math.	A. J. Hurst	
	Crabbers & Fisherman's Wharf, The	
	Jessie Haywood	
	Lemuel Brown	
	Myrtle L. Diggs	
	Owens Marina	
	Public Landing	
	William M. Snow	
	Davis Cr.	43
96 - Acc.	Bowen's Clam House	
	H. M. Terry Co., Inc.	
	Hamblin Seafood	
	Willis Wharf Boat Harbor	
	Parting Cr.	260

TOTAL ACREAGE BY COUNTY/CITY:

Accomack	408	Northampton	90
Essex	17	Northumberland	160
Gloucester	129	Poquoson	91
Hampton	67	Richmond	13
Lancaster	352	Westmoreland	643
Mathews	300	York	34
Middlesex	377		
		Total	2,681

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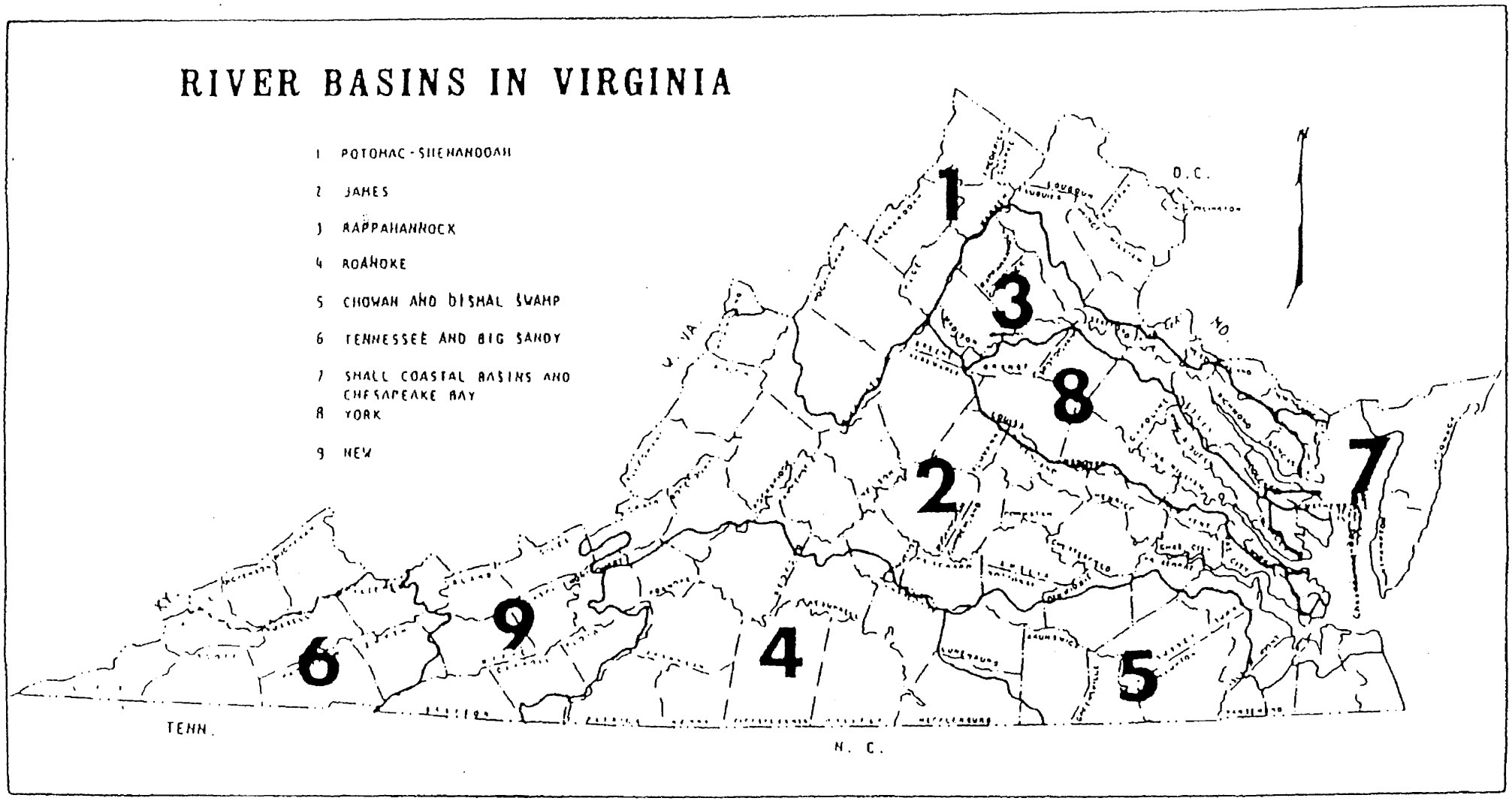
Facilities Affected By Seasonal Condemnations

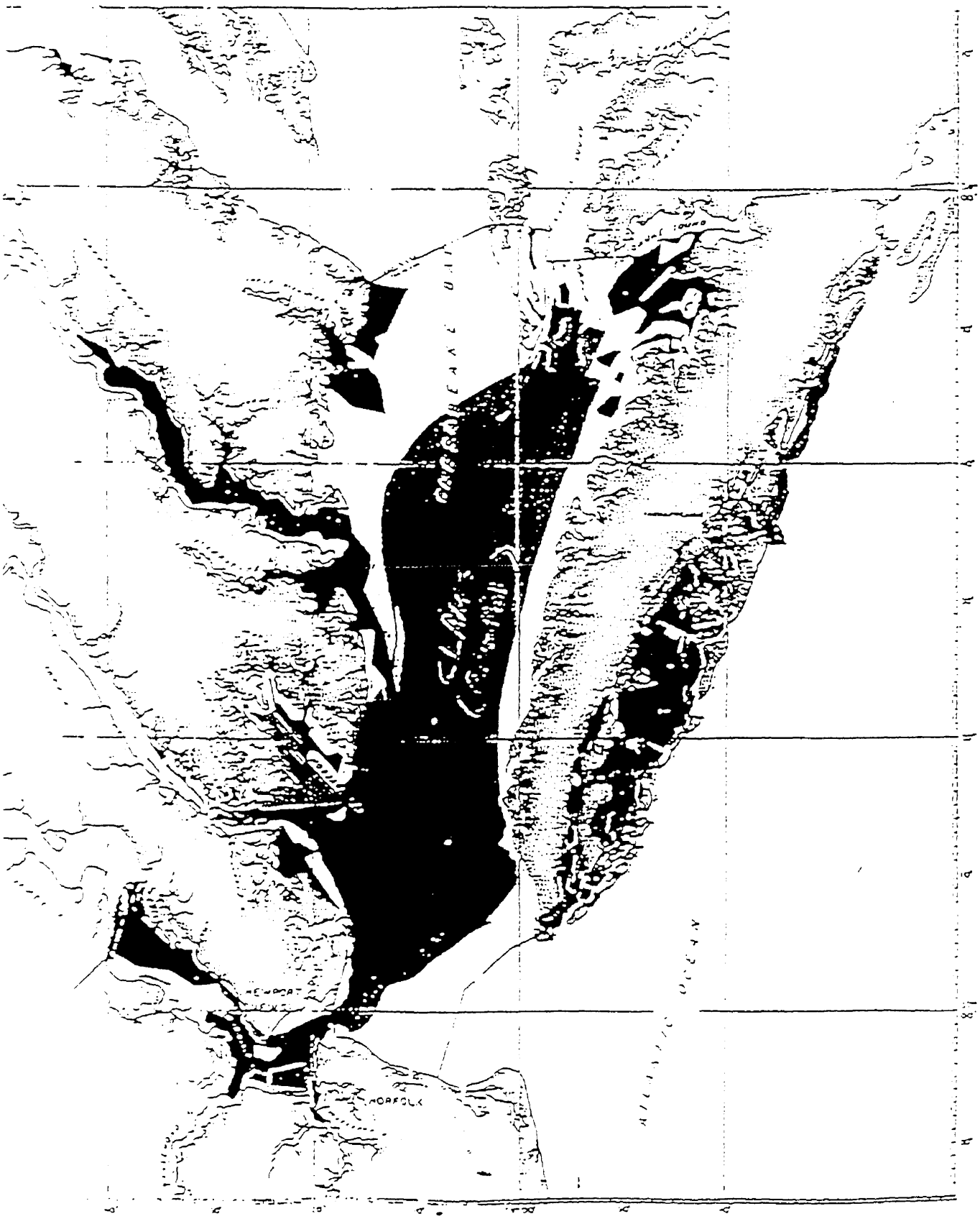
Basin *	Marinas/Other Places Where Boats Are Moored	Boat Capacity Wet & Dry	Pump-out Stations	Sewage Dump Stations
1	33	1,883	15	18
3	38	1,526	13	18
7	83	3,517	30	34
8	1	390	1	1
State Totals	155	7,316	59	71

* Basins identified on enclosed map.

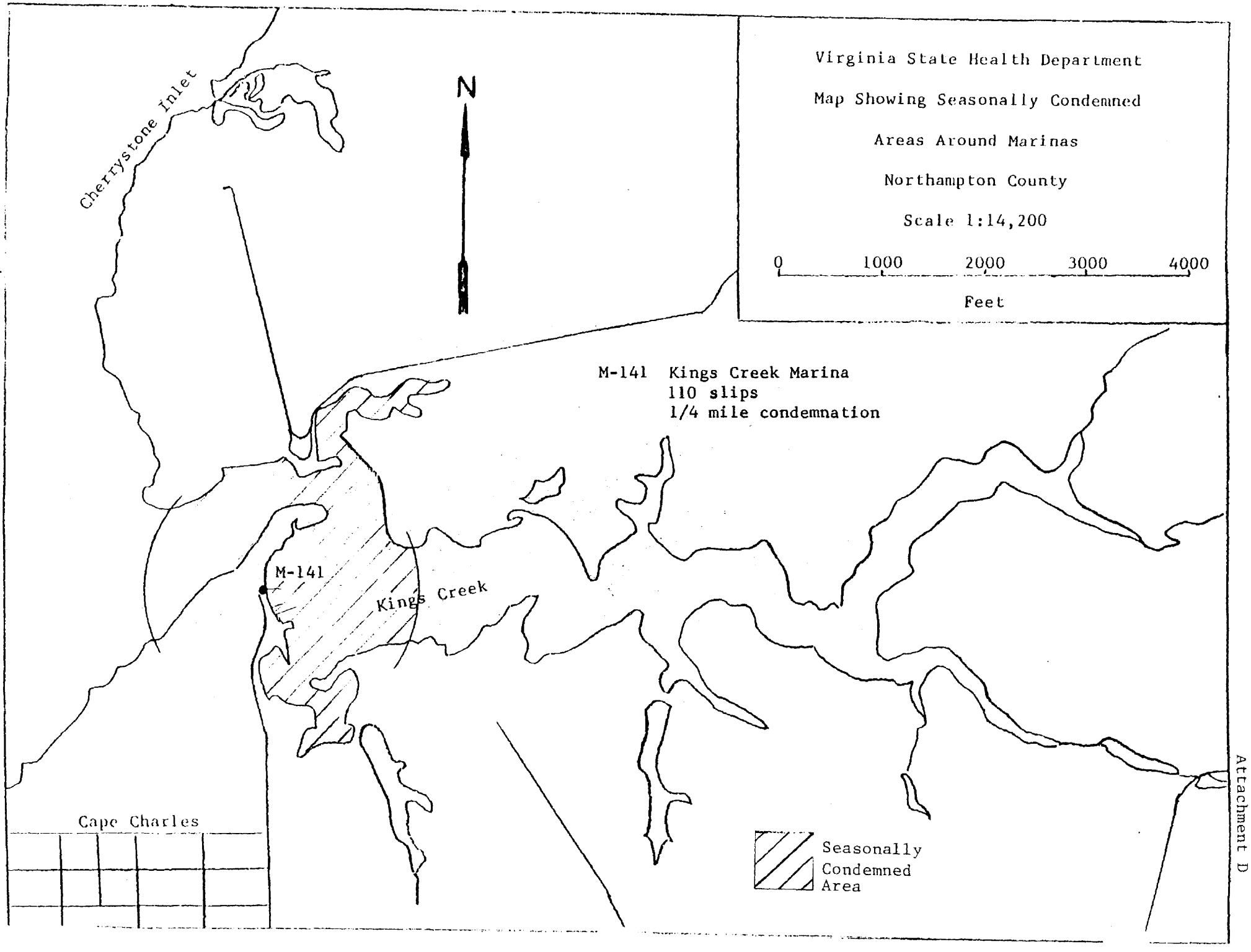
RIVER BASINS IN VIRGINIA



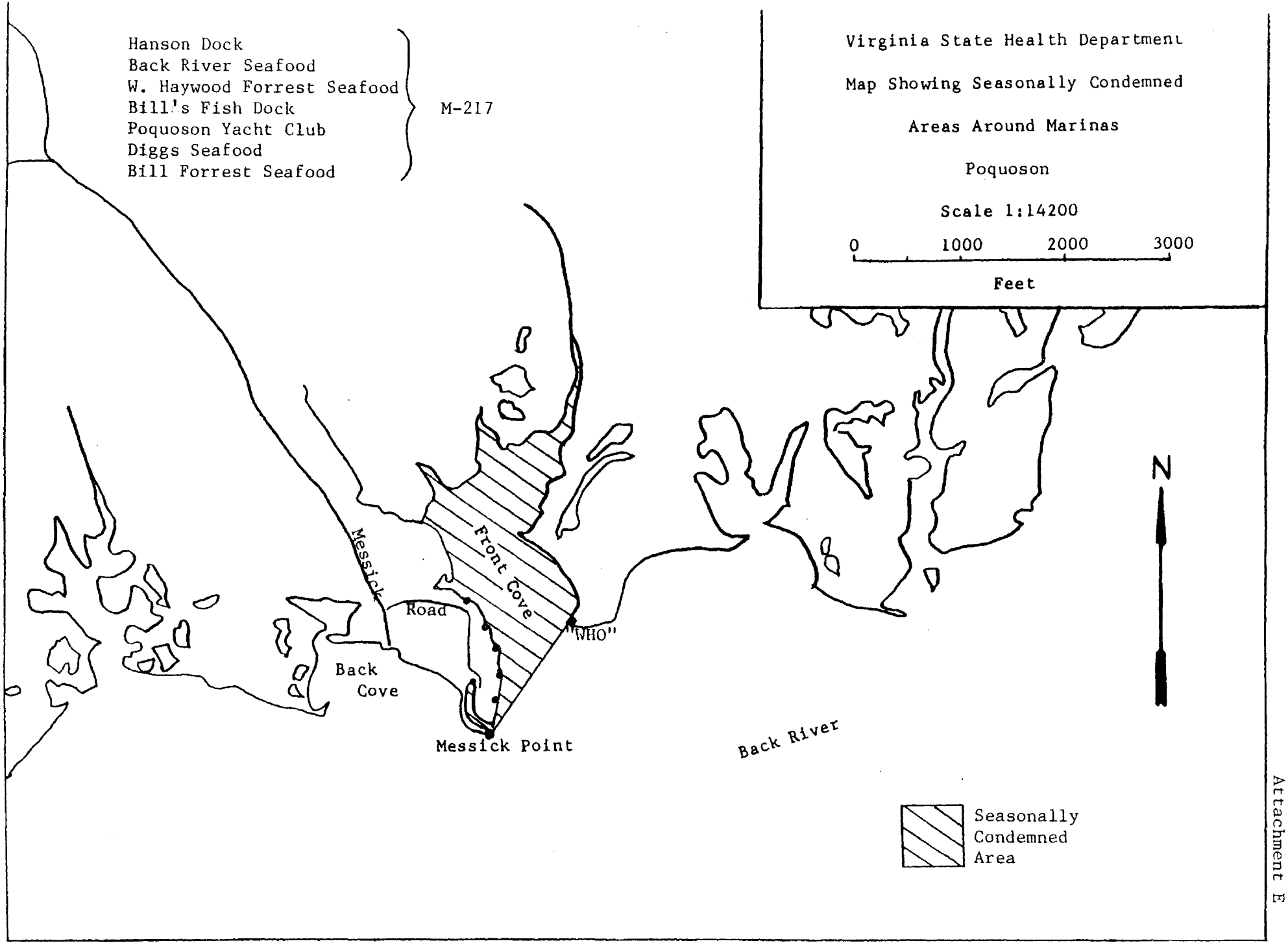
Map Showing Potential Public and Private Shellfish Harvesting Areas in Virginia Coastal Waters



Public Shellfish Harvesting Areas (Baylor Ground) Darkly Shaded
Anywhere not Shaded can be used as Private Grounds



Attachment D



Attachment E

Marina Establishment Facilities Located in the River Basins in Virginia Shellfish Growing Waters Affected by Seasonal Condemnations*

Basin**	Marinas/Other Places Where Boats are Moored and Under Surveillance	Wet/Dry Slips and Storage	Pump-out Facilities	Dump Stations	Boats Under 26 Feet in Length*	Boats 26 - 40 Feet in Length*	Boats Over 40 Feet in Length*
1	159	8,019	39	55	2,710	1,557	345
3	165	4,265	25	38	1,392	864	193
7	457	12,933	69	105	3,321	2,205	648
8	56	2,855	11	15	988	541	158
4 Basin Totals	837	28,072	144	213	8,411	5,167	1,344
State Totals	1100	40,167	201	282	13,092	7,009	2,000

* Information gathered from the 1994 - 1995 DWE marina inspections. Boat totals were calculated by counting the boats, by size, that were moored at the establishment at the time of the inspection.

** See Attachment B

Total Potential Peak Pollution Contributions(1) from Boats Located in the Four River Basins Affected by Shellfish Seasonal Condemnations

Boat Length	Boats(2)	People(3)	Gallons	BOD/TSS(4)	TKN(4)	P(4)
Under 26 ft.	3,364	10,092	5,046	2,018	505	101
26-40 ft.	2,067	8,268	8,268	1,654	413	83
Over 40 ft.	538	3,228	6,456	646	161	32
4 River Basin Totals	5,969	21,588	19,770	4,318 (lbs)	1079 (lbs)	216 (lbs)

Notes: 1. Pollution factors utilized for individual contributions:
Portable toilet - 2 quarts (Common to boats under 26 ft.)
Holding Tank - 1 gallon (Common to boats 26 - 40 ft.)
Flush Toilet - 2 gallons (Common to boats over 40 ft.)

2. Numbers reflect the USEPA recommended peak usage factor of 40% of the boats counted as moored or stored at marina establishments.

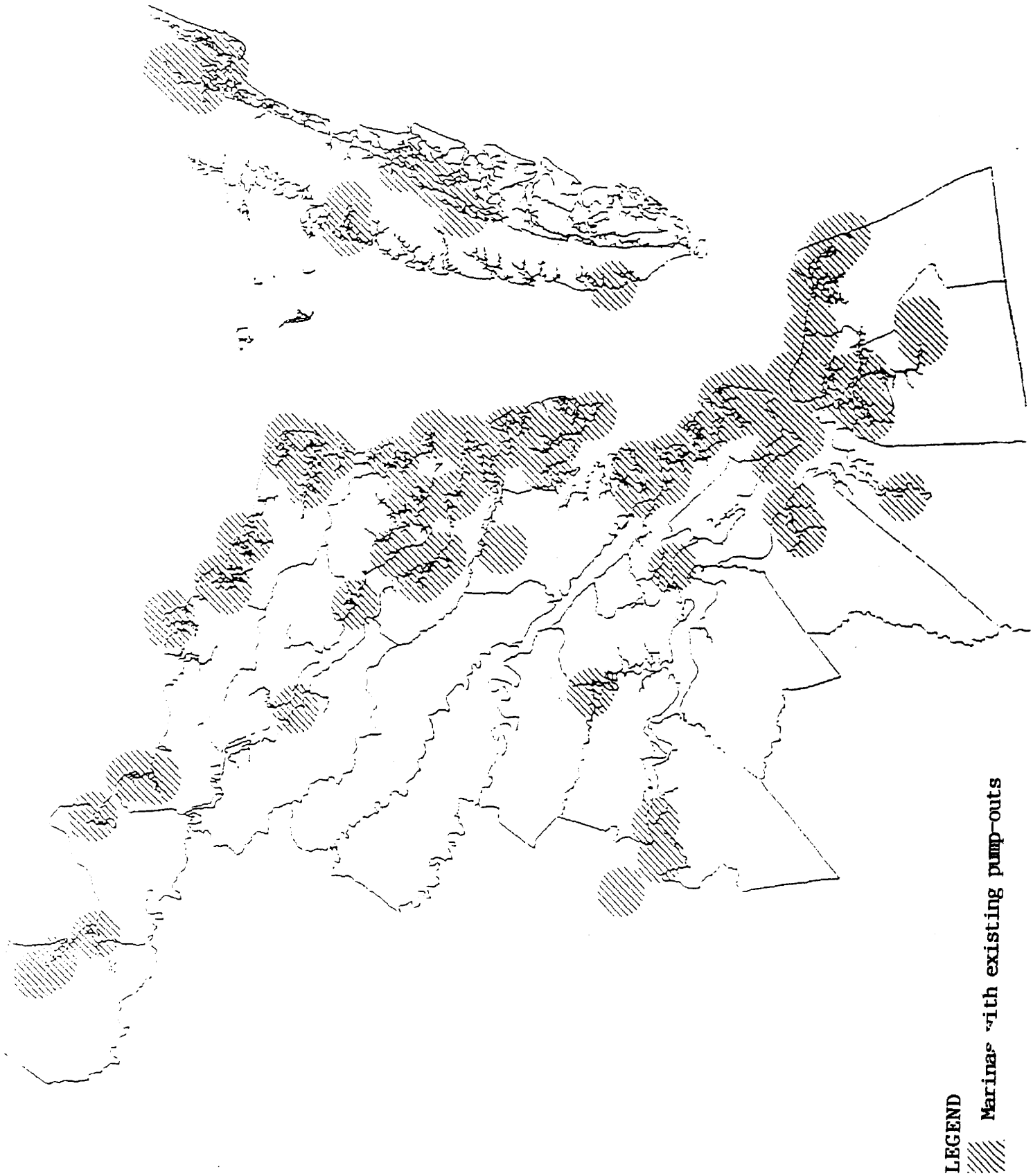
3. VDH estimated occupancy figures based on boat lengths:
a. 3 persons per boat under 26 feet in length,
b. 4 persons per boat 26 to 40 feet, and
c. 6 persons per boat over 40 feet in length.

4. Amounts of pollutants in pounds (lbs.) in accordance with typical domestic waste water characteristics.
lbs. = (concentration in mg/l)(8.34)(volume in million gallons)

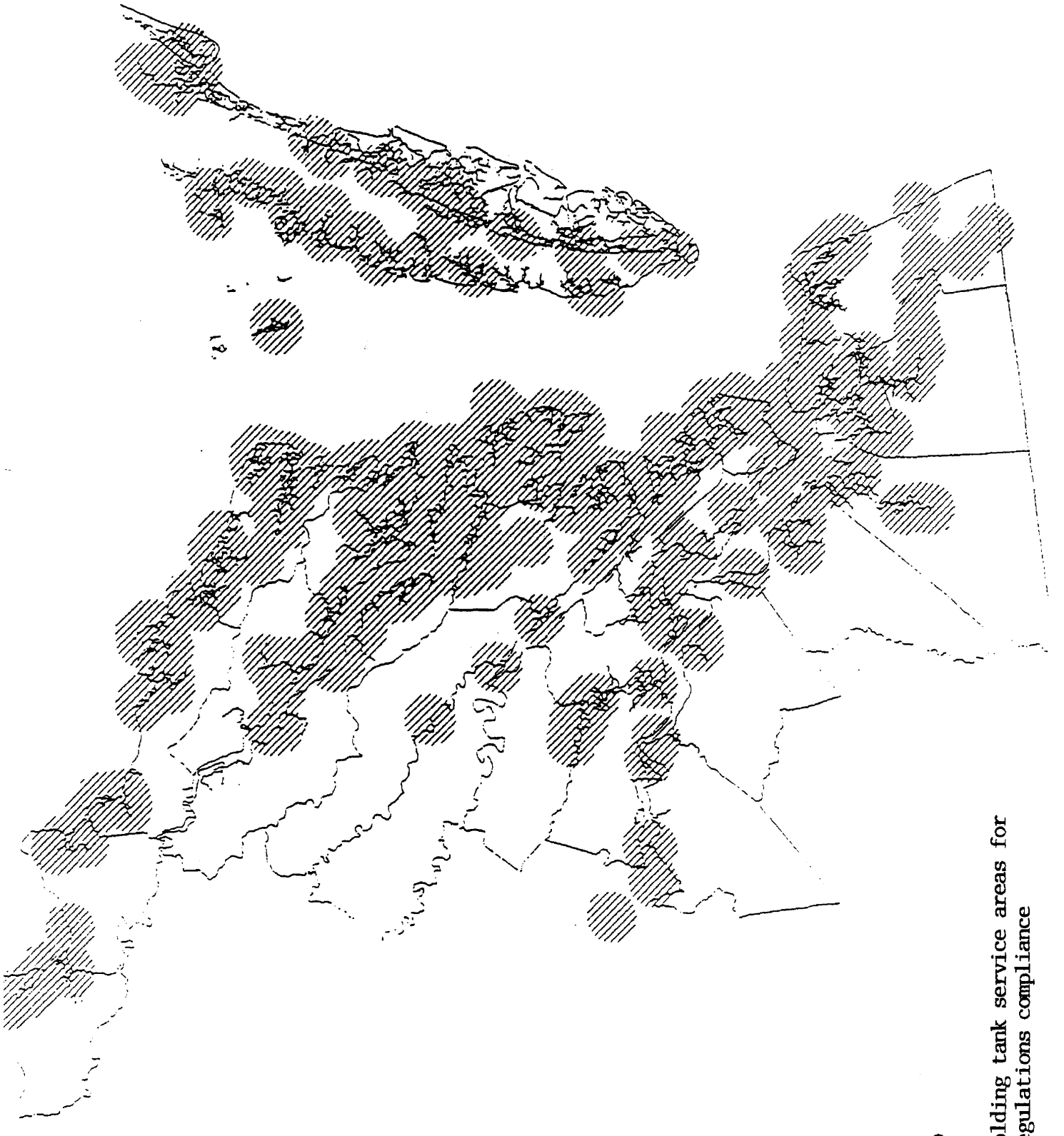
BOD/TSS - .2 lb./person/day
TKN - .05 lb./person/day
P - .01 lb./person/day

Attachment G

Existing Pump-out Service Areas



Potential Pump-out Service Areas



Virginia Clean Vessel Act (CVA) Grant for Fiscal Year 1995

Pump-out and sewage dump station installation

During this fiscal year, we plan to install 15 pump-out and dump stations at a cost of $177,733. Some of the installations will be refurbishing pump-out systems which are in need of upgrading so as to be readily accessible to the boating public. We had planned to install twenty-five pump-out and sewage dump stations, but due to a cut in the funds made available to Virginia under CVA this year, we will not be able to meet this goal. The location of these facilities will be chosen by the CVA coordinating committee whose members represent the concerns of the boaters, environmentalist, protectors of public health, and the protection of the aquatic environment. The marina operators will contribute $44,434 to the cost of the pump-out and sewage dump station facilities and $133,300 of CVA funds will be used in this phase of the Virginia CVA program to finance these facilities.

Education

We plan to spend $40,000 on various types of educational programs for boaters, public, marina owners and sewage treatment plant operators during this fiscal year. The U. S. Fish and Wildlife Service has indicated that they will give some assistance to the educational phase of this program so as to prevent duplication of materials.

During this fiscal year we will:

1. Complete our mailing of brochures to all boaters who have a boat of 16

feet or more in length.

2. Make up and distribute signs to marinas so as to designate pump-out stations and sewage dump stations.

3. Participate in boat shows

4. Provide materials to all students enrolled in boater safety education classes on the potential public health hazards created by discharging untreated sewage into the water.

5. Print a list of pump-out stations with maps for distribution.

6. Work with the mass media.

7. Conduct pump-out demonstration programs to educate the public of the potential public health hazards created by discharging untreated sewage into the water.

	Total	Federal	State[1]	
Installation and Upgrade of Pump-out and Sewage Dump Stations	177,333	133,300	44,433	(Marina Operator)
Education complete brochure made mailing make up signs boat shows clean water instruction list of pump-outs mass media pump-out demonstration	40,000	30,000	10,000	
Total	217,733	163,300	54,433	

[1] The marina operator will provide the 25% matching funds under the Virginia CVA program.

USEPA Information Requirements for NDZ Status

1. Certification of necessity for greater environmental protection for designated areas
   - Description of specific resources to be protected (Shellfish and Recreation)
   - Fecal coliform and other water quality data

2. Location of existing sewage receiving facilities within designated areas
   - Map showing location of proposed pump-out facilities
   - Map showing location of existing and proposed dump stations
   - Map showing location of existing and proposed restrooms

3. Description of available sewage receiving facilities
   - Accessibility of pump-out facilities and dump stations
   - Schedule of operating hours for pump-out facilities
   - Schedule of operating hours for dump stations
   - Fees for pump-out facilities and dump stations
   - Operation restrictions for pump-out facilities and dump stations
   - Operating capacity of pump-out facilities
   - Maintenance plans for pump-out facilities and dump stations
   - Completion schedule for proposed pump-out facilities and dump stations

4. Maximum draught of vessels for use of pump-out facilities
   - Mean low water and draught limitations for pump-out station and dump station use
   - Maximum height limitations for pump-out facilities and dump stations
   - Percentage of vessels precluded from using facilities in the area

5. Waste disposal methods for pump-out facilities and dump stations
   - Regulations and permits
   - Holding tank wastewater characteristics

6. Pollution potential within designated areas
   - Estimated number or percentage of vessels with MSDs (Types I, II, and III)
   - Estimated wastewater discharge loadings
   - Enforcement plan to be used after approval as No Discharge Area
   - Existing/proposed local ordinances related to vessel sewage discharges
   - Public education/information program related to boater waste disposal
   - Existing point source pollution in designated areas

GENERAL ASSEMBLY OF VIRGINIA -- 1995 SESSION

HOUSE JOINT RESOLUTION NO. 448

Requesting the Department of Health to study the effect of boat discharge on the waters of the Commonwealth and the feasibility of establishing no-discharge zones for boats.

Agreed to by the House of Delegates, February 23, 1995
Agreed to by the Senate, February 21, 1995

WHEREAS, the shellfish resources of the Commonwealth are important to the economy of Virginia and the ecology of the Chesapeake Bay; and

WHEREAS, many sources of pollution have contributed to the general decline of water quality in the Chesapeake Bay watershed, sometimes resulting in the closure of productive shellfish areas to direct harvest; and

WHEREAS, one threat to local water quality conditions and resident shellfish resources is the discharge of human waste from boats; and

WHEREAS, the discharge of human waste poses the greatest threat in areas heavily used by the boating public including marinas, boat ramps and areas where boats congregate which are often located in quiet, protected waters and which are common locations for shellfish grounds; and

WHEREAS, the 1987 Chesapeake Bay Agreement included as one of its objectives "to eliminate pollutant discharges from recreational boats"; and

WHEREAS, a 1991 report authorized by the Chesapeake Executive Council recommended, among other things, the designation of "no-discharge zones" in sensitive waters and the establishment of a program to provide additional and adequate pump-out facilities for boats with sewage holding tanks; and

WHEREAS, the result of improved management of human waste from boats could reduce the closing of shellfish beds as well as protect the health of those who consume shellfish; and

WHEREAS, Water Control Board Regulation VR 680-14-05 includes a requirement for mandatory use of holding tanks in shellfish areas that is only effective following the establishment of no-discharge zones by the Commonwealth pursuant to U.S. Environmental Protection Agency requirements; and

WHEREAS, Department of Health regulations require that adequate onshore sanitary facilities, a dump station for portable toilets, and pump-out facilities be provided at each marina or other place where boats are moored; and

WHEREAS, a recent analysis of boat pump-out facilities in Virginia's portion of the Chesapeake Bay estimated that facilities are operational at half of those locations required to have them; and

WHEREAS, the federal Clean Vessel Act provides grant moneys to states for pump-out facility installation, maintenance and education programs, and the Commonwealth has garnered about $390,000 of those moneys for its 750 marinas; and

WHEREAS, prior to determining whether it is in the interest of the Commonwealth to apply to the U.S. Environmental Protection Agency for the establishment of no-discharge zones, it is necessary to determine where the Commonwealth stands with respect to the availability of boat pump-out facilities and the vulnerability of sensitive waters; now, therefore, be it

RESOLVED by the House of Delegates, the Senate concurring, That the Department of Health be requested to study the effect of boat discharge on the waters of the Commonwealth and the ability of the Commonwealth to meet current U.S. EPA standards for the establishment of no-discharge zones by examining data regarding the extent of pollution loadings, the sensitivity of affected waters with particular attention to the existence of productive or potentially productive shellfish areas, and the availability of operational pump-out facilities. The Department shall also evaluate compliance with existing regulations and the feasibility of requesting additional federal moneys through the Clean Vessel Act. All agencies of the Commonwealth shall provide assistance to the Department, upon request.

The Department shall complete its work in time to submit its findings to the Governor and the 1996 Session of the General Assembly as provided in the procedures of the Division of Legislative Automated Systems for the processing of legislative documents.