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PUGET SOUND NO DISCHARGE ZONE FOR VESSEL SEWAGE

Puget Sound Vessel Population and Pumpout Facilities

Prepared for
Washington State Department of Ecology

Prepared by
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DEPARTMENT OF ECOLOGY
State of Washington

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CONTENTS

TABLES

FIGURES

INTRODUCTION

The Washington State Department of Ecology (Ecology) is exploring the possibility of petitioning the United States Environmental Protection Agency (U.S. EPA) to designate some or all of Puget Sound as a No Discharge Zone (NDZ) for vessel sewage. The discharge of sewage from all boats and other vessels is regulated by federal law, and requirements vary depending upon distance from shore. Currently, if Washington State boaters and commercial vessel operators are within 3 nautical miles (nmi) of shore, their sanitary sewage must be at least minimally treated by a marine sanitation device (MSD) before discharge into the waters of Puget Sound. Beyond 3 nmi from shore, federal law permits the discharge of untreated sewage.

The U.S. EPA is authorized, under the Federal Clean Water Act (CWA), to institute a NDZ in waters that are threatened by the discharge of sewage waste from vessels. The authorization, as documented in federal code, allows the U.S. EPA to "completely prohibit the discharge from all vessels of any sewage, whether treated or not" (40 CFR 401.4 [a]). The U.S. EPA, however, cannot act unilaterally to establish a NDZ. A NDZ can only be established following receipt and approval of a petition from a state requesting that the U.S. EPA designate a specific area as a NDZ. Currently, 8 out of 10 U.S. EPA regions have instituted NDZs. Washington State's region (Region 10) is not one of them.

Herrera Environmental Consultants (Herrera) is assisting Ecology in gathering data and preparing materials that will be used in the development of a NDZ petition should Ecology continue pursuing an NDZ designation for Puget Sound. Herrera is preparing three reports intended to help clarify the NDZ petition process and fulfill specific elements of an NDZ petition. The first report summarized NDZ petition elements, requirements, and petition development strategies used by other states. The second report summarized the environmental condition of Puget Sound, and outlined the regulatory context for vessel sewage discharges. This report, the third of three, characterizes Puget Sound's vessel population and identifies existing vessel sewage pumpout facilities.

Accurately estimating the number of recreational and commercial vessels, and the location and number of pumpout facilities available to them is a critical step for developing a strong and acceptable NDZ petition. Six of the seven required elements of an NDZ petition under CWA 312 (f)(3) (listed below) are related to vessel population and pumpout facilities.

NDZ Petition Required Elements

1. A certification that the waters included in the petition require greater environmental protection than the applicable federal standard
2. A map showing locations of pumpout facilities
3. A description of the location of pumpout facilities

4. A schedule of operating hours for the pumpout facilities
5. Vessel size limits or draught limits for the pumpout facilities
6. Information on treatment of wastes from pumpouts and verification that treatment conforms with federal law
7. Information on area vessel population and usage

Ultimately, U.S. EPA bases its decision of whether there are a sufficient number of pumpout facilities on the ratio of vessels to pumpout facilities in the area covered by the proposed NDZ. The ratio threshold for a NDZ is based on federal guidelines (CVA 1994) which recommend one pumpout facility for every 300 to 600 vessels that have MSDs. The threshold varies between what are called 'parking lot' harbors versus 'transient harbors'. A parking lot harbor is "a harbor which is home port to many boats kept on swing moorings or in marina docks; most of the time these boats are unoccupied and unused." For a parking lot harbor, a ratio of 1:600 pumpouts to vessels is sufficient. Transient harbors are defined as "destination harbors where boaters go during day trips or berth overnight." For transient harbors a ratio of 1:300 pumpouts to vessels is considered sufficient. In other words, higher vessel use rates at transient harbors equate to higher demand for pumpout facilities.

This report provides a preliminary assessment of Puget Sound's vessel population, and the availability of pumpout facilities. Only existing public data that was readily accessible was used for this assessment. Some of the data provided may need to be augmented by further research to attain an acceptable level of detail for an NDZ petition. These data gaps and recommendations for future research are also summarized.

This report is organized into two sections. The first section describes what is known about the vessel population specifically, the number and type (size) of vessels that use Puget Sound. The second section describes the number and location of pumpout facilities.

VESSEL POPULATIONS AND PUMPOUT FACILITY NEEDS

Puget Sound is used by vessels for recreation, commerce, transportation, and national defense. For this NDZ study, vessels are divided into two general categories: recreational and commercial. Commercial vessels may be private vessels or publically-owned vessels such as ferries and battleships.

Recreational Vessels

Recreational vessels vary in size from less than 16 feet to over 60 feet in length. They comprise a significant portion of the vessel population that uses Puget Sound. The method for estimating the vessel population and the pumpout facility needs for recreational vessels is described below. Recommendations on how recreational vessel population estimates may be improved in the future and a brief discussion on methods used by other states to estimate recreational vessel populations are also included.

Methods

Vessel registration data obtained from the Washington State Department of Licensing (DOL) was used to estimate the number of boats likely to use Puget Sound on a regular basis. DOL provided vessel registration data for 2011 that identified the number of vessels of given size classes for each Washington county. For these calculations, it was assumed that all vessels registered in the counties bordering Puget Sound (Clallam, Island, Jefferson, King, Kitsap, Mason, Pierce, San Juan, Skagit, Snohomish, Thurston, and Whatcom), operate in Puget Sound. This method likely overestimates the number of recreational vessels using Puget Sound since some may only operate in lakes or rivers, or exclusively in the Pacific Ocean. An overestimate of the vessel population would result in an over estimate of the need for pumpout facilities. Overestimating the need for pumpout facilities would increase protection for Puget Sound because there would be more pumpout facilities available which would increase the likelihood of boaters using them.

Vessel size classes are frequently used to estimate the number of vessels with MSDs and therefore the number of pumpout facilities needed. According to federal guidelines (CVA 1994), vessels that are less than 26 feet in length are unlikely to have a toilet or MSD, and would not need access to pumpout stations. The federal guidelines indicate that approximately 50 percent of vessels between 26 feet and 40 feet in length have MSDs, and 100 percent of vessels over 40 feet in length are assumed to have MSDs. Vessels with MSDs would require access to pumpout facilities. Approximately 20 percent of vessels less than 26 feet in length are likely to have portable toilets, which would need to be emptied in a home toilet or at a designated receptacle at a dock or marina; these are called dumpout facilties or dump stations. (Although assessment of the adequacy of dump stations is not a required part of an NDZ evaluation, this information has been included where available to allow a more thorough understanding of waste handling by recreational vessels.)

The vessel registration data provided by DOL came organized into the following categories: under 16 feet, 16 to 21 feet, 21 to 30 feet, 31 to 40 feet, 40 to 60 feet, and over 60 feet. Because the data provided by DOL did not exactly match the vessel size categories described in the federal guidelines (CVA 1994), certain assumptions regarding the type of MSD based on size were made. It was assumed that none of the vessels under or equal to 21 feet in length would require pumpout facilities. The 21- to 30-foot category used by DOL spans the 26-foot cutoff designated in the federal guidelines (CVA 1994). Therefore, for this analysis, all boats in the 21- to 30-foot category were treated the same as the 26- to 40-foot category used in the federal guidelines. That is, it was assumed that 50 percent of them have MSDs installed, and therefore would require pumpout facilities. This same assumption was applied to vessels in the 31- to 40-foot category. Applying this assumption to all boats in this size range provides an overestimate of vessels requiring pumpout facilities, further ensuring that the estimate of the required number of pumpout facilities is conservative; meaning that it provides an overestimate of the number of facilities needed.

The majority of recreational vessels are not in use all of the time; for example, they are used more during summer than winter, and they are used more on weekends than mid-week. This use pattern, which is referred to in federal guidance as an 'occupancy rate', impacts how much waste would be created and the pressure on existing pumpout facilities. The peak occupancy rate of vessels (the percentage of registered vessels that are occupied during peak periods) was defined in federal guidelines as 40 percent of recreational vessels (CVA 1994). A peak occupancy rate is used rather than an average to ensure that pumpout facility capacity needs are met during peak boating season. This peak occupancy rate was applied to the estimate of numbers of vessels of each type to further refine pumpout facility needs.

A second method that was considered for estimating recreational vessel use was to calculate the number of marina slips and mooring buoys in Puget Sound. This method would have provided an estimate of recreational vessel capacity rather than of actual vessel number, which would represent something closer to a worse-case scenario. Although data on marina slips and buoys is available for marinas that have pumpout facilities, it has not yet been collected for other marinas. Since the database was incomplete the estimate would have been misleading, therefore this calculation was not performed.

Results

In 2011, there were nearly 145,000 vessels registered in the counties that border Puget Sound. Results by county and vessel size range are presented in Table 1. More than 100,000 (approximately 70 percent) registered vessels are under 21 feet in length, and therefore would not require pumpout facilities according to federal guidelines (CVA 1994). Nearly half of these boats (approximately 48,000) are shorter than 16 feet and would have no toilet facilities. Of the remaining vessels (the approximately 56,000 that are in the 16- to 21-foot class length), 20 percent (approximately 11,200) can be assumed to have portable toilets and would require dump stations (Table 2).

There are approximately 37,000 registered vessels between 21 and 40 feet in length. Approximately 18,500 of these vessels would require access to pumpout facilities based on the assumption that 50 percent have MSDs installed. There are approximately 4,000 vessels over

40 feet, and it is presumed that all of these vessels have MSDs and would require pumpout facilities. In total, the Puget Sound recreational vessel population requiring access to pumpout facilities is about 22,500 another approximately 11,200 would require access to dump stations (Table 2).

Table 1. Puget Sound Vessel Registration by County.

County	Under 16'	16'-20'	21'-40'	Over 40'	Total Registered Vessels
CLALLAM	1,414	1,565	771	64	3,814
ISLAND	2,254	2,104	1,180	75	5,613
JEFFERSON	809	731	891	104	2,535
KING	14,508	17,520	13,754	1,742	47,524
KITSAP	3,372	4,012	2,978	377	10,739
MASON	1,693	1,975	679	44	4,391
PIERCE	8,457	10,884	5,283	477	25,101
SAN JUAN	696	601	1,303	229	2,829
SKAGIT	2,920	2,844	2,517	458	8,739
SNOHOMISH	9,013	9,748	5,469	253	24,483
THURSTON	2,986	3,969	1,938	163	9,056
Puget Sound Totals	**48,122**	**55,953**	**36,763**	**3,986**	**144,824**

Table 2. Total Estimated Number of Vessels Requiring Sewage Pumpout Facilities and Dump Stations.[a]

Vessel Size	Under 16'	16'-20'	21'-40'	Over 40'	Total	Estimated Peak Occupancy [b]	Required Number of Pumpouts to Meet Federal Guidelines
Dump Stations	0	11,191	0	0	11,191	4,477	N/A
Pumpout Facilities	0	0	18,382	3,986	22,368	8947	15-30

N/A Not Applicable (there is no federal requirement for dump stations).

[a] The number of vessels requiring access to sewage dump and pumpout stations was calculated using the method described in federal guidelines (CVA 1994).

[b] A 40 percent peak occupancy rate was assumed based on federal guidelines (CVA 1994).

Even though there are nearly 145,000 recreational vessels that may be operated in Puget Sound, a much smaller percentage of these vessels may be used at any point in time. Assuming a peak occupancy rate of about 40 percent (CVA 1994), a maximum of about 58,000 vessels might be in use during a peak period (such as a summer weekend). However, as described above, many of these vessels do not require access to pumpout facilities. Only about 9,000 of these vessels might require access to pumpout facilities (based on the number of boats in each size class and the percentage that would have MSDs). Another 4,500 (i.e., vessels between 16 and 21 feet in length) would require access to dump stations. Based on these estimates of peak vessel population, between 15 and 30 pumpout stations would be required in Puget Sound to provide a ratio of one pumpout station for every 300 to 600 vessels. This estimate of course does not account for many practical considerations such as location, convenience, and accessibility.

A significant population of recreational vessels not included in the DOL database would be those traveling to Puget Sound from Canada. According to Statistics Canada, approximately 29,000 U.S. residents travelled to British Columbia by private boat in 2011, while approximately 14,000 Canadian residents returned from the U.S. by private boat (Amy Jankowiak, Ecology, Pers. Comm.). It is therefore safe to assume that travel between the countries is fairly equal in terms of vessel traffic. Or, if 2011 is a good indicator that more boats may travel into Canadian waters and therefore not require U.S. pumpout facilities.

Data Gaps and Recommendations

This report provides a valuable preliminary assessment of the number of recreational vessels that use Puget Sound. It is a conservative (high) estimate primarily because it assumes all recreational boats registered in the counties that surround Puget Sound are operated within Puget Sound, and because it includes more smaller boats (those between 21 and 26 feet in length) than are likely to have MSDs. This estimate should be further refined before determining if there are enough pumpout facilities that are reasonably accessible to most boaters.

There is no common method used by states for estimating recreational vessel populations. Maine, for example, used a combination of techniques, including counting vessels on aerial photos and interviewing harbormasters and marina owners, for the Casco Bay and Penobscot Bay NDZ proposals (Pamela Parker, Maine Department of Environmental Protection, Pers. Comm.). For the Long Island Sound and Lake Ontario NDZ petitions, New York State calculated the number of vessels based on historical data that was obtained through interviews with harbormasters and marina managers, and by evaluating vessel registration on a county by county basis (similar to the analysis that was performed for this study). Vessel registration data yielded an estimate about 40 percent higher than the estimate obtained through interviews. It was not determined which was the more accurate method (Jeff Myers, New York State Department of Environmental Conservation, Pers. Comm.).

Based on the experiences of staff from other states responsible for developing NDZ petitions, it is possible that a basic assessment of the vessel population, such as using vessel registration data, will be sufficient to satisfy the EPA's requirements for documenting the total need for pumpout facilities. This seems like a practical approach since a conservative (high) number would provide a better guarantee that an adequate number of pumpout facilities were available. However, from an implementation viewpoint, a more refined estimate may be preferable.

It is also important to consider pumpout facility locations as well as the total number for a water body as large as Puget Sound, since facilities should be dispersed in a way that makes them easily accessible to the majority of boaters for the NDZ to be successful. In addition, the vessel population in Puget Sound is not uniformly distributed. For example, the majority of vessels are registered in King, Pierce, and Snohomish counties. Presumably, more pumpout facilities would be needed in these areas. It may be more appropriate to evaluate vessel populations and pumpout facility needs based on smaller scale areas. For planning and studying purposes, the Puget Sound Partnership has divided Puget Sound into seven sections, called Action Areas, these might be a more appropriate scale to use for this analysis.

Interviewing harbormasters and marina owners to determine the number of vessel moored in Puget Sound, and/or counting vessels on recent aerial photos would provide a more refined estimate of the number of boats, as well as where they are located. This may yield more accurate and useful results. Boater surveys would also be valuable for identifying where there are unmet needs.

One population which may not have been adequately addressed in this document is live-a-board vessels and house boats. These vessels would be registered with DOL and therefore included in the estimates above, however their need for pumpouts differs from most vessels. First, their occupancy rate is closer to 100 percent during all periods, which means the volume of sewage generated from these vessels would be greater. Second, most of these vessels are likely to be permanently moored or incapable of motoring any distance to a pumpout facility. Therefore, they would need access to pumpout boats or mobile dock units. More information about live-aboard-vessels may be warranted in future stages of this project.

Commercial Vessels

Large commercial and public vessels are used on Puget Sound for trade, transportation, armed services operations, fishing, and work. Many of these vessels are too large to use pumpout facilities designed for recreational vessel use. Therefore, the commercial vessel population is evaluated separately to determine their pumpout facility needs.

Methods

In 2005, the Puget Sound Maritime Air Forum gathered detailed information on the commercial vessel population of Puget Sound as part of the 2007 maritime emissions inventory (Starcrest 2007). This report included vessel usage statistics for all categories of commercial vessels. The study results, summarized below, provide a complete characterization of the commercial vessel population, thus further research on commercial vessels was not included.

Results

There are two categories of commercial vessels that operate in Puget Sound. Oceangoing vessels such as tankers, cruise ships and container ships, are vessels that typically transit between Puget Sound ports and destinations outside of Puget Sound. There are harbor vessels such as ferries and tugboats and commercial fishing boats which operate primarily in Puget Sound waters close to home ports (Starcrest 2007). Table 3 summarizes commercial vessel entries into Puget Sound by vessel type for 2005. As shown, there were nearly 3,000 trips made by oceangoing vessels into Puget Sound in 2005; the majority were container ships. More recent data on commercial vessels is available from Ecology (http://www.ecy.wa.gov/biblio/1108001.html). That data indicates that from 2007 through 2010, the total number commercial vessel entries into Puget Sound ranged from 2,638 to 3,070; thus, the 2005 results appear to represent a fair estimate of the normal range. It can be assumed that the proportion of different commercial vessel types was similar to what was counted in 2005. Table 4 summarizes the Puget Sound population of harbor vessels. The majority of harbor vessels are commercial fishing boats.

Table 3. Oceangoing Vessel Transits into Puget Sound for 2005.[a]	
Vessel Type	**Number of Transits**
Auto Carriers	188
Bulk Carriers	310
Container Ships	1,336
Cruise Ships	167
General Cargo	169
Oceangoing Tugs	146
Miscellaneous	16
Reefer	5
Roll on Roll Off	133
Tanker	467
Total	**2,937**

[a] Table 3 was excerpted from Starcrest (2007).

Table 4. Puget Sound Harbor Vessel Population for 2005.[a]	
Harbor Craft Vessel Type	**Number of Vessels**
Commercial Fishing	347
Ocean Tugboats	68
Harbor Tugboats	60
Excursion	60
Government	52
Ferry	45
Workboat	27
Assist and Escort Tugboats	19
Total	**678**

[a] Table 4 was excerpted from Starcrest (2007).

The majority of commercial vessel usage occurs in the vicinity of or en route to Puget Sound Ports. There are nine major shipping ports in Puget Sound (Table 5). Each of these ports serves a limited set or type of vessels. The Port of Seattle has container terminals, bulk carrier terminals and cruise ship terminals. The Port of Tacoma has container terminals, bulk terminals, an auto facility, and serves tanker vessels. The Port of Everett serves cargo carriers, primarily those carrying parts for the Boeing Company which are transferred between Puget Sound Ports (Heather Trim, People for Puget Sound Pers. Comm.). The Port of Port Angeles operates a cargo carrier terminal for export of forest products. The Port of Olympia serves container ships, and cargo carriers for the export of forest products. The Port of Anacortes serves tanker vessels.

The ports of Seattle and Tacoma are the most active Puget Sound ports. More than 80 times the tonnage of cargo is shipped through each of these two ports than any other individual Puget Sound port. The status and availability of pumpout facilities at these ports is largely

unknown, however, large vessels may be served at these ports via pumpout barges or land based trucks. Also, many large vessels may hold their waste while in Puget Sound and at port and wait until they are in open water and under way to discharge.

Table 5. Tonnage of Cargo Shipped Annually from Major Puget Sound Ports.

Puget Sound Port	Tonnage of Cargo Shipped Annually [a]
Anacortes	252,500
Everett	225,394
Olympia	127,268
Port Angeles	Not Available
Seattle	20,564,860
Tacoma	20,384,213
Ferndale	Not Available
Blaine	Not Available
Cherry Point	Not Available

[a] Data in Table 5 was excerpted from Starcrest (2007).

There are also a number of United States armed services facilities, which have ports for vessels operating in Puget Sound. The number of military vessels was not evaluated as there is no publicly available information on the number, type, and operations of armed services vessels in Puget Sound (Starcrest 2007). According to one contact at the Navy facility in Everett, all Navy vessels in Puget Sound use pumpouts for vessel sewage and do not discharge to Puget Sound (Steve Murphy, U.S. Navy. Pers. Comm. to Amy Jankowiak).

Data Gaps and Recommendations

The commercial vessel population of Puget Sound is relatively well documented. The most significant data gap is related to U.S. military vessels. Direct contacts with military bases would be necessary to determine how waste is handled on their vessels.

PUGET SOUND PUMPOUT FACILITIES

NDZ petition elements 2 through 6, listed in the Introduction to this report and required under CWA 312(f)(3), are all related to the identification and description of pumpout facilities. The following sections summarize the information that has been gathered to date on pumpout facilities available to recreational vessels and large vessels. Areas where knowledge of pumpout facilities is limited are identified, and recommendations as to how these deficiencies might be remedied are provided.

Recreational Vessels

Many Puget Sound marinas, yacht clubs, and ports have pumpout facilities that are available to the public for recreational vessels. There are also a number of mobile pumpout boats which operate in Puget Sound. These pumpout boats may serve marinas that do not have pumpout facilities, or recreational vessels for which it is more convenient than using a land based pumpout facility.

Methods

Data on recreational pumpout facilities was provided by the Washington State Parks Department (WSPD) (Al Wolsgel, Washington State Parks, Pers. Comm.). This database includes known recreational vessel pumpout facilities in Washington State that have public access. This database was provided in spreadsheet format to Herrera and was used to summarize pertinent information about Puget Sound. Attributes of pumpout facilities described in this database including; number of pumpout stations, type of pumpout (e.g., mobile cart vs. stationary) number of moorage slips, and vessel draft restrictions, are summarized in Appendix A. A more limited summary of this database is included in Table 6. In an effort to improve this database, many of the facilities listed were contacted to verify the existence and condition of the facilities (Heather Trim, People for Puget Sound, Pers. Comm.). Facilities which were successfully contacted and were found to have functioning pumpout facilities are listed as 'verified'. Facilities which were not successfully contacted, but are on the pumpout facility list, are described as 'not verified'. Facilities which were determined to not be operating are not displayed on maps or tables contained in this document.

Results

There were 115 publicly accessible pumpout facilities identified in Puget Sound (Table 6 and Appendix A). The majority of these facilities were included in the WSPD database and therefore, features of these facilities such as the number of moorage slips, number of pumpout stations, and minimum depth are all documented. Of these facilities, 106 were land based and the other 9 were mobile pumpout services. Seventy-four of the land based facilities were verified as operational; and 32 have yet to be verified. Portable toilet dump stations are also available at 60 of the land based pumpout facilities. The locations of the pumpout facilities (verified and non-verified) and portable toilet dump stations are identified on Figure 1. Pumpout boats are

Table 6. Known Puget Sound Pumpout Facilities and Mobile Services with Access Available to the Public.					
Facility Name	**Location**	**Water Body**	**Pumpout(s)**	**Dump Station(s)**	**Pumpout Operation Status**
16th Street Moorage	Tacoma	Puget Sound	yes	unknown	not verified
Alderbrook Inn	Union	Hood Canal	yes	no	verified
Allyn Dock	Allyn	Puget Sound	yes	unknown	verified
Arabella's Landing Marina	Gig Harbor	Puget Sound	yes	unknown	verified
Ballard Mill Marina	Seattle	Lake Washington	yes	no	verified
Blaine Harbor-Port of Bellingham	Blaine	Strait of Georgia	yes	yes	verified
Blake Island State Park	Manchester	Puget Sound	yes	unknown	verified
Boat Street Marina	Seattle	Lake Union	yes	yes	verified
Breakwater Marina, Inc.	Tacoma	Puget Sound	yes	yes	verified
Carillon Point Marina	Kirkland	Lake Washington	yes	yes	not verified
Chandlers Cove Marina, Chiles & Company	Seattle	Lake Union	yes	unknown	not verified
Chinook Landing Marina	Tacoma	Puget Sound	yes	yes	verified
City of Bainbridge Island – Eagle Harbor Waterfront Park	Bainbridge Island	Puget Sound	yes	yes	verified
City of Des Moines Marina	Des Moines	Puget Sound	yes	yes	verified
Crow's Nest Marina	Tacoma	Puget Sound	yes	yes	verified
Deception Pass State Park	Oak Harbor	Puget Sound	yes	unknown	not verified
Deer Harbor Marina	Deer Harbor	Puget Sound	yes	unknown	verified
Delin Docks	Tacoma	Thea Foss Waterway	yes	yes	verified
Dock Street Marina	Tacoma	Thea Foss Waterway	yes	yes	verified
Dock Street Marina 17	Tacoma	Thea Foss Waterway	yes	yes	verified
Dock Street Marina Albers	Tacoma	Thea Foss Waterway	yes	yes	verified
Dockton Park	Vashon	Puget Sound	yes	unknown	not verified
Driftwood Keys Club	Hansville	Hood Canal	yes	yes	verified
Eagle Harbor Marina	Bainbridge	Puget Sound	yes	no	verified
Elliott Bay Marina	Seattle	Puget Sound	yes	yes	Verified

Table 6 (continued). Known Puget Sound Pumpout Facilities and Mobile Services with Access Available to the Public.					
Facility Name	**Location**	**Water Body**	**Pumpout(s)**	**Dump Station(s)**	**Pumpout Operation Status**
Fairview Marina	Seattle	Lake Union	yes	no	Verified
Fishermen's Terminal - Port of Seattle	Seattle	Lake Union Ship Canal	yes	unknown	Verified
Fort Flagler	Nordland	Admiralty Inlet	yes	yes	Verified
Foss Harbor Marina	Tacoma	Puget Sound	yes	yes	Verified
Foss Landing Marina	Tacoma	Puget Sound	yes	no	Verified
Gig Harbor	Gig Harbor	Puget Sound	yes	unknown	verified
H.C. Henry Pier	Seattle	Puget Sound	yes	unknown	verified
Harbor Island Marina - Port of Seattle	Seattle	Puget Sound	yes	yes	verified
Harbour Marina	Bainbridge Island	Puget Sound	yes	yes	verified
Harbour Village Marina	Kenmore	Lake Washington	yes	yes	verified
Hood Canal Marina	Union	Hood Canal	yes	unknown	Verified
Islands Marine Center	Lopez Island	Puget Sound	yes	yes	verified
Jarrell Cove State Park	Shelton	Puget Sound	yes	no	not verified
Jarrell's Cove Marina	Shelton	Puget Sound	yes	unknown	verified
Jeresich City Dock	Gig Harbor	Puget Sound	yes	yes	verified
John Wayne Marina	Sequim	Strait of Juan de Fuca	yes	yes	verified
La Conner Marina	La Conner	Puget Sound	yes	yes	verified
Liberty Bay Marina	Poulsbo	Puget Sound	yes	yes	verified
Longbranch Marina	Lakebay	Puget Sound	yes	yes	verified
Marine Servicenter	Anacortes	Puget Sound	yes	unknown	not verified
Morrison's North Star Fuel Dock/Diamond Marina	Seattle	Lake Union	yes	unknown	verified
Murphy's Landing Marina	Gig Harbor	Puget Sound	yes	unknown	not verified
Mystery Bay State Park	Nordland	Admiralty Inlet	yes	unknown	verified
Narrows Marina	Tacoma	Puget Sound	yes	unknown	not verified
North Point Moorage Marina	Tacoma	Thea Foss Waterway	yes	no	not verified

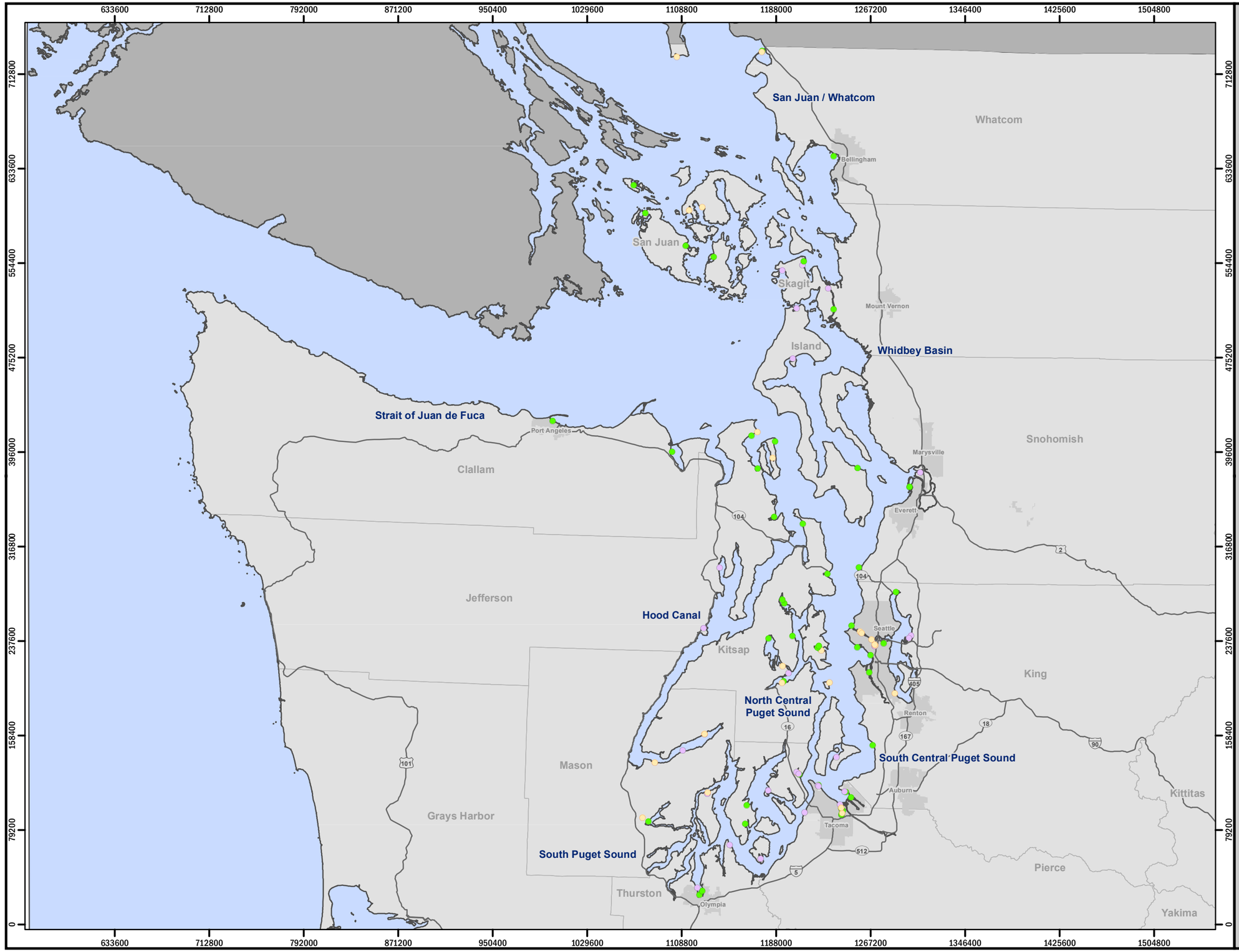
Table 6 (continued). Known Puget Sound Pumpout Facilities and Mobile Services with Access Available to the Public.

Facility Name	Location	Water Body	Pumpout(s)	Dump Station(s)	Pumpout Operation Status
Oak Harbor Marina	Oak Harbor	Puget Sound	yes	yes	not verified
Oakland Bay Marina	Shelton	Puget Sound	yes	unknown	verified
Oro Bay Properties	Anderson Island	Puget Sound	yes	unknown	not verified
Parkshore Marina	Seattle	Lake Washington	yes	no	verified
Pelican Pump	Olympia	Puget Sound	yes	unknown	verified
Penrose Point State Park	Lakebay	Puget Sound	yes	yes	verified
Percival Landing Park	Olympia	Puget Sound	yes	yes	verified
Phecal Phreak	Roche Harbor	Puget Sound	yes	yes	verified
Pleasant Harbor Marina	Brinnon	Hood Canal	yes	no	not verified
Point Defiance Boathouse Marina	Tacoma	Puget Sound	yes	unknown	not verified
Point Defiance Marina Complex	Tacoma	Puget Sound	yes	unknown	not verified
Point Hudson Marina	Port Townsend	Admiralty Inlet	yes	unknown	verified
Point Roberts Marina	Point Roberts	Strait of Georgia	yes	unknown	verified
Port Angeles Boat Haven	Port Angeles	Strait of Juan de Fuca	yes	yes	verified
Port Hadlock Marina	Port Hadlock	Admiralty Inlet	yes	yes	verified
Port Ludlow Bay Marina	Port Ludlow	Hood Canal	yes	yes	verified
Port of Allyn Hood Canal Dock	Allyn	Hood Canal	yes	unknown	not verified
Port of Allyn NorthShore Dock	Belfair	Puget Sound	yes	unknown	verified
Port of Anacortes - Cap Sante Boat Haven	Anacortes	Puget Sound	yes	yes	verified
Port of Bremerton	Port Orchard	Puget Sound	yes	yes	not verified
Port of Brownsville	Bremerton	Puget Sound	yes	yes	verified
Port of Coupeville	Coupeville	Strait of Juan de Fuca	yes	no	not verified
Port of Edmonds	Edmonds	Puget Sound	yes	yes	verified
Port of Everett Marina	Everett	Puget Sound	yes	yes	verified
Port of Everett Marine Park & Boat Ramp	Everett	Puget Sound	yes	yes	verified

Table 6 (continued). Known Puget Sound Pumpout Facilities and Mobile Services with Access Available to the Public.					
Facility Name	**Location**	**Water Body**	**Pumpout(s)**	**Dump Station(s)**	**Pumpout Operation Status**
Port of Friday Harbor Marina	Friday Harbor	Puget Sound	yes	yes	verified
Port of Hoodsport Marina	Hoodsport	Hood Canal	yes	unknown	not verified
Port of Kingston	Kingston	Puget Sound	yes	yes	verified
Port of Olympia - Swantown Marina	Olympia	Puget Sound	yes	yes	verified
Port of Poulsbo Marina	Poulsbo	Puget Sound	yes	yes	verified
Port of Seattle - Bell Harbor Marina	Seattle	Puget Sound	yes	yes	verified
Port of Shelton - Shelton Yacht Club	Shelton	Puget Sound	yes	yes	verified
Port of Silverdale	Silverdale	Puget Sound	yes	yes	verified
Port of South Whidbey	Freeland	Puget Sound	yes	yes	verified
Port Orchard Marina	Port Orchard	Puget Sound	yes	yes	verified
Port Orchard Railway Marina	Reno	Puget Sound	yes	no	verified
Port Townsend Boat Haven	Port Townsend	Admiralty Inlet	yes	yes	verified
Port Washington Marina	Bremerton	Puget Sound	yes	unknown	verified
Poseidon's Landing - Maritime Chanlery	Gig Harbor	Puget Sound	yes	unknown	not verified
Pumpty Dumpty	Friday Harbor		yes	unknown	verified
Pump Me Out	Tacoma	Puget Sound	yes	unknown	verified
Quartermaster Marina	Federal Way	Puget Sound	yes	unknown	not verified
Quilcene Boat Haven	Quilcene	Hood Canal	yes	unknown	not verified
Roche Harbor Resort	Roche Harbor	Puget Sound	yes	unknown	verified
Rose Head Service	Everett	Puget Sound	yes	unknown	verified
Seacrest Marina	Marysville	Puget Sound	yes	unknown	not verified
Seattle Sanitation Service	Seattle	Lake Union Ship Canal	yes	unknown	not verified
Semiahmoo Marina	Blaine	Strait of Georgia	yes	no	verified
Shilshole Bay Marina	Seattle	Puget Sound	yes	yes	verified
Skyline Marina	Anacortes	Puget Sound	yes	yes	not verified

Table 6 (continued). Known Puget Sound Pumpout Facilities and Mobile Services with Access Available to the Public.					
Facility Name	**Location**	**Water Body**	**Pumpout(s)**	**Dump Station(s)**	**Pumpout Operation Status**
Squalicum Harbor-Port of Bellingham	Bellingham	Strait of Georgia	yes	yes	verified
SS Head	Seattle	Puget Sound	yes	unknown	verified
Stuart Island State Park/Reid Harbor & Prevost Harbor Marine Parks	Friday Harbor	Puget Sound	yes	yes	verified
Sweet Pea Pumping Service	Hansville	Puget Sound	yes	unknown	verified
Tacoma Youth Marine Center	Tacoma	Thea Foss Waterway	yes	unknown	not verified
Terry & Sons Mobile Marine Pumpout	Seattle Area	Puget Sound	yes	unknown	verified
Totem Moorage	Tacoma	Puget Sound	yes	unknown	verified
Twanoh State Park	Union	Hood Canal	yes	unknown	not verified
Twin Bridges Marina	Mt. Vernon	Puget Sound	yes	yes	not verified
Tyee Marina	Tacoma	Puget Sound	yes	yes	not verified
West Sound Marina	Orcas	Puget Sound	yes	unknown	verified
Westbay Marina	Olympia	Puget Sound	yes	yes	not verified
Winslow Wharf Marina	Bainbridge Island	Puget Sound	yes	yes	verified
Yarrow Bay Marina	Kirkland	Lake Washington	yes	yes	not verified
Zittel's Marina	Olympia	Puget Sound	yes	yes	not verified

Figure 1.
Locations of Known Puget Sound Pumpout and Dumpout Station Facilities



Legend

- Pumpout
- Pumpout with dump station
- Pumpout not verified

Notes:

1. There are at least 65 additional marinas in Puget Sound for which no pumpout facility or location information was readily available.
2. People for Puget Sound attempted to contact all of the mapped facilities in January of 2012 to confirm the existence and operation of their pumpout and dump stations. Those that are listed as 'not verified' were not successfully contacted, but are likely operational.

N

0 7.5 15 30

Miles

HERRERA

Coordinates: NAD83 Wahington State Plane North (feet)

Produced By: GIS ( )
Project: K:\Projects\11-05217-000\Project\ndz\pumpouts.mxd (3/21/2012)

not depicted on this figure as they serve a range of locations. Their names and areas of operation are listed in Table 7. The numbers listed in Table 7 reflect the number of established businesses. Some of these businesses operate more than one pumpout boat (Al Wolsgel, WSPD, Pers. Comm.; Heather Trim, People For Puget Sound, Pers. Comm.).

Table 7. Puget Sound Pumpout Boat Services.

Service Name	Area of Operation
Terry & Sons Mobile Marine Pumpout Service LLC	Seattle, Bellevue, Kirkland, Renton
Pump Me Out	Tacoma to Point Roberts
Sweet Pea Pumping	Kitsap and Port Madison
SS Head	Seattle
Rose Head Service	Everett and possibly Seattle
Seattle Sanitation Service	Seattle
Phecal Phreak	Roche and Friday Harbor
Pumpty Dumpty	Friday Harbor
Pelican Pumps	Olympia

Pumpout facilities are relatively well distributed throughout Puget Sound. There are more pumpout facilities in areas of denser population (such as near urban centers such as Seattle, Tacoma, Bellevue, and Everett). Presumably the greater number of pumpout facilities reflects the greater level of vessel usage in these areas.

Based only on those facilities where data was provided, there is a total boat moorage capacity of over 15,000 slips in Puget Sound, not including mooring buoys (Appendix A). For those facilities for which maximum vessel length was provided, most can handle vessels of up to 60 feet.

Many Puget Sound boaters already utilize pumpout facilities. A recent survey of Washington boaters indicated that more than 80 percent use pumpout facilities the majority of the time (Barnett 2011). In 2011, more than 4 million gallons of sewage were pumped at CVA funded pumpout stations alone, which is also a strong indication of boater wiliness to use pumpouts (Al Wolsgel, WSPD, Pers. Comm.).

Data Gaps and Recommendations

The majority of information required to fulfill the requirements of CWA 312(f)(3) have been established for the known pumpout facilities (Figure 1, Table 6, Appendix A). However, there are still 32 locations that are listed as having pumpout facilities, but could not be verified. There may also be a substantial number of pumpout facilities that were not identified in this report. There are 183 marinas identified within the potential NDZ area, but there was no information regarding pumpout facilities for at least 65 of them. These 63 marinas are listed in Appendix B. Since the calculations indicate that Puget Sound has an ample number of pumpout facilities based on EPA's criteria, it may be more productive to focus the research on these 63 marinas on those located in areas of Puget Sound that appear to have less than adequate coverage of pumpout facilities.

A few pumpout facilities that are not available to the public (e.g., where boaters must be a member of a yacht club), were identified through this effort. Even though these facilities are not open to the public they would still absorb some of the demand for pumpout facilities. Therefore, it is appropriate to include non-public facilities in pumpout facility demand estimations for NDZ petitions (Joel Salter, EPA Region 10, Pers. Comm.). However, much of the requisite information for an NDZ proposal such as latitude and longitude, and vessel draft restrictions, was not available at this time. In the next phase of this project, a more complete list of private pumpout facilities and their attributes should be obtained for development of an NDZ petition.

Additional information required for an NDZ petition for the pumpout facilities identified that is not addressed in this report, is how the waste pumped at these facilities is ultimately disposed (such as by sanitary sewer, septic, etc.). This information will be gathered in the next phases of this project.

Large Vessels

The Puget Sound large vessel population is comprised of both commercial (e.g., freight carriers, and cruise ships) and public vessels (e.g., armed services, ferries, and other government vessels). Given the size of many of these vessels, recreational pumpout facilities may not be accessible to them. Therefore facilities capable of servicing large vessels must be identified separately. Information regarding pumpout facilities for large vessels is not as readily available as it is for recreational facilities. Given the current lack of data, the focus of this section is directed at identifying data needs and future investigative efforts.

Methods

Data presented on large vessel pumpout facilities was primarily gathered via interviews conducted by People for Puget Sound. They contacted selected ports and vessel operators to learn about sewage management and disposal practices (Heather Trim, People for Puget Sound, Pers. Comm.). Their findings are summarized below. NDZ petitions from other states were also reviewed to assess the level of detail they presented on large vessel pumpout facilities, and strategies they used for obtaining information about large vessel pumpout facilities.

Results

Large vessels, especially cargo and passenger vessels often have set routes, and operate to and from specific ports and vessel terminals. Pumpout facilities for these vessels need to be located at the Ports where they dock or need to be provided via a mobile pumpout. The issue of pumpout facility adequacy for these vessels is further complicated by the fact that large vessels use specific terminals at major ports. So it is not sufficient to know that a Port has a pumpout facility; instead it is necessary to understand which terminal(s) have pumpout capabilities and which vessel types (for example ferry or cruise ship or container ship) are using that terminal.

Adequate data for characterization of pumpout facilities was only available for some segments of the large vessel population. It was confirmed that all ferries operated by Washington State Department of Transportation (WSDOT) hold waste until they can pump out at their own

shoreside facilities (Heather Trim, People for Puget Sound, Pers. Comm.). The majority of cruise ships have voluntarily agreed to refrain from discharging sewage waste while operating in Washington waters (Ecology 2011). And, as described earlier, U.S. Navy ships also use pumpout facilities. Pumpout facility availability and vessel sewage management practices are not well documented for most segments of the large vessel population. The following section describes existing data limitations and strategies for determining the adequacy of large vessel pumpout facilities for a future NDZ proposal.

Data Gaps and Recommendations

Documentation of pumpout facilities for large vessels can be problematic in the development of NDZ proposals, and Puget Sound is no exception. Some states have done little short of acknowledging this data gap. Others have performed more in-depth research, usually via interviews with specific stakeholder groups. In New York's Long Island Sound NDZ petition, it was acknowledged that there is a lack of data for large vessel pumpout facilities, and a likely shortage of facilities. To address this issue, New York opted for a 1-year phase-in period "for commercial vessels to comply, [and allow time] for the terminals, fleet operators, and other businesses that rely on or operate commercial vessels to establish the necessary pumpout facilities." (Long Island Sound NDZ Petition; Jeff Myers, New York State Department of Environmental Conservation, Pers. Comm.).

It is important to acknowledge that U.S. EPA requirements for NDZ petitions do not require an evaluation of the adequacy of pumpout facilities for commercial vessels. However, as a matter of practicality, it may be prudent to evaluate the availability of pumpout facilities, and existing sewage management practices of large vessels because they are still subject to NDZ regulations. Ultimately, the protection of Puget Sound will be best served by identifying commercial vessel capacity needs and making it easy or practical to comply. A first step would be to conduct more thorough interviews at each of the nine commercial vessel ports to obtain specific information about which terminal(s) have facilities and types of commercial vessels that have access to those facilities. This effort would be useful for identifying stakeholder groups that may have trouble complying with NDZ regulations. It is possible that some of these groups (such as oceangoing vessels) have large sewage holding capacity and therefore the capacity to hold waste until it can be discharged at sea.

CONCLUSIONS AND RECOMMENDATIONS

A preliminary assessment of the recreational vessel population based on vessel registration data suggested that a maximum of about 9,000 vessels would require access to pumpout facilities on the busiest boating days of the year in Puget Sound. Although there are a few data gaps in this estimate, these gaps are not expected to significantly alter estimates of pumpout facility needs. Based on federal guidelines (CVA 1994) and the estimated maximum of 9,000 occupied vessels, between 15 and 33 pumpout facilities would be needed in Puget Sound to meet EPAs guidelines. Currently, there are more than 100 known pumpout facilities in Puget Sound. Thus, it appears that in terms of overall number there are already enough pumpout facilties to adequately serve the recreational vessel population. Furthermore, WSPD is continuing to help fund new pumpout facilties through the CVA grant program, therefore the availability of pumpout facilities will continue to improve over the long term.

The data collected for this study also indicates that the bulk of pumpout facilities are located near where the majority of vessels are located. In that sense, the distribution of facilities is reasonable. However, given the size and complexity of the Puget Sound shoreline, a smaller scale assessment will help to capture differences in vessel usage patterns and populations among different geographic areas. Pumpout facility coverage should be considered at smaller scale; such as the Action Area scale used by the Puget Sound Partnership or even a smaller scale. There are also usage patterns that should be considered in evaluating needs. For example, many recreational boaters will plan to pumpout before a long day, such as when crossing the Straits of Juan de Fuca, to improve fuel efficiency. Many boaters also plan their trips with the intent of being able to access a pumpout at either the beginning or end of their boating day. Further research is needed to determine if in practice the recreational boating population has reasonable access to pumpout facilities, where they need them. Future research efforts may be streamlined by focusing on areas where it is suspected that pumpout facility access is a problem. Additionally, if Ecology decides to seek NDZ designations for only certain areas of Puget Sound, separate analyses would be required for each individual area.

The commercial vessel population of Puget Sound was accurately cataloged as part of the 2005 Puget Sound Maritime Air Emissions Inventory (Starcrest 2007). There are typically about 3,000 transits per year by large oceangoing vessels; and there are about 680 harbor vessels that operate within Puget Sound. Estimating the pumpout facility needs of these vessels is more complicated than for recreational vessels. This complication is due in part to the fact that commercial vessels use specific terminals at specific ports. Therefore, it is not sufficient to know that a port has a pumpout facility; instead, it is necessary to understand which terminal(s) have pumpout capabilities and which vessel types (e.g., ferry or cruise ship or container ship) are using that terminal. Instead of gathering specific information on pumpout facilities capable of servicing large vessels, it may be more informative to contact stakeholder groups directly to learn about their specific sewage management practices. Additionally, transient oceangoing vessels may not need pumpout facilities to comply with NDZ regulations, as many may have the capacity to hold sewage while they are in Puget Sound. Given these considerations, an

evaluation of existing sewage management practices of large vessels in Puget Sound may be most informative for determining a specific stakeholder group's ability to comply with NDZ regulations. Additional contacts to U.S. military bases should also be made to develop a summary of their waste handling practices.

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APPENDIX A

Attributes of Known Pumpout Facilities

Table A-1. Attributes of Known Pumpout Facilities. [a]

Facility Name	Location	Water Body	Latitude	Longitude	Type of Facility	Number of Moorage Slips	Number of Moorage Buoys	Number of Stationary Pumpouts	Number of Portable Pumpouts	Number of Dump Stations	Hours of Operation [b]	Max. Vessel Length	Min. Depth at Low Tide	Pumpout Operation Status
16th Street Moorage	Tacoma	Puget Sound	47°14'73"	122°26'00"	Public Marina	1	0	1	0	unknown	8:00 am - 12:00 am	300	15	not verified
Alderbrook Inn	Union	Hood Canal	47°21'00"	123°04'05"	Other	unknown	0	3	0	0	By appointment	85		verified
Allyn Dock	Allyn	Puget Sound	47°25'09"	122°54'11"	Public Marina	10	unknown	1	unknown	unknown	24 hours		2	verified
Arabella's Landing Marina	Gig Harbor	Puget Sound	47°20'03"	122°35'00"	Private Marina	8	unknown	1	0	unknown	24 hours	150	8	verified
Ballard Mill Marina	Seattle	Lake Washington	47°39'44"	122°22'58"	Other	117	0	1	unknown	0	24 hours	50		verified
Blaine Harbor-Port of Bellingham	Blaine	Strait of Georgia	48°59'26"	122°45'56"	Public Marina	629	0	0	4	4	8:00 am - 5:00 pm		12	verified
Blake Island State Park	Manchester	Puget Sound	47°32'37"	122°29'00"	Public Marina	0	24	1	unknown	unknown	24 hours		10	verified
Boat Street Marina	Seattle	Lake Union	47°38'9"	122°18'8"	Public Marina	90	0	1	0	1	24 hours	40		verified
Breakwater Marina, Inc.	Tacoma	Puget Sound	47°18'27"	122°30'48"	Full Service Marina	182	0	0	1	1	7:00 am - 8:00 pm		15	verified
Carillon Point Marina	Kirkland	Lake Washington	47°39'21"	122°12'34"	Private Marina	200	0	1	unknown	1	24 hours	90	6	not verified
Chandlers Cove Marina, Chiles & Company	Seattle	Lake Union	47°37'46"	122°19'60"	Private Marina	unknown	unknown	0	unknown	unknown	9:00 am - 5:00 pm			not verified
Chinook Landing Marina	Tacoma	Puget Sound	47°16'50"	122°24'09"	Private Marina	213	unknown	1	0	1	8:30 am - 5:00 pm	65	8	verified
City of Bainbridge Island – Eagle Harbor Waterfront Park	Bainbridge Island	Puget Sound	47°37'15"	122°31'10"	Public Marina	6	4	1	unknown	1	24 hours	150	5	verified
City of Des Moines Marina	Des Moines	Puget Sound	47°24'06"	122°19'58"	Public Marina	65	0	1	1	1	unknown	75	-12	verfied
Crow's Nest Marina	Tacoma	Puget Sound	47°17'37"	122°25'14"	Private Marina	140	unknown	1	1	1	Variable	40		verified
Deception Pass State Park	Oak Harbor	Puget Sound	48°24'06"	122°37'30"	State Park Marina	unknown	11	1	unknown	unknown	24 hours		25	not verified
Deer Harbor Marina	Deer Harbor	Puget Sound	48°37'14"	123°0'17"	Full Service Marina	125	2	1	unknown	unknown	8:30 am - 4:30 pm	150	5	verified
Delin Docks	Tacoma	Thea Foss Waterway	47°15'00"	122°25'48"	Private Marina	144	unknown	3	unknown	1	8:00 am - 12:00 am	60	6	verified
Dock Street Marina	Tacoma	Thea Foss Waterway	47°14'29"	122°26'00"	Public Marina	78	0	2	0	2	8:00 am - 12:00 am	130	6	verified
Dock Street Marina 17	Tacoma	Thea Foss Waterway	47°14'29"	122°26'00"	Public Marina	77	0	2	0	2	8:00 am - 12:00 am	130	6	verified
Dock Street Marina Albers	Tacoma	Thea Foss Waterway	47°14'29"	122°26'00"	Public Marina	78	0	2	unknown	2	8:00 am - 12:00 am	130	6	verified
Dockton Park	Vashon	Puget Sound	47°22'22"	122°27'17"	Public Marina	unknown	unknown	1	unknown	unknown	Variable	60	20	not verified
Driftwood Keys Club	Hansville	Hood Canal	47°54'26"	122°35'11"	Private Marina	0	0	1	unknown	1	24 hours	40		verified
Eagle Harbor Marina	Bainbridge	Puget Sound	47°37'03"	122°30'50"	Private Marina	125	0	0	1	0	Variable	60	6	verified
Elliott Bay Marina	Seattle	Puget Sound	47°37'36"	122°23'31"	Private Marina	1250	0	1	1	1	24 hours		30	Verified
Fairview Marina	Seattle	Lake Union	47°37'54"	122°19'51"	Private Marina	165	0	1	0	0	24 hours	44	0	Verified
Fishermen's Terminal - Port of Seattle	Seattle	Lake Union Ship Canal	47°39'33"	122°22'39"	Public Marina	350	0	1	unknown	unknown	7:00 am - 9:00 pm	100		Verified
Fort Flagler	Nordland	Admiralty Inlet	48°05'44"	122°41'16"	State Park Marina	unknown	7	unknown	unknown	1	6:30 am - dusk		6	Verified
Foss Harbor Marina	Tacoma	Puget Sound	47°15'22"	122°26'01"	Private Marina	402	0	1	0	1	Variable	90		Verified
Foss Landing Marina	Tacoma	Puget Sound	47°14'38"	122°25'55"	Private Marina	190	0	1	0	0	unknown	75	5	Verified
Gig Harbor	Gig Harbor	Puget Sound	47°20'07"	122°35'13"	Public Marina	unknown	unknown	1	unknown	unknown	24 hours			verified
H.C. Henry Pier	Seattle	Puget Sound	47°38'"	122°20'"	Private Marina	68	unknown	1	unknown	unknown	24 hours	60		verified
Harbor Island Marina - Port of Seattle	Seattle	Puget Sound	47°34'07"	122°20'57"	Public Marina	80	unknown	1	unknown	1	24 hours		12	verified
Harbour Marina	Bainbridge Island	Puget Sound	47°37'25"	122°31'37"	Private Marina	50	0	1	0	1	24 hours	60	15	verified
Harbour Village Marina	Kenmore	Lake Washington	47°45'35"	122°15'77"	Private Marina	135	0	1	0	1	24 hours	50	6	verified
Hood Canal Marina	Union	Hood Canal	47°21'54"	123°05'67"	unknown	unknown	unknown	unknown	unknown	unknown	unknown			verified

Table A-1 (continued). Attributes of Known Pumpout Facilities. [a]

Facility Name	Location	Water Body	Latitude	Longitude	Type of Facility	Number of Moorage Slips	Number of Moorage Buoys	Number of Stationary Pumpouts	Number of Portable Pumpouts	Number of Dump Stations	Hours of Operation [b]	Max. Vessel Length	Min. Depth at Low Tide	Pumpout Operation Status
Islands Marine Center	Lopez Island	Puget Sound	48°30'55"	122°54'56"	Public Marina	56	unknown	5	0	1	Variable	80	30	verified
Jarrell Cove State Park	Shelton	Puget Sound	47°16'53"	122°53'16"	State Park Marina	0	14	1	0	0	24 hours		4	not verified
Jarrell's Cove Marina	Shelton	Puget Sound	47°17'03"	122°53'12"	Private Marina	37	0	1	unknown	unknown	10:00 am - 6:00 pm	100	5	verified
Jeresich City Dock	Gig Harbor	Puget Sound	47°19'54"	122°34'46"	Other	unknown	1	1	0	1	24 hours	50		verified
John Wayne Marina	Sequim	Strait of Juan de Fuca	48°03'56"	123°02'23"	Public Marina	300	0	1	0	2	24 hours	100	12	verified
La Conner Marina	La Conner	Puget Sound	48°24'04"	122°29'48"	Public Marina	unknown	unknown	3	0	2	24 hours	600	10	verified
Liberty Bay Marina	Poulsbo	Puget Sound	47°43'27"	122°38'38"	Private Marina	152	0	1	1	1	8:00 am - 6:00 pm	80	6	verified
Longbranch Marina	Lakebay	Puget Sound	47°12'56"	122°45'28"	Public Marina	36	0	1	unknown	1	24 hours			verified
Marine Servicenter	Anacortes	Puget Sound	48°30'06"	122°36'02"	Full Service Marina	unknown	unknown	3	unknown	unknown	Variable	60		not verified
Morrison's North Star Fuel Dock/Diamond Marina	Seattle	Lake Union	47°38'41"	122°20'38"	Other	unknown	unknown	2	unknown	unknown	Variable	200		verified
Murphy's Landing Marina	Gig Harbor	Puget Sound	47°20'13"	122°35'19"	Private Marina	85	unknown	1	unknown	unknown	Variable			not verified
Mystery Bay State Park	Nordland	Admiralty Inlet	48°03'27"	122°41'42"	State Park Marina	30	7	1	unknown	unknown	24 hours	55	4	verified
Narrows Marina	Tacoma	Puget Sound			Private Marina	204	0	0	unknown	unknown	Variable			not verified
North Point Moorage Marina	Tacoma	Thea Foss Waterway	47°15'51"	122°26'24"	Public Marina	unknown	unknown	2	0	0	24 hours		25	not verified
Oak Harbor Marina	Oak Harbor	Puget Sound	48°17'12"	122°38'03"	Public Marina	421	0	2	2	2	8:00 am - 5:00 pm	75	12	not verified
Oakland Bay Marina	Shelton	Puget Sound	47°13'24"	123°06'18"	Public Marina	112	0	1	unknown	unknown	24 hours	50	20	verified
Oro Bay Properties	Anderson Island	Puget Sound	47°08'08"	122°42'10"	Private Marina	unknown	unknown	1	unknown	unknown	8:00 am - 8:00 pm	45		not verified
Parkshore Marina	Seattle	Lake Washington	47°31'20"	122°15'40"	Private Marina	183	0	1	1	0	24 hours	50	3	verified
Pelican Pump	Olympia	Puget Sound			Mobile Service			unknown	unknown	unknown	Variable			verified
Penrose Point State Park	Lakebay	Puget Sound	47°15'29"	122°45'15"	Public Marina	0	8	1	0	1	24 hours		3	verified
Percival Landing Park	Olympia	Puget Sound	47°02'55"	122°54'19"	Public Marina	unknown	0	1	0	1	24 hours		8	verified
Phecal Phreak	Roche Harbor	Puget Sound			Mobile Service	377	unknown	1	1	1	9:00 am - 5:00 pm		30	verified
Pleasant Harbor Marina	Brinnon	Hood Canal	47°39'70"	122°55'07"	Public Marina	43	0	1	1	0	8:00 am - 8:00 pm	150	4	not verified
Point Defiance Boathouse Marina	Tacoma	Puget Sound	47°18'26"	122°30'56"	Public Marina	unknown	unknown	1	unknown	unknown	Variable	50		not verified
Point Defiance Marina Complex	Tacoma	Puget Sound	47°18'22"	122°30'48"	Public Marina	unknown	0	1	0	unknown	24 hours	60	16	not verified
Point Hudson Marina	Port Townsend	Admiralty Inlet	48°06'57"	122°44'58"	Full Service Marina	46	unknown	1	unknown	unknown	24 hours	100	8	verified
Point Roberts Marina	Point Roberts	Strait of Georgia	48°58'21"	123°03'46"	Full Service Marina	30	unknown	2	unknown	unknown	24 hours	200	7	verified
Port Angeles Boat Haven	Port Angeles	Strait of Juan de Fuca	48°07'38"	123°27'09"	Public Marina	unknown	unknown	2	unknown	1	24 hours	50	15	verified
Port Hadlock Marina	Port Hadlock	Admiralty Inlet	48°01'54"	122°44'43"	Private Marina	unknown	unknown	1	1	1	8:00 am - 5:00 pm	60	15	verified
Port Ludlow Bay Marina	Port Ludlow	Hood Canal	47°55'17"	122°41'08"	Private Marina	300	0	1	1	1	24 hours	100	15	verified
Port of Allyn Hood Canal Dock	Allyn	Hood Canal	46°24'"	122°49'"	unknown	unknown	unknown		unknown	unknown	unknown			not verified
Port of Allyn NorthShore Dock	Belfair	Puget Sound	47°25'09"	122°54'11"	Public Marina	6	unknown	2	unknown	unknown	24 hours	50	5	verified
Port of Anacortes - Cap Sante Boat Haven	Anacortes	Puget Sound	48°30'39"	122°36'13"	Public Marina	850	0	4	4	2	24 hours	90	12	verified
Port of Bremerton	Port Orchard	Puget Sound	47°33'48"	122°37'21"	Public Marina	350	unknown	2	1	1	8:00 am - 5:00 pm		20	not verified
Port of Brownsville	Bremerton	Puget Sound	47°38'58"	122°36'46"	Public Marina	45	0	2	2	2	24 hours	65	25	verified
Port of Coupeville	Coupeville	Strait of Juan de Fuca	48°13'29"	122°41'34"	Public Marina	12	4	1	0	0	24 hours			not verified

Table A-1 (continued). Attributes of Known Pumpout Facilities. [a]

Facility Name	Location	Water Body	Latitude	Longitude	Type of Facility	Number of Moorage Slips	Number of Moorage Buoys	Number of Stationary Pumpouts	Number of Portable Pumpouts	Number of Dump Stations	Hours of Operation [b]	Max. Vessel Length	Min. Depth at Low Tide	Pumpout Operation Status
Port of Edmonds	Edmonds	Puget Sound	47°48'36"	122°23'31"	Full Service Marina	100	unknown	2	unknown	2	24 hours	110		verified
Port of Everett Marina	Everett	Puget Sound	47°59'51"	122°13'26"	Full Service Marina	1969	0	5	0	2	24 hours		11	verified
Port of Everett Marine Park & Boat Ramp	Everett	Puget Sound	47°59'52"	122°13'26"	Public Marina	unknown	unknown	5	unknown	2	24 hours	143		verified
Port of Friday Harbor Marina	Friday Harbor	Puget Sound	48°32'21"	123°00'48"	Public Marina	100	unknown	1	1	2	24 hours	64		verified
Port of Hoodsport Marina	Hoodsport	Hood Canal			unknown	unknown	unknown		unknown	unknown	unknown			not verified
Port of Kingston	Kingston	Puget Sound	47°47'38"	122°29'58"	Full Service Marina	46	4	1	unknown	1	Variable	75	15	verified
Port of Olympia - Swantown Marina	Olympia	Puget Sound	47°03'31"	122°53'46"	Public Marina	733	0	1	0	1	24 hours	100	12	verified
Port of Poulsbo Marina	Poulsbo	Puget Sound	47°43'58"	122°39'52"	Public Marina	130	0	1	2	1	8:00 am - 4:30 pm	80	7	verified
Port of Seattle - Bell Harbor Marina	Seattle	Puget Sound	47°36'31"	122°20'48"	Public Marina	37	0	2	1	1	24 hours	100	22	verified
Port of Shelton - Shelton Yacht Club	Shelton	Puget Sound	47°12'52"	123°05'03"	Public Marina	unknown	0	1	0	1	24 hours	50	13	verified
Port of Silverdale	Silverdale	Puget Sound	47°38'30"	122°41'41"	Public Marina	1300	unknown	1	unknown	1	6:00 am - 10:00 pm		10	verified
Port of South Whidbey	Freeland	Puget Sound	48°02'18"	122°24'11"	Public Marina	34	unknown	2	0	1	unknown	50	6	verified
Port Orchard Marina	Port Orchard	Puget Sound	47°32'42"	122°38'24"	Public Marina	44	unknown	1	1	1	8:00 am - 5:00 pm	100	30	verified
Port Orchard Railway Marina	Reno	Puget Sound	47°32'29"	122°38'43"	Private Marina	60	0	1	0	0	24 hours	150	0	verified
Port Townsend Boat Haven	Port Townsend	Admiralty Inlet	48°06'26"	122°46'12"	Full Service Marina	20	unknown	2	unknown	1	24 hours			verified
Port Washington Marina	Bremerton	Puget Sound	47°34'46"	122°38'39"	Marina	unknown	unknown	1	unknown	unknown	24 hours			verified
Poseidon's Landing - Maritime Chanlery	Gig Harbor	Puget Sound	47°19'58"	122°34'52"	Private Marina	unknown	unknown		unknown	unknown		unknown		not verified
Pumpty Dumpty	Friday Harbor	San Juan Islands			Mobile Service									
Pump Me Out	Tacoma	Tacoma to Pt Roberts			Mobile Service									
Quartermaster Marina	Federal Way	Puget Sound	47°17'35"	122°40'58"	Private Marina	88	unknown	1	unknown	unknown	unknown			not verified
Quilcene Boat Haven	Quilcene	Hood Canal	47°48'07"	122°51'58"	Public Marina	40	unknown	1	unknown	unknown	24 hours		6	not verified
Roche Harbor Resort	Roche Harbor	Puget Sound	48°36'43"	123°09'25"	Public Marina	377	0	2	unknown	unknown	24 hours			verified
Rose Head Service	Everett	Puget Sound			Mobile Service				unknown	unknown	unknown			verified
Seacrest Marina	Marysville	Puget Sound	48°1'52"	122°11'17"	Public Marina	110	0	1	unknown	unknown	unknown			not verified
Seattle Sanitation Service	Seattle	Lake Union Ship Canal			Mobile Service	unknown	unknown	unknown	unknown	unknown	9:00 am - 5:00 pm			not verified
Semiahmoo Marina	Blaine	Strait of Georgia	48°59'22"	122°46'02"	Full Service Marina	unknown	unknown	1	1	0	24 hours	75	12	verified
Shilshole Bay Marina	Seattle	Puget Sound	47°40'33"	122°24'46"	Public Marina	40	unknown	4	0	2	24 hours		15	verified
Skyline Marina	Anacortes	Puget Sound	48°29'18"	122°40'37"	Private Marina	50	0	2	unknown	1	Variable	100	10	not verified
Squalicum Harbor-Port of Bellingham	Bellingham	Strait of Georgia	48°45'13"	122°30'29"	Public Marina		0	2	8	8	24 hours	100	10	verified
SS Head	Seattle	Puget Sound			Mobile Service	unknown	unknown		unknown	unknown	9:00 am - 4:00 pm			verified
Stuart Island State Park/Reid Harbor & Prevost Harbor Marine Parks	Friday Harbor	San Juan Islands	48°40'30"	123°12'00"	Public Marina	0	12	1	0	1	24 hours	60	4	verified
Sweet Pea Pumping Service	Hansville	Puget Sound			Mobile Service	unknown	unknown		unknown	unknown	Variable			verified
Terry & Sons Marine Pumpout	Tacoma	Puget Sound			Mobile Service									
Tacoma Youth Marine Center	Tacoma	Thea Foss Waterway			unknown	unknown	unknown		unknown	unknown	unknown			not verified
Totem Moorage	Tacoma	Puget Sound	47°15'27"	122°26'07"	Public Marina	467	unknown	1	unknown	unknown	24 hours	90		verified

Table A-1 (continued). Attributes of Known Pumpout Facilities. [a]

Facility Name	Location	Water Body	Latitude	Longitude	Type of Facility	Number of Moorage Slips	Number of Moorage Buoys	Number of Stationary Pumpouts	Number of Portable Pumpouts	Number of Dump Stations	Hours of Operation [b]	Max. Vessel Length	Min. Depth at Low Tide	Pumpout Operation Status
Twanoh State Park	Union	Hood Canal	47°22'49"	122°58'30"	State Park Marina	unknown	7	1	unknown	unknown	24 hours		3	not verified
Twin Bridges Marina	Mt Vernon	Puget Sound	48°27'"	122°31'"	Private Marina	0	0	1	1	1	9:00 am - 5:00 pm	34	11	not verified
Tyee Marina	Tacoma	Puget Sound	47°17'42"	122°25'28"	Private Marina	unknown	0	2	0	2	Variable	65		not verified
West Sound Marina	Orcas	Puget Sound	48°37'46"	122°57'36"	Private Marina	180		1	unknown	unknown	Variable		5	verified
Westbay Marina	Olympia	Puget Sound	47°03'56"	122°54'47"	Private Marina	350	0	1	unknown	1	Variable	50	6	not verified
Winslow Wharf Marina	Bainbridge Island	Puget Sound	47°37'40"	122°31'20"	Private Marina	225	unknown	unknown	1	1	9:00 am - 5:00 pm	80	12	verified
Yarrow Bay Marina	Kirkland	Lake Washington	47°39'"	122°13'"	Private Marina	100	0	1	unknown	1	24 hours	75	6	not verified
Zittel's Marina	Olympia	Puget Sound	47°09'56"	122°48'28"	Full Service Marina	200	0	0	2	1	Variable	45	8	not verified

[a] The pumpout facilities listed in Appendix A primarily came from the Washington State Parks Pumpout Database with a few additions that were identified during this study. This should still be considered a partial listing. Other marinas, such as those listed in Appendix B may also have pumpout facilities and there are likely marinas not identified in either of these lists. Information for these facilities needs to be acquired.

[b] Hours of operation listed as 'variable' refers to pumpout facilities whose hours vary by season, day of the week, or are not open on some days of the week.

APPENDIX B

Puget Sound Marinas Not Included in the Washington State Parks Database

Table B-1. Puget Sound Marinas Not Included in the Washington State Parks Database.

Facility Name	Street Address	City	Zip Code	Telephone
Anacortes Marina	2415 T Avenue	Anacortes	98211	(360) 293-4543
Anchor Cove Marina	1600 5th Street	Anacortes	98211	(360) 293-7033
Bellevue Yacht Basin	100 100th Avenue SE	Bellevue	98004	(425) 454-8780
Bellevue Yacht Club	P.O. Box 1175	Bellevue	98009	(206) 730-0302
Bellingham Yacht Club	2625 Harbor Loop	Bellingham	98225	(360) 733-7390
Blakely Island Marina	1 Marine Drive	Blakely Is	98221	(360) 375-6121
Boston Harbor Marina	312 73rd Avenue NE	Olympia	98506	(360) 357-5670
Camano Marine	909 SR 532	Camano Is	98282	(360) 629-4507
Capron's Landing	620 Warbass	Friday Harbor	98250	(360) 378-2688
CayouQuay Marina	P.O. Box 116	Deer Harbor	98243	(360) 376-4560
Dagmar's Marina	1871 Ross Avenue	Everett	98201	(425) 259-6124
Day Island Yacht Club	2120 91st Avenue W.	University Place	98466	(253) 565-3777
Day Island Yacht Harbor	1855 E. Day Island Boulevard	University Place	98466	(253) 565-4814
Deer Harbor Boatworks	155 Channel Road	Deer Harbor	98243	(360) 376-4056
Des Moines Yacht Club	P.O. Box 13004	Des Moines	98198	(360) 878-7220
Down River Marina	9025 NE Bothell Way	Bothell	98011	(425) 485-2981
Eagledale Moorings	5842 Main Street NE	Bainbridge	98110	(206) 842-7751
East Bay Marina	1022 Marine Drive NE	Olympia	98501	(360) 786-1400
Fair Harbor Marina	Box A, Fair Harbor Marina	Grapeview	98546	(360) 426-4028
Fiddlehead Marina	611 Columbia Street NW	Olympia	98501	(360) 352-0528
Gateway Cove Marina	904 2nd Street	Anacortes	98221	(360) 293-7022
Gig Harbor Marina	3117 Harborview Drive	Gig Harbor	98332	(253) 851-7157
Gonnason Marina	307 South Central	Kent	98032	(253) 852-5336
Harborview Marina	3219 Harborview Drive	Gig Harbor	98332	(253) 851-3948
Hat Island Marina	1016 14th Street	Everett	98201	(206) 339-8485
Hilton Harbor Marina	1000 Hilton Avenue	Bellingham	98225	(360) 733-1110
Hoodsport Marina	24060 Highway 101	Hoodsport	98548	(360) 877-9657
Jerry's Marina	7514 Cattail Lane SW	Olympia	98512	(360) 943-8839
Kenmore Marina	6321 NE 175th Street	Kenmore	98028	(360) 462-1257
Kitsap Marina	1595 SW Bay Street	Port Orchard	98366	(360) 895-2193
Lighthouse Marine	3720 Harborview Drive	Gig Harbor	98332	(253) 858-7280
Longview Yacht Club	5945 Willow Grove Road	Longview	98632	(360) 425-9377
Lovrics Landing	3022 Oaks Avenue	Anacortes	98221	(360) 293-2042
Lucas Landing	3521 Harborview Drive	Gig Harbor	98332	(253) 851-7233
Marina Park	Foot of Kirkland Avenue	Kirkland	98033	(425) 828-1218
Martin Marina	401 Columbia Street NW	Olympia	98501	(360) 357-5433

Table B-1 (continued). Puget Sound Marinas Not Included in the Washington State Parks Database.				
Facility Name	**Street Address**	**City**	**Zip Code**	**Telephone**
McConnell's Boat House	718 Front Street	Mukilteo	98275	(425) 355-3411
Meadowdale Marina	16111 76th Place W.	Edmonds	98020	(425) 743-2211
Mercer Marine	3911 Lake Washington Boulevard	Bellevue	98006	(425) 641-2090
Meydenbauer Bay Marina	#2 99th Avenue NE	Bellevue	98009	(425) 454-8880
Moss Bay Marina	135 Lake Street S.	Kirkland	98033	(425) 822-0291
Neah Bay Resort	Hwy 112, Mile 0	Neah Bay	98357	(360) 645-2288
Newport Yacht Basin	3911 Lake Washington Boulevard	Bellevue	98009	(206) 267-2535
Olson's Resort	P.O. Box 216	Seiku	98381	(360) 963-2311
One Tree Island Marina	900 Meridian E.	Milton	98354	(253) 863-5176
Peninsula Yacht Basin	8913 Harborview Drive	Gig Harbor	98332	(253) 858-2250
Pleasurecraft Marina	3215 Harborview Drive	Gig Harbor	98332	(253) 858-2350
Port of Keyport	P.O. Box 195	Keyport	98345	(360) 779-4360
Puget Marina	8141 Walnut Road NE	Olympia	98516	(360) 491-7388
Rainbow Beach Resort	Route 1, Box 146	Inchelium	98138	(509) 722-5901
Rice's Resort	P.O. Box 180	Seiku	98381	(360) 963-2300
San Juan Marina	2 Spring Street	Friday Harbor	98250	(360) 378-2841
Seacrest Boat Moorage	4020 Old Highway 99	Marysville	98270	(425) 252-4823
Shaw General Store	P.O. Box 455	Shaw Island	98286	(360) 468-2288
Shelter Bay	1000 Shoshone Drive	La Conner	98257	(360) 466-3805
Shipyard Cove Marina	740 Turnpoint Road	Friday Harbor	98250	(360) 378-5101
Snug Harbor Marina	1997 Mitchell Bay Road	Friday Harbor	98250	(360) 378-4762
Steilacoom Marina	401 First Street	Steilacoom	98388	(253) 582-2600
Thunderbird Boat House	826 Boat Haven Drive	Port Angeles	98362	(360) 457-4274
Tropic Isles Marina	3515 Totem Beach Road	Marysville	98270	(941) 729-8128
Tulalip Marina	7411 Tulalip Bay Drive	Marysville	98271	(360) 629-7999
West Beach Resort	190 Waterfront Way	East Sound	98245	(360) 376-2240
West Shore Marina	3815 Harborview Drive	Gig Harbor	98332	(253) 858-3953