



**Elliott Bay/Duwamish Restoration Program
Elliott Bay Nearshore Substrate Enhancement
Monitoring Plan**

Panel Publication No. 25
May 2000

Individuals and organizations needing further information about the Elliott Bay/Duwamish Restoration Program should contact the Administrative Director at the following address and telephone number:

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The Panel of Managers holds regularly scheduled meetings that are open to the public. Technical Working Group and committee meetings are scheduled on an as-needed basis, and are also open to the public. Meetings are generally held at the National Oceanic and Atmospheric Administration, National Marine Fisheries Service - Regional Directorate Conference Room, Building #1, 7600 Sand Point Way, NE, Seattle. The Panel recommends that you contact the Administrative Director at the above phone number to confirm meeting schedules and locations. The Panel also holds periodic special evening and weekend public information meetings and workshops.

Individuals and organizations needing further information about this report should contact the following individual:

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(206) 296-0600 (voice) and 1-800-833-6388 (TTY/TDD users only).

Acknowledgments

Elliott Bay/Duwamish Restoration Program

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Special thanks to Tim Clancy, NOAA, and Paul Dinnel, Dinnel Marine Research, for their review comments, and to Patrick Cagney, U.S. Army Corps of Engineers, for photographs used in this document.

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Report cover photographs provided by King County Department of Natural Resources photograph files. Upper photo: Speckled Sanddab (*Citharichthys stigmaeus*), middle photo: Epibenthic Suction Pump, lower photo: *Cumella vulgaris*.

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Introduction

The Elliott Bay Nearshore Substrate Enhancement Project was implemented in March 1998 pursuant to a decision made by the Elliott Bay/Duwamish Restoration Program (EB/DRP)¹ Panel of Managers to undertake a substrate enhancement project in the West Seattle nearshore area as described in the 1994 Concept Document (EB/DRP, 1994). Investigations of the nearshore areas in the vicinities of Myrtle Edwards Park, Seacrest Marina, and Duwamish Head during 1996 resulted in the selection of two sites for substrate enhancement: Site #1, referred to as Duwamish Head, and Site #2, referred to as "Seacrest area" (See Figure 1)².

The substrate enhancement project was undertaken to improve nearshore marine habitat conditions by enhancing productivity of benthic infauna, increasing the distribution and density of macro algae and other primary producers, and improving the attributes that support resident and migratory marine and estuarine fish species. Habitat objectives included the following:

- ◆ Increase diversity of bottom substrates;
- ◆ Increase area of limiting hard bottom substrates;
- ◆ Provide intertidal substrates for bait fish spawning;
- ◆ Provide suitable substrates at proper horizons for eelgrass;
- ◆ Increase volume of physical and protective structures for juvenile and adult resident invertebrates and fishes;
- ◆ Increase hard structure surfaces for macro algae; and
- ◆ Remove undesirable bottom debris.

¹ The Elliott Bay/Duwamish Panel of Managers was established to implement terms of the Consent Decree arrived at by and between federal, Tribal and state natural resource trustees and the City of Seattle and Municipality of Metropolitan Seattle (now King County Department of Natural Resources) pursuant to United States of America v. the City of Seattle and Municipality of Metropolitan Seattle, No. C90-395WD (W.D. Wash.).

²Site #2 is identified as Site #3 in the permit application (Appendix B); however, it has been relabeled as Site 2 for ease of communication because no enhancement activities occurred on the site originally designated as Site #2. The "Seacrest Marina area" identified in the permit application is referred to as the Seacrest area in this plan because the marina was removed in the late 1970s.

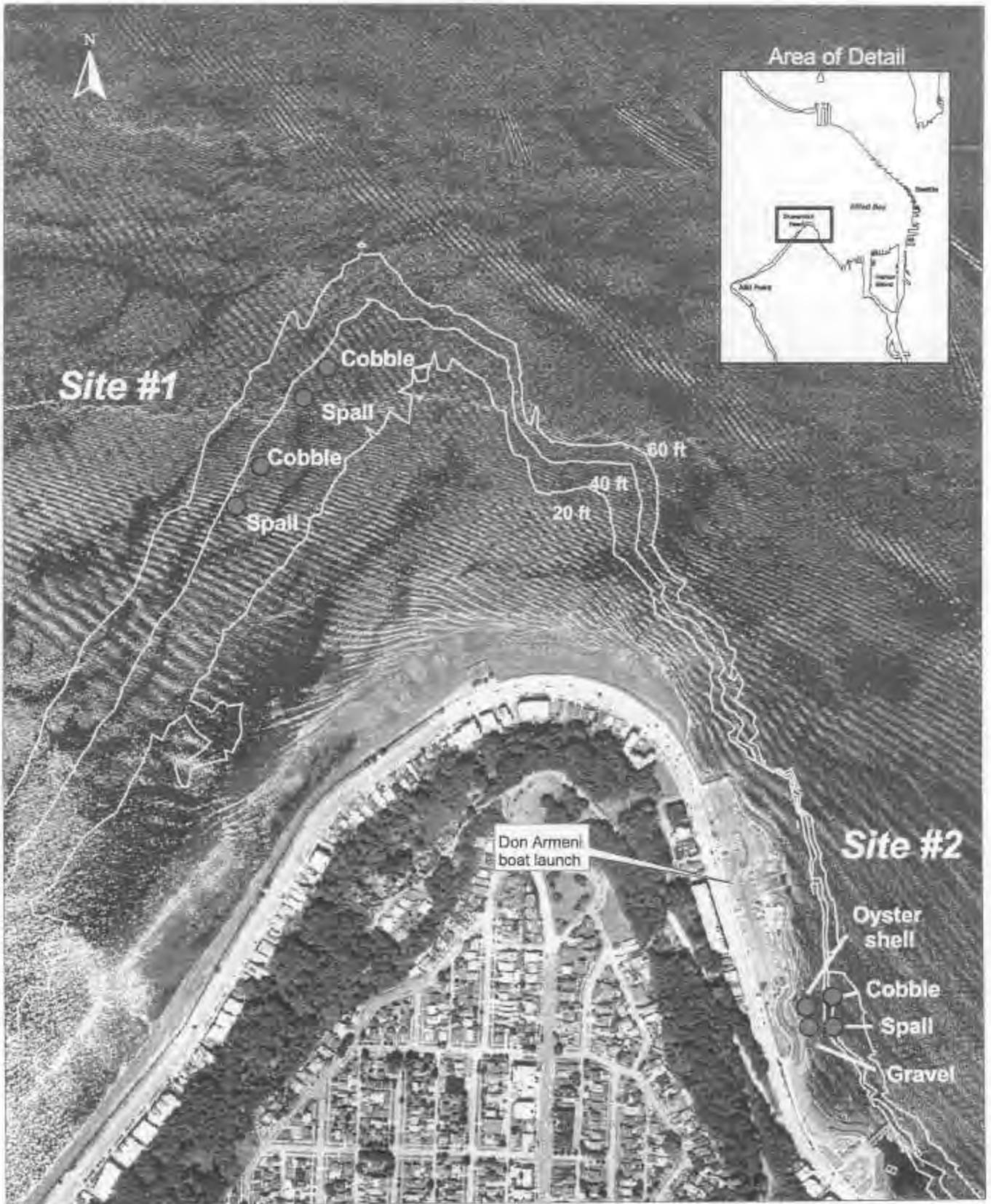


Figure 1. Elliott Bay Nearshore Substrate Enhancement Project Location

Site Conditions Prior to Project Implementation

As part of the site selection process, the Panel engaged the Washington Department of Fish and Wildlife (WDFW) to conduct an assessment of physical and biological parameters of potential project locations (Resolution 1995-26).

Substrate in the Duwamish Head project area (Site #1) was described by WDFW as stable and suitable with high potential for a "significant increase in the biodiversity and densities of species in the Elliott Bay area resulting from benthic habitat enhancement..." (Buckley, April - May 1996). A checklist of the variety of species found at Duwamish Head appears in Appendix A (Table A-1).

The subtidal (offshore) area north of Seacrest Park (Site #2), with variably sloping substrate and some shelf areas, was also judged to have a favorable physical profile and potential for high biodiversity. The biological checklist of species found at the site is provided in Appendix A (Table A-2). Paul Dinnel, Dinnel Marine Research (DMR), recommended small scale oyster shell plots in the intertidal (nearshore) area for the creation of juvenile Dungeness crab nursery habitat (Dinnel, 1993).

The Panel selected King County Department of Natural Resources (King Co. DNR) as the Project Manager for the development of a plan, schedule and budget for the enhancement project (Resolution 1996-31) and for project implementation (Resolution 1997-13). Three major factors influenced project design. A contaminated area north of the Seacrest area designated by the Washington Department of Ecology (Ecology) as EB3 initially posed concerns and significant design constraints. However, by 1997, Ecology determined that the "hot spot" containing mercury, benzoic acid, and copper, among other contaminants, was no longer a problem due to the process of natural recovery. Oyster shell enhancement could not occur in the intertidal area due to City of Seattle concerns about activities that might result in the concentration of additional recreational divers in shoreline areas already impacted by diver activities. Project design was also influenced by the Panel's desire to minimize restrictions on commerce, navigation, tribal and sport fishing.

The Washington Department of Natural Resources (WDNR) granted a right of entry for the substrate enhancement treatments for state aquatic lands northwest of Duwamish Head and seaward of City of Seattle tidelands north of Seacrest Park in West Seattle, extending outward from SW Atlantic Street (See Appendix B).

Project Design and Implementation

The Joint Aquatic Resource Permits Application (JARPA) was submitted to the U.S. Army Corps of Engineers in January 1998 (see Appendix C). The project was approved under a Nationwide Permit, and was constructed in early March 1998. The U.S. Army Corps of

Engineers, together with King County DNR, placed cobble, quarry spall, pea gravel and oyster shell in designated locations (See Figure 2). Materials were deployed by barge and placed in separate plots through the use of a crane and clamshell bucket. Project consultant Paul Dinnel participated in the placement of oyster shell.

Site #1

Cobble and spalls were placed at Site #1 - Duwamish Head. Four treatments of approximately 5 cubic yards each were placed near the -35' mean lower low water (MLLW) bathymetric contour. Each plot measured 10' x 10', less than 18" high. Protocols called for placing one treatment of cobble and one treatment of spall from above the water surface, and one treatment of cobble and one treatment of spall from below the water surface. During construction, however, all treatments were placed from above water.

Site #2

Oyster shell, cobble, quarry spall and pea gravel were placed in subtidal plots at Site #2 located just north of Seacrest Park, seaward of the Seattle tidelands, extending outward from SW Atlantic Street (See Figures 1 and 2). About 5 cubic yards of oyster shell were deployed over an area roughly 10' x 20', with a shell layer depth of about 6" at a depth of -2' to -12' MLLW. The oyster shell plot and eelgrass control site are shown in Figure 3.

A 10' x 20' x 6" high plot of pea gravel (5 cubic yards) was placed near the -2' to -10' MLLW contour. One plot of cobble and one plot of quarry spall, each about 5 cubic yards, approximately 10' x 10', were placed near the -35' MLLW bathymetric contour. Each plot contains rocks ranging in size from 2" to 12", with an average 12" thickness and height less than 18".



Cobble

Quarry spall



Oyster shell



Pea gravel



Figure 2. Project Materials (photographs courtesy of U.S. Army Corps of Engineers)

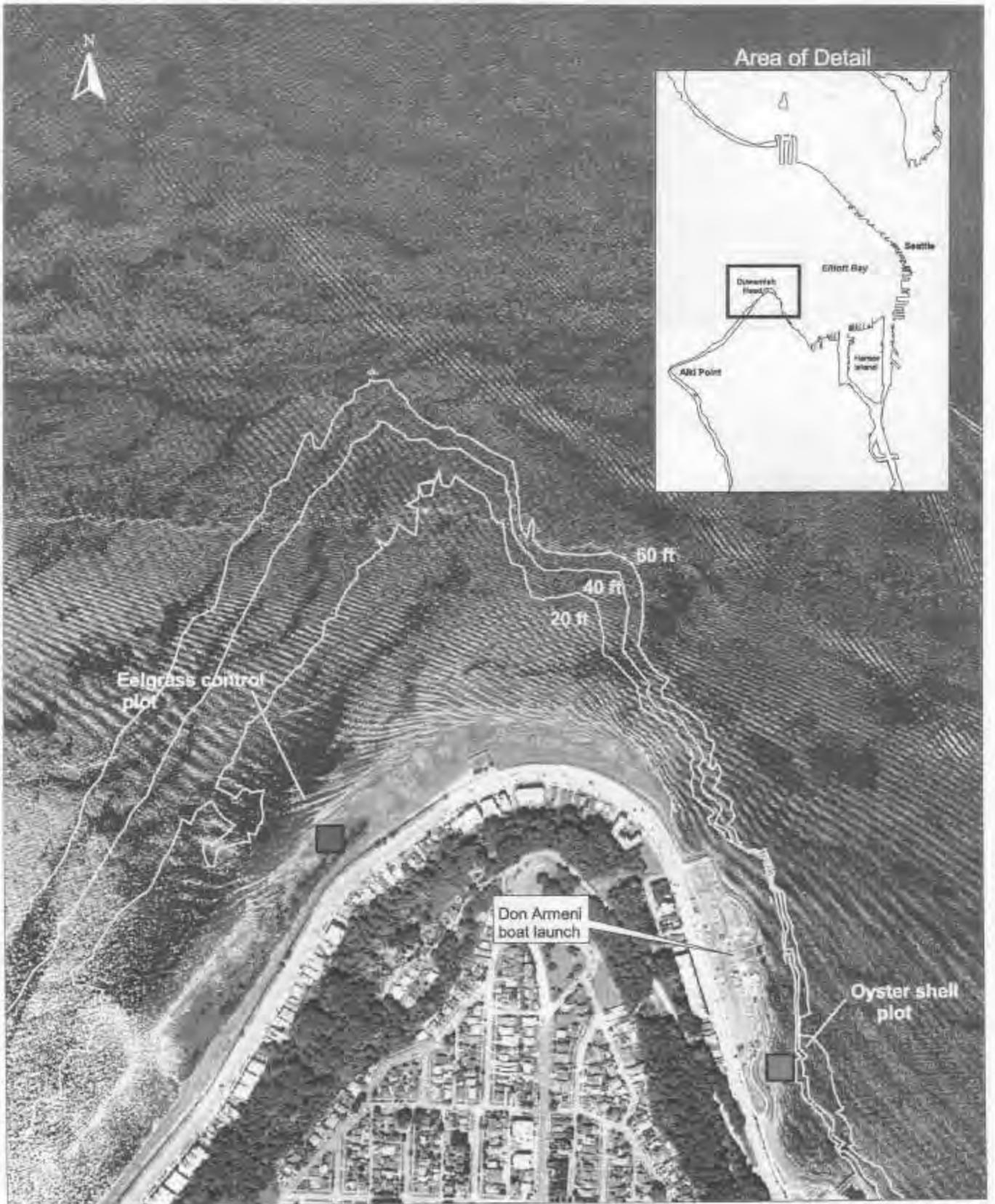


Figure 3. Oyster Shell and Eelgrass Control Plot Locations for Juvenile Dungeness Crab Survey

Monitoring Schedule, Methods and Budget

Project monitoring is necessary to assess the stability of substrate enhancements and determine the extent to which enhancements result in an increase in macroalgae, macroinvertebrates, juvenile and adult migratory and resident fish, juvenile Dungeness crab, and non-prey and prey benthos preferred by juvenile salmonids. A summary of the monitoring schedule is provided in Table 1.

Monitoring Schedule

Table 1 provides a summary of the monitoring schedule, events and budget.

Physical observations of all treatments will occur four times during the first year of substrate placement, and subsequently, in years two, three, four and five during February and August, at a minimum.

Biological sampling of the pea gravel plot will occur at least once per year in years one, two, three and five, anytime during April through early May. A second sampling event will be scheduled during June of each year as resources permit.

Biological sampling of the oyster shell plot will occur in July in year one and possibly in year three, dependent upon an evaluation of year one results.

Monitoring Methods

Three primary monitoring methods will be used for both project sites: physical observation (video monitoring), epibenthic invertebrate sampling, and juvenile Dungeness crab assessment. Species diversity and abundance at both sites #1 and #2 will be determined by physical observation. In addition, the pea gravel plot at site #2 will be sampled for epibenthic fauna and the oyster shell plot will be sampled for juvenile Dungeness crab settlement.

Physical observations of all treatments will be made with remote control camera and/or with diver and video camera. Monitoring reports will provide information on the areal extent and configuration of substrate, accumulation of sediment, and qualitative data of species diversity and abundance.

Biological sampling of the pea gravel plot to determine juvenile salmonids prey resources production will entail taking a minimum of 10 epibenthic samples with a gas powered centrifugal water pump, sucked through a 15 meter (m) long (51 millimeter [mm] inner diameter) hose connected to a terminal head attachment .35m wide and .38m high. Five samples will be collected from the gravel plot and five samples will be collected from an adjacent untreated substrate which will serve as a control, at an average tidal height of -22" MLLW. Samples will be preserved in 10% buffered formalin and transferred to 70% alcohol once back at the laboratory.

Samples will be processed by University of Washington, Fisheries Research Institute - Wetland Ecosystem Team (UWFRI-WET).

The oyster shell plot will be sampled during July of designated years using a hand-held venturi suction dredge. Ten samples will be collected on each date from the plot by working the nozzle of the suction dredge between the oyster shells within a 1/4 m² metal frame. By this method, crabs and associated fauna are sucked into a mesh bag, which will be exchanged for a new bag at the end of each sample effort. Samples will be sorted, identified and measured; other organisms will be identified to major taxonomic group, and animals returned live to the bay. Ten samples will be collected on each date from eelgrass beds representing the control site on the northwest side of Duwamish Head (See Figure 1). Control samples will be collected intertidally at low tide by digging 1/4m² quadrat samples to a depth of about 2 centimeter (cm) and washing the samples in a mesh bag with mesh size of about 3 mm.

Monitoring Program Budget

Prior to construction, the Panel approved an allocation of \$40,000 for the implementation of the monitoring program. The monitoring budget is provided in Table 1.

Monitoring Program Management and Implementation

As the project manager, King County DNR is responsible for the management and implementation of the monitoring program. Where practicable, volunteer community stewards will be invited to participate in determining physical success. Contractors for sampling activities to determine biological success will be selected by King County DNR and approved by the Panel. Modifications in the monitoring plan may be made by the project manager and the Panel.

Monitoring Reports

Monitoring report summaries will be provided to members of the Panel and the Habitat Development Technical Working Group no later than one year following sampling events and observations. Full reports will be provided within one year of the sampling events and observations. Monitoring reports are also available to interested members of the public upon request.

Table 1.

**Elliott Bay Nearshore Substrate Enhancement Project
Monitoring Schedule and Budget**

Monitoring Type/Project Site	Year/Frequency - Estimated Costs					Comments
	1 (1998) annual	2 (1999) semi-annual	3 (2000) semi-annual	4 (2001) semi-annual	5 (2002) semi-annual	
Physical Attributes						
Sites 1 & 2	\$ 50	\$ 50	\$ 50	\$ 50	\$ 50	Scuba supplies
erosion	\$ 2,461	\$ 1,753	\$ 1,000	\$ 1,000		Sampling costs
			\$ 126			Computer software
Biological Attributes	1 annual	2 annual	3 semi-annual	4 semi-annual	5 semi-annual	Comments
Site #2 (oyster shell)	\$ 6,140	\$ 6,200 reserved	-	-	-	Monitoring in year 2 will occur if warranted
juvenile Dungeness crab presence						
Site #2 (pea gravel)	\$ 1,200	\$ 1,000	\$ 4,600	-	\$ 4,600	Consultant
Salmonid Prey	\$ 616	\$ 584	\$ 1,000	-	\$ 1,000	Sampling costs
Total Projected Monitoring Costs	\$ 10,648	\$ 3,387	\$ 6,776	\$ 1,050	\$ 6,650	\$28,331 plus \$6,200 reserved

References

Buckley, Raymond, Washington Department of Fish and Wildlife. Undated. *Elliott Bay Habitat Restoration Project Progress Report for April - May 1996*. Prepared for the Elliott Bay/Duwamish Restoration Program Panel, Habitat Development Technical Working Group.

Buckley, Raymond and Betty Bookheim, Washington Department of Fish and Wildlife. Undated. *Elliott Bay Habitat Restoration Project Report for December - March 1996*. Prepared for the Elliott Bay/Duwamish Restoration Program Panel, Habitat Development Technical Working Group.

Dinnel, Paul A. 1993. *Creation of marine habitat complexity and stability with a focus on Dungeness crab nursery habitat*. Concept Paper for the Elliott Bay/Duwamish Restoration Program.

Elliott Bay/Duwamish Restoration Program. June 1994. *Concept Document*. Panel Publication No. 7.

Joint Aquatic Resource Permits (JARPA) Application for: Hydraulic Project Approvals, Shoreline Management Permits, Water Quality Certification and Approval for Exceedance of Standards, and U.S. Army Corps of Engineers Section 404 and 10 Permits. Submitted by King County Department of Natural Resources, Jan. 14, 1998.

Washington State Department of Natural Resources, Aquatic Lands Right of Entry Agreement, Number 22-002805, February 1998.

United States et.al. v. City of Seattle and Municipality of Metropolitan Seattle, Case No. C90-395WD, (W.D. Wash), Consent Decree, September 1991.

Appendix A

Table A-1. Checklist of species found at Duwamish Head, Site #1, 1996. (Buckley)

Table A-2. Checklist of species found at Seacrest nearshore area, Site #2, 1996. (Buckley and Bookheim)

Table A-1. Checklist of species found at Duwamish Head, Site #1, 1996.

Fish	Echinodermata (continued)
Big skate (<i>Raja binoculata</i>)	Ochre sea star (<i>Pisaster brevispinus</i>)
Shiner perch (<i>Cymatogaster aggregata</i>)	California sea cucumber (<i>Parastichopus californicus</i>)
Puget Sound sculpin (<i>artedius meanyi</i>)	White sea cucumber (<i>Eupentacta quinquesemita</i>)
Painted greenling (<i>Oxylebius pictus</i>)	Cnidaria
C-O sole (<i>Pleuronectes coenosus</i>)	White plumed anemone (<i>Metridium giganteum</i>)
Mollusca	Anemone (<i>Metridium senile</i>)
Gumboot chiton (<i>Cryptochiton stelleri</i>)	Painted anemone (<i>Urticina crassicomis</i>)
Lined chiton (<i>Tonicella lineata</i>)	Sand-rose anemone (<i>Urticina columbiana</i>)
Black chiton (<i>Katharina tunicata</i>)	Sea pen (<i>Ptilosaris gumei</i>)
Nudibrach (<i>Armina californica</i>)	Annelida
Purple olive (<i>Olivella biplicate</i>)	Polychaete worm (<i>Mesochaetopterus taylon</i>)
Wrinkled amphissa (<i>Amphissa columbiana</i>)	Northern feater duster worm (<i>Eudistylia vancouveri</i>)
Rock oyster (<i>Pododesmus macroschisma</i>)	Serpulid worm (<i>Serpula vermicularis</i>)
Gaper clam (<i>Tresus sp.</i>)	Angiosperms
Piddock (<i>Zirfaea pilsbryi</i>)	Eelgrass (<i>Zostera marina</i>)
Heart cockle (<i>Clinocardium nuttalli</i>)	Algae
Native littleneck clam (<i>Protothaca staminea</i>)	Navicula
Bay mussel (<i>Mytilus edulis</i>)	<i>Laminaria saccharina</i>
Horse mussel (<i>Mytilus edulis</i>)	<i>Nereocystis leutkeana</i>
Arthropoda	<i>Alaria marginata</i>
Northern kelp crab (<i>Pugettia producta</i>)	<i>Pterygophora californica</i>
Graceful kelp crab (<i>Pugettia gracilis</i>)	<i>Desmarestia ligulata</i>
Red rock crab (<i>Cancer productus</i>)	<i>Iridea cordata</i>
Coonstripe shrimp (<i>Pandalus danae</i>)	<i>Gigartina exasperata</i>
Acorn barnacle (<i>Balanus glandula</i>)	<i>Gracilaria sjoestedtii</i>
Echinodermata	<i>Ahnfeltiopsis pacifica</i>
Brittle star (<i>Ophiopteris papillosa</i>)	<i>Sarcodiotheca gaudichaudii</i>
Sunflower star (<i>Pcynopodia helianthoides</i>)	<i>Callophyllis sp.</i>
Rose star (<i>Crossaster papposus</i>)	<i>Opuntiella californica</i>
Sand star (<i>Luidia foliolata</i>)	<i>Delessaria decipiens</i>
False ochre sea star (<i>Evasterias troschelli</i>)	

Source: Buckley, undated)

Table A-2. Checklist of Species found at Seacrest nearshore area Site #2, 1996.

Fish	Arthropoda (continued)
Tubesnout (<i>Aulorhynchus flavidus</i>)	Red rock crab (<i>Cancer productus</i>)
Wolf-eel (<i>Anarrhichthys ocellatus</i>)	Graceful crab (<i>Cancer gracilis</i>)
	Hermit crab (<i>Pagurus armatus</i>)
Pacific herring (<i>Clupea harengus pallasii</i>)	Coonstripe shrimp (<i>Pandalus danae</i>)
Brown rockfish (<i>Sebastes auriculatus</i>)	Annelida
Copper rockfish (<i>Sebastes cauprinus</i>)	Feather duster worm (<i>Eudistylia polymorpha</i>)
Quillback rockfish (<i>Sebastes maliger</i>)	Polycheate (<i>Mesochaetopterus taylori</i>)
Lingcod (<i>Ophiodon elongates</i>)	Echinodermata
Whitespotted greenling (<i>Hexagrammos stelleri</i>)	Sunflower star (<i>PCynopodi halianthoides</i>)
Sculpin (<i>Artedius sp.</i>)	Stimpson's sun star (<i>Solaster stimpsoni</i>)
Buffalo sculpin (<i>Enophrys bison</i>)	Rose star (<i>Crossaster papposus</i>)
Sailfin sculpin (<i>Nautichthys oculofasciatus</i>)	Sand star (<i>Luidia foliolata</i>)
Kelp perch (<i>Brachyistius frenatus</i>)	False ochre star (<i>Pisaster ochraceus</i>)
Pile perch (<i>Rhacochilus vacca</i>)	Cushion star (<i>Pteraster tessellatus</i>)
Shiner perch (<i>Cymatogaster aggregata</i>)	California sea cucumber (<i>Parastichopus californicus</i>)
Striped perch (<i>Embiotoca lateralis</i>)	Cnidaria
Speckled sanddab (<i>Citharichthys stigmaeus</i>)	White plumed anemone (<i>Metridium giganteum</i>)
Rock sole (<i>Lepidopsetta bilineata</i>)	White spotted rose anemone (<i>Urticina lofotensis</i>)
C-0 sole (<i>Pleuronichthys coenosus</i>)	Sand-rose anemone (<i>Urticina columbiana</i>)
Mollusca	Aggregating anemone (<i>Anthopleura elegantissima</i>)
Giant Pacific octopus (<i>Octopus dofleini</i>)	Water jellyfish (<i>Aequorea aequorea</i>)
Stubby squid (<i>Rossia pacifica</i>)	Lion's mane jellyfish (<i>Cyanea capillata</i>)
Market squid (<i>Loligo opalescens</i>)	Fleishy sea pen (<i>Ptilosarcus gurneyi</i>)
Lewis' moon snail (<i>Polinices lewisii</i>)	Macro-algae
Gaper clam (<i>Tresus capax</i> or <i>nuttallii</i>)	<i>Navicula sp.</i>
Bay mussel (<i>Mytilis edulis</i>)	<i>Sargassum muticum</i>
Nudibrach (<i>Flabellina fusca</i>)	<i>Laminaria saccharina</i>
False sea lemon (<i>Archidoris montereyensis</i>)	<i>Sarcociotheca sp.</i>
Arthropoda	<i>Sarcodiotheca sp.</i>
Acorn barnacle (<i>Balanus glandula</i>)	<i>Callophyis flabellulata</i>
Northern kelp crab (<i>Pugettia producta</i>)	<i>Opuntia californica</i>
Dungeness crab (<i>Cancer magister</i>)	

Source: Buckley and Bookheim

Appendix B

Washington State Department of Natural Resources, Aquatic Lands Right of Entry Agreement
Number 22-002805.



WASHINGTON STATE DEPARTMENT OF
Natural Resources

JENNIFER M. BELCHER
Commissioner of Public Lands

March 5, 1998

CERTIFIED MAIL

Ms. Judy Bevington
King County Department of Natural Resources
506 Second Avenue, Suite 708
Seattle, WA 98104

Subject: Aquatic Resources Right of Entry No. 22-002805

Dear Ms. Bevington:

Enclosed is a final copy of Right of Entry No. 22-002805 for your records.

If you should have any questions, feel free to contact Mary Barrett, your land manager at (360) 825-1631.

Sincerely,

Bonnie B. Bunning
Region Manager

Donna Berube

Donna Berube, Administrative Assistant
South Puget Sound Region

Enclosure

sk/Barrett/22002805.ftl

**STATE OF WASHINGTON
DEPARTMENT OF NATURAL RESOURCES
JENNIFER M. BELCHER
Commissioner of Public Lands
Olympia, Washington 98504**

AQUATIC LANDS RIGHT OF ENTRY AGREEMENT

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STATE OF WASHINGTON
DEPARTMENT OF NATURAL RESOURCES
JENNIFER M. BELCHER
Commissioner of Public Lands
Olympia, Washington 98504

AQUATIC LANDS RIGHT OF ENTRY AGREEMENT

AQUATIC LANDS RIGHT OF ENTRY AGREEMENT NO. 22-002805

THIS AGREEMENT is made by and between the STATE OF WASHINGTON, acting through the Department of Natural Resources ("State"), and KING COUNTY DEPARTMENT OF NATURAL RESOURCES, a government agency/entity ("Licensee").

1. PERMISSION, LOCATION AND ACCESS

Subject to the terms and conditions set forth below, State grants Licensee and its agents, contractors and subcontractors a temporary revocable license to enter upon the real property described in Exhibit A (the "Property") to conduct the authorized activities described below and for no other purpose.

2. CONSIDERATION

The consideration paid by Licensee to State shall be as follows: Zero Dollars (\$0).

3. TERM OF LICENSE

This license shall be effective on the 1st day of March, 1998 (the "Effective Date"), and shall terminate on the 28th day of February, 1999 (the "Termination Date"), unless terminated sooner under the terms of this License, or when Licensee completes the Activities, whichever occurs first. State reserves the right to revoke this license at any time upon thirty (30) days notice to Licensee.

4. AUTHORIZED ACTIVITIES

(a) The activities authorized to be conducted are described in Exhibit B to this Agreement (the "Activities"). No other activities may be conducted on the Property without the prior written permission of State. Not included in this Agreement are any rights to harvest, collect, or damage any natural resource, including aquatic life or living plants.

(b) Restrictions on Use. Licensee shall not cause or permit any damage to natural resources on the Property. Licensee shall also not cause or permit any filling activity to occur on the Property. This prohibition includes any deposit of rock, earth, ballast, refuse, garbage, waste matter (including chemical, biological or toxic wastes), hydrocarbons, any other pollutants, or other matter in or on the Property, except as approved in writing by State. Licensee shall neither commit nor allow waste to be committed to or on the Property. If Licensee fails to comply with all or any of the restrictions in use set out in this Section 4, State may take any steps reasonably necessary to remedy such failure. Upon demand by State, Licensee shall pay all costs of such

remedial action, including but not limited to the costs of removing and disposing of any material deposited improperly on the Property.

(c) Condition of the Property. Prior to the termination of this Agreement, or within thirty (30) days after receiving notice of an early revocation of this License, Licensee shall restore the Property to a condition as near as reasonably possible to the condition of the Property at the commencement of this Agreement except for any changed conditions caused solely by parties other than Licensee, its agents, contractors, or subcontractors.

5. TITLE TO PROPERTY

State grants a right of access only to the extent of its interest in the Property. It does not warrant that it is the owner of the Property or that Licensee's entry and use of the Property does not violate other persons' rights to the Property. Licensee agrees to obtain approvals from other persons who have a right, title, or interest in the Property. This license shall not be exclusive and State may grant similar rights to anyone else. State may also lease the Property or grant easements or licenses.

6. NOTICE OF DATE OF ENTRY

Licensee and its agents, contractors, and subcontractors shall provide State with at least two (2) weeks notice of the schedule of anticipated dates necessary for conducting the Activities. Licensee shall promptly notify State of any modifications in the schedule.

7. COMPLIANCE WITH LAWS

Licensee shall, at all times, keep current and comply with all conditions and terms of any permits, licenses, certificates, regulations, ordinances, statutes, and other government rules and regulations regarding the use of the Property. Licensee shall, at its sole expense, obtain all regulatory or proprietary consents or approvals required to be obtained from any public authority, State or third party in connection with any work on the Property or Licensee's use or occupation of the Property.

8. INDEMNIFICATION AND LIABILITY

Licensee shall indemnify, defend, and hold harmless State, its employees, officers, and agents from any and all liability, damages (including personal injury and damages to land, aquatic life, and other natural resources), expenses, causes of action, suits, claims, costs, fees (including attorneys' fees), penalties, or judgments, of any nature whatsoever, arising out of the use, occupation, or control of the Property by Licensee, its sublicensees, invitees, agents, employees, licensees, or permittees, except as may arise solely out of the willful or negligent act of State or State's elected officials, employees, or agents. To the extent that RCW 4.24.115 applies, Licensee shall not be required to indemnify, defend, and hold State harmless from State's sole or concurrent negligence.

9. INSURANCE

At its own expense, Licensee shall procure and maintain during the Term of this license, the insurance coverages and limits described in Section 9(a) and (b) below. This insurance shall be issued by an insurance company or companies admitted and licensed by the Insurance Commissioner to do business in the State of Washington. Insurers must have a rating of B+ or better by "Best's Insurance Reports," or a comparable rating by another rating company acceptable to State. If non-admitted or non-rated carriers are used, the policies must comply with Chapter 48.15 RCW.

(a) **Types of Required Insurance.**

(1) **Commercial General Liability Insurance.** Licensee shall procure and maintain Commercial General Liability insurance covering claims for bodily injury, personal injury, or property damage arising on the Property and/or arising out of Licensee's operations. Insurance must include liability coverage with limits not less than those specified below:

Description

Each Occurrence	\$1,000,000
General Aggregate Limit	\$2,000,000

(2) **Worker's Compensation/Employer's Liability Insurance.** As applicable, Licensee shall procure and maintain:

- (i) State of Washington Worker's Compensation coverage with respect to any work by Licensee's employees on or about the Property and on any improvements;
- (ii) Employers Liability or "Stop Gap" insurance coverage with limits not less than those specified below. Insurance must include bodily injury coverage with limits not less than those specified below:

	Each Employee	Policy Limit
<u>By Accident</u>	<u>By Disease</u>	<u>By Disease</u>
\$1,000,000	\$1,000,000	\$1,000,000

(iii) Jones Act coverage with respect to any work by Licensee's employees on or about the Property and on any improvements.

(b) **Terms of Insurance.** The policies required under Section 9(a) shall name the State of Washington, Department of Natural Resources as an additional insured (except for State of Washington Worker's Compensation coverage, and Federal Jones' Act coverage). Furthermore, all policies of insurance described in Section 9(a) shall meet the following requirements:

- (1) Policies shall be written as primary policies not contributing with and not in excess of coverage that State may carry;
 - (2) Policies shall expressly provide that such insurance may not be canceled or nonrenewed with respect to State except upon forty-five (45) days prior written notice from the insurance company to State;
 - (3) All liability policies must provide coverage on an occurrence basis;
- and
- (4) Liability policies shall not include exclusions for cross liability.

(c) **Proof of Insurance.** Licensee shall furnish evidence of insurance in the form of a Certificate of Insurance satisfactory to the State accompanied by a check list of

coverages provided by State, executed by a duly authorized representative of each insurer showing compliance with the insurance requirements described in Section 9, and, if requested, copies of policies to State. The Certificate of Insurance shall reference the State of Washington, Department of Natural Resources and the right of entry number. Receipt of such certificates or policies by State does not constitute approval by State of the terms of such policies. Licensee acknowledges that the coverage requirements set forth herein are the minimum limits of insurance the Licensee must purchase to enter into this agreement. These limits may not be sufficient to cover all liability losses and related claim settlement expenses. Purchase of these limits of coverage does not relieve the Licensee from liability for losses and settlement expenses greater than these amounts.

10. PROHIBITION AGAINST ASSIGNMENT

Licensee shall not assign this Agreement.

11. APPLICABLE LAW AND VENUE

This Agreement shall be interpreted and construed pursuant to the laws of the State of Washington. Venue for any action arising out of or in connection with this Agreement shall be in the Superior Court for Thurston County, Washington.

12. MODIFICATION

Any modification of this Agreement must be in writing and signed by the parties. State shall not be bound by any oral representations or statements.

THIS AGREEMENT requires the signature of all parties and is executed as of the date of the last signature below.

STATE:

LICENSEE:

STATE OF WASHINGTON
DEPARTMENT OF NATURAL
RESOURCES

KING COUNTY DEPARTMENT OF
NATURAL RESOURCES

By: Bonnie B Bunning
BONNIE B. BUNNING

By: Pam Bissonnette
PAM BISSONNETTE

Its: South Puget Sound Region Manager

Its: Director

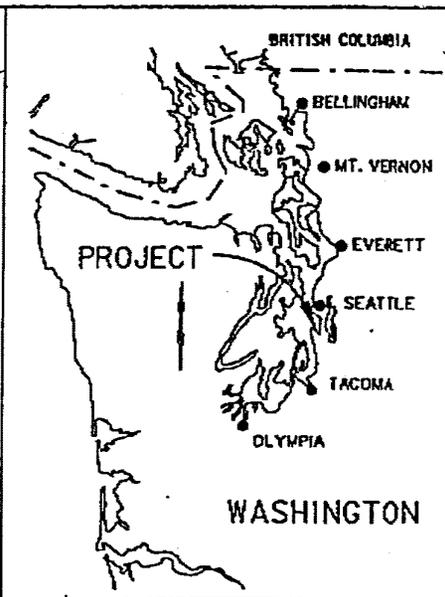
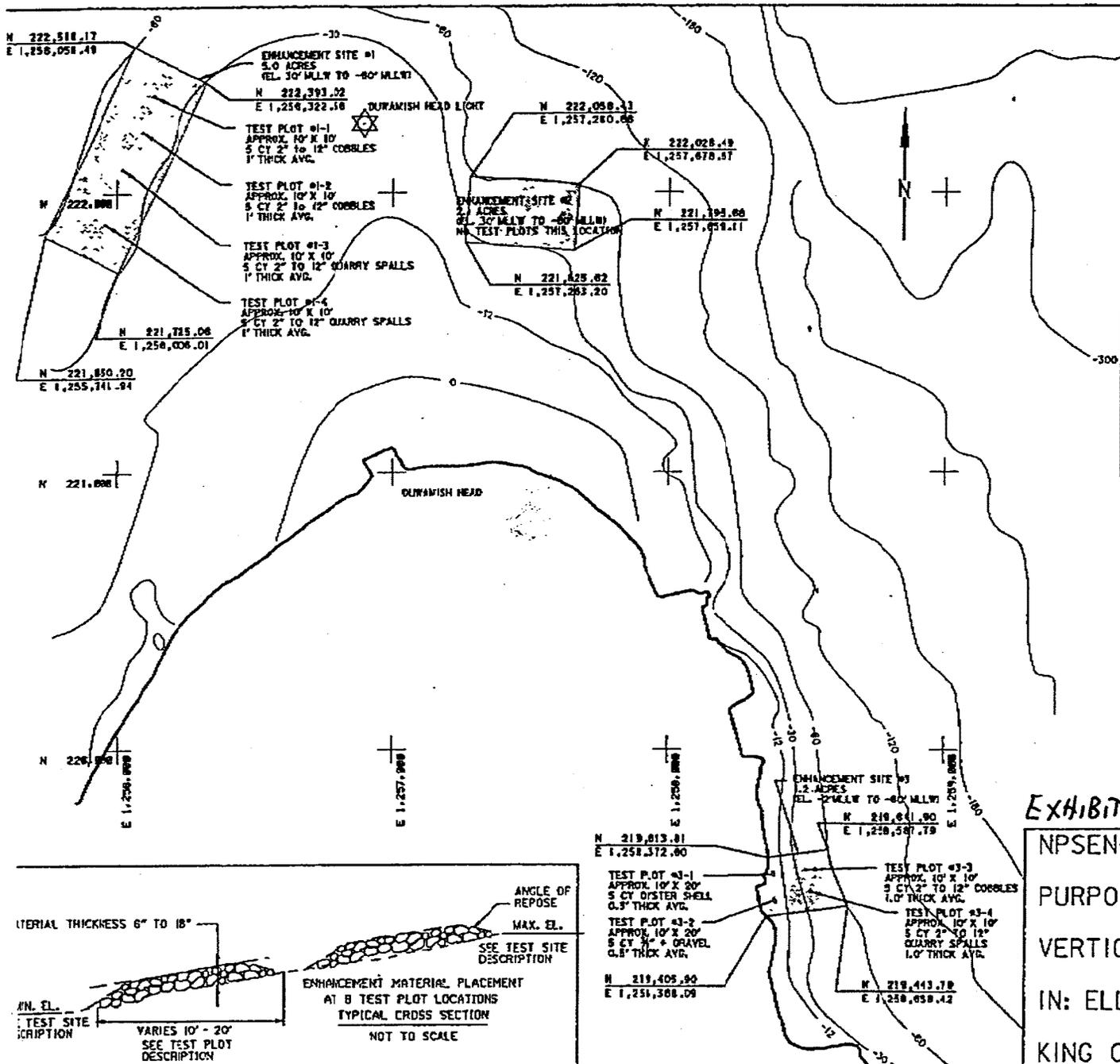
Dated: [February 23, 1998]

Dated: [2/20/98]

PROOFED

BB

db/Barett/980213/22002805.roe



1" = 200'

HORIZONTAL CONTROL IS BASED ON NAD 83/91.

EXHIBIT "A" FIGURE 1

NPSN-PL-X

PURPOSE: HABITAT ENHANCEMENT

VERTICAL DATUM: MLLW (NOS)

IN: ELLIOTT BAY

KING COUNTY, WA.

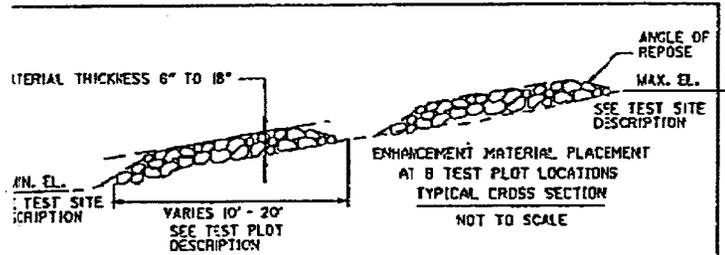


EXHIBIT B

This exhibit describes the activities that are permitted based on this right of entry. The activities that are permitted is the placement of materials as described below for the purpose of testing these materials as marine habitat restoration systems and prior to the construction of large habitat restoration project that is proposed at some future date.

a. At site one the proposed test would consist of placing of materials in four locations with approximately 5 cubic yards of material in each location. 2 to 12 inch quarry spalls would be placed in two locations and 2 to 12 inch cobbles would be placed in two other locations as shown on figure 1. The material would be placed within 18 inches of the sea bed utilizing different placement methods. The material would be placed from a barge utilizing a floating crane.

b. Site two would be used for the major project at a latter date and is not included in this right of entry.

c. At site three the proposed test would consist of placing of materials in four locations with approximately 5 cubic yards of material in each location as shown on figure 1. At two locations material would be placed between -2 and -12 feet. At one of these shallow locations whole oyster shells would be placed and at another location 3/8 inch gravel would be placed within 6 inches of the bottom. At the other two locations at this site cobbles and quarry spalls would be placed in a similar method to site one. These materials would also be placed by barge and crane.

d. All the material will be considered permanent as it will need to remain in place for both monitoring and incorporation into a larger project that will be constructed at a later date.

Date Received: _____

- JARPA APPLICATION FORM -

- for use in Washington State -



PLEASE TYPE OR PRINT IN BLUE OR BLACK INK

Based on the preceding checklist, I am sending copies of this application to the following: *(check all that apply)*
 Local Government: for shoreline Substantial Development Conditional Use Variance Exemption; or
 Floodplain Management Critical Areas Ordinance
 Washington Department of Fish and Wildlife for HPA
 Washington Department of Ecology Approval to Allow Temporary Exceedance of Water Quality Standards
 401 Water Quality Certification Nationwide Permits
 Corps Engineers for Section 404 or Section 10 permit(s)

SECTION A - Use for all permits covered by this application. Be sure to also complete Section C (Signature Block) for all permit applications.

1. Applicant King County Department of Natural Resources Attn: Larry Ellington

Mailing Address 506 Second Avenue, Suite 708

Seattle, WA 98104-2311

Work Phone: (206) 296-7816

Home Phone: () _____

Fax Number: (206) 296-0516

If an agent is acting for the applicant during the permit process, complete #2 & 3.

2. Authorized Agent _____

Mailing Address _____

Work Phone: () _____

Home Phone: () _____

Fax Number: () _____

3. Designation of Authorized Agent, if applicable:

I hereby designate _____ to act as my agent in matters related to this application for permit(s). I understand that if a Federal permit is issued, I must sign the permit.

Signature of Applicant _____

Date _____

4. Relationship of applicant to property: Owner Purchaser Lessee Other (County Sewer Utility)

5. Name, address, and phone number of property owner(s), if other than applicant:

Washington State Department of Natural Resources, P.O. Box 68, Enumclaw, WA 98022-0068

Attn: Mary Barrett (360) 902-1086

6. Location where proposed activity exists or will occur:

Waterbody Elliott Bay, Puget Sound

Near Seacrest Park

Street Address 1660 Harbor Ave. SW

Seattle, King, WA, 98126

City, County, State, Zip Code

Near Luna Park

Street Address 1228 Harbor Ave. SW

Seattle, King, WA, 98116

City, County, State, Zip Code

Department of Natural Resources, Sub- and Intertidal lands

DNR Stream Type (if known) _____
Tributary of _____

Legal Description:

Adjacent to, north of, Block 448 Seattle Tide Lands

Tax Parcel No.: 766670-6730

¼	¼	Section	Township	Range
SW		2	24N	3E

Legal Description:

Adjacent to, east of, Block 456A, Seattle Tide Lands

Extension #1

Tax Parcel No.: 766670-6950

¼	¼	Section	Township	Range
SE		2	24N	3E

7. Describe the current use of the property, and structures existing on the property. If any portion of the proposed activity is already completed on this property, indicate month and year of completion.

The Department of Natural Resources property is located within Elliott Bay. DNR property is used for navigation, public access, and recreation. It is not currently used for the commercial harvesting of shellfish.

No portions of the proposed activities have been completed.

Is the property agricultural land? Yes No Are you a USDA program participant? Yes No

8. Describe the proposed activity, and the activity's purpose. Include expected water quality and fish impacts, and proposed actions to reduce the duration and severity of those impacts and provide proper protection for fish life. Complete plans and specifications should be provided for all work seaward of the Ordinary High Water Mark or Line, including types of equipment to be used, and for all work if applying for a shoreline permit. If additional space is needed, please attach a separate sheet.

We plan to conduct this small habitat enhancement test project in the vicinity of Duwamish Head in West Seattle, at two sites. The bulk of the project will be NW of Duwamish Head on DNR property (Site #1), and a smaller portion at Site #3 which is seaward of Seattle Tidelands on property designated "Public Place" and "Waterway(s)," north of Seacrest Marina, extending outward from SW Atlantic Street. Please see attached maps for location. This area is important to juvenile and adult fish passage.

There will be 4 plots at Site #1 along the 35 foot depth line. Approximately five cyds of rocks will be put in place at each of the four plots. The size of the "mounds" will be approximately 10' x 10' with an average height of 1 ft. aiming to not exceed 18 inches. Rocks used will be 2-12" inches in size; two plots will be cobbles and the other two quarry spalls.

At site #3 we propose to place a 10' x 20' plot of pea gravel and a 10' by 20' plot of oyster shells (approx. 5 cyds and averaging .5' deep each) from the -2 to the -12 mllw depth. At the 35' depth we propose to place 5 cyds of rocks at each of two plots, approximately 10' x 10' each with 2-12" rocks with an average 1 foot thickness, aiming to not exceed 18 inches. One plot will have quarry spalls and the other cobbles.

An effort will be made to locate the plots along the designated depth and at designated GPS positions. This project will help to determine how exact this process can be, given wave action, currents and wind conditions and vessel limitations for implementation of future larger projects of a similar nature. Therefore the whole site patch should be considered the project area. We will work with City of Seattle to address any issues. Prior to construction, divers will set corners of the plots and make GPS readings to more precisely determine the location of the plots. The chief criteria for plot selection include relatively bare

substrate of the appropriate size along the appropriate depth and avoidance of eel grass beds. The GPS reading will be given to the project manager for USACE who will direct the contraction person to dump the materials as close as possible to those positions. Monitoring will evaluate this.

Monitoring

Using a remote video camera, the Project area will be monitored immediately before and after the emplacement of the substrate materials and at two other times, such as April, after winter storms and in August, after a growth season. This will be to determine: 1. actual vs. planned location and configuration of materials, 2) stability of materials, 3) effectiveness in providing habitat including attachment of vegetation and providing protective spaces for small aquatic animals.

Sedimentation will be determined by accumulation of sediments on ceramic tiles. Any unanticipated results will be recorded. If the video camera proves insufficient, a diver will be contracted to assess the effectiveness of the materials.

At this time we have insufficient funds for long term monitoring (beyond 1 year), but our aim is to identify future funding sources to enable this.

Preparation of drawings: See Appendix A - sample drawings and checklist for completing the drawings. One set of original or good quality reproducible drawings must be attached. NOTE: Applicants are encouraged to submit photographs of the project site, but these do not substitute for drawings. THE CORPS OF ENGINEERS REQUIRES DRAWINGS ON 8-1/2 X 11 INCH SHEETS. Larger drawings may be required by other agencies.

9. Proposed Starting Date: February/March 1998 Estimated duration of activity: One Week

Will the project be constructed in stages? Yes No. In water will only occur during the WDFW fish windows of October 15 through April 1.

10. Will any structures be placed:

- a. waterward of the Ordinary High Water Mark or Line for fresh or tidal waters? Yes No
b. waterward of Mean High Water Line in tidal waters? Yes No

11. Will fill material (rock, fill, bulkhead, pilings or other material) be placed waterward of Ordinary High Water Mark or Line for fresh or tidal waters? Yes No

- a. If "yes," in fresh water indicate volume in cubic yards: .
b. If "yes," in tidal waters, indicate volume in cubic yards waterward of the line of mean higher high water: 50 cubic yards.

12. Will material be placed in wetlands? Yes No If yes, impacted area: _____ (acres)

If yes:

- a. Has a delineation been completed? Yes No (If yes, please submit with application.)
b. Type and composition of fill material (e.g., sand, etc.): _____
c. Material source: _____
d. List all soil series (type of soil) located at the project site, & indicate if they are on the county's list of hydric soils: Soils information can be obtained from the Natural Resources Conservation Service (NRCS), formerly Soil Conservation Service (SCS). _____

13. Will proposed activity cause flooding or draining of wetlands? Yes No If yes, impacted area: _____ (acres)

14. Will excavation or dredging be required in water or wetlands? Yes No If yes, volume: _____ (cubic yards)

- a. Composition of material removed: _____
b. Disposal site for excavated material: _____
c. Method of dredging: _____

15. List other applications, approvals, or certifications from other Federal, state or local agencies for any structures, construction, discharges, or other activities described in the application (i.e., preliminary plat approval, health district approval, building permit, SEPA review, FERC license, Forest Practices Application, etc.) Also indicate whether work has



WASHINGTON



JOINT AQUATIC RESOURCE PERMITS (JARPA) APPLICATION FOR: HYDRAULIC PROJECT APPROVALS, SHORELINE MANAGEMENT PERMITS, WATER QUALITY CERTIFICATION & APPROVAL FOR EXCEEDANCE OF STANDARDS, & U.S. ARMY CORPS OF ENGINEERS SECTION 404 and 10-PERMITS

— INSTRUCTIONS —

This Joint Application can be used to apply for Hydraulic Project Approvals, Shoreline Management Permits, Approvals for Exceedance of Water Quality Standards, Water Quality Certifications and Army Corps of Engineers Permits. **You must submit readable copies of the completed application form together with detailed drawings, prepared in accordance with the drawing guidance in Appendix A to the appropriate agencies.** Remember, depending on the type of project you are proposing, other permits may be required that are not covered by this application.

Use the following checklist to determine which permits to apply for. If you have trouble deciding which permits you need, please contact the appropriate agency for questions. Agency telephone numbers are in appendix B.

Your project may require some, or all, of these permits. IF YOU CHECK ANY BOX UNDER A PERMIT TITLE, THEN YOU MUST APPLY FOR THAT PERMIT. Complete Section A & C for any of the permits listed below. Also complete Section B for Shoreline & Corps of Engineers permits. Detailed drawings are required for any of these permits (see Appendix A for drawing requirements).

- ◆ Hydraulic Project Approval issued by the Department of Fish and Wildlife under 75.20 RCW is required if your project includes construction or other work, that:
 - will use, divert, obstruct, or change the natural flow or bed of any fresh or salt water of the state. This includes all construction or other work waterward and over the Ordinary High Water Line, including dry channels, and may include projects landward of the Ordinary High Water Line (e.g., activities outside the Ordinary High Water Line that will directly impact fish life and habitat, falling trees into streams or lakes, etc.).
- ◆ Shoreline Substantial Development, Conditional Use, Variance Permit, or Exemption issued by Local Government (under the Shoreline Management Act, 90.58 RCW:) required for work or activity in the 100-year floodplain, or within 200 feet of the Ordinary High Water Mark of certain waters; and which includes any one of the following:
 - dumping; drilling; dredging; filling;
 - placement or alteration of structures (whether temporary or permanent);
 - any activity which substantially interferes with normal public use of the waters regardless of cost.
- ◆ Floodplain Management permits and/or Critical Areas Ordinances review by local government for:
 - work in frequently flooded areas, geologically unstable areas, wildlife habitats, aquifer recharge areas, and wetlands.
- ◆ A Section 401 Water Quality Certification issued by the Department of Ecology under 33 USC §§ 401 and 1344 is required when a Corps of Engineer's §404 is required. However, the Corps will notify Ecology of the project through the Corps' public notice unless you are applying for a Corps Nationwide Permit. NOTE: Certification of hydropower projects will require additional information — contact Ecology's Shorelands & Water Resources Program for additional permitting requirements.
 - Send a copy of this application and drawings to Ecology for a 401 Certification only when applying for a Corps of Engineers Nationwide Permit, or hydropower projects.

Allow Temporary Exceedance of Water Quality Standards by the Department of Ecology, under 90.48 RCW, if results in:

any exceedance of water quality criteria established by WAC 173-201A for in water work (e.g., changes in sediment disturbances and pH changes from concrete curing). NOTE: Application of aquatic herbicides and is covered by a separate application-contact Ecology's Regional Office to apply.

- ◆ A Section 404 Permit from the Corps of Engineer under 33 USC §§ 404 and 1344 is required if your project includes:
 - discharge or excavation of dredged or fill material waterward of the Ordinary High Water Mark, or the Mean Higher High Tide Line in tidal areas, in waters of the United States, **including wetlands**;
 - mechanized land clearing in waters of the United States, **including wetlands**.

- ◆ A Section 10 Permit from the Corps of Engineer is required for:
 - any work in or affecting navigable waters of the United States (e.g., floats, piers, docks, dredging, piles, buoys, overhead power lines, etc.).

USEFUL DEFINITIONS

The following definitions are presented to help applicants in completing the JARPA. They may not necessarily represent specific language from the laws implemented through JARPA.

Mean High Water and Mean Higher High Water Tidal Elevations at any specific location can be found in tidal benchmark data compiled by the United States Department of Commerce, Environmental Science Services Administration, Coast and Geodetic Survey, dated January 24, 1979. This information can be obtained from the Corps of Engineers at (206) 764-3495.

The determination of tidal elevation is obtained by averaging each day's highest tide at a particular location over a period of 19 years, measured from mean Lower Low water, which equals 0.0 tidal elevation.

Mean Lower Low is the 0.0 tidal elevation, determined by averaging each day's lowest tide at a particular location over a period of 19 years. It is the tidal datum for vertical tidal references in the salt water area.

Ordinary High Water Mark or Line means the mark on all lakes, streams and tidal waters, which will be found by examining the beds and banks and ascertaining where the presence and action of waters are so common and usual, and so long continued in all ordinary years, as to mark upon the soil or vegetation a character distinct from that of the abutting upland, provided that in any area where the ordinary high water mark cannot be found, the ordinary high water mark adjoining saltwater shall be the line of mean higher high tide and the ordinary high water mark adjoining fresh water shall be the line of mean high water.

Shorelands or shoreland areas means those lands extending landward for two hundred feet in all directions as measured on a horizontal plane from the ordinary high water mark; floodways and contiguous floodplain areas landward two hundred feet from such floodways; and all wetlands and river deltas associated with the streams, lakes, and tidal waters which are subject to the provisions of 90.58 RCW.

Shorelines means all water areas of the state, including reservoirs, and their associated wetlands, together with the lands underlying them, except stream segments upstream of the point where mean annual flow is less than 20 cubic feet per second, and lakes less than 20 acres in size.

Wetlands means areas that are inundated or saturated by surface water or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. Wetlands do not include those artificial wetlands intentionally created from nonwetland sites, including, but not limited to, irrigation and drainage ditches, grass-lined swales, canals, detention facilities, wastewater treatment facilities, farm ponds, and landscape amenities. Wetlands may include those artificial wetlands intentionally created from nonwetland areas to mitigate the conversion of wetlands.

Appendix C

Joint Aquatic Resource Permits (JARPA) Application for: Hydraulic Project Approvals, Shoreline Management Permits, Water Quality Certification and Approval for Exceedance of Standards & U.S. Army Corps of Engineers Section 404 and 10 Permits.

Signature of Landowner (REQUIRED if other than applicant)

Date

This application must be signed by the applicant. If an authorized agent is to be designated, the applicant must also sign at Item #3.

18 U.S.C §1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly falsifies, conceals, or covers up by any trick, scheme, or device a material fact or makes any false, fictitious, or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious, or fraudulent statement or entry, shall be fined not more than \$10,000 or imprisoned not more than 5 years or both.

DO NOT SEND FEDERAL PROCESSING FEE WITH APPLICATION

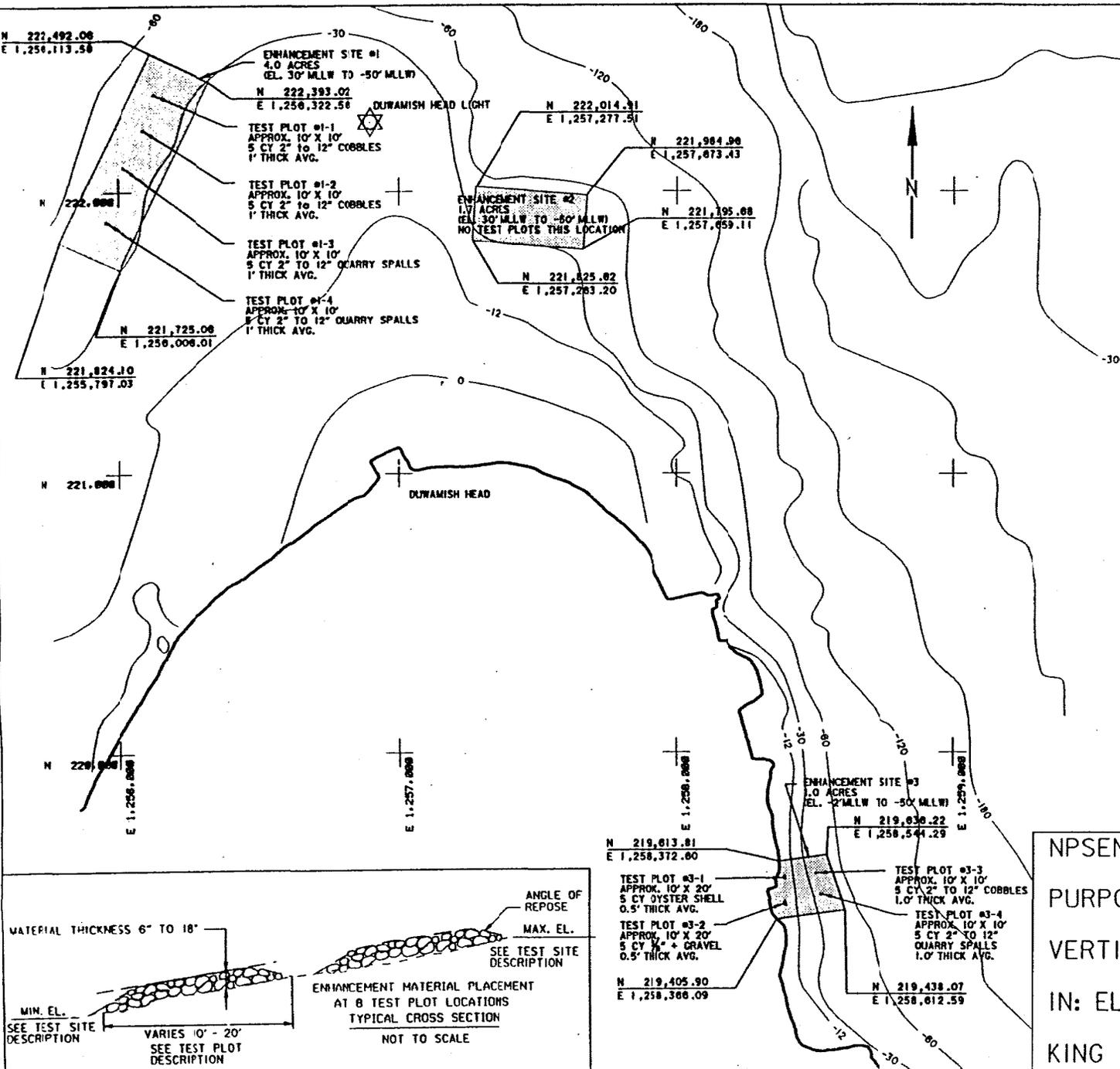
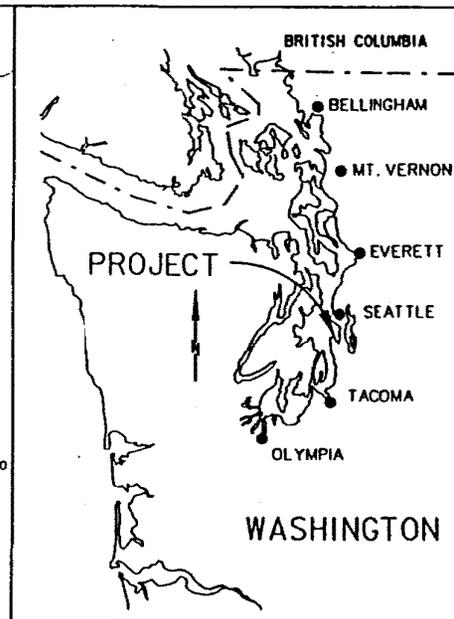
TO BE COMPLETED BY LOCAL OFFICIALS

A. Name of the existing shoreline. (Describe type of shoreline: wetland, marsh, stream, lake, lagoon, marsh, bog, swamp, etc.) and floodway, if any, or reach, such as accretion, erosion, high bank, low bank, or any material such as sand, gravel, etc., that may be present and extent and type of bank/bedline, if any.

B. In the event that any of the proposed buildings or structures will exceed a height of five feet above the average grade level, indicate the approximate location of and number of residential units, existing and potential, that will have an obstructed view.

C. If the application involves a conditional use or variance, set forth in full that portion of the master program which provides that the proposed use may be a conditional use, or, in the case of a variance, from which the variance is being sought.

*These Agencies are Equal Opportunity and Affirmative Action employers.
For special accommodation needs, please contact the appropriate agency from Appendix A.*

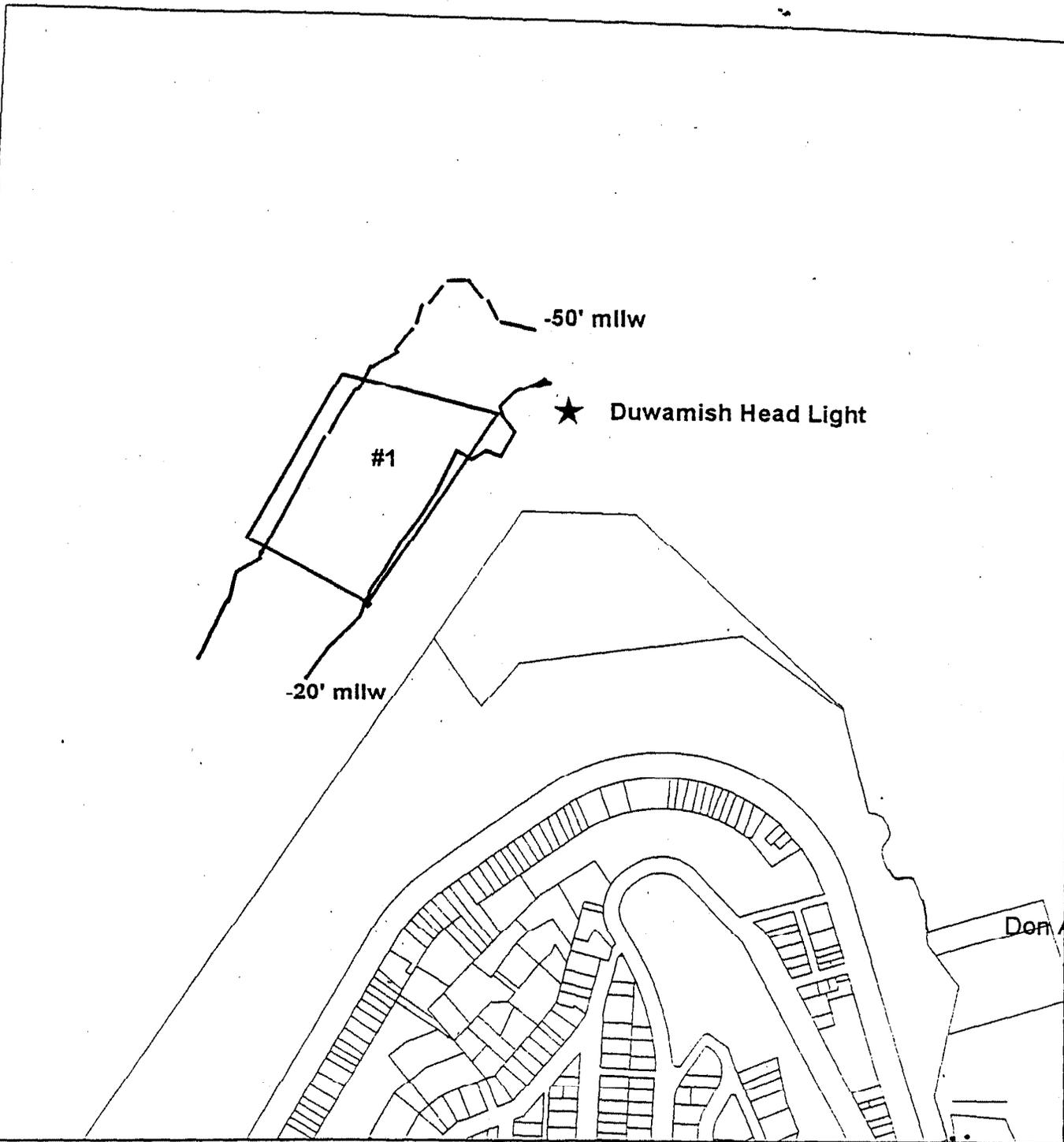


1" = 200'
300' 100' 0 200' 400'

HORIZONTAL CONTROL IS BASED ON NAD 83/91.

FIGURE 1.

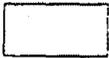
NPSEN-PL-X
PURPOSE: HABITAT ENHANCEMENT
VERTICAL DATUM: MLLW (NOS)
IN: ELLIOTT BAY
KING COUNTY, WA.



Duwamish Head Habitat

Site 1

Legend

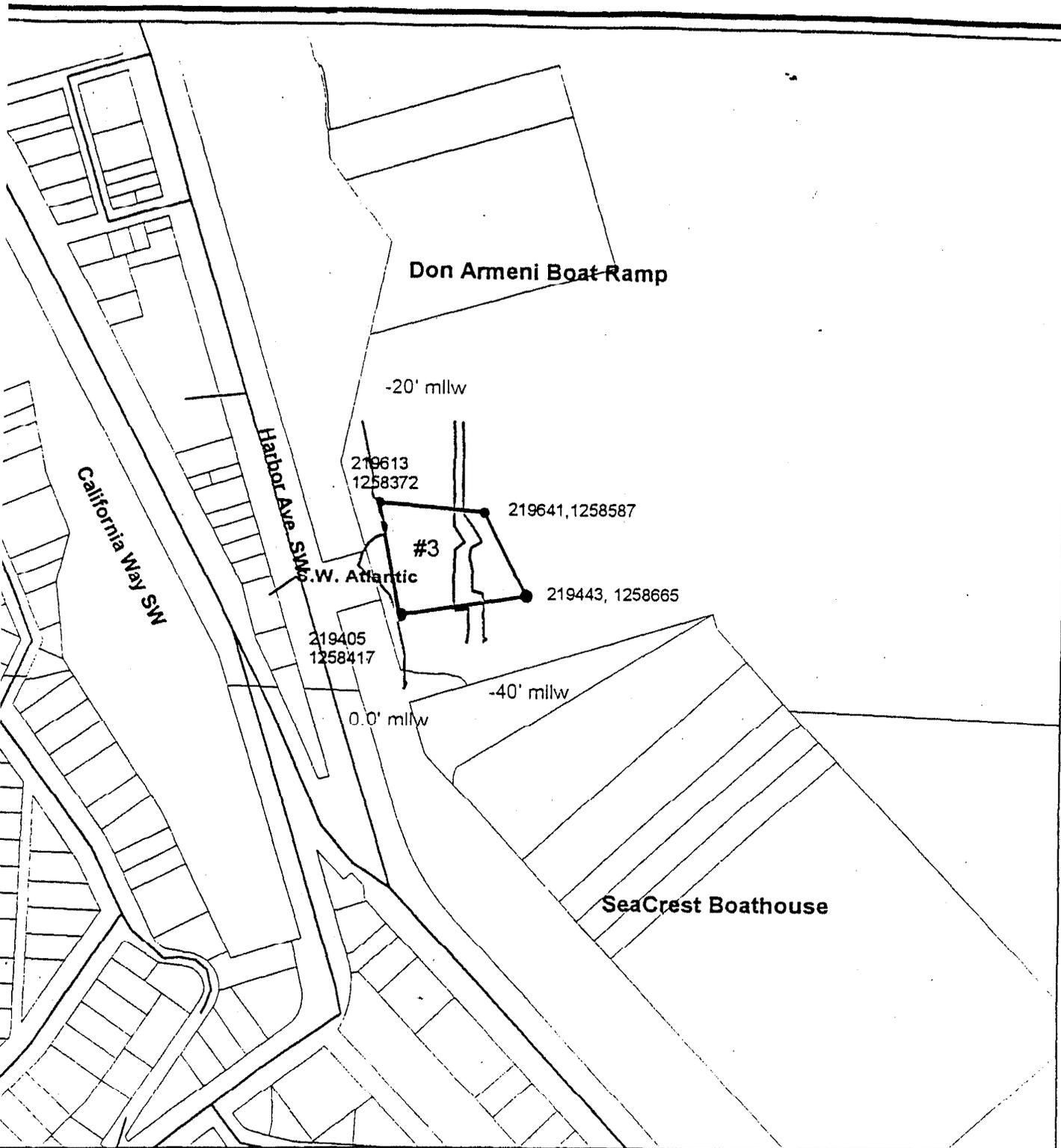
 Parcel.shp

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Scale: 0 80 160 240 320 400 Feet



January 8, 1998

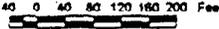


Habitat Site #3

Legend

 Parcel.shp
 Street.shp

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 January 8, 1996