

CHAPTER 1

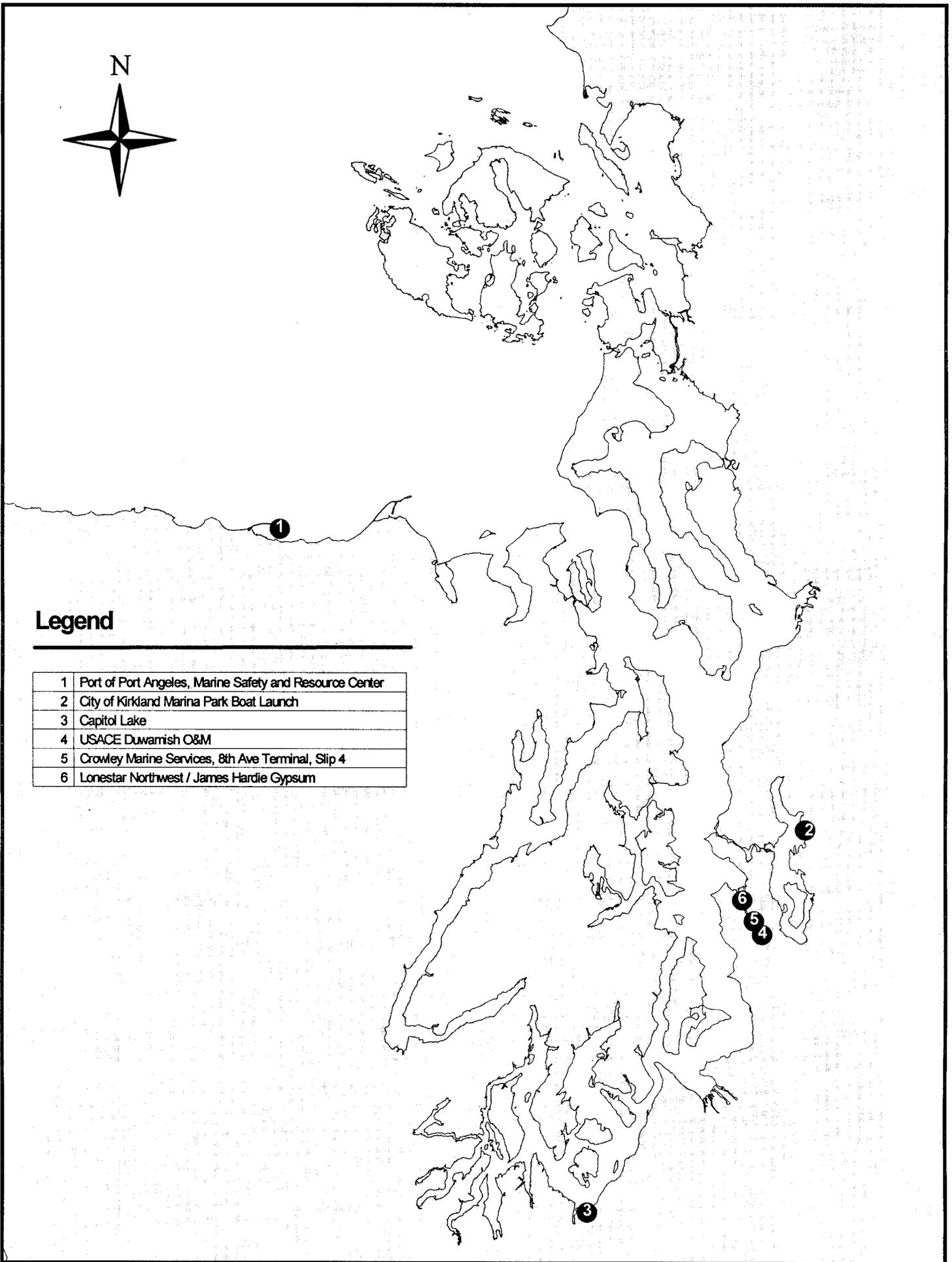
DREDGED MATERIAL MANAGEMENT PROGRAM (DMMP) EVALUATION ACTIVITIES

A. INTRODUCTION

This chapter summarizes the application of DMMP (Lake Washington, Puget Sound, Grays Harbor and Willapa Bay, Lower Columbia River) evaluation guidelines for Dredging Years 1996 and 1997. A dredging year includes all projects evaluated between June 16 of a given year and June 15 of the following year (DY96 = June 16, 1995 - June 15, 1996; DY97 = June 16, 1996 - June 15, 1997). Tables related to project-specific ranking, sampling, testing, and suitability determinations are presented in the first part of this chapter. The second half of the chapter presents an overall assessment of these activities and data. Where projects involved unusual circumstances or the application of best professional judgment by the agencies, more detailed descriptions are provided in Appendix A.

During DY96/97 there were twenty-eight projects at some stage of the DMMP process. Table 1-1 provides a complete summary of these projects/activities. Activities occurring in other dredging years are indicated by parentheses.

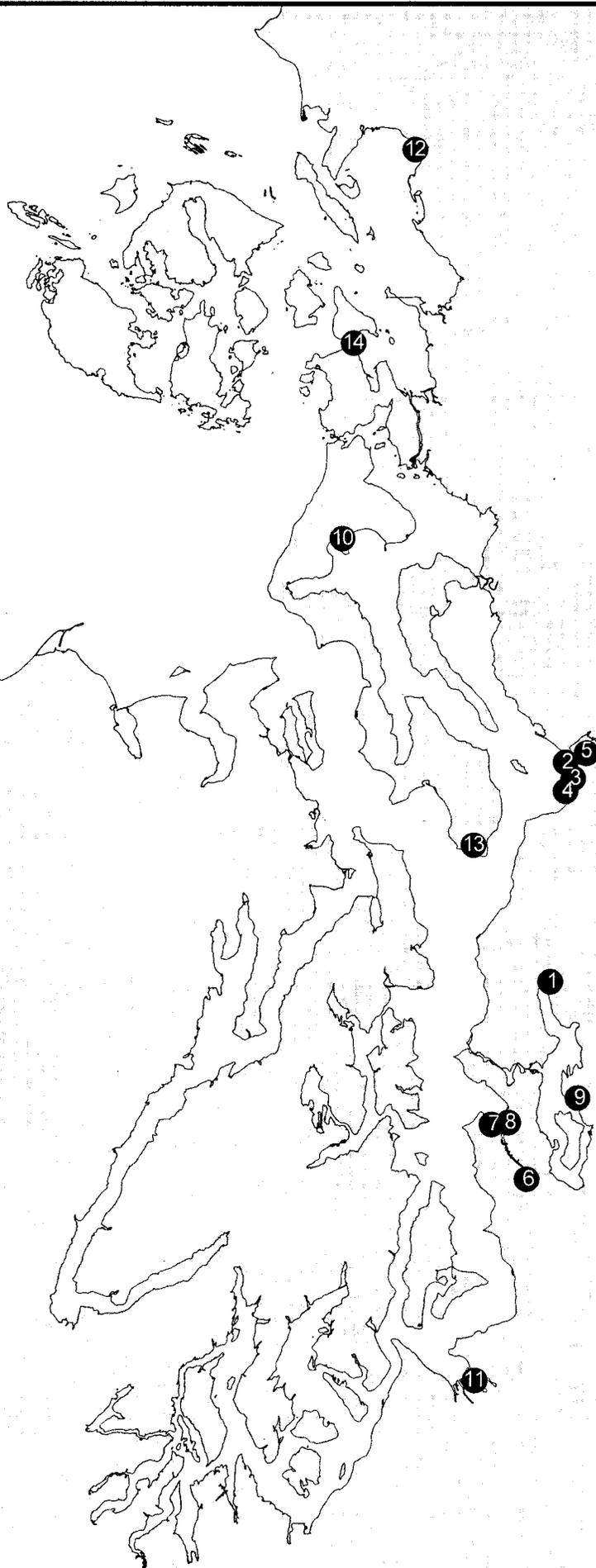
Of the projects listed in Tables 1-1a and 1-1b, seven had suitability determinations completed or applications withdrawn by June 15, 1996 and are considered DY96 projects for the purposes of this chapter. Nineteen projects had either suitability determinations completed or applications withdrawn by June 15, 1997. These are considered DY97 projects. DY96 and DY97 project locations in Puget Sound can be seen in Figures 1-1a and 1-1b respectively, projects located in Grays Harbor and Willapa Bay are shown in Figure 1-1c.



Legend

1	Port of Port Angeles, Marine Safety and Resource Center
2	City of Kirkland Marina Park Boat Launch
3	Capitol Lake
4	USACE Duwamish O&M
5	Crowley Marine Services, 8th Ave Terminal, Slip 4
6	Lonestar Northwest / James Hardie Gypsum

Figure 1-1a Dredging Year 1996 PSDDA Project Locations



Legend

1	USACE Kenmore Lake Washington
2	Port of Everett, Piers 1 and 3 NCD
3	Port of Everett, NCD Berth
4	Port of Everett, Stage I Marine Terminal Improvements
5	USACE Everett, (downstream)
6	USACE Duwamish O&M
7	Port of Seattle, Terminal 5
8	Port of Seattle, Terminal 18
9	City of Bellevue, Meydenbauer Yacht Club
10	Oak Harbor Marina
11	Port of Tacoma, Blair Turning Basin
12	Whatcom International Shipping Terminal
13	Sandy Hook Yacht Club
14	Curtis Wharf

Figure 1-1b Dredging Year 1997 PSDDA Project Locations

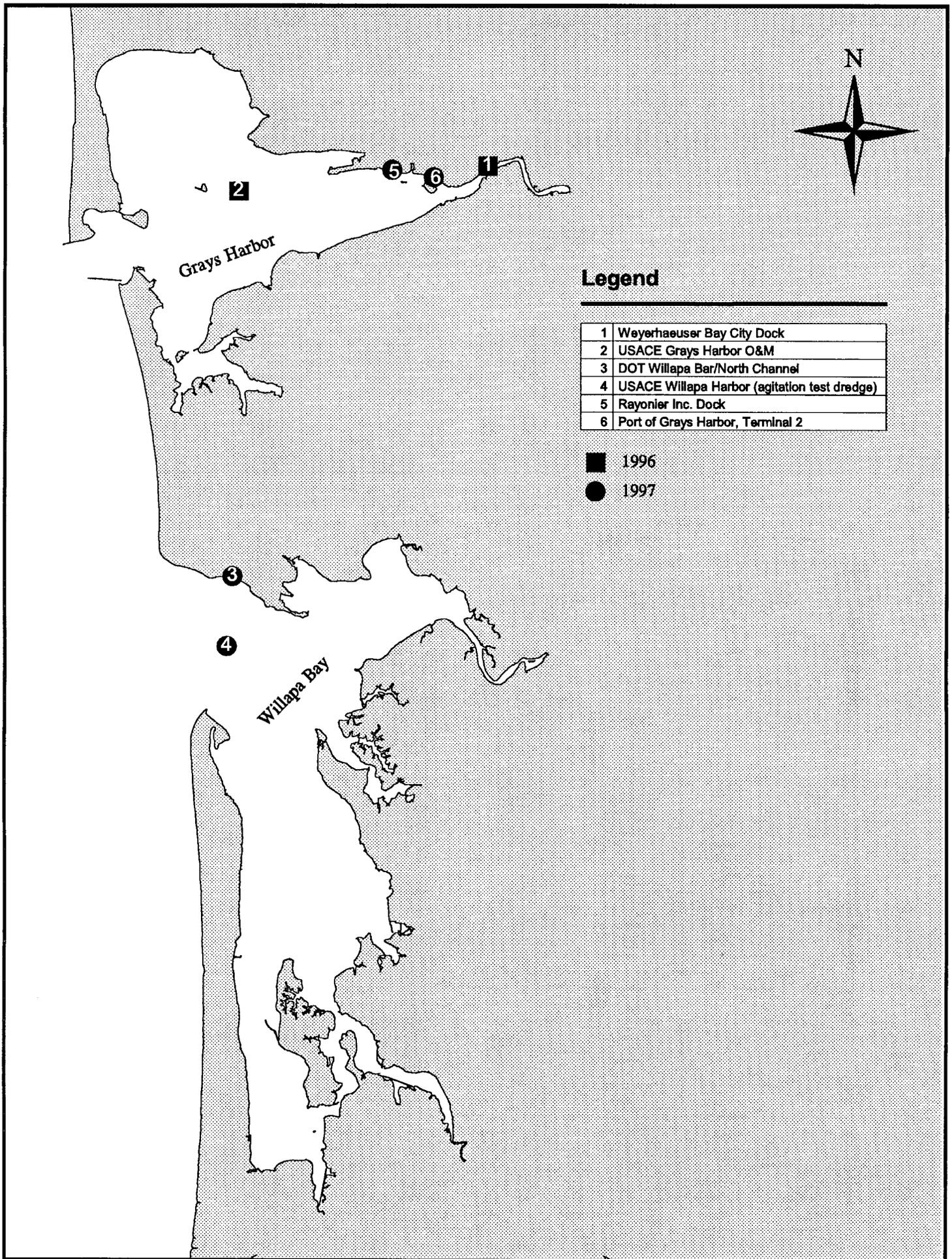


Fig. 1-1c Grays Harbor/Willapa Bay DMMP Projects

Table 1-1a. DY96 DMMP EVALUATION ACTIVITIES

PROJECT	Disposal Jurisdiction	Project Volume (cy)	Ranking Determination	Sampling Plan Review	Suitability Determination
Capitol Lake	PSDDA	180,000	96	96	application withdrawn
Crowley Marine Services 8 th Avenue Terminal, Slip 4	PSDDA	13,000	96	96	96
High Cascade International	CR	20,000	96	96	96
City of Kirkland Marina Park Boat Launch	PSDDA	800	96	No test ¹	96
Lonestar Northwest / James Hardie Gypsum	PSDDA	9,000	(95) ²	(95)	96
Port of Port Angeles, Marine Safety and Resource Center	PSDDA	30,000	96	96 ³	application withdrawn
Weyerhaeuser Bay City Dock	GH	14,000	(93)	frequency ⁴	96
USACE Duwamish	PSDDA	98,000	(93)	96	96
USACE Grays Harbor	GH	2,120,000	(94)	96	96

CR = Columbia River

GH = Grays Harbor

NCD = Nearshore confined disposal

PSDDA = Puget Sound Dredged Disposal Analysis

WB = Willapa Bay

¹ No testing required under small project guidelines.

² Activities noted in parenthesis occurred outside DY96/97.

³ Initial SAP reviewed by DMMP agencies, Permit application subsequently withdrawn.

⁴ No testing required under frequency guidelines.

Table 1-1b. DY97 DMMP EVALUATION ACTIVITIES

PROJECT	Disposal Jurisdiction	Project Volume (cy)	Ranking Determination	Sampling Plan Review	Suitability Determination
City of Bellevue, Meydenbauer Bay	PSDDA	2500	96	96	97
Curtis Wharf	PSDDA	32,700	97	97	97
Department of Transportation, Willapa Bar/North Channel	WB	5,000,000	97	97	97
Oak Harbor Marina	PSDDA	27,000	96	96	97
Port of Everett, Piers 1 and 3	NCD	131,000	(93)	(95)	97 ⁵
Port of Everett, NCD Berth Approach	PSDDA	86,400	(93)	97	97
Port of Everett, Stage I Marine Terminal Improvement	PSDDA	239,000	(93)	No Test	97
Port of Grays Harbor, Terminal 2	GH	15,000	(93)	frequency ⁴	97
Port of Seattle, Terminal 5	PSDDA	36,000	(94)	96	97
Port of Seattle, Terminal 18	PSDDA	546,430	96	96	97
Port of Tacoma, Blair Turning Basin	PSDDA	755,000	97	97	97
Rayonier Inc. Dock	GH	20,000	(92)	frequency ⁴	97
Sandy Hook Yacht Club	Upland	42,000	(95)	(95)	97
Weyerhaeuser, Mt Coffin Access Channel, Longview, WA	CR	200,000	97	97	97
Whatcom International Shipping Terminal	PSDDA	8,700	97	97	application withdrawn
USACE Everett (downstream & settling basin)	PSDDA	300,437	(93)	97	97
USACE Duwamish	PSDDA	112,000	(93)	97	97
USACE Kenmore, Lake Washington	PSDDA	60,000	96	96	97
USACE Willapa Harbor (Agitation Test Dredge)	WB	250,000	97	97	97

⁵ PSDDA open-water suitability assessment conducted in DY95 (see March 1996 Sediment Management Program Biennial Report).

B. DY96/97 PROJECTS

Ranking

Each of the DMMP projects discussed herein comes from one of three jurisdictional areas: Puget Sound (PSDDA), Grays Harbor/Willapa Bay and the Lower Columbia River. Each jurisdiction has specific guidance which explains requirements for evaluating dredging and disposal therein. Sampling and analysis requirements under the PSDDA program are fully explained in the 1988 Phase I Evaluation Procedures Technical Appendix (EPTA) and the 1997 PSDDA Users Manual. Sampling and analysis requirements in Grays Harbor and Willapa Bay are explained in the June 1995 Dredged Material Evaluation Procedures and Disposal Site Management Manual, Grays Harbor and Willapa Bay, Washington (Grays Harbor Manual). Draft sampling and analysis requirements for projects on the Lower Columbia River have been formulated for public interest review and future implementation as part of the Lower Columbia River Dredged Material Evaluation Framework. The ranking guidance contained in this framework is being implemented on an interim “best professional judgment” basis until guidance for the Lower Columbia River has been finalized.

The initial appraisal of a proposed dredging project requires a careful examination of all existing sediment quality data within the dredging area. The project ranking is based on a “reason to believe” that chemicals of concern may or may not be present in the project area. The agencies have established ranks for general areas within each jurisdiction (e.g., Elliott Bay/PSDDA) and activities (e.g., marinas) based on historical data or awareness of active sources of contamination. In the absence of project-specific data, representatives of the agencies apply an initial ranking based on guidance contained in the regional guidance documents.

All three jurisdictional areas allow for a reconsideration of the initial ranking if the historical data at the site are adequate, or the applicant conducts a partial characterization (PC) as described within each regional guidance document. If the PC chemistry data support a lower ranking, sampling and analysis requirements for surface and subsurface sediments may be reduced during the full characterization (FC). Tables 1-2a and 1-2b contain the initial and full characterization rankings of all DY96/97 projects. The “initial rank” was taken from the respective regional guidance documents. The “full characterization” rank was used to determine the sampling and analysis requirements for project sediments. No DY96 projects had ranking adjustments. Three of nineteen DY97 projects had ranking adjustments based on evaluations of existing data or PC data. The reranking allowed for reduced sampling requirements for the subsurface material from the Port of Seattle Terminal 18 project and significantly lower ranks for Port of Everett Stage I Marine Terminal Improvements and Port of Tacoma Blair Turning Basin projects.

Sampling and Analysis Plans

Approved sampling and analysis plans, based on the ranking which has been assigned to the proposed project, are required before applicants collect sediment samples for either a PC or FC. The applicant or dredging consultant receives guidance on sampling plan development from the Corps of Engineers Dredged Material Management Office (DMMO). Protocols for station positioning, decontamination, field sampling, sample compositing, chemical analysis, biological testing, QA/QC and data submittal are all included in the sampling and analysis plan. Once completed, DMMO coordinates review and approval of the plan with the DMMP agencies.

Tables 1-3a and 1-3b contain data related to sampling plans approved for DY96/97 projects. Application of specific sampling and analysis requirements resulted in the number of field samples and dredged material management units (DMMUs) formulated for each of the projects. Descriptions of projects that required no testing or where best professional judgment was applied, are included in Appendix A.

Sampling

Tables 1-4a and 1-4b contain data related to sampling efforts during DY96/97. Two general requirements which exist within all three jurisdictions are to sample to the depth of dredging (including overdepth)⁶, and to provide positioning data to a minimum precision of one-tenth of a second (approximately 2 meters). For the majority of the projects listed in the tables, the maximum sediment depths correspond to both the actual length of the deepest boring as well as to the maximum depth of the dredging prism including overdepth. In high-ranked areas there is an additional requirement to provide an archived sample from the one foot of sediment beyond the dredging prism. This additional depth is not reflected in the table. A variety of positioning techniques were used to provide the required precision. Great emphasis is placed on positioning in order to provide repeatability in sampling and to provide data which can be utilized in a geographic information system (GIS).

Chemical Testing

Chemical testing was conducted for six projects in DY96 and thirteen projects in DY97. During DY96 one project (City of Kirkland Marina Park Boat Launch) did not require chemical testing based on PSDDA small project guidelines, and one project (Weyerhaeuser Bay City Dock) did not require testing under the Grays Harbor/Willapa Bay frequency guidelines. During DY97 two Grays Harbor projects (Port of Grays Harbor Terminal 2 and Rayonier Inc. Dock) met frequency guidelines and testing was not required. One DY96 and one DY97 project on the Lower Columbia River had limited testing for grain size and TOC only. Two DY97 Willapa Bay Projects (Corps test dredge

⁶ This requirement is less stringent in areas with high shoaling rates, which have been previously characterized to the limits of the dredging prism. In these cases, sampling of the surface layer with a grab sampler is generally allowed.

of the Middle Channel and DOT project) also received limited testing for grain size only to ensure compliance with Section 103 exclusionary criteria and Section 404 reason to believe guidelines. In general, the QA/QC for projects undergoing testing was excellent and acceptable by the DMMP agencies for regulatory decision-making. A complete listing of PSDDA sediment guideline value exceedances for DY96/97 is included in Appendix C.

Biological Testing

Biological testing summaries can be found in Tables 1-5a and 1-5b. For those projects undergoing tiered testing only those DMMUs which had exceedances of SLs were subject to biological testing. Based on a reason-to-believe that at least one COC would exceed SL, and to save time in the testing process, several project proponents opted for concurrent biological testing.

DMMP regulatory use of the saline Microtox[®] test has been suspended since DY94 for regulatory decision-making. This suspension remains in force pending commitment of agency resources to effectively evaluate the continued use of this test. The saline Microtox test continues to be run for a limited number of federal maintenance dredging projects in conjunction with the solid-phase Microtox test to further evaluate alternative protocols.

Bioaccumulation testing was conducted on one DY96 project and one DY97 project. In both instances bioaccumulation testing employed two species, with the adult facultative deposit-feeding bivalve, *Macoma nasuta*, and the adult deposit-feeding polychaete, *Nephtys caecoides*, co-tested within the same aquarium. In DY96, sediment from one surface DMMU on the Crowley Marine Services 8th Avenue Terminal Project exceeded the bioaccumulation trigger for fluoranthene. In DY97, for the Port of Seattle's Terminal 18 project, 45 DMMU exceeded bioaccumulation triggers for PCBs, mercury, or TBT. Of those 45 DMMU, nine passed routine biological testing, and were subjected to bioaccumulation testing using an extended exposure of 44 days. The results of these tests are discussed in Appendix A.

Suitability Determinations

A suitability determination outlines the evaluation procedures used in the characterization of project sediments, summarizes chemical and biological testing data and associated QA/QC issues, and documents the interpretation of testing results. The suitability determination is a technical memorandum, drafted by the Corps' DMMO, and signed by DMMP representatives. The determination documents the suitability of proposed dredged sediments for open-water disposal at one of the eight Puget Sound sites, six Grays Harbor and Willapa Bay sites, or appropriate inwater sites in the Columbia River. It does not, however, constitute final project approval by the agencies. Comprehensive agency comments on the overall project are provided through the regulatory public notice and review process.

Tables 1-6a and 1-6b contains information taken from the suitability determinations for each of the projects which completed their DMMP review during DY96/97. For the seven projects receiving suitability determinations in DY96, three projects had one or more DMMUs that were found unsuitable for unconfined open-water disposal. In DY97, six of 19 projects receiving suitability determinations had one or more DMMU that were found unsuitable for unconfined open-water disposal. All projects with unsuitable material were from Puget Sound.

Cost Data

A limited number of projects reported cost data for DY96/97. For DY96 cost data was reported for the USACE Duwamish and Grays Harbor projects. For DY97, cost data was received for the Curtis Wharf, Oak Harbor Marina, Port of Tacoma Blair Turning Basin, Weyerhaeuser Mt. Coffin Channel and USACE Duwamish and USACE Everett projects. With less than a third of the projects reporting data, no cost comparison analysis with previous years can be performed.

Table 1-2a. DY96 PROJECT RANKING

PROJECT	DISPOSAL JURISDICTION	LOCATION	WATERBODY	INITIAL RANK	FULL CHARACTERIZATION RANK
Capitol Lake	PSDDA	Olympia	Capitol Lake	not ranked	LM
Crowley Marine Services 8 th Avenue Terminal, Slip 4	PSDDA	Harbor Island Seattle	Duwamish River	H	H
High Cascade International	CR	Stevenson	Columbia River	not ranked	not ranked
City of Kirkland Marina Park Boat Launch	PSDDA	Kirkland	Lake Washington	M	M
Lonestar Northwest / James Hardie Gypsum	PSDDA	Harbor Island	Duwamish River	H	H
Port of Port Angeles, Marine Safety and Resource Center	PSDDA	Port Angeles	Strait of Juan de Fuca, Puget Sound	H	H
Weyerhaeuser Bay City Dock ⁷	GH	Grays Harbor	Chehalis River	LM	LM
USACE Duwamish ⁸	PSDDA	Seattle	Duwamish River	LM/H	LM/H
USACE Grays Harbor	GH	Grays Harbor	Chehalis River Grays Harbor	L	L

⁷ No testing required based on frequency guidelines. Last tested in 1993.

⁸ No testing required in LM ranked area (70,000 cy) based on frequency guidelines. Last tested in 1991.

Table 1-2b. DY97 PROJECT RANKING

PROJECT	DISPOSAL JURISDICTION	LOCATION	WATERBODY	INITIAL RANK	FULL CHARACTERIZATION RANK
City of Bellevue, Meydenbauer Bay	PSDDA	Bellevue	Lake Washington	H	H
Curtis Wharf	PSDDA	Anacortes	Guemes Channel	M	M
Oak Harbor Marina	PSDDA	Oak Harbor	Oak Harbor Bay	M	M
DOT, Willapa Bar/North Channel	WB	Tokeland	North Channel	L	L
Port of Everett, Piers 1 and 3	NCD ⁹	Everett	East Waterway	H	H
Port of Everett, NCD Berth Approach	PSDDA	Everett	East Waterway	H	M
Port of Everett, Stage I Marine Terminal	PSDDA	Everett	East Waterway	H	LM, M
Port of Grays Harbor, Terminal 2 ¹⁰	GH	Aberdeen	Chehalis River	H	LM
Port of Seattle, Terminal 5	PSDDA	Seattle	West Waterway	LM	LM
Port of Seattle, Terminal 18	PSDDA	Harbor Island, Seattle	East Waterway	H	H, M
Port of Tacoma, Blair Turning Basin	PSDDA	Tacoma	Blair Waterway	M	L
Rayonier Inc. Dock ¹¹	GH	Hoquiam	Chehalis River	LM	LM
Sandy Hook Yacht Club	Upland	Sachet Head, Whidbey Island	Cultus Bay	LM	LM
Weyerhaeuser, Mt Coffin Access Channel, Longview, WA	CR	Longview	Mt. Coffin Access Channel	not ranked	not ranked
Whatcom International Shipping Terminal	PSDDA	Bellingham	Whatcom Waterway	H	H
USACE Everett (downstream)	PSDDA	Everett	Snohomish River	LM	LM
USACE Duwamish	PSDDA	Seattle	Duwamish River	LM, H	LM, H
USACE Kenmore, Lake Washington	PSDDA	Kenmore	Lake Washington	H	H
USACE Willapa Harbor (Agitation Test Dredge)	WB	Tokeland	Middle Channel	L	L

⁹ NCD = nearshore confined disposal assessment (modified elutriate, sequential batch leach and column leach).

¹⁰ No testing based on frequency guidelines. Last tested in 1995.

¹¹ No testing based on frequency guidelines. Last tested in 1993.

Table 1-3a. DY96 PROJECTS - APPROVED SAMPLING PLANS

PROJECT	Rank	Total Volume (cy)	Surface Volume (cy)	Number of Surface Samples	Number of Surface DMMUs	Subsurface Volume (cy)	Number of Subsurface Samples	Number of Subsurface DMMUs
Capitol Lake	LM	180,000	180,000	24	6	0	0	0
Crowley Marine Services 8 th Avenue Terminal, Slip 4	H	13,000	13,000	8	4	0	0	0
High Cascade International	not ranked	20,000	20,000	2	2	-	-	-
Lonestar Northwest / James Hardie Gypsum	H	18,000	12,500	4	4	5,500	1	1
USACE Duwamish	H	28,000	28,000	7	7	0	0	0
USACE Grays Harbor	L	2,120,000	2,120,000	69	9	0	0	0

Table 1-3b. DY97 PROJECTS - APPROVED SAMPLING PLANS

PROJECT	Rank	Total Volume (cy)	Surface Volume (cy)	Number of Surface Samples	Number of Surface DMMUs	Subsurface Volume (cy)	Number of Subsurface Samples	Number of Subsurface DMMUs
City of Bellevue, Meydenbauer Bay	H	150	150	2	1	0	0	0
Curtis Wharf	M	32,700	17,000	4	1	15,700	4	1
Department of Transportation, Willapa Bar/North Channel	L	5,000,000	5,000,000	8	8	0	0	0
Oak Harbor Marina	M	27,000	27,000	7	2	0	0	0
Port of Everett, Piers 1 and 3 ¹²	H	131,000	114,000	3	not applicable	17,000	0	not applicable
Port of Everett, NCD Berth Approach	H	42,000 ¹³	42,000	9	4	0	0	0
Port of Seattle, Terminal 5	LM	36,000	36,000	8	2	0	0	0
Port of Seattle, Terminal 18	H, M	546,430	304,670	80	76	241,760	54	20
Port of Tacoma, Blair Turning Basin	L	126,203 ¹⁴	48,000	6	1	78,203	12	2
Sandy Hook Yacht Club	LM	42,000	42,000	10	10	0	0	0
Weyerhaeuser, Mt Coffin Access Channel, Longview, WA	not ranked	200,000	200,000	7	7	0	0	0
Whatcom International Shipping Term.	H	8,700	8,700	6	3	0	0	0
USACE Everett (downstream)	LM	300,437	188,717	24	6	111,720	17	3
USACE Duwamish	LM, H	112,000	112,000	6	4	0	0	0
USACE Kenmore, Lake Washington	H	60,000	60,000	15	15	0	0	0
USACE Willapa Harbor (Agitation Test Dredge)	L	250,000	250,000	5	5	0	0	0

¹² Worst-case testing done for NCD determination.

¹³ An additional 44,000 cubic yards, the majority of which was native sediment, was not tested.

¹⁴ An additional 628,787 cubic yards of native sediment was not tested.

TABLE 1-4a. DY96 PROJECT SAMPLING

PROJECT	GRAIN SIZE PERCENTAGES				SAMPLING EQUIPMENT	MAXIMUM SEDIMENT DEPTH (FT)	MEAN SEDIMENT DEPTH (FT)
	GRAVEL > 2 mm	SAND .063 - 2mm	SILT .004 - .063mm	CLAY < .004 mm			
Capitol Lake	<1-6	37-87	7-53	<1-10	hand held corer (Wildco 2424-A50)	3.0	3.0
Crowley Marine Services 8 th Avenue Terminal, Slip 4	<1-7	44-85	11-40	13-51	hammer impact corer	4.5	3.7
High Cascade International	34-71	28-63	<1-3	<1-3	Van Veen grab	0.5	0.5
Lonestar Northwest / James Hardie Gypsum	<1-2	9-64	40-77	5-17	hydraulic impact corer	12	5.1
USACE Duwamish	0-2	22-39	50-69	8-11	Vibracorer	4	4
USACE Grays Harbor	0-1	21-64	25-62	10-18	Van Veen grab	0.5	0.5

TABLE 1-4b. DY97 PROJECT SAMPLING

PROJECT	GRAIN SIZE PERCENTAGES				SAMPLING EQUIPMENT	MAXIMUM SEDIMENT DEPTH (FT)	MEAN SEDIMENT DEPTH (FT)
	GRAVEL > 2 mm	SAND .063 - 2mm	SILT .004 - .063mm	CLAY < .004 mm			
Curtis Wharf	13-43	38-52	4-26	2-24	Vibracorer	14.5	9.4
Oak Harbor Marina	1-6	7-16	56-58	24-34	Gravity corer	8	6.1
DOT, Willapa Bar/ North Channel	0-1	99-100	0-<1	0	Van Veen grab	0.5	0.5
Port of Everett, NCD Berth Approach	39-51		49-61 ¹⁵		Pneumatic impact corer	9.8	8.1
Port of Seattle, Terminal 5	1-89	6-73	1-17	6-7	Vibracorer	8.4	5.2
Port of Seattle, Terminal 18	0-15	3-8	3-77	5-54	Pneumatic impact corer	15.3	4.4
Port of Tacoma, Blair Turning Basin	1-17	55-73	9-35	3-9	18", 24" split spoon sampler, hollow stem auger	14	4
Sandy Hook Yacht Club	0	96	2	2	Van Veen grab	0.5	0.5
Weyerhaeuser, Mt Coffin Access Channel	0	99	<1	<1	Van Veen grab	0.5	0.5
Whatcom International Shipping Terminal	4-7	20-32	35-48	13-36	Vibracorer	11	3.8
USACE Everett (downstream)	1-2	60-84	5-45	3-7	Vibracorer	16	5.9
USACE Duwamish	0-2	40-90	7-55	1-5	Vibracorer	13	4
USACE Kenmore, Lake Washington	0-21	29-78	16-65	1-17	Vibracorer	6.8	5.2
USACE Willapa Harbor (Agitation Test Dredge)	0-1	97-100	0-<1	0	Van Veen grab	0.5	0.5

¹⁵ Only percent fines reported.

Table 1-5a. DY96 BIOLOGICAL TESTING DATA

PROJECT	Number of biological analyses	Number of analyses failing bioassays	Number undergoing concurrent testing	Number undergoing tiered testing	Bioassays Conducted			Control Sediment Location	Reference Sediment Location
					Amphipod	Sediment Larval	20-day Growth		
Crowley Marine Services 8 th Ave. Terminal, Slip 4	4	3	0	4 ¹⁶	<i>Ra</i>	<i>De</i>	<i>Na</i>	West Beach	Carr Inlet
Lonestar Northwest / James Hardie Gypsum	4	3	4	0	<i>Aa</i>	<i>De</i>	<i>Na</i>	Narrow River, RI West Beach	Carr Inlet
USACE Duwamish	7	2	0	7	<i>Aa</i>	<i>Mg</i>	<i>Na</i>	Narrow River, RI West Beach	Carr Inlet
USACE Grays Harbor	2	0	2	0	<i>Aa</i>	<i>De</i>	<i>Na</i>	Narrow River, RI West Beach	North Bay

¹⁶ One DMMU passing routine bioassay testing subjected to 28-day bioaccumulation testing (see Appendix A for summary of this testing).

Table 1-5b. DY97 BIOLOGICAL TESTING DATA

PROJECT	Number of biological analyses	Number of DMMU failing bioassays	Number undergoing concurrent testing	Number undergoing tiered testing	Bioassays Conducted			Control Sediment Location	Reference Sediment Location
					Amphipod	Sediment Larval	20-day Growth		
Port of Everett, NCD Berth Approach	4	1	0	4	<i>Aa</i>	<i>Mt</i>	<i>Na</i>	West Beach Narrow River, RI	Carr Inlet
Port of Seattle, Terminal 5	3	0	0	3	<i>Ra</i>	<i>Mg</i>	<i>Na</i>	West Beach	Sequim Bay
Port of Seattle, Terminal 18	96	48	96	9 ¹⁷	<i>Ee</i>	<i>Mg</i>	<i>Na</i>	Beaver Creek, OR	West Beach, Cape George, Sequim Bay
Port of Tacoma, Blair Turning Basin	1	0	0	1	<i>Ra</i>	<i>Sp</i>	<i>Na</i>	West Beach	Carr Inlet
USACE Duwamish	3	1	3	-	<i>Aa</i>	<i>De</i>	<i>Na</i>	Narraganset, RI West Beach	Carr Inlet
USACE Kenmore, Lake Washington	3	2	0	3	<i>Ee</i>	<i>De</i>	<i>Na</i>	West Beach	Carr Inlet

Aa = *Ampelisca abdita*
De = *Dendraster excentricus*
Ee = *Eohaustorius estuarius*
Mt = *Mytilus trossulus*
Mg = *Mytilus galloprovincialis*
Na = *Neanthes arenaceodenta*
Ra = *Rhepoxynius abronius*
Sp = *Strongylocentrotus purpuratus*

¹⁷ Nine DMMU passing routine bioassay testing were subjected to 44-day bioaccumulation testing (See appendix A).

Table 1-6a. DY96 SUITABILITY DETERMINATIONS

PROJECT	RANK	Total Volume (cy)	No. of chemical analyses	No. of biological analyses	DMMUs Failing	Volume Failing (cy)	DMMUs Passing	Volume Passing (cy)	Proposed DMMP Disposal Site
Crowley Marine Services 8 th Avenue Terminal, Slip 4	H	13,000	4	4	3	9,750	1	3,250	Elliott Bay
High Cascade International	L	20,000	2 ¹⁸	0	0	0	2	20,000	Upland
City of Kirkland Marina Park Boat Launch	M	800	0	0	0	0	0	800	Elliott Bay
Lonestar Northwest / James Hardie Gypsum	H	18,000	5	4	3	9,375	2	8,625	Elliott Bay
Weyerhaeuser Bay City Dock ¹⁹	LM	14,000	0	0	0	0	0	14,000	Pt. Chehalis South Jetty 3.9 mile Ocean
USACE Duwamish ²⁰	H	98,000	7	7	2	8,000	5	90,000	Elliott Bay
USACE Grays Harbor	L	2,120,000	9	2	0	0	9	2,120,000	Pt. Chehalis South Jetty 3.9 mile Ocean

¹⁸ Grain-size analysis only.

¹⁹ Frequency determination

²⁰ Approximately 70,000 cubic yards were found suitable under frequency guidelines.

Table 1-6b. DY97 SUITABILITY DETERMINATIONS

PROJECT	RANK	Total Volume (cy)	No. of chemical analyses	No. of biological analyses	DMMUs Failing	Volume Failing (cy)	DMMUs Passing	Volume Passing (cy)	Proposed DMMP Disposal Site
City of Bellevue, Meydenbauer Bay	H	150	1	0	1	150	0	0	Upland
Curtis Wharf	M	32,700	2	0	0	0	2	32,700	Rosario Strait
Oak Harbor Marina	M	27,000	2	0	0	0	2	27,000	Rosario Strait / Port Gardner
DOT, Willapa Bar/North Channel	L	5,000,000	8 ¹⁸	0	0	0	8	5,000,000	Middle Channel, North Channel, Adjacent Beach
Port of Everett, Piers 1 and 3	H	131,000	1 ²¹	not applicable	not applicable	not applicable	not applicable	not applicable	NCD
Port of Everett, NCD Berth	M	86,400	4	4	1	10,200 ²²	3	76,200 ²³	Port Gardner, NCD
Port of Everett, Stage I Marine Terminal	LM, M	239,000	0	0	not applicable	20,000	not applicable	219,000	Port Gardner, beneficial use
Port of Grays Harbor, Terminal 2	LM	15,000	0	0	0	0	0	15,000	Pt. Chehalis, South Jetty
Port of Seattle, Terminal 5	LM	36,000	3	3	0	0	3	36,000	Elliott Bay
Port of Seattle, Terminal 18	H, M	546,430	96	96	50	268,810	46	277,620	Elliott Bay
Port of Tacoma, Blair Turning Basin	L	755,000	3	1	0	0	3	755,000	Commencement Bay
Rayonier Inc. Dock	LM	20,000 ²⁴	0	0	0	0	0	20,000	Pt. Chehalis South Jetty
Sandy Hook Yacht Club	LM	42,000	10 ¹⁸	0	0	0	10	42,000	Upland

²¹ Modified elutriate, sequential batch leach and column leach tests.

²² Includes 4,200 cubic yards found unsuitable based on existing data.

²³ Includes 40,200 cubic yards, most of which was native sediment, found suitable for open-water disposal based on existing data.

²⁴ Frequency determination.

Table 1-6b. DY97 SUITABILITY DETERMINATIONS (Continued)

PROJECT	RANK	Total Volume (cy)	No. Of chemical analyses	No. of biological analyses	DMMUs Failing	Volume Failing (cy)	DMMUs Passing	Volume Passing (cy)	Proposed DMMP Disposal Site
Weyerhaeuser, Mt Coffin Access Channel, Longview	not ranked	200,000	7 ¹⁸	0	0	0	7	200,000	River Mile 62 Columbia River
Whatcom International Shipping Terminal	H	8,700	3	not conducted	3	8,700	0	0	not yet determined
USACE Everett (downstream)	LM	300,437	9	0	0	0	9	300,437	Port Gardner, Jetty Island
USACE Duwamish ²⁵	LM, H	112,000	4	3	1	4,000	3	108,000	Elliott Bay
USACE Kenmore, Lake Washington	H	60,000	15	3	2	8,000	13	52,000	Elliott Bay
USACE Willapa Harbor (Agitation Test Dredge)	L	250,000	5 ¹⁸	0	0	0	5	250,000	Middle Channel

²⁵ Approximately 100,000 cubic yards from the LM-ranked turning basin received “safety-net” testing (3 samples composited for 1 chemical analysis).

C. SUMMARY AND ASSESSMENT OF DY96/97 DATA

Chemical Testing Table 1-7 summarizes the chemical testing results from DY96 and DY97. A total of 51 of the 61 DMMP screening levels were exceeded for at least one project. These included both detected exceedances (41 SLs) and detection limit exceedances (26 SLs). Eleven COCs had detected concentrations above the BT, while 18 COCs were detected above the ML.

Table 1-8 highlights those chemicals which had detected concentrations exceeding SL, BT and ML most frequently. Also included are those chemicals for which the detection limit exceeded SL the most frequently. From Table 1-8 it can be seen that the chemicals most often detected above SL, BT and ML included a single metal (lead), six individual PAHs, total LPAH, total HPAH, total DDT and total PCBs. Detection limit exceedances of SL were inconsequential as none of them would have triggered, on their own, the need to conduct biological testing.

TABLE 1-7. DY96/97 CHEMICAL TESTING SUMMARY FOR DMMP PROJECTS

CHEMICAL OF CONCERN	# of	# of	# of									
	Projects	DMMU										
	D>SL	D>SL	D>BT	D>BT	D>ML	D>ML	U>SL	U>SL	U>BT	U>BT	U>ML	U>ML
METALS AND ORGANOMETALLICS												
Antimony	1	1										
Cadmium (1)	3	49										
Copper (1)	3	41										
Lead (1)	5	56										
Mercury	3	76	1	4	1	1						
Silver	1	32	1	4	1	3	1	2				
Zinc (1)	4	44										
Tributyltin (2)	3	5	1	3								
LPAH												
2-Methylnaphthalene (1)	3	29			1	12	1	6				
Acenaphthene (1)	4	39			1	4	1	5				
Acenaphthylene (1)	1	1					1	19				
Anthracene (1)	5	52			1	2						
Fluorene (1)	5	55			2	5	1	1				
Naphthalene (1)	1	13										
Phenanthrene (1)	5	43			1	2						
Total LPAH (1)	5	49			2	6						
HPAH												
Benzo(a)anthracene (1)	3	29										
Benzo(a)pyrene	3	10										
Benzo(a)fluoranthene (1)	3	30										
Chrysene (1)	3	28										
Dibenzo(a,h)anthracene (1)	3	3					1	8				
Fluoranthene	4	48	3	3	3	3						
Indeno(1,2,3-c,d)pyrene (1)	9	89										
Pyrene (1)	7	84			1	1						
Total HPAH (1)	9	85										

total projects with chemical testing = 15, total DMMUs = 159

D = Detected U = Undetected SL = Screening Level BT = Bioaccumulation Trigger

(1) No BT exists (2) No ML exists (3) No BT or ML exists

TABLE 1.7 (CONTINUED) - DY96/97 CHEMICAL TESTING SUMMARY FOR DMMP PROJECTS

CHEMICAL OF CONCERN	# of	# of										
	Projects	DMMU										
	D>SL	D>SL	D>BT	D>BT	D>ML	D>ML	U>SL	U>SL	U>BT	U>BT	U>ML	U>ML
CHLORINATED HYDROCARBONS												
1,2-Dichlorobenzene	1	1	1	1								
1,2,4-Trichlorobenzene (1)	1	3					3	26				
1,4-Dichlorobenzene					1	1						
Hexachlorobenzene							1	33				
Hexachlorobutadiene	1	1					1	34				
PHTHALATES												
Bis(2-ethylhexyl) Phthalate (2)	1	9										
Diethyl Phthalate (3)							1	8				
Dimethyl Phthalate (2)							1	2				
Ethylbenzene	1	4	1	3	1	2						
Xylenes	1	11			1	2						
PHENOLS												
2 Methylphenol (1)							1	31			1	4
2,4-Dimethyl phenol (1)							1	17			1	7
4 Methylphenol (1)	1	4					1	8				
Pentachlorophenol							1	28				
Phenol	2	20					1	2				
MISCELLANEOUS EXTRACTABLES												
Benzoic Acid (1)	1	3			1	3	1	7			1	2
Benzyl Alcohol (1)	2	2			1	1	2	27			1	8
Dibenzofuran (1)	4	29			1	1	1	12				
N-Nitrosodiphenylamine							1	26				
PESTICIDES AND PCBs												
Aldrin (2)	1	23	1	3			2	6				
Alpha chlordane(2)	1	16	1	1			1	15	1	7		
Dieldrin (2)	1	40	1	13								
Heptachlor (2)							1	8				
Gamma-HCH (Lindane) (2)							1	8				
Total DDT	6	61	1	18	1	16	1	13				
Total PCBs	5	72	2	3	1	11	1	4				

total projects = 15, total DMMUs = 159

D = Detected U = Undetected SL = Screening Level BT = Bioaccumulation Trigger ML = Maximum Level
 (1) No BT exists (2) No ML exists (3) No BT or ML exists

TABLE 1-8. MULTIPLE EXCEEDANCES OF DMMP GUIDELINE VALUES

CHEMICAL	CHEMICALS EXCEEDING SL IN AT LEAST ONE-THIRD OF THE PROJECTS	CHEMICALS EXCEEDING BT IN AT LEAST TWO PROJECTS	CHEMICALS EXCEEDING ML IN AT LEAST TWO PROJECTS	CHEMICALS WITH DETECTION LIMITS EXCEEDING SL IN AT LEAST TWO PROJECTS
Lead	X			
Anthracene	X			
Fluorene	X		X	
Phenanthrene	X			
Total LPAH	X		X	
Fluoranthene		X	X	
Indeno(1,2,3-c,d)pyrene	X			
Pyrene	X			
Total HPAH	X			
1,2,4-Trichlorobenzene				X
Benzyl Alcohol				X
Aldrin				X
Total DDT	X			
Total PCBs	X	X		

Biological Testing Biological testing was conducted for 127 DMMUs at nine of the fifteen projects which underwent chemical testing during DY96/97. Table 1-9 shows the number of times each of the three bioassays was conducted and the number of hits for each.

TABLE 1-9 - DY96/97 BIOASSAY "HITS"¹

BIOASSAY	Number of DMMUs Tested	Number of Hits Under the "Two-Hit Rule"	Number of Hits Under the "Single-Hit Rule"
Amphipod	127	33	35
Sediment Larval	127	24	33
<i>Neanthes</i> Biomass	127	6	27

¹Nondispersive interpretation

As can be seen from this tabulation, the amphipod test exhibited the most hits, with 68 hits out of 127 bioassays. The majority of these hits (60 of 68) occurred for a single project, Port of Seattle Terminal 18. The larval bioassay resulted in 57 hits in five projects. The *Neanthes* biomass test resulted in 33 hits, with all but two hits occurring for Terminal 18.

Regulatory Processing

For the majority of dredging projects, DMMP sediment sampling and testing are among the regulatory requirements under Section 404 of the Clean Water Act or Section 103 of the Marine Protection, Research and Sanctuaries Act. For those dredging projects requiring sampling and testing, the regulatory process consists of a sequence of steps which must be taken before obtaining a permit. The majority of permit actions involve 404 jurisdiction, but the steps are similar for 103 actions. These are as follows:

- (1) Submit application for permit.
- (2) Prepare sampling and analysis plan (SAP) for characterization of proposed dredged material.
- (3) Receive approval of SAP from DMMP agencies.
- (4) Perform sampling and chemical/biological analysis.
- (5) Submit testing results.
- (6) Receive suitability determination for open-water disposal from DMMP agencies.
- (7) Complete application details required to issue public notice.
- (8) Corps prepares and issues public notice.
- (9) Corps transmits review comments to applicant after 30-day public comment period.
- (10) Applicant provides Corps with responses to public comments.
- (11) Corps completes public interest review, 404(b)1 evaluation, NEPA documentation and issues permit.

The average time requirements for steps 3 through 11 are included in Figures 1-5a and 1-5b, which were constructed using data from processing activities occurring in DY96/97 (this included public interest reviews and permitting actions for several dredging projects which received suitability determinations during DY94/95). Steps 1 and 2, while part of the regulatory process, are completely within control of the permit applicant and were not included in the analysis of processing time.

Permit Application An application for a Corps of Engineers Section 10/404 permit for dredging and dredged material disposal must be submitted before any DMMP processing may take place. An application number and Regulatory Branch Project

Manager are assigned at this time and the Dredged Material Management Office begins review of information relevant to the proposed dredging.

Sampling and Analysis Plan Development A sediment sampling and analysis plan must be developed and submitted to the DMMP agencies for review prior to commencement of field sampling. The time required for SAP development is highly variable and almost completely within control of the dredging applicant. In many cases a permit application is submitted at the same time as a draft SAP, while in other cases a permit application is submitted long before development of a SAP begins. Therefore, the time required for SAP development is difficult to quantify and was not included in Figures 1-5a and 1-5b.

Sampling and Analysis Plan Approval Once a sediment SAP has been submitted, the DMMO coordinates review with the other DMMP agencies: EPA, DNR and Ecology. An approval letter is sent which includes DMMP agency comments and recommended modifications of the SAP. Once these comments and modifications have been acknowledged by the applicant, via telephone, letter or e-mail, sampling and analysis may proceed. It is the goal of the DMMO to complete the review of SAPs within three weeks. During DY 96/97 the average time from the submittal of the final SAP for a project to SAP approval was 19 days.

Sampling and Analysis During this phase, field sampling and chemical/ biological analysis are completed following the protocols established in the approved SAP. Data are compiled and submitted in a hard copy report. These data are entered into the Dredged Analysis Information System by a Corps contractor. Sampling, testing and reporting consume a substantial portion of the DMMP Process time budget, averaging 199 days during DY96/97. There was a high degree of variability in this phase, with projects ranging from 44 to 357 days. Factors influencing the time required for this phase include weather, sampling difficulties, laboratory capacity and turn-around, QA problems arising during chemical and biological testing, and report compilation time.

Data Review. Once a full set of chemical/biological testing data is submitted along with the sampling report, the DMMO conducts a data review with the other DMMP agencies. The result of this review is the signing, by DMMP agency representatives, of a Memorandum for Record documenting the determination reached on the suitability/ unsuitability of each of the dredged material management units defined in the approved SAP. The goal of the DMMO is to complete this review within three weeks of data submittal. In DY96/97, the average time required was 17 days.

Complete Permit Application Once the suitability determination has been signed, the DMMO informs the Corps Regulatory Branch project manager and preparations are made to issue a public notice. However, if project details have not been fully developed by this time, or if project plans are modified subsequent to the suitability determination, new drawings or other information may be required of the applicant prior to the preparation of the public notice. In other cases, a shorelines development permit may not

have yet been obtained by the applicant and a decision may be made to wait to go out to public notice until the local shoreline jurisdiction has issued a permit. During DY96/DY97 the average time required for the applicant to complete their permit application was 48 days. Again, there was a high degree of variability in this phase, with projects ranging from 0 to 239 days.

Prepare and Issue Public Notice. By regulation, the Regulatory Branch must issue a public notice within fifteen days of the completion of the permit application. The average time required for DY96/DY97 projects was 12 days.

Public Comment Period and Transmittal of Review Comments. A DMMP project typically undergoes a 30-day public comment period. Comments received during this period are collated by the Corps and transmitted to the applicant for response. For DY96/97 projects, the average time required for the public comment period and transmittal of review comments was 42 days.

Applicant Responds to Review Comments. The permit applicant is responsible for providing written responses to review comments and supporting data to the Corps before the Regulatory Branch project manager can complete a public interest review. The average time required for this step in DY96/97 was 14 days.

Corps Completes Public Interest Review and Makes Permit Decision. The public interest review, including a Section 404(b)(1) alternatives analysis and NEPA evaluation, is completed and documented after the permit applicant provides responses to review comments. The Corps project manager prepares a permit decision upon completion of the public interest review.

This stage of the process may be very time consuming. Dredging and DMMP processing are often only part of complex projects. Other elements may be involved, such as wetland fills or eelgrass bed impacts. Resolution of controversial issues such as these may consume substantial amounts of time. The time required to complete this phase was highly variable in DY96/97, ranging from 7 to 139 days, with a mean time of 72 days. To improve regulatory response time, the Department of Ecology recommends that applicants seek a hydraulic project approval (HPA) from the Department of Fish and Wildlife, and resolve other problems as early as possible in the permit process.

Dredged Material Evaluation. The DMMP dredged material evaluation process, as depicted in Figure 1-5b, includes final sampling and analysis plan review and approval, field sampling and analysis, data review and completion of the suitability determination. The average time required for the DMMP dredged material evaluation process was 250 days (range = 68 to 396) in DY96/97, with the majority of that time taken up by sampling, testing, and data report preparation by the applicant. Note that Figure 1-5b shows the average time required for each of the three phases of the dredged material evaluation process, the sum of which does not equal the mean time for the entire process.

Time Elapsing for Each Regulatory Stage:

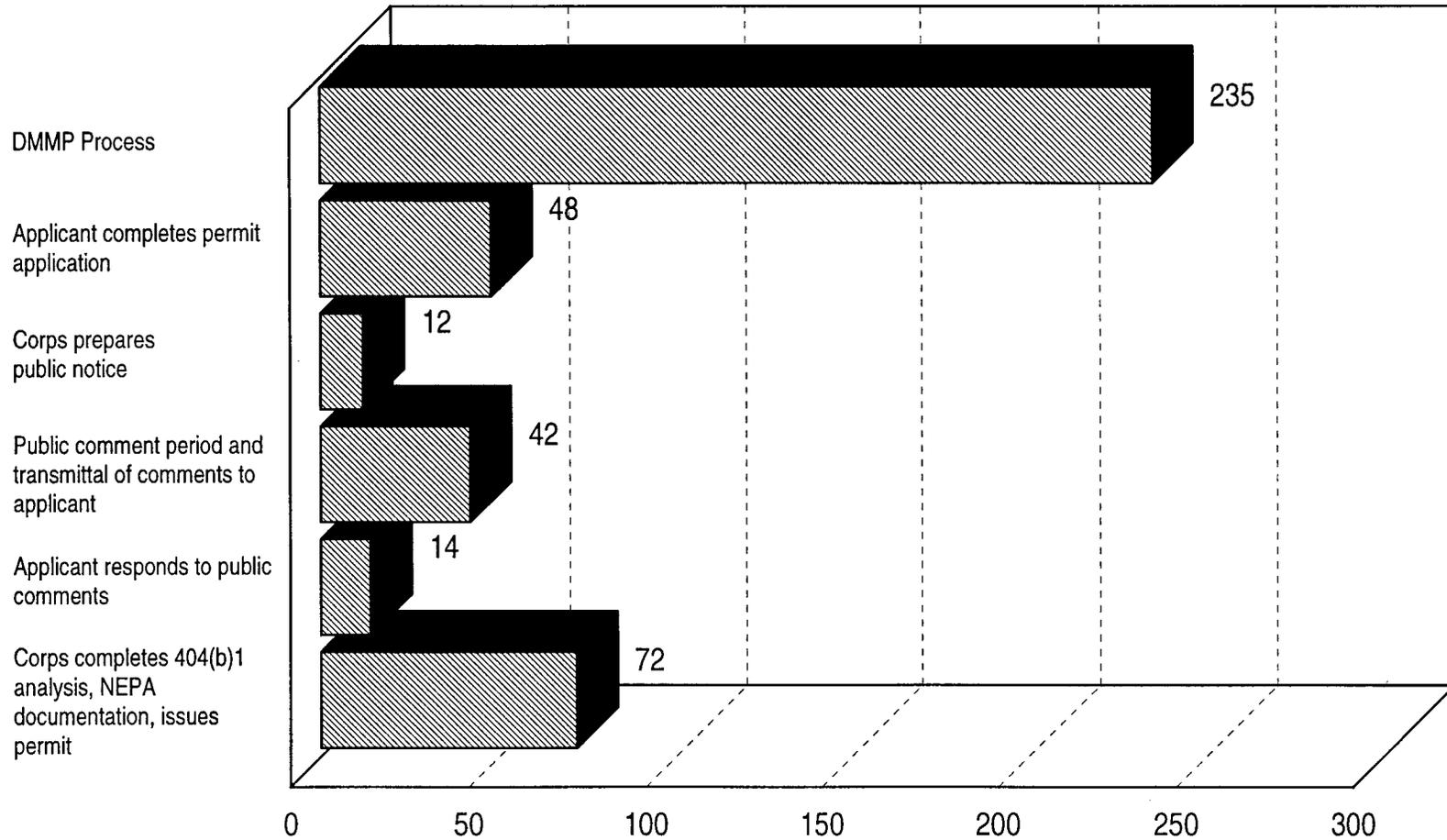
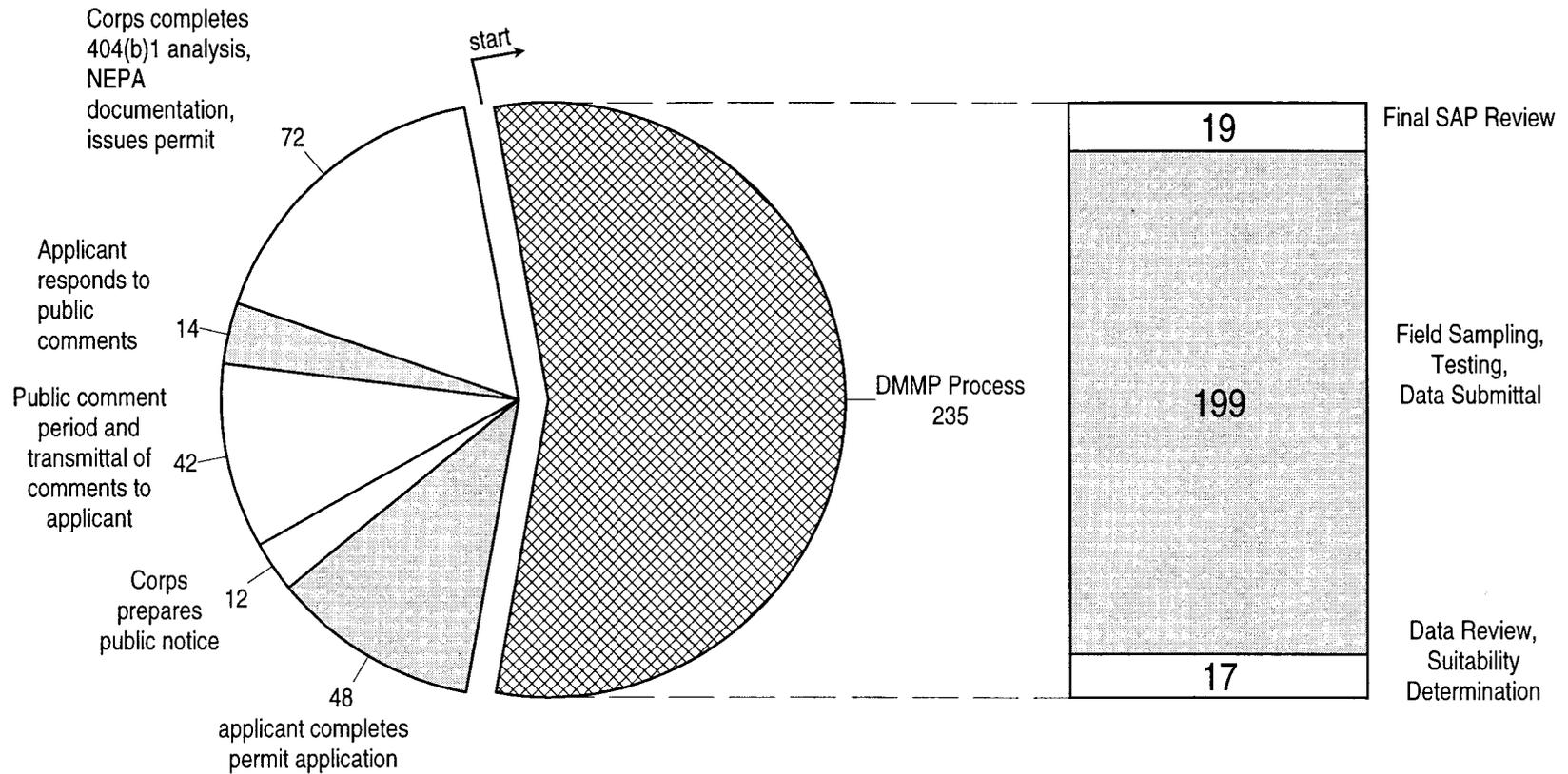


FIGURE 1-5a. Regulatory Processing Time

Means for DY96/DY97 Projects (days)

FIGURE 1-5b. DMMP PROCESSING TIME

Means for DY96/DY97 Projects (days)



Note: solid gray areas are under control of dredging applicant