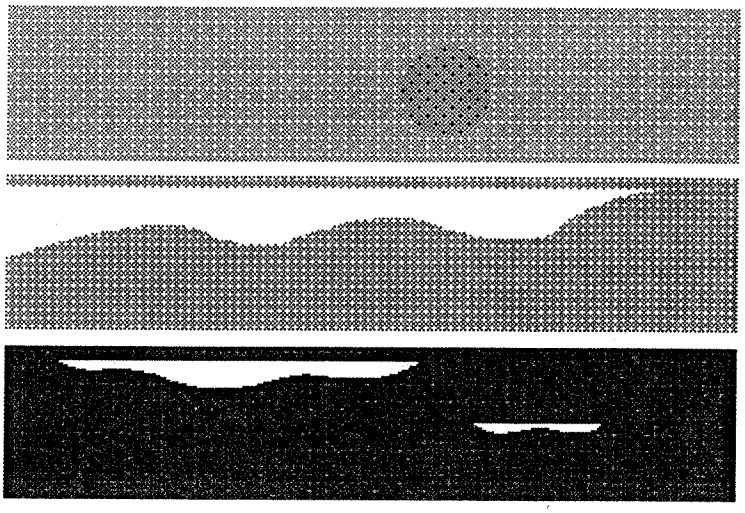


WASHINGTON STATE
DEPARTMENT OF
ECOLOGY

Sediment Management Standards
Contaminated Sediment Site List

Sediment Management
Washington State Department of Ecology
May 1996

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
P.O. Box 47600 • Olympia, Washington 98504-7600 • (206) 407-6000 • TDD Only (Hearing Impaired) (206) 407-6006

DATE: May 31, 1996

TO: Interested Persons

FROM: Greg Sorlie, Central Programs

SUBJECT: Puget Sound Ranked List of Contaminated Sediment Sites

---

Enclosed is a packet of information describing the Department of Ecology's (Ecology) Puget Sound Ranked List of Contaminated Sediment Sites. The packet contains pieces of information to assist in the use and understanding of the site list. The list is designed to satisfy the requirements of the Puget Sound Water Quality Authority Management Plan and Ecology's Sediment Management Standards.

Ecology began developing the contaminated site list in 1991. Preparation of the list has involved: collection, data entry, and validation of sediment data from Puget Sound; data retrievals and interpretation; preparation of Geographic Information System maps; and several opportunities for public review and comment on available data. This list of sites and associated maps represents our current understanding of the nature and location of contaminated sediment sites. The packet includes complete information about the sites currently identified.

Ecology intends to use this list to aid decision-making on cleanup efforts from either a local or Puget Sound wide perspective. The Department does not intend to use the list to redirect any ongoing sediment cleanup activities. Ongoing activities are summarized in the attached site description packet.

For further information, please feel free to contact Michelle Wilcox at (360/407-7557) (fax: 360/407-6902) or by email at *mcla461@ecy.wa.gov*. Thank you for your interest.

Contents

WASHINGTON STATE DEPARTMENT OF ECOLOGY

News Release

FOR IMMEDIATE RELEASE
June 7, 1996
96-90

CONTACT: Michelle Wilcox
(360) 407-7557

Ron Langley
Ecology Public Information
(360) 407-6162

ECOLOGY RELEASES CONTAMINATED SEDIMENT SITE LIST

OLYMPIA -- The Washington State Department of Ecology has released a list of 49 sites in Puget Sound that have underwater sediment contamination. The list will help state and federal agencies target future site cleanups and provide useful information to anyone doing construction work in or near the Sound.

"This represents our current knowledge about contaminated sediments in Puget Sound," said Ecology Director Mary Riveland. "Cleanup work by the state or federal government is already underway at 30 of these sites, and more will be done when resources become available."

Ecology developed the list in connection with the state's environmental plan for the Sound, which was developed by the Puget Sound Water Quality Authority.

"What the Department of Ecology has accomplished is a big step forward in our efforts to clean up and control toxic contaminants in Puget Sound," said Nancy McKay, executive director of the Puget Sound Water Quality Authority. "This list will help us set priorities for addressing serious sediment contamination in the Sound."

Toxic contaminants are found in marine sediments in all of Puget Sound's urban areas. High levels of contaminants pose a threat to marine life that finds shelter and food in the sediments, as well as to humans and other creatures that eat such marine life. Much of the contamination can be linked to discharge of pollutants and past industrial practices in the Sound.

Ongoing contamination has been significantly reduced in recent years thanks to increased environmental awareness, enforcement of water quality laws, and site cleanups conducted under the federal Superfund and state Model Toxics Control Act programs.

Sites on the list represent groups of contaminated sediment samples with chemical similarity found in close proximity to each other. Sites were given an ecological score based on available information from a variety of sources such as current sediment sampling data and ecological studies. The list does not establish potentially liable parties for cleanup.

Ecology's Michelle Wilcox, who coordinates the site list, said the quality and quantity of data varies from site to site. "We weren't expecting new data," she said. "Instead, our goal was to gather and catalog the available information and help focus attention on sites that need eventual cleanup or more research."

Wilcox said the list also provides more certainty for financing and insuring construction work and property sales at waterfront locations because contaminated sites are better defined than they were in the past. She said the list will be updated annually.

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Focus

Puget Sound Contaminated Sediment Site List

Why Do We Care About Marine Sediments?

Toxic contaminants are found in marine sediments in many parts of Puget Sound. When present at high levels, these contaminants pose a threat to the aquatic organisms that live in and feed from the sediments as well as the humans who eat these aquatic organisms. Much of the contamination can be linked to pollutant discharges and past industrial practices. Areas of contaminated sediments and associated adverse effects have been identified in Washington since the early 1980s. The Washington State Department of Ecology (Ecology) has recently developed contaminated sediment site lists to better understand the order in which contaminated areas should be cleaned up.

Why Is Ecology Preparing the Puget Sound Contaminated Site List?

The Puget Sound Water Quality Management Plan directs Ecology to establish a contaminated sediment site list. The Sediment Management Standards (SMS) (Chapter 173-204 WAC) contain a similar requirement and define procedures for developing and updating the site list. The SMS also establishes cleanup standards and requirements for evaluating and selecting actions to address contaminated sediments.

Ecology has designed the list to serve several general purposes: resource allocation, cross-program coordination at the agency, and measurement of progress. The list will assist cleanup prioritization efforts by identifying sites not being addressed under a federal or state cleanup authority (e.g. Superfund, Model Toxics Control Act) that may warrant state-directed cleanup efforts and resource allocation. Generating two types of lists, one for the whole of Puget Sound and one for each urban bay, provides a state or regional perspective to highlight areas in need of cross-program coordination. Because the list is dynamic and will be updated, progress on cleanup can be measured by the revisions.

How Many Sites Did Ecology Identify and Include on the Site List?

Forty-nine sites have been identified and included on the site list. Those sites which have already been ranked and prioritized by the Environmental Protection Agency (EPA) Superfund Program have not been ranked in Ecology's process.

What Procedures Did Ecology Use to Prepare the List?

The Sediment Management Standards define procedures for identifying and ranking contaminated sediment sites. The following is a brief summary of the steps taken by Ecology to develop the current list:

- **Data Compilation:** Ecology gathered available sediment quality data to compile an inventory of sediment sampling stations. Stations are categorized depending on whether or not contamination levels exceed applicable sediment quality standards.

Ecology is an Equal Opportunity and Affirmative Action Employer.

Publication # 96-1155-CP

printed on recycled paper

- **Station Cluster Identification:** Station clusters are defined as a number of stations having spatial and chemical similarity. A station cluster is of potential concern when the average of the three highest concentrations for any chemical, biological effects, or other reserved criteria, exceeds the SMS cleanup screening level.

- **Public Notice/Hazard Assessment:** The public is then notified of Ecology's preliminary findings. At this stage, Ecology asks for additional information to support site ranking. Types of information requested are: sediment sampling data; physical parameters; administrative information; and resource uses, such as ecological studies, human exposure pathways, and fishing rights.

- **Site Identification:** Once additional information is reviewed, sites are identified. Pending no changes to the original clusters of potential concern, these clusters then are designated as sites. As party to the Sediment Cleanup Workgroup recommendations of December 1994, to expedite cleanup efforts, Ecology's site list contains sites composed solely of stations exceeding the cleanup screening level.

- **Site Ranking:** Ecology's ranking model incorporates sediment chemistry values and information collected during hazard assessment. The rank scores listed are based on ecological effects. The greater the degree of ecological hazard, the higher the score. The scores allow comparison among sites on a Puget Sound or bay wide basis.

Where Do We Go From Here?

During the next several years, Ecology intends to work with other agencies and responsible parties to move forward on sediment cleanup. Actions include:

- **Ongoing Cleanup Actions:** Cleanup actions have been initiated by Ecology, EPA, or responsible parties at 30 of the 49 sites.

- **Initiate/New Cleanup Actions:** Ecology will initiate or focus on new cleanup actions as resources become available.

- **Baywide Demonstration Project:** To move sediment cleanup forward, six state and federal agencies have formed the Cooperative Sediment Management Program in Washington. These agencies are now working collectively to eliminate conflicting sediment management policies and coordinate sediment cleanup and source control efforts. In addition, the Cooperative Sediment Management Program team is establishing a Demonstration Pilot Project. The pilot project will work with local agencies and interested parties in a selected urban bay to identify specific issues that affect sediment quality.

- **Updating the Site List:** The site list will be updated on an annual basis.

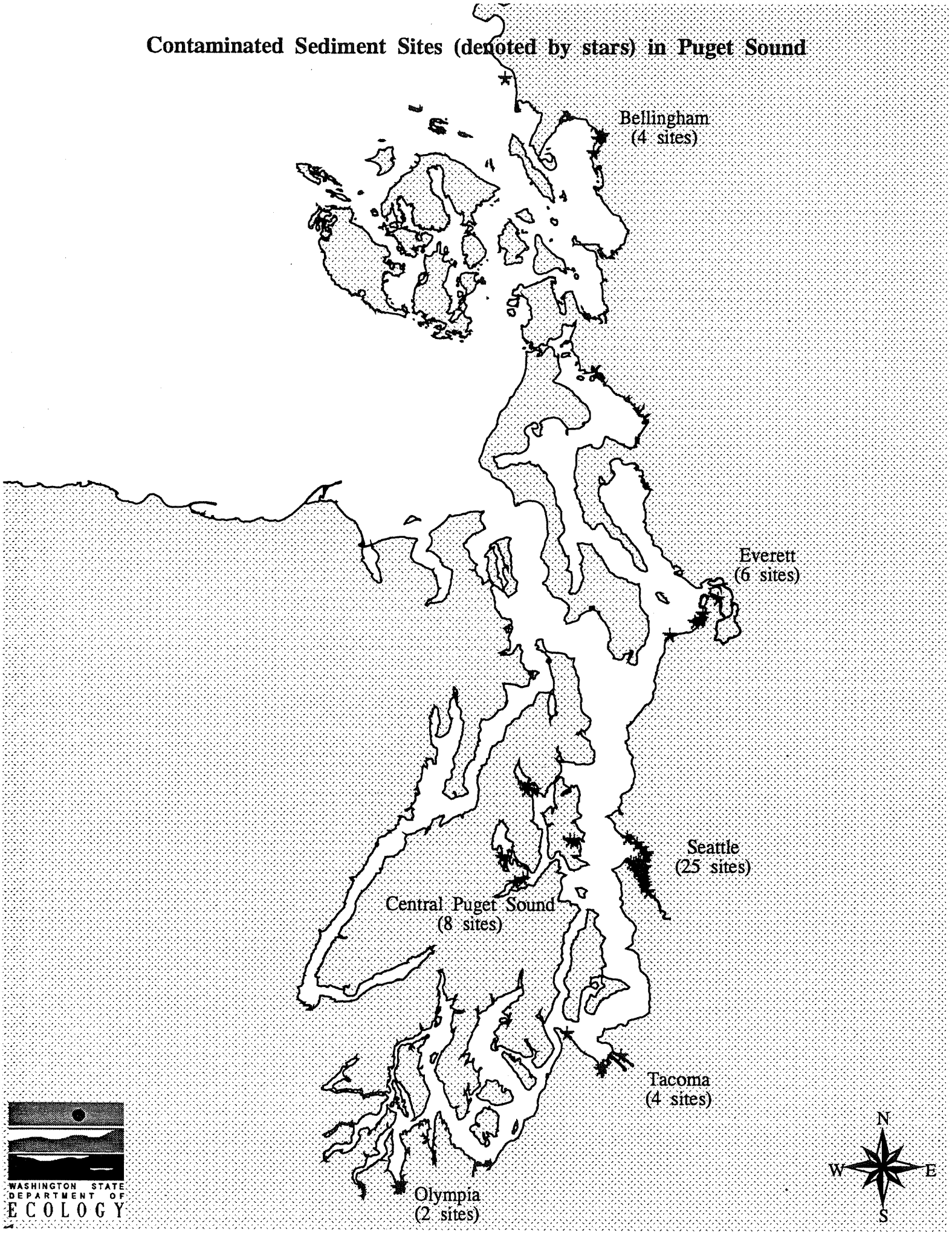
For More Information

To receive more information about the site list process or a copy of the site list, contact:

Michelle Wilcox	Department of Ecology Environmental Review and Sediment Section PO Box 47703 Olympia WA 98504-7703	(360) 407-7557 mcla461@ecy.wa.gov

If you have special accommodation needs, contact Michelle Wilcox at (360) 407-7557 (voice only) or (360) 407-6006 (TDD).

Contaminated Sediment Sites (denoted by stars) in Puget Sound



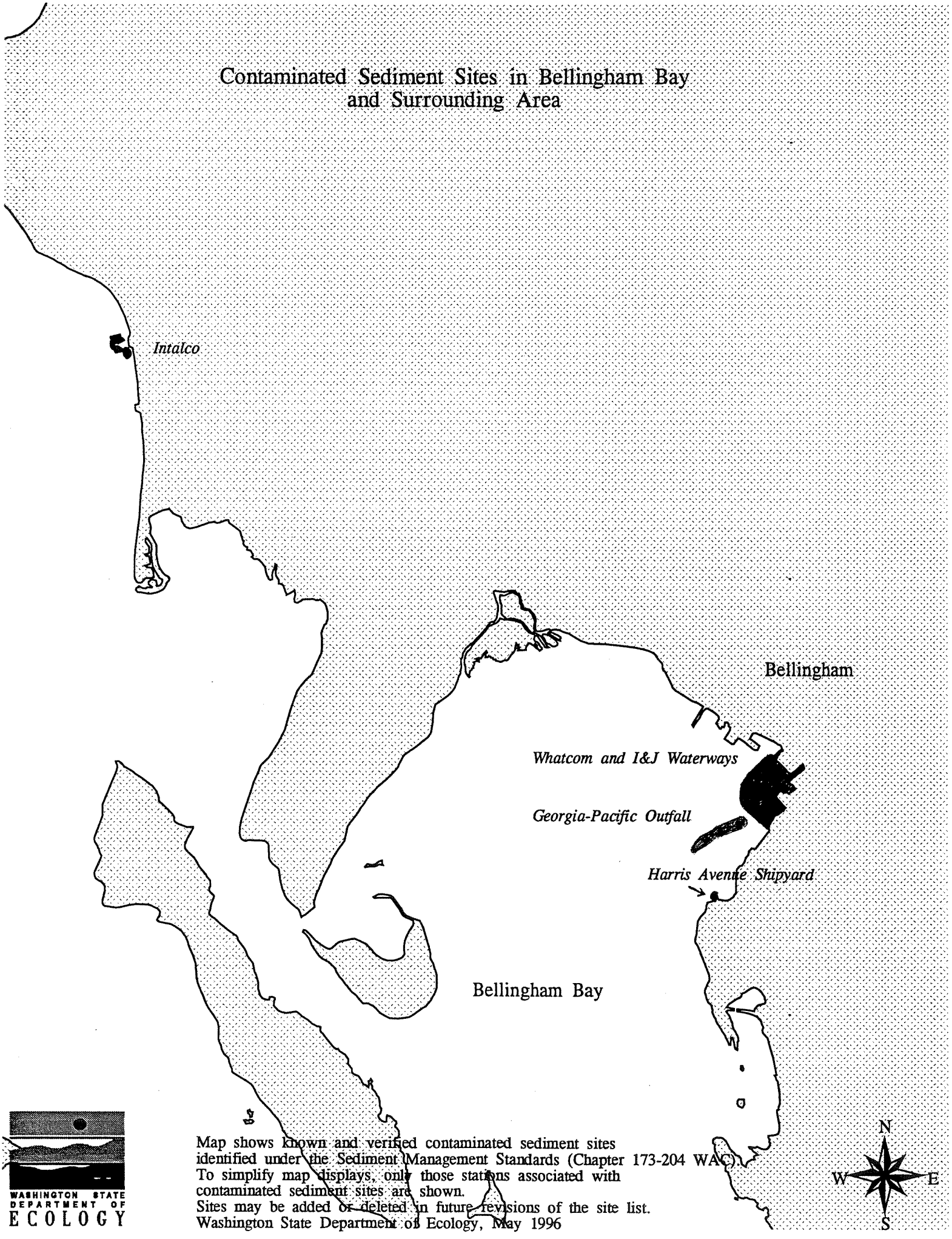
WASHINGTON STATE
DEPARTMENT OF
ECOLOGY

Michelle Wilcox, Sediment Management, Department of Ecology		**Ecology's List of Contaminated Sediment Sites Ranked Puget Sound Wide**			
May 1996		**FINAL**			
Contaminated Sediment Sites	Bay/City	Contaminant Groups of Concern	SMS Cleanup Screening Level Exceedance Factor Range	Ecological Score+ (maximum score = 100)	Undergoing Cleanup Process
Ecology Sites (listed in descending order of Ecological Score)					
Cascade Pole	Budd Inlet/Olympia	petroleum hydrocarbons, dibenzofuran	109 - 1.12	31	MTCA
EB3	Elliott Bay/Seattle	PAHs, benzene, metals, phthalate, phenol	88.2 - 1.39	24	partial Superfund
Intalco	North Puget Sound/Ferndale	HPAHs, cadmium, LPAHs, PCBs	47.4 - 1.29	22	
Whatcom and I&J Waterways	Bellingham Bay/Bellingham	mercury, dibenzofuran, LPAH, HPAH	30.1 - 1.61	21	MTCA
Harris Avenue Shipyard	Bellingham Bay/Bellingham	PCBs, copper	17.4 - 1.82	19	
EB5	Elliott Bay/Seattle	PAHs, phthalate, PCBs, benzene, metals, phenol	7.88 - 1.02	18	MTCA
EB8	Elliott Bay/Seattle	PCBs, mercury, cadmium, phthalates, PAHs, benzene, arsenic	5.85 - 1.16	14	partial Superfund
EB7	Elliott Bay/Seattle	PCBs, mercury	4.04 - 1.38	13	
DR30	Duwamish River/Seattle	PCBs, metals	2.31 - 1.19	12	
DR31	Duwamish River/Seattle	phthalates, benzoic acid, mercury	2.65 - 1.02	12	MTCA
EB23	Elliott Bay/Seattle	mercury, benzoic acid, copper	3.34 - 1.52	11	
EB27	Elliott Bay/Seattle	metals, benzyl alcohol	5.94 - 1.36	10	
EB28	Elliott Bay/Seattle	mercury, benzoic acid, phenols, PAHs	3.22 - 1.03	10	NRDA
South Terminal	Port Gardner/Everett	phenols, benzoic acid, metals, LPAH	23.6 - 1.02	10	
EB9	Elliott Bay/Seattle	hydrocarbon, phthalate, lead	1.21 - 1.13	10	
EB17	Elliott Bay/Seattle	PCBs, mercury	3.90 - 1.62	10	
DR32	Duwamish River/Seattle	phthalate, mercury	1.52 - 1.06	10	
DR36	Duwamish River/Seattle	metals, phthalate	4.75 - 1.12	10	
DR34	Duwamish River/Seattle	arsenic, PCBs	2.05 - 1.08	9	
South East Waterway	Port Gardner/Everett	phenols, benzyl alcohol, phthalate	17.4 - 1.38	8	Incidental
Midwest	Budd Inlet/Olympia	bioassay	Not applicable	8	
EB25	Elliott Bay/Seattle	mercury, phenol, chromium	3.45 - 1.65	7	
DR29	Duwamish River/Seattle	benzoic acid, phenol, PCBs, cadmium	3.23 - 1.10	7	
EB18	Elliott Bay/Seattle	mercury	4.01	6	
EB26	Elliott Bay/Seattle	silver, mercury	1.71 - 1.45	6	
Mill E/Koppers	Port Gardner/Everett	arsenic, naphthalene, acenaphthene	2.08 - 1.01	6	
North East Waterway	Port Gardner/Everett	4-methylphenol	2.99	4	
Georgia-Pacific Outfall	Bellingham Bay/Bellingham	mercury	1.25	1	
Mukilteo	Port Gardner/Everett	bioassay	Not applicable	0	MTCA
Piers 1&3	Port Gardner/Everett	bioassay and PSDDA SL chemistry exceedances: metals, HPAHS, LPAHs, phenols, PCBs, benzyl alcohol, benzoic acid	Not available	Not ranked	Incidental
Superfund Sites (listed alphabetically)					
CB1	Commencement Bay/Tacoma	metals, phthalates, phenols, benzyl alcohol, n-nitrosodiphenylamine	136 - 1.11	Not applicable	Superfund
CB2	Commencement Bay/Tacoma	metals, LPAH, HPAH, chlorinated hydrocarbons, phthalates, PCBs	127 - 1.01	Not applicable	Superfund
CB3	Commencement Bay/Tacoma	metals, LPAH, HPAH, chlorinated hydrocarbons, phthalates, PCBs, miscellaneous compounds	63.4 - 1.19	Not applicable	Superfund
CB4	Commencement Bay/Tacoma	mercury	2.54	Not applicable	Superfund
Eagle - East OU 1	Central Puget Sound/Bainbridge	HPAHs	Not available	Not applicable	Superfund
Eagle - East OU 2*	Central Puget Sound/Bainbridge	HPAHs	Not available	Not applicable	Superfund
EB1	Elliott Bay/Seattle	benzene, PAHs, metals	23.2 - 1.07	Not applicable	Superfund
EB10	Elliott Bay/Seattle	phenol, PAHs, mercury, phthalate, benzene, copper	14.6 - 1.15	Not applicable	Superfund
EB11	Elliott Bay/Seattle	phenol, metals	8.18 - 1.63	Not applicable	Superfund
EB12	Elliott Bay/Seattle	phthalate, phenols, metals	12.5 - 1.30	Not applicable	Superfund
EB13	Elliott Bay/Seattle	PAHs	2.03 - 1.05	Not applicable	Superfund
EB2	Elliott Bay/Seattle	phenol, metals	3.11 - 1.05	Not applicable	Superfund
EB6	Elliott Bay/Seattle	PAHs, phthalate, copper, phenol	55.4 - 1.01	Not applicable	Superfund
Jackson Park	Central Puget Sound/Dyes Inlet	bioassay	Not applicable	Not applicable	Superfund
Keyport - Liberty1	Central Puget Sound/Liberty Bay	phthalate	11.24	Not applicable	Superfund
Keyport - Liberty2	Central Puget Sound/Liberty Bay	phthalate	5.34	Not applicable	Superfund
Keyport - Tide Flats	Central Puget Sound/Liberty Bay	phthalate, phenol, benzene	12.74 - 1.19	Not applicable	Superfund
Sinclair East	Central Puget Sound/Sinclair Inlet	metals	6.38 - 1.03	Not applicable	Superfund
Sinclair West	Central Puget Sound/Sinclair Inlet	metals, benzoic acid, pyrene, phthalate	5.65 - 1.03	Not applicable	Superfund

+ The larger the ecological score, the greater the degree of hazard.

* OU2 may be clean pending finalization of the 1995 Environmental Monitoring Report Long-Term Monitoring Program Wyckoff/Eagle Harbor Superfund Site East Harbor Operable Unit Bainbridge Island, WA, SAIC, 1996.

Contaminated Sediment Sites in Bellingham Bay and Surrounding Area



WASHINGTON STATE DEPARTMENT OF ECOLOGY

Map shows known and verified contaminated sediment sites identified under the Sediment Management Standards (Chapter 173-204 WAC). To simplify map displays, only those stations associated with contaminated sediment sites are shown.
Sites may be added or deleted in future revisions of the site list.
Washington State Department of Ecology, May 1996

Michelle Wilcox, Sediment Management, Dept. of Ecology	**Ecology's List of Contaminated Sediment Sites Ranked by Bay**			
May 1996				
	FINAL			
Bay/Site Name	Contaminant Groups of Concern	SMS Cleanup Screening Level Exceedance Factor Range	Ecological Score+* (maximum score = 100)	Undergoing Cleanup Process
BELLINGHAM BAY				
Whatcom and I&J Waterways	mercury, dibenzofuran, LPAH, HPAH	30.1 - 1.61	62	MTCA
Intalco	HPAHs, cadmium, LPAHs, PCBs	47.4 - 1.29	22	
Harris Avenue Shipyard	PCBs, copper	17.4 - 1.82	19	
Georgia-Pacific Outfall	mercury	1.25	2	
+ The larger the ecological score, the greater the degree of hazard.				
* Rank score for a site may be different in Puget Sound wide list and bay wide list due to bay specific area modifications.				

Status of Sites in Bellingham Bay and Surrounding Area

Four sites have been identified in Bellingham Bay and the surrounding area. The following brief summaries are intended to provide site cleanup status information that is not included on the site list spreadsheets. Most of the summaries have been written by Ecology site managers. Cleanup actions are the primary focus of the site status summaries. However, source control and sediment monitoring activities have been included in the summaries for some sites.

Whatcom and I&J Waterways

In August, 1995, the Georgia-Pacific Corporation and the Department of Ecology began negotiations towards an agreed order to conduct a remedial investigation/feasibility study of the site. Following public comment, the agreed order was finalized in January of 1996. Georgia-Pacific is currently developing a work plan and other project plans. Drafts of these documents will be available for public review in July 1996. Sampling will begin in August 1996.

Harris Avenue Shipyard

This site is currently ranked as a category 2 site on the Model Toxics Control Act Hazardous Sites List and is awaiting remedial action.

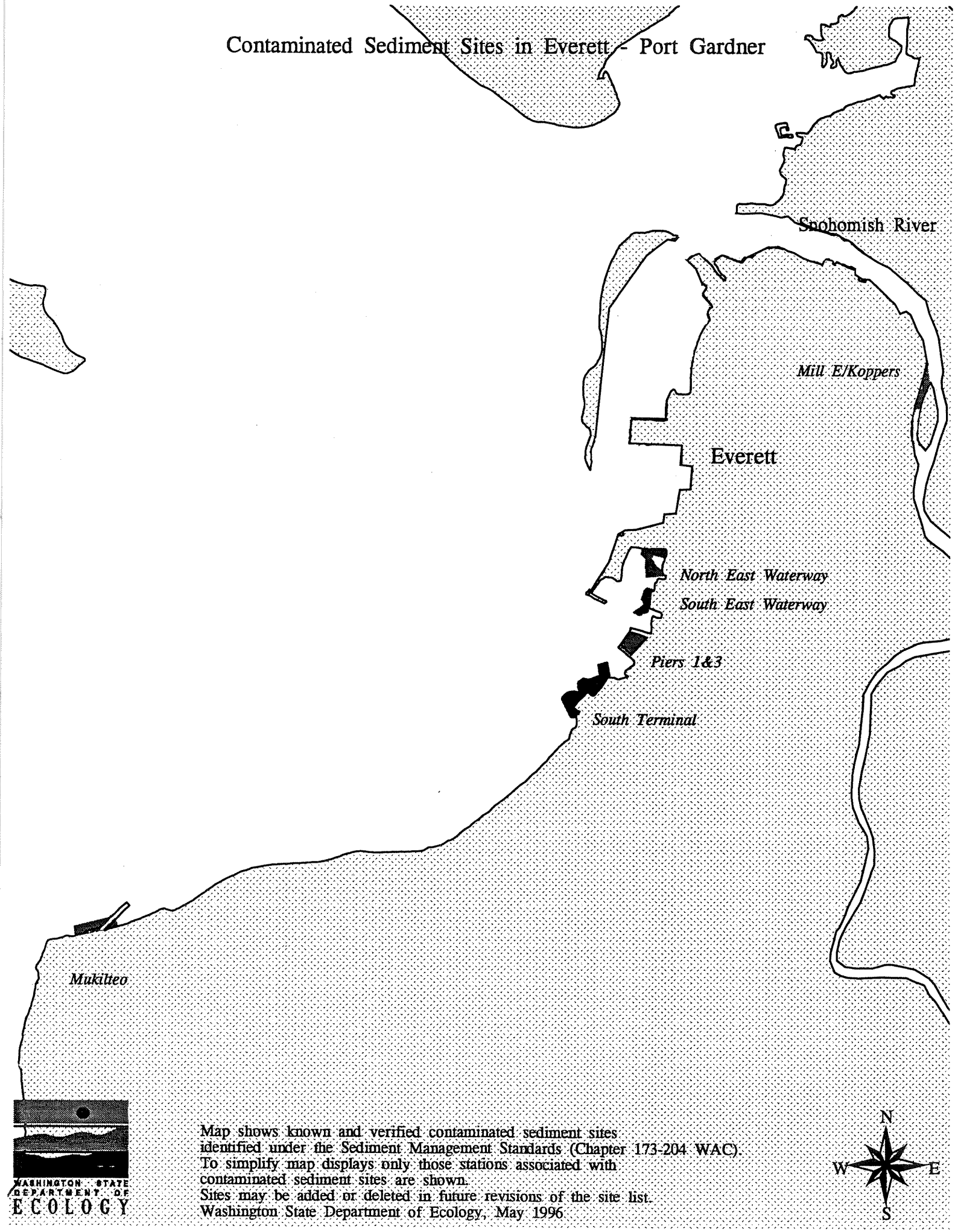
Georgia-Pacific Outfall

No cleanup action is occurring at this time. Ecology and Georgia-Pacific are currently evaluating source control options as part of the NPDES permit process.

Intalco

No cleanup action is occurring at this time.

Contaminated Sediment Sites in Everett - Port Gardner



WASHINGTON STATE DEPARTMENT OF ECOLOGY

Map shows known and verified contaminated sediment sites identified under the Sediment Management Standards (Chapter 173-204 WAC).
To simplify map displays only those stations associated with contaminated sediment sites are shown.
Sites may be added or deleted in future revisions of the site list.
Washington State Department of Ecology, May 1996

Michelle Wilcox, Sediment Management, Dept. of Ecology	Ecology's List of Contaminated Sediment Sites Ranked by Bay			
May 1996				
	FINAL			
Bay/Site Name	Contaminant Groups of Concern	SMS Cleanup Screening Level Exceedance Factor Range	Ecological Score+* (maximum score = 100)	Undergoing Cleanup Process
PORT GARDNER				
South Terminal	phenols, benzoic acid, metals, LPAH	23.6 - 1.02	21	
Mill E/Koppers	arsenic, naphthalene, acenaphthene	2.08 - 1.01	19	
South East Waterway	phenols, benzyl alcohol, phthalate	17.4 - 1.38	8	Incidental
North East Waterway	4-Methylphenol	2.99	4	
Mukilteo	bioassay	Not applicable	0	MTCA
Piers 1&3	bioassay and PSDDA SL chemistry exceedances: metals, HPAHS, LPAHs, phenols, PCBs, benzyl alcohol, benzoic acid	Not available	Not ranked	Incidental
+ The larger the ecological score, the greater the degree of hazard.				
* Rank score for a site may be different in Puget Sound wide list and bay wide list due to bay specific area modifications.				

Status of Sites in Everett - Port Gardner

Five sites have been identified in Port Gardner and one in the mouth of the Snohomish River. The following brief summaries are intended to provide site cleanup status information that is not included on the site list spreadsheets. Most of the summaries have been written by Ecology site managers. Cleanup actions are the primary focus of the site status summaries. However, source control and sediment monitoring activities have been included in the summaries for some sites.

Mukilteo

The Defense Fuel Supply Point is a Model Toxics Control Act site contaminated primarily with aviation fuel spilled or leaked from large storage tanks along the shoreline. A remedial investigation/feasibility study and interim corrective action plan have been finalized and a groundwater remediation system will be installed along the shoreline in 1996. Seeps occur offshore of the site, contaminating subtidal sediment areas and producing toxicity in bioassay tests. These seeps will be further addressed once upland source control is successful.

South Terminal

Sediments offshore of South Terminal contain wood waste and associated contaminants, such as phenols, metals, and low molecular weight polycyclic aromatic hydrocarbons. Elevated levels of these contaminants are the result of many years of log rafting and log storage in the area. Dredging south of Pier 1 and planned construction of a barge berth along the shoreline will partially clean up some of the contaminated sediments, but some will remain to be addressed during future planned construction activities at the terminal.

Port of Everett Piers 1 and 3

The area between Piers 1 and 3 has been heavily contaminated with a variety of contaminants as a result of historical spills, discharges from industries and combined sewer overflows along the shoreline. The Port of Everett plans to dredge these contaminated sediments and place them in a nearshore confined fill as part of the development of a barge berth in 1996.

South East Waterway

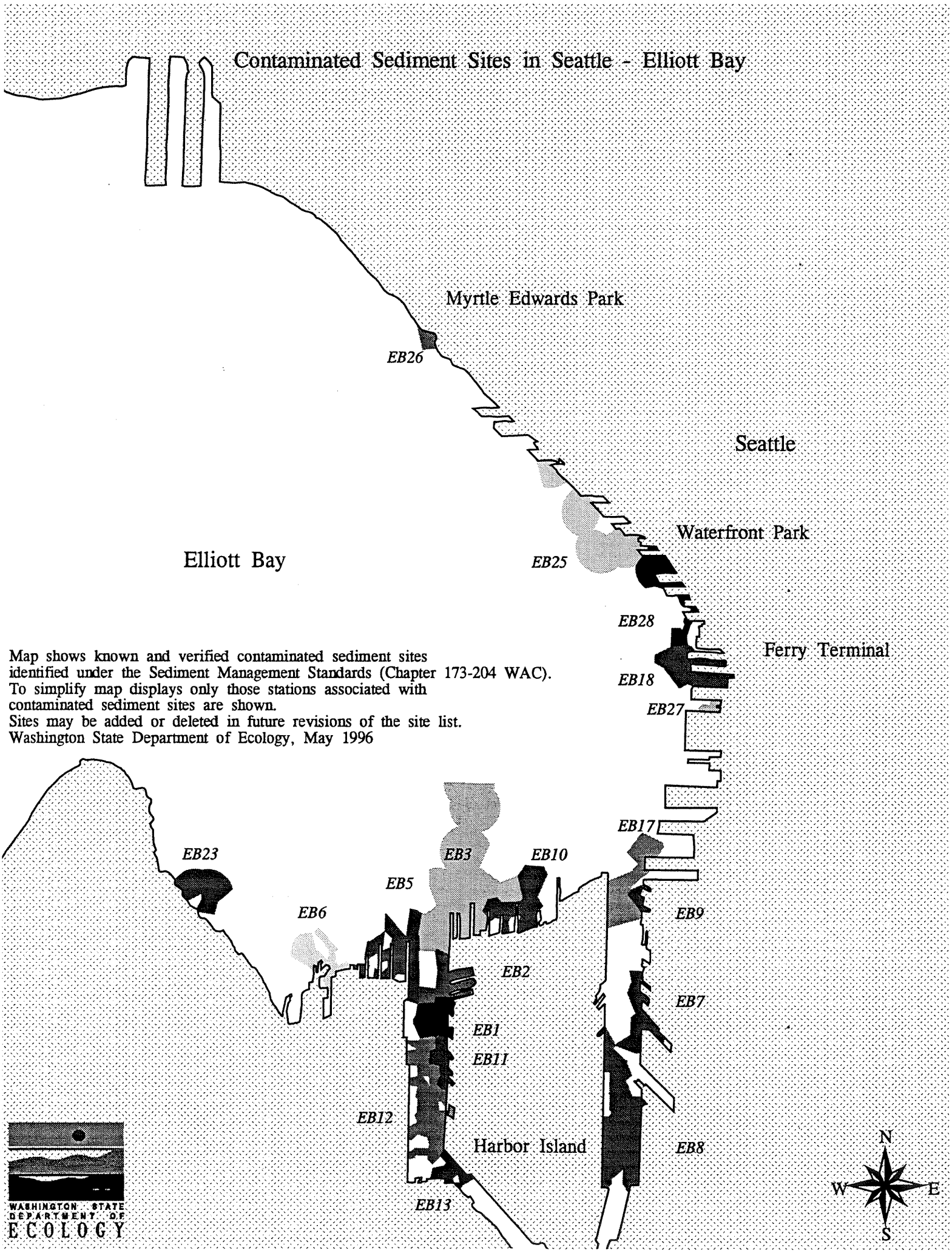
No cleanup action is occurring at this time.

North East Waterway

No cleanup action is occurring at this time.

Weyerhaeuser Mill E/Koppers Facility

This site and limited areas along the shoreline are contaminated with arsenic, naphthalene, and acenaphthene, possibly due to historical operation of a wood treating facility at this location. Weyerhaeuser is conducting an independent cleanup of the site, which may address the shoreline contamination. An upland remedial investigation/feasibility study (which may or may not address nearshore sediment issues) has been received but not yet reviewed by Ecology.


Contaminated Sediment Sites in Seattle - Elliott Bay
Myrtle Edwards Park
EB26
Seattle
Waterfront Park
Elliott Bay
EB25
EB28
Ferry Terminal
EB18
EB27
Map shows known and verified contaminated sediment sites
identified under the Sediment Management Standards (Chapter 173-204 WAC).
To simplify map displays only those stations associated with
contaminated sediment sites are shown.
Sites may be added or deleted in future revisions of the site list.
Washington State Department of Ecology, May 1996
EB17
EB23
EB3
EB10
EB5
EB6
EB9
EB2
EB7
EB1
EB11
EB12
Harbor Island
EB8
EB13
WASHINGTON STATE
DEPARTMENT OF
ECOLOGY
N
W
E
S

Michelle Wilcox, Sediment Management, Dept. of Ecology	**Ecology's List of Contaminated Sediment Sites Ranked by Bay**			
May 1996				
	FINAL			
Bay/Site Name	Contaminant Groups of Concern	SMS Cleanup Screening Level Exceedance Factor Range	Ecological Score+* (maximum score = 100)	Undergoing Cleanup Process
ELLIOTT BAY				
EB3	PAHs, benzene, metals, phthalate, phenol	88.2 - 1.39	72	partial Superfund
EB8	PCBs, mercury, cadmium, phthalates, PAHs, benzene, arsenic	5.85 - 1.16	42	partial Superfund
EB5	PAHs, phthalate, PCBs, benzene, metals, phenol	7.88 - 1.02	35	MTCA
EB25	mercury, phenol, chromium	3.45 - 1.65	22	
EB23	mercury, benzoic acid, copper	3.34 - 1.52	22	
EB17	PCBs, mercury	3.90 - 1.62	21	
EB18	mercury	4.01	16	
EB7	PCBs, mercury	4.04 - 1.38	13	
EB27	metals, benzyl alcohol	5.94 - 1.36	10	
EB28	mercury, benzoic acid, phenols, PAHs	3.22 - 1.03	10	NRDA
EB9	hydrocarbon, phthalate, lead	1.21 - 1.13	10	
EB26	silver, mercury	1.71 - 1.45	6	
EB1	benzene, PAHs, metals	23.2 - 1.07	Not applicable	Superfund
EB10	phenol, PAHs, mercury, phthalate, benzene, copper	14.6 - 1.15	Not applicable	Superfund
EB11	phenol, metals	8.18 - 1.63	Not applicable	Superfund
EB12	phthalate, phenols, metals	12.5 - 1.30	Not applicable	Superfund
EB13	PAHs	2.03 - 1.05	Not applicable	Superfund
EB2	phenol, metals	3.11 - 1.05	Not applicable	Superfund
EB6	PAHs, phthalate, copper, phenol	55.4 - 1.01	Not applicable	Superfund
+ The larger the ecological score, the greater the degree of hazard.				
* Rank score for a site may be different in Puget Sound wide list and bay wide list due to bay specific area modifications.				

Status of Sites in Seattle - Elliott Bay

Nineteen sites have been identified in Elliott Bay. The following brief summaries are intended to provide site cleanup status information that is not included on the site list spreadsheets. Most of the summaries have been written by Ecology site managers. Cleanup actions are the primary focus of the site status summaries. However, source control and sediment monitoring activities have been included in the summaries for some sites.

EB3, EB5: Harbor Island Superfund Site - Todd and Lockheed Martin Shipyards
(extracted from The Proposed Plan Shipyard Sediments Operable Unit Harbor Island, Keith Rose, EPA, 1995) Harbor Island (HI) was listed as a Superfund site in 1983. An initial investigation of marine sediments around HI was completed by EPA in 1988. Contaminants of concern are polychlorinated biphenyls, polycyclic aromatic hydrocarbons, arsenic, cadmium, copper, lead, mercury, and zinc. Direct disposal of industrial waste to the Duwamish River, storm drain discharges, and surface runoff have been the major sources of contaminants. Shipyard activities have been a major source of direct disposal of industrial waste via ship hull sandblasting. EPA is cleaning up contaminated sediments in accordance with CERCLA and, to the extent practicable, the National Contingency Plan. EPA's remedy for contaminated sediments at the Todd and Lockheed Martin Shipyards is to dredge and dispose of the most contaminated sediments and contain the remaining contaminated sediments with a cap.

EB1, EB2, EB8, EB10, EB11, EB12, EB13: Harbor Island Superfund Site - Remaining Contaminated Sediment Areas
EPA is deferring a final cleanup decision on the remaining contaminated sediments at Harbor Island until potential human health risks due to bioaccumulation of contaminants in marine organisms can be further evaluated. Remediation based on a tributyltin criteria value is also being evaluated.

EB6
A wood treating plant was located at this site for approximately 100 years. Chemicals of concern associated with the wood treating process include creosote, pentachlorophenol, and various metals. This is a Superfund site, separate from the Harbor Island Superfund site. EPA is conducting a remedial investigation and identifying the vertical and horizontal extent of contamination.

EB7, EB9, and EB17
These sites are contaminated areas of East Waterway that are not included within EPA's Harbor Island Superfund site. These areas are located along the north and east sides of East Waterway, and were excluded from the Harbor Island site because the sources of contamination may not have originated on Harbor Island. Contaminants that have been found in these sediments include polychlorinated biphenyls (PCBs), tributyltin, mercury, and petroleum hydrocarbons. Possible sources of these contaminants include historic PCB spills and discharges to the Duwamish River, former bulk fuel plants on the eastern

shoreline, combined sewer overflows and storm drain outfalls, and port and shipping operations. Ecology is responsible for cleaning up these areas once upland sources (e.g., cleanup at former bulk fuel plants) have been eliminated or controlled.

EB18

Nearshore sediments between Pier 48 and Pier 52 are contaminated with low levels of mercury, silver, and hydrocarbons. These contaminants are believed to be related to historical discharges from the Washington Street combined sewer overflow (CSO). Activities at piers historically located in this area may also have contributed to sediment contamination. The CSO has been controlled by the City of Seattle and is limited to no more than one discharge per year and is not considered a current significant source of contamination.

EB23

Sediments offshore of Seacrest Park are contaminated with low levels of metals; copper wire, batteries, and other debris was observed during sampling. The source of this contamination is unknown, but may be related to historical pier activities that were once located in this area. The Elliott Bay/Duwamish Restoration Panel is considering a habitat restoration project in this area, which could result in an incidental cleanup of this contamination.

EB25

Construction at the Pier 65 Short-Stay Marina has recently been completed. Prior to construction, sediments in this area were contaminated with petroleum, mercury, and other contaminants. To address this contamination, the Port of Seattle placed a cap in the area where the marina was to be constructed to clean up and prevent disturbance of these contaminated sediments. The sediment cap was completed in March 1994. This cap is considered an interim measure, and is being monitored to evaluate its success. Contaminated areas may remain just offshore and south of the Port property. The site does not include the capped area.

EB26

Sediments offshore of the Denny Way combined sewer overflow (CSO) are contaminated with silver, mercury, and polycyclic aromatic hydrocarbons. The Denny Way CSO is the largest CSO in Elliott Bay, discharging 300-600 million gallons per year. In 1990, Metro placed a sand cap offshore of the outfall to address the most contaminated areas. However, an area near the shoreline was not accessible by barge and was not addressed by the capping project. Significant source control efforts are planned for the Denny Way CSO, resulting in a targeted 50% reduction by 2003. In the year 2000, METRO plans to begin construction of a new outfall that will discharge further offshore. At that time, remaining sediment cleanup needs near the shoreline will be evaluated and may be able to be addressed as part of the construction activities.

EB27

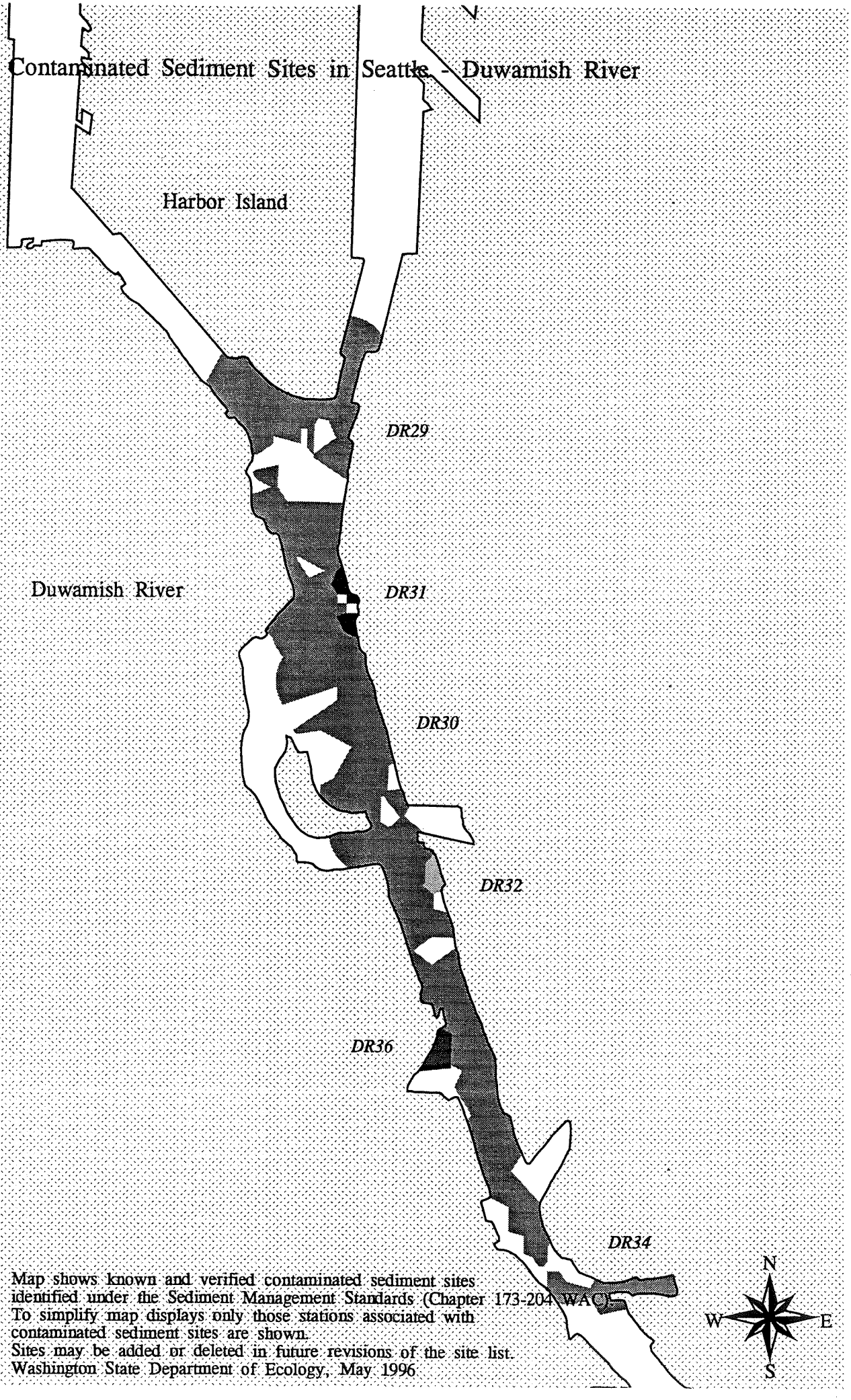
Sediments in the slip between Pier 46 and Pier 48 are contaminated with metals. The source of these metals is unknown, but may be related to discharges from the King Street combined sewer overflow, metal shop and historical shipbuilding activity at Pier 46, and/or Port and shipping activities.

EB28

Sediments at the north end of Colman Dock and extending up the waterfront to Pier 58 are contaminated with petroleum hydrocarbons and metals. Boring logs for several piers and recent investigations at Colman Dock indicate that a petroleum contaminated layer of sediments up to 20 feet thick may be present along much of this area. Many possible historical sources of this contamination have been identified, including spills and discharges of coal and petroleum wastes in the early 1900's; sewage, stormwater, and combined sewer overflow (CSO) discharges; debris from the Seattle Fire; leachate from creosoted pilings and bulkheads; and spills and discharges from vessels and refueling activities. In 1992, a sand cap was placed over some of the more contaminated areas offshore of the Madison Street CSO (Pier 53-55) by Metro on behalf of the Elliott Bay/Duwamish Restoration Panel.

DOT is in the process of completing a remedial investigation/feasibility study for the area at the north end of Colman Dock, and the Elliott Bay/Duwamish Restoration Panel has recently completed a two-year study of sources of recontamination and contaminant transport along the Seattle Waterfront. The Elliott Bay/Duwamish Restoration Panel is currently following up this study with a remedial investigation/feasibility study designed to fill data gaps and select one or more remedial alternatives for the area between Colman Dock and Pier 58. The entire area is currently scheduled for remediation in 1998/1999.

Contaminated Sediment Sites in Seattle - Duwamish River



WASHINGTON STATE DEPARTMENT OF ECOLOGY

Map shows known and verified contaminated sediment sites identified under the Sediment Management Standards (Chapter 173-204 WAC).
To simplify map displays only those stations associated with contaminated sediment sites are shown.
Sites may be added or deleted in future revisions of the site list.
Washington State Department of Ecology, May 1996

Michelle Wilcox, Sediment Management, Dept. of Ecology	**Ecology's List of Contaminated Sediment Sites Ranked by Bay**			
May 1996				
	FINAL			
Bay/Site Name	Contaminant Groups of Concern	SMS Cleanup Screening Level Exceedance Factor Range	Ecological Score+* (maximum score = 100)	Undergoing Cleanup Process
DUWAMISH RIVER				
DR30	PCBs, metals	2.31 - 1.19	35	
DR29	benzoic acid, phenol, PCBs, cadmium	3.23 - 1.10	20	
DR31	phthalates, benzoic acid, mercury	2.65 - 1.02	12	MTCA
DR32	phthalate, mercury	1.52 - 1.06	10	
DR36	metals, phthalate	4.75 - 1.12	10	
DR34	arsenic, PCBs	2.05 - 1.08	9	
+ The larger the ecological score, the greater the degree of hazard.				
* Rank score for a site may be different in Puget Sound wide list and bay wide list due to bay specific area modifications.				

Status of Sites in Seattle - Duwamish River

Six sites have been identified in the Duwamish River. The following brief summaries are intended to provide site cleanup status information that is not included on the site list spreadsheets. Most of the summaries have been written by Ecology site managers. Cleanup actions are the primary focus of the site status summaries. However, source control and sediment monitoring activities have been included in the summaries for some sites.

DR29

This area south of Harbor Island contains low levels of phenols, benzoic acid, and polychlorinated biphenyls (PCBs). Phenols in this area may be related to discharges through storm drains from historical chemical companies on Harbor Island and the Duwamish Waterway. PCBs and tributyltin are ubiquitous in the waterways around Harbor Island as a result of spills and shipping activities.

DR30

There is widespread low level PCB contamination in the Duwamish River from a variety of possible historic sources. No cleanup action is being taken for the waterway as a whole. However, certain areas are being addressed as stated by the other Duwamish River site descriptions.

DR31

The Duwamish/Diagonal site includes a number of current and historical discharges. Sewage was once discharged from a slough in this location. Currently present are the City of Seattle Diagonal Way combined sewer overflow/storm drain and the Metro Duwamish Pump Station outfall. In addition, a treatment plant was once located just south of these outfalls that may have discharged contaminants to sediments. Contaminants near the treatment plant outfall include polychlorinated biphenyls (PCBs), chlorobenzenes, metals, and phthalates, while contaminants near the Duwamish/Diagonal outfalls consist of limited metals and widespread phthalates. Recent source control efforts at these outfalls appear to have been successful in greatly reducing discharges. The Elliott Bay/Duwamish Restoration Panel is currently conducting a remedial investigation/feasibility study for this area and anticipates cleanup in 1998.

DR32

Sediments offshore of the Brandon Street combined sewer overflow are contaminated with low levels of phthalates and mercury. Cleanup of this area has been scheduled to occur after METRO completes various source control actions (estimated for year 2003).

DR34

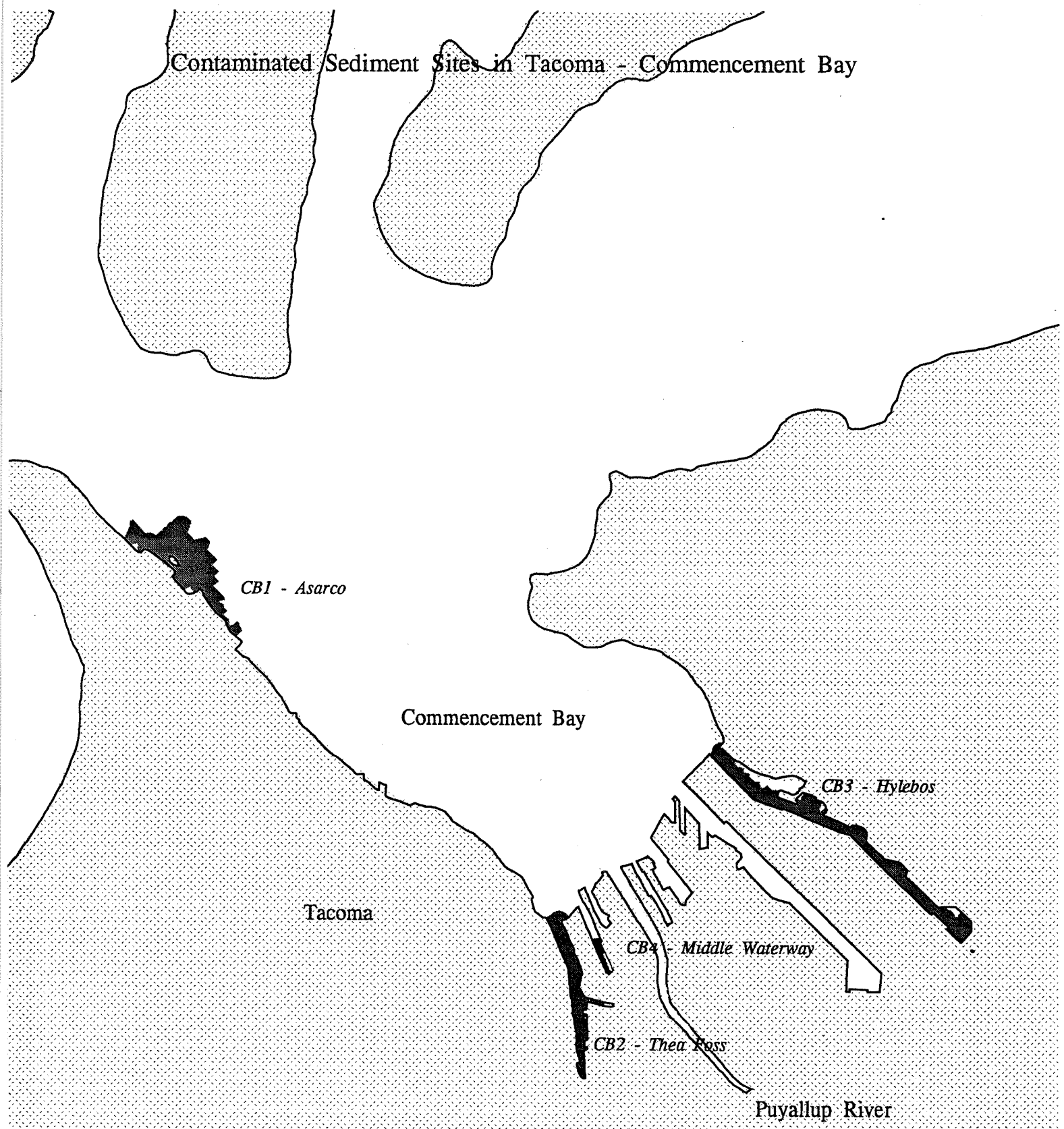
Sediments in Slip 3 and offshore of the old Marine Power & Equipment (MP&E) site are contaminated with polychlorinated biphenyls (PCBs) and metals. Sources include spills and discharges of sandblast grit and paint wastes from Marine Power & Equipment, Morton Marine Equipment, and a sandblast grit supplier, R. A. Barnes. These

contaminants were also discharged to the South River Street storm drain system and the Fox Avenue South combined sewer overflow/storm drain system, which also received various organic contaminants from Tyee Lumber and Great Western Chemical. The MP&E site was foreclosed on in 1989 by First Interstate Bank, who subsequently conducted an environmental investigation. Some cleanup of the upland property may have been conducted at that time, but is not documented in Ecology files.

DR36

Sediment contamination at the Duwamish Shipyard was identified during recent NPDES monitoring, and includes contamination by metals and phthalates. No cleanup action is occurring at this time.

Contaminated Sediment Sites in Tacoma - Commencement Bay



WASHINGTON STATE DEPARTMENT OF ECOLOGY

Map shows known and verified contaminated sediment sites identified under the Sediment Management Standards (Chapter 173-204 WAC).
To simplify map displays, only those stations associated with contaminated sediment sites are shown.
Sites may be added or deleted in future revisions of the site list.
Washington State Department of Ecology, May 1996

N
W E
S

Michelle Wilcox, Sediment Management, Dept. of Ecology	**Ecology's List of Contaminated Sediment Sites Ranked by Bay**			
May 1996				
	FINAL			
Bay/Site Name	Contaminant Groups of Concern	SMS Cleanup Screening Level Exceedance Factor Range	Ecological Score+* (maximum score = 100)	Undergoing Cleanup Process
COMMENCEMENT BAY (listed alphabetically)				
CB1	metals, phthalates, phenols, benzyl alcohol, n-nitrosodiphenylamine	136 - 1.11	Not applicable	Superfund
CB2	metals, LPAH, HPAH, chlorinated hydrocarbons, phthalates, PCBs	127 - 1.01	Not applicable	Superfund
CB3	metals, LPAH, HPAH, chlorinated Hydrocarbons, phthalates, PCBs, miscellaneous compounds	63.4 - 1.19	Not applicable	Superfund
CB4	mercury	2.54	Not applicable	Superfund
+ The larger the ecological score, the greater the degree of hazard.				
* Rank score for a site may be different in Puget Sound wide list and bay wide list due to bay specific area modifications.				

Status of Sites in Tacoma - Commencement Bay

Four sites have been identified in Commencement Bay. The following brief summaries are intended to provide site cleanup status information that is not included on the site list spreadsheets. Most of the summaries have been written by Ecology site managers. Cleanup actions are the primary focus of the site status summaries. However, source control and sediment monitoring activities have been included in the summaries for some sites.

CB1

Asarco was a copper smelter operating for approximately 100 years. The smelter recently ceased operations and was listed as a Superfund site. Contamination is primarily due to historical discharges. Possible sources of contamination include: slag (smelting process residue), runoff from upland contaminated areas, upland activities, organic loading from vessels and docks, and contaminated groundwater. Source control work is presently occurring to control off-site flow. Active remediation may be required where physical constraints allow, areas that are too steep and/or deep may be extremely difficult to remediate. The sediments work currently underway is for an expanded remedial investigation/feasibility study.

CB2

The Thea Foss Waterway is part of the Commencement Bay Superfund site. Because this is an industrial waterway, it is difficult to pinpoint sources of contamination. The major chemicals of concern are: polychlorinated biphenyls (PCBs), bis (2-ethylhexyl) phthalate, mercury, and polycyclic aromatic hydrocarbons (PAHs). The Commencement Bay Nearshore/Tideflats Record of Decision (ROD) was completed in 1989. Pre-design sampling efforts for the site are continuing. EPA approval of the final design for cleanup action is targeted for the end of 1998. Source control is presently occurring and the potential for recontamination is being determined.

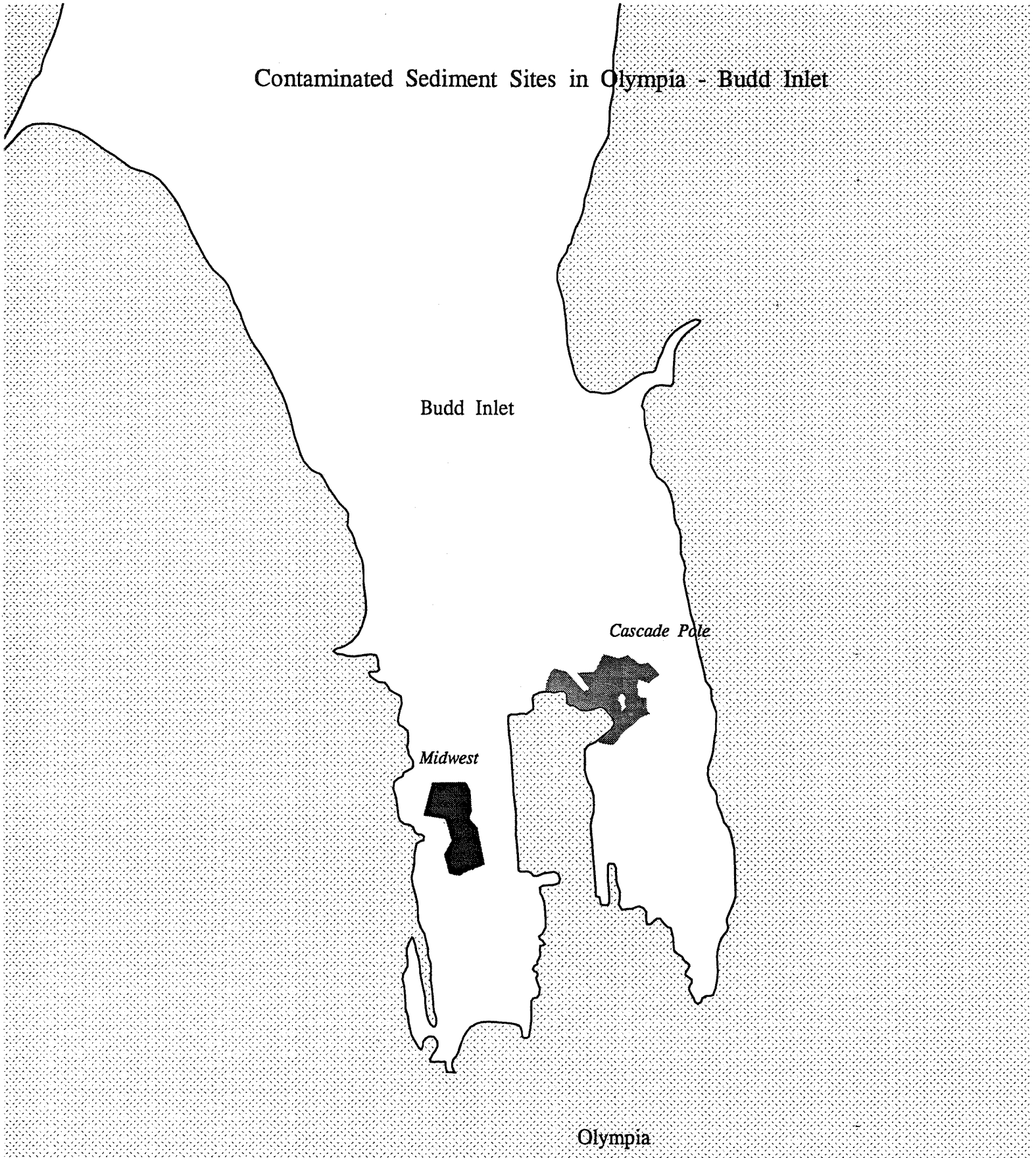
CB3

Middle Waterway is part of the Commencement Bay Superfund site identified in the 1989 ROD. Presently, EPA is in the process of identifying potentially responsible parties (PRPs) and assessing available data to characterize the site.

CB4

Hylebos Waterway is also part of the Commencement Bay Superfund site identified in the 1989 ROD. The major chemicals of concern are polychlorinated biphenyls (PCBs), chlorinated organics from various facilities, polycyclic aromatic hydrocarbons (PAHs), and heavy metal contamination localized along the banks. Major sources have been controlled. Ecology, the Tacoma Pierce County Health Department, and EPA are working with individual sources to identify and control additional discharges to the waterway. EPA and the Hylebos Steering Committee are currently conducting several pre-remedial design activities which are intended to further characterize the vertical and horizontal extent of contamination. The pre-remedial design is scheduled to be completed by 1998.

Contaminated Sediment Sites in Olympia - Budd Inlet



WASHINGTON STATE DEPARTMENT OF ECOLOGY

Map shows known and verified contaminated sediment sites identified under the Sediment Management Standards (Chapter 173-204 WAC). To simplify map displays, only those stations associated with contaminated sediment sites are shown. Sites may be added or deleted in future revisions of the site list.
Washington State Department of Ecology, May 1996

N
W E
S

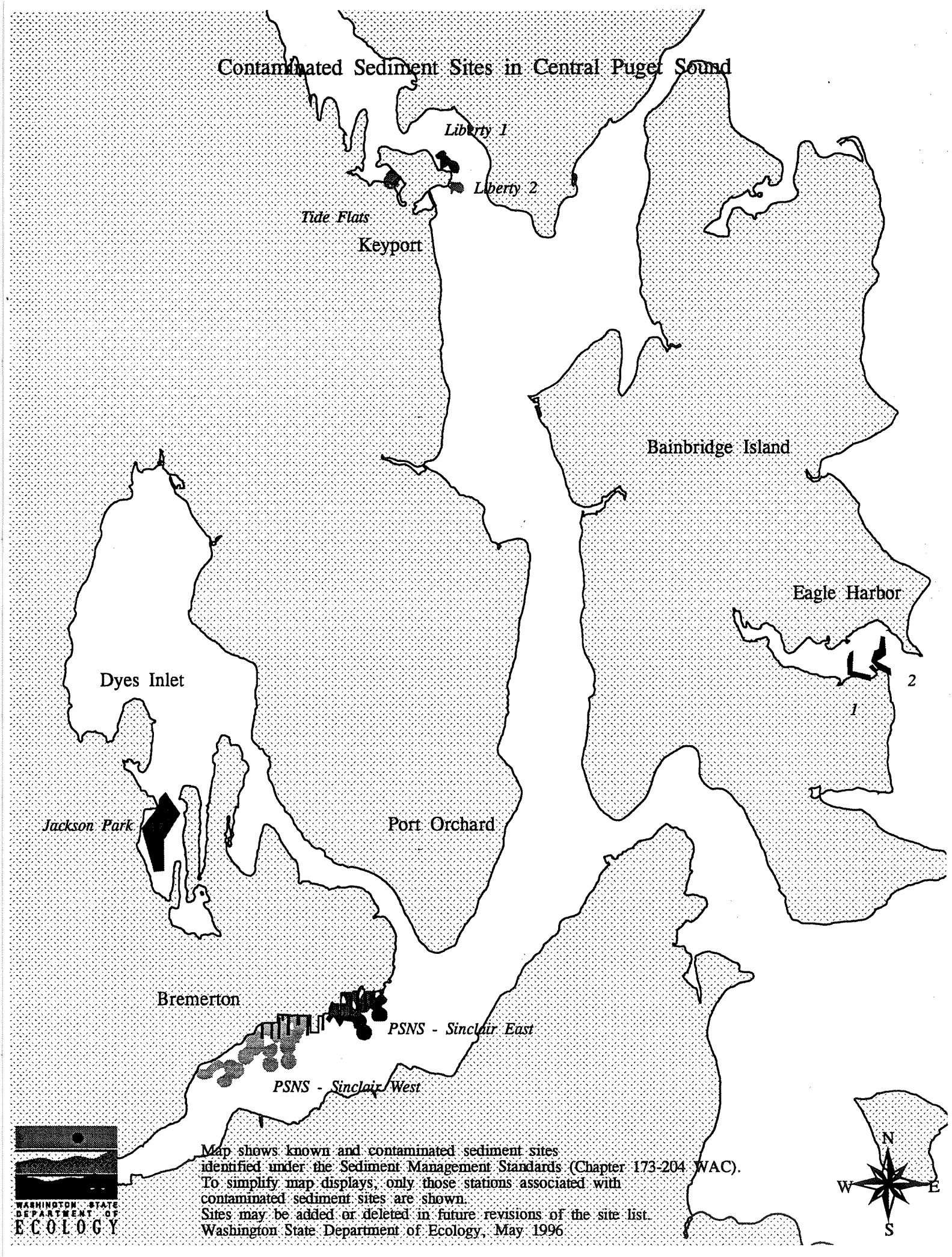
Michelle Wilcox, Sediment Management, Dept. of Ecology	**Ecology's List of Contaminated Sediment Sites Ranked by Bay**			
May 1996				
	FINAL			
Bay/Site Name	Contaminant Groups of Concern	SMS Cleanup Screening Level Exceedance Factor Range	Ecological Score+* (maximum score = 100)	Undergoing Cleanup Process
BUDD INLET				
Cascade Pole	petroleum hydrocarbons, dibenzofuran	109 - 1.12	31	MTCA
Midwest	bioassay	Not applicable	15	
+ The larger the ecological score, the greater the degree of hazard.				
* Rank score for a site may be different in Puget Sound wide list and bay wide list due to bay specific area modifications.				

Status of Sites in Olympia - Budd Inlet

Two sites have been identified in Budd Inlet. The following brief summaries are intended to provide site cleanup status information that is not included on the site list spreadsheets. The summaries have been written by the Ecology site manager. Cleanup actions are the primary focus of the site status summaries.

Cascade Pole This is a Model Toxics Control Act (MTCA) site. The majority of sediment contamination is associated with several decades of wood treatment operations at this site. A number of interim actions have been undertaken to prevent ongoing migration/seepage of contaminants to the intertidal aquatic environment. The owner/operator of the wood treatment facility has settled with the Port of Olympia. The Port is currently working with Ecology to identify long-term cleanup solutions for the site. Excavation with upland disposal and insitu capping are among the alternatives being considered to address intertidal sediment contamination.

Midwest Sampling occurred at this site in the late 1980's to characterize the area for a possible widening/deepening effort for improved deepwater access to Port of Olympia dock facilities. When sediments were found to be unsuitable for Puget Sound Dredge Disposal Analysis (PSDDA) open water disposal as a result of bioassay hits, the project was stopped. Source of contamination is unknown. No cleanup action is presently occurring at this site.


Contaminated Sediment Sites in Central Puget Sound
Liberty 1
Liberty 2
Tide Flats
Keyport
Bainbridge Island
Eagle Harbor
2
1
Dyes Inlet
Jackson Park
Port Orchard
Bremerton
PSNS - Sinclair East
PSNS - Sinclair West
N
W
E
S
WASHINGTON STATE DEPARTMENT OF ECOLOGY
Map shows known and contaminated sediment sites identified under the Sediment Management Standards (Chapter 173-204 WAC).
To simplify map displays, only those stations associated with contaminated sediment sites are shown.
Sites may be added or deleted in future revisions of the site list.
Washington State Department of Ecology, May 1996

Michelle Wilcox, Sediment Management, Dept. of Ecology	**Ecology's List of Contaminated Sediment Sites Ranked by Bay**			
May 1996				
	FINAL			
Bay/Site Name	Contaminant Groups of Concern	SMS Cleanup Screening Level Exceedance Factor Range	Ecological Score+* (maximum score = 100)	Undergoing Cleanup Process
CENTRAL PUGET SOUND (listed alphabetically)				
Eagle - East OU 1	HPAHs	Not available	Not applicable	Superfund
Eagle - East OU 2	HPAHs	Not available	Not applicable	Superfund
Jackson Park - bioassay	bioassay	Not applicable	Not applicable	Superfund
Keyport - Liberty1	phthalate	11.24	Not applicable	Superfund
Keyport - Liberty2	phthalate	5.34	Not applicable	Superfund
Keyport - Tide Flats	phthalate, phenol, benzene	12.74 - 1.19	Not applicable	Superfund
Sinclair East	metals	6.38 - 1.03	Not applicable	Superfund
Sinclair West	metals, benzoic acid, pyrene, phthalate	5.65 - 1.03	Not applicable	Superfund
+ The larger the ecological score, the greater the degree of hazard.				
* Rank score for a site may be different in Puget Sound wide list and bay wide list due to bay specific area modifications.				

Status of Sites in Central Puget Sound

Eight sites have been identified in the central Puget Sound area. The following brief summaries are intended to provide site cleanup status information that is not included on the site list spreadsheets. Most of the summaries have been written by Ecology site managers. Cleanup actions are the primary focus of the site status summaries. However, source control and sediment monitoring activities have been included in the summaries for some sites.

Keyport, Liberty Bay

This is a Superfund site in the post-remedial investigation/feasibility study pre-record of decision phase. Source of contamination for Dogfish Bay is a landfill located south of Dogfish Bay and the tide flats. The landfill was created by placing wastes in a marshy area near the west boundary of the naval base. Disposal at this location ceased in the mid-1970s. The site is now used primarily as a parking lot and for temporary outside storage. Sources of contamination for the Liberty Bay sites are from a historic chrome plating facility and various shipyard operations. The Remedial Investigation and Feasibility Study were completed in 1993. The Proposed Plan, to monitor and apply institutional controls, was not well received by the community. It has been agreed by the appropriate parties to do additional pre-record of decision sampling to provide additional information on the site on which a decision for appropriate remedial measures may be made.

Jackson Park, Dyes Inlet

The Jackson Park Housing Complex (JPHC), which is located in central Kitsap County, approximately 2 miles northwest of Bremerton, is a military residential complex. From 1904 to 1973, the JPHC site was used by the Navy as the naval magazine in Puget Sound. Operations at this site included ordnance preparation, projectile cleaning, and mechanical demilitarization. During World War II, the facility's primary role shifted to ordnance demilitarization. Ostrich Bay is adjacent to the JPHC.

A marine field investigation was conducted by the Navy to assess the condition of the sediments in Ostrich Bay. The chemicals detected in the surface sediments were volatile organics, semi-volatile organics, ordnance compounds, and metals. Phenol, cadmium, mercury, and silver were detected above State standards. Bioassay tests were performed on the sediments, resulting in some exceedances of State standards. The remedial investigation/feasibility study is scheduled to be completed in 1996.

Puget Sound Naval Shipyard, Bremerton

Ecology issued a Model Toxics Control Act enforcement order to Puget Sound Naval Shipyard in 1992. Ecology began working with the Navy on the removal of the most obviously contaminated areas and a marine study of Sinclair Inlet. Approximately 30 leaking underground petroleum tanks have been removed, and limited cleanups on two other contaminated areas have been completed. The Navy is implementing best management practices to reduce contaminant discharges to Sinclair Inlet. The shipyard was listed as a Superfund site in 1994.

During the marine study of Sinclair Inlet, samples were collected for analysis of water, sediment, English Sole, and shellfish (Blue Mussel) contamination. The result of this sampling will be included in a Remedial Investigation Report, which is planned to be completed in 1996.

Eagle Harbor, Bainbridge Island

The Wyckoff/Eagle Harbor Superfund site encompasses contaminated areas of Eagle Harbor and the former Wyckoff wood treating facility, as well as other upland sources of contamination to the harbor, including a former shipyard on the north shore. The site is currently divided into four operable units (OUs): East Harbor, West Harbor, Wyckoff Soil, and Wyckoff Groundwater.

The East Harbor OU is largely contaminated with organic chemicals associated with wood treating operations. The Remedial Investigation (1989) conducted by EPA identified mercury and polynuclear aromatic hydrocarbons (PAHs) as the principal contaminants of concern in marine sediments. Sediments north of the Wyckoff facility contained the highest concentrations of PAHs in Eagle Harbor. Elevated levels of mercury and PAH in fish and shellfish were also documented.

In 1993, the EPA authorized a Removal Action (RA) in the East Harbor OU to remediate heavily PAH contaminated marine sediments. The RA consisted of placing approximately 211,000 cubic meters of clean, sandy sediments dredged from the Snohomish River channel over 21.4 hectares of chemically contaminated sediments.

EPA issued a Record of Decision (ROD) for the East Harbor OU in September 1994. The ROD outlines monitoring and maintenance needs for the sediment cap, as well as phased sediment cleanup for remaining contaminated East Harbor areas. Once source control measures are completed at the Wyckoff operable units, clean sediment material will be placed over the remaining contaminated sediments in subtidal areas. Intertidal sediments will be monitored during natural recovery. Source control measures are underway at the Wyckoff facility, but complete source control may be many years away.

The West Harbor OU is primarily contaminated with mercury. On the north shore of the harbor, ship building, maintenance and repair activities have been conducted since the turn of the century. Past activities have been identified as the primary source of the mercury and other heavy metals found in the sediments.

In September 1992, EPA issued a Record of Decision (ROD) for the West Harbor OU. EPA amended the ROD in December 1995. The amended ROD requires the construction of a near shore fill in the intertidal and subtidal areas adjacent to the former shipyard property. The most heavily contaminated sediments will be dredged and placed within the fill. The remaining contaminated areas will be capped with clean sediment material. The remedial design is scheduled to be completed in 1996.

Sources of Contaminated Sediment Site List Chemicals of Concern

	1	2 Point Sources	3	4	5
	Municipal[b]	Industrial[c]	CSOs[d]	Nonpoint[e] Sources	Spills[1]
Inorganic Chemicals					
Arsenic	>25%	C,(E),IC,L,LS,M,OC,OR,P,S	>25%	AR,UR,IR,GW	OS
Cadmium	>25%	C,CP,(DC),M,PI	>25%	UR,IR,GW	C
Chromium	>25%	CP,F,IC,(L),OR,P,PI,(S),(SC)	>25%	UR,IR,GW	C,OS
Copper	>25%	C,CA,CP,L,LS,M,OR,P,PD,PI,S	>25%	UR,IR,GW	OS
Lead	>25%	C,CA,(DC),LS,M,OC,OR,P,PD,PI,(S)	>25%	UR,IR,GW	OS,O
Mercury	>25%	B,CA,(DC),(IC),M,OC,OR,P,S	>25%	UR,IR,GW	C,OS
Silver	>25%	(CP),(E),IC,PH,PI	>25%	GW,IR,UR	OS,C
Zinc	>25%	C,CA,(CP),(DC),(E),IC,LS,M,OC,OR,P,PD, R,S,SC	>25%	GW,IR,UR	OS
Nonionic Organic Compounds					
LPAH Compounds	>25%	(CO),D,L,M,(P),(RU,(S)	>25%	GW,IR,UR	O
Naphthalene	>25%	D,L,(OR),(OC),(P)	>25%	GW,IR,UR	O
Acenaphthylene	ND	L	≥25%	GW,IR,UR	O
Acenaphthene	≤25%	L,M,PD	≤25%	GW,IR,UR	O
Fluorene	≤25%	L,M,PD	≤25%	GW,IR,UR	O
Phenanthrene	>	D,L,M,PD	>25%	GW,IR,UR	O
Anthracene	>25%	D,L	≤25%	GW,IR,UR	O
2-Methylnaphthalene	>25%	(OR),(OC),(P)	>25%	GW,IR,UR	O
HPAH Compounds	>25%	(CO),D,L,M,OC,(P),(R),(S)	>25%	GW,IR,UR	O
Fluroanthene	>25%	(CO),D,L,M,OC,(P),(R),(S)	>25%	GW,IR,UR	O
Pyrene	>25%	DLM	>25%	GW,IR,UR	O

	1	2	3	4	5
	Point Sources				
	Municipal[b]	Industrial[c]	CSOs[d]	Nonpoint[e] Sources	Spills[i]
Benz(a)anthracene	>25%	L,M	>25%	GW,IR,UR	O
Chrysene	>25%	L,M	>25%	GW,IR,UR	O
Total benzofluroanthenes	>25%	L	>25%	GW,IR,UR	O
Benzo(a)pryene	>25%	L,M	≤25%	GW,IR,UR	O
Indeno(1,2,3-c,d)pyrene	>25%	L	≤25%	GW,IR,UR	O
Dibenz(a,h)anthracene	≤25%	L	≤25%	GW,IR,UR	O
Benzo(g,h,i)perylene	>25%	L	≤25%	GW,IR,UR	O
Chlorinated Benzenes					
1,4-Dichlorobenzene	≤25%	(E),OC	≤25%	IR,UR	--
Hexachlorobenzene	ND	(M),OC	--	IR	--
Misc. Extractable Compounds					
N-Nitrosodiphenylamine	ND	(OC),(PI),(RU)	≤25%	UR	—
Bis(2-ethyl)hexylphthalate	--	(E),PL,(PI)	--	IR	C
Hexachlorobutadiene	ND	(DC),OC	--	GW	C
Dibenzofuran	--	C,L,LS	--	IR,UR	--
PCBs					
Total PCBs	≤25%	M,SC	>25%	IR,UR	C,O
Phenols					
Phenol	>25%	IC,L,LS,M,OC,OR,P,(PL),RU	>25%	UR,IR	C
4-Methylphenol	--	(L),(M),(OC),OR),P,(PL),(RU)	--	UR,IR	O,C
Pentachlorophenol	≤25%	IC,L,OC,P	--	UR,IR,GW	C

[a] Information Contained in each column is explained by column number in the text.

[b] >25% = Chemical occurs in more than 25 percent of samples from Puget Sound municipal discharges
≤25% + Chemical occurs in 25 percent or fewer samples from Puget Sound municipal discharges
ND = Chemical not detected based on available information
--+There are insufficient data to categorize.

[c] The following codes are used to describe industries that are point sources of chemicals:

B = Bleach Plant
C = Copper smelters
CA = Chloralkall plants
CO = Coal handling
CP = Chrome and silver plating
D = Docks
DC = Dry cleaning
E = Electronics
F = Ferro, silicon, chrome industries
IC = Inorganic Chemical manufacturing
L - Log/wood treatment facility, plywood
LS = Log Sort yards
M = Primary production of ferrous and nonferrous metals
OC = Organic chemical manufacturing
OR = Oil Refining
P = Pulp mills
PD = Petroleum Distributor
PI = Paint and Ink
PH = Photography
PL = Plastics
R = Roofing
RU = Rubber manufacturing
S = Ship building/repair
SC = Scrap yards

Codes enclosed in parentheses are potential sources that have not yet been documented in Puget Sound
--=There are insufficient data to categorize

[d] >25% = Chemical occurs in more than 25 percent of samples from Puget Sound combined sewer overflows (CSOs)
≤25% = Chemical occurs in 25 percent or fewer samples from Puget Sound CSOs
ND = Chemical not detected based on available information
--=There are insufficient data to categorize

[e] The following codes are used to describe nonpoint sources of chemicals:

UR=Urban runoff
AR=Agricultural runoff
IR=Industrial runoff
GW=Groundwater seeps

--=There are insufficient data to categorize.

[f] Sources of chemicals may be attributed to the following spills:

O = Oil spills, or particularly in the case of PAH, creosote spills
C = Miscellaneous product spills
OS = ORE spills
--=There are insufficient data to categorize.

Extracted from *Pollutants of Concern in Puget Sound*, Puget Sound Estuary Program, April 1991.